

Draft Environmental Assessment

Critical Fuel Break Management and Dip Tank Project

Hawai`i Wildfire Management Organization

FEMA-1640-DR-HI, HMGP 1640-7

December 2013



FEMA

Federal Emergency Management Agency
U.S. Department of Homeland Security
1111 Broadway, Suite 1200
Oakland, CA 94607

This document was prepared by:



with contributions from CH2M HILL

Contract No.: HSFEHQ-09-D-1128

Task Order: HSFE60-12-J-0005

FEMA-1640-DR-HI

HMGP 1640-7

Cover Sheet
Draft Environmental Assessment
Critical Fuel Break Management and Dip Tank Project

Responsible Agencies: U.S. Department of Homeland Security, Federal Emergency Management Agency (FEMA)

Proposed Action: Provide funding under the Hazard Mitigation Grant Program (HMGP) to the Hawai'i Wildfire Management Organization (HWMO) to implement fuel break management and dip tank measures in West Hawai'i

For more information, contact:

FEMA Region IX
Environmental and Historic Preservation Office
1111 Broadway, Suite 1200
Oakland, California 94607
fema-rix-ehp-documents@fema.dhs.gov
(510) 627-7027

Report Designation: Draft Environmental Assessment (EA)

Abstract: FEMA has prepared this EA to assess the potential environmental effects that would result from awarding HGMP funding to HWMO to (1) implement fuel break management measures in two locations to reduce hazardous vegetative fuel for wildfires and (2) install three or five new dip tanks to provide water resources for aerial wildfire suppression activities. These proposed measures would be implemented to reduce wildfire hazards for several communities on the west side of Hawai'i Island.

The fuel break management measures would involve reducing hazardous vegetation in designated wildland-urban interface areas to mitigate the spread of wildfire toward the communities of Puako and Waikoloa. The dip tank measures would involve installation of three or five new dip tanks near Waikoloa, Kohala (Kahua), Waimea, and Pu`u Anahulu to provide readily available sources of water for use in wildfire suppression activities in these areas. Each measure would be implemented by HWMO in coordination and with ongoing maintenance performed by a local partner (generally the landowner or lessee). For each site, a Memorandum of Agreement (MOA) detailing the maintenance responsibility would be signed before work commences. In the event of a wildfire, the dip tanks would be used, as appropriate, by responders from the Hawai'i County Fire Department and the State of Hawai'i Department of Land and Natural Resources Division of Forestry and Wildlife (DOFAW) Fire Management Program.

Table of Contents

Table of Contents.....	iv
Acronyms and Abbreviations.....	vi
1.0 Introduction	1
1.1 Purpose and Need.....	1
2.0 Description of Proposed Action and Alternatives	4
2.1 Proposed Action.....	4
2.1.1 Fuel Break Management Measures.....	5
2.1.2 Dip Tanks.....	6
2.2 Justification for Proposed Action.....	8
2.3 Reduced Scope Alternative.....	8
2.4 No Action Alternative	9
3.0 Affected Environment and Environmental Consequences.....	24
3.1 Geology, Soils and Seismicity.....	24
3.1.1 Affected Environment.....	24
3.1.2 Environmental Consequences	26
3.2 Air Quality and Greenhouse Gas Emissions.....	27
3.2.1 Affected Environment.....	27
3.2.2 Environmental Consequences	28
3.3 Water Resources.....	29
3.3.1 Affected Environment.....	29
3.3.2 Environmental Consequences	31
3.4 Biological Resources	32
3.4.1 Existing Environment	32
3.4.2 Critical Habitat	34
3.4.3 Environmental Consequences	34
3.5 Historic Properties	37
3.5.1 Existing Environment.....	37
3.5.2 Environmental Consequences	38
3.6 Land Use.....	39
3.6.1 Existing Environment	39
3.6.2 Environmental Consequences	41
3.7 Hazardous Materials	41
3.7.1 Existing Environment	41
3.7.2 Potential Impacts and Mitigation	41
3.8 Noise	42
3.8.1 Affected Environment.....	42
3.8.2 Environmental Consequences	42
3.9 Public Services and Recreation	43
3.9.1 Affected Environment.....	43
3.9.2 Environmental Consequences	43
3.10 Transportation and Traffic.....	44
3.10.1 Affected Environment.....	44

3.10.2	Environmental Consequences	44
3.11	Visual Resources	45
3.11.1	Affected Environment.....	45
3.11.2	Environmental Consequences	45
3.12	Socioeconomics and Environmental Justice.....	47
3.12.1	Affected Environment.....	47
3.12.2	Environmental Consequences	49
3.13	Cumulative Impacts	49
3.14	Summary of Impacts and Mitigation	50
4.0	Public Participation and Agency Coordination.....	53
5.0	List of Preparers.....	55
6.0	References.....	56

List of Figures

Figure 1	Recorded Wildfire Events in West Hawai`i, 1957-2012.....	3
Figure 2	Location of Proposed Action.....	10
Figure 3	Waikoloa Fuel Break	11
Figure 4	Puako Fuel Break	12
Figure 5	Kuainiho Dip Tank.....	13
Figure 6	1859 Flow Dip Tank.....	14
Figure 7	Waikoloa Dip Tank.....	15
Figure 8	Ponoholo Dip Tank.....	16
Figure 9	Lalamilo Dip Tank.....	17
Figure 10	Photographs of Project Sites.....	18
Figure 11	Location of Reduced Scope Alternative.....	23
Figure 12	Proposed Critical Habitat (Unit 32).....	35

List of Tables

Table 1	Summary of Proposed Fuel Break Management and Dip Tank Measures	5
Table 2	Flood Zone Classifications.....	31
Table 3	Estimated Water Use	32
Table 4	State Land Use and County Zoning Designations	40
Table 5	Demographic and Socioeconomic Data for Hawai`i County and Select Census Tracts (2010).....	48
Table 6	Summary of Impacts and Avoidance and Minimization Measures	51

List of Appendices

A	Community Wildfire Protection Plan for Northwest Hawai`i Island
B	Biological Resources Survey Report
C	USFWS Correspondence
D	Archaeological Survey Reports
E	Section 106 Correspondence
F	Distribution List

Acronyms and Abbreviations

ACHP	Advisory Council on Historic Preservation
APE	area of potential effect
BMP	best management practice
CEQ	President's Council on Environmental Quality
CFR	Code of Federal Regulations
CH ₄	methane
CO	carbon monoxide
CO ₂	carbon dioxide
CWRM	Commission on Water Resource Management
CZM	Coastal Zone Management
CZMA	Coastal Zone Management Area
DLNR	State of Hawai'i Department of Land and Natural Resources
DOFAW	Division of Forestry and Wildlife
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FR	Federal Register
HRS	Hawai'i Revised Statutes
HWMO	Hawai'i Wildfire Management Organization
HDOH	State of Hawaii Department of Health
HAAQS	Hawai'i ambient air quality standards
HMGP	Hazard Mitigation Grant Program
IPBC	Infantry Platoon Battle Course
mgd	million gallons per day
MOA	Memorandum of Agreement
MLRA	Major Land Resource Areas
N ₂ O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969
NFIP	National Flood Insurance Program
NHD	National Hydrography Dataset
NHO	Native Hawaiian Organization

NHPA	National Historic Preservation Act
NO2	nitrogen dioxide
NOI	Notice of Intent
NRCS	Natural Resources Conservation Service
NWI	National Wetlands Inventory
OEQC	Office of Environmental Quality Control
PEIS	Programmatic Environmental Impact Statement
PM	particulate matter
PTA	Pōhakuloa Training Area
SCD	State of Hawai'i State Civil Defense
SHPO	State Historic Preservation Officer
SMA	Special Management Area
SO2	sulfur dioxide
UBC	Uniform Building Code
USACE	U.S. Army Corps of Engineers
U.S.C.	United States Code
USDA	U.S. Department of Agriculture
USEPA	U.S. Environmental Protection Agency
USFW	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
WDFI	Waikoloa Dryland Forest Initiative

1.0 Introduction

The Hawai'i Wildfire Management Organization (HWMO) has applied, through the State of Hawai'i State Civil Defense (SCD), to the U.S. Department of Homeland Security's Federal Emergency Management Agency (FEMA) for funding under the Hazard Mitigation Grant Program (HMGP) to (1) implement fuel break management measures in two locations to reduce hazardous vegetative fuel for wildfires and (2) install five new dip tanks to provide water resources for aerial wildfire suppression activities.¹ These proposed measures would be implemented to reduce wildfire hazards for several communities on the west side of Hawai'i Island and are collectively referred to as the Proposed Action for the purposes of this Environmental Assessment (EA). During the preparation of this EA, HWMO considered reducing the scope of the HMGP application to eliminate two of the five dip tanks; this proposal is referred to as the Reduced Scope Alternative in the EA.

Pursuant to the requirements of the National Environmental Policy Act of 1969 (NEPA), the President's Council on Environmental Quality (CEQ) regulations for implementing NEPA (Title 40 of the *Code of Federal Regulations* [CFR] Parts 1500-1508), and FEMA's implementing regulations (44 CFR Part 10), FEMA is required to consider the potential impacts before funding or approving an action. The purpose of this EA is to evaluate the potential impacts of the proposed project and its alternatives, and to make that information available to the public as part of the federal decision-making process. If the impacts associated with an alternative are found to not be significant, FEMA would issue a Finding of No Significant Impact (FONSI) and proceed with the funding process for that alternative. If the impacts are found to be significant based on criteria established in 40 CFR § 1508.27, a Notice of Intent (NOI) would be published and an Environmental Impact Statement (EIS) would be prepared before implementation of the alternative with significant impacts.

1.1 Purpose and Need

Under the authority of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (42 United States Code [U.S.C.] 5121 et seq.) and 44 CFR, FEMA provides HGMP grants to state and local governments to implement long-term hazard mitigation measures after a major disaster declaration. The purpose of the action is to provide HMGP funding to HWMO to reduce wildfire hazards and improve wildfire suppression capabilities in several communities on the west side of Hawai'i Island.

Wildfire is an extreme hazard in West Hawai'i, which includes some of the most fire prone areas in the state. Over a 5-year period (2000-2005), approximately 30 wildfires have occurred in this area. Many of the wildfires in this area have encompassed significant land area, including a wildfire in 1969 that burned approximately 45,000 acres, and a wildfire in 2005 that burned approximately 25,000 acres (from Waimea to Waikoloa) (HWMO, 2007). Figure 1 depicts the history of wildfire in this area over a 55-year period (1957-2012). These wildfires are a threat to human life and property, as well as some of the state's remaining intact dryland forest habitat. Historically one of the most diverse ecosystems in Hawai'i, native dryland forest habitat is now highly imperiled, with only an estimated 10 percent of the original habitat still intact; a large number of Hawai'i's endangered species occur within this remaining habitat (Cordell, 2008; Bruegmann, 1996). *Hawaii's Comprehensive Wildlife Conservation Strategy* (Department of Land and Natural Resources [DLNR], 2005), which reviews the status of the state's native species and presents strategies for the long-term conservation of these species and their habitats, identifies wildfire as a key threat to these resources. Unlike many continental ecosystems, Hawaiian

¹ The funding for the Proposed Action would be provided under the disaster relief fund FEMA-1640-DR-HI.

plants and animals are not adapted to periodic fire. However, invasive fire-adapted species provide an easily combustible fuel source, which combined with human activities, has led to an increase in wildfires in Hawai'i, particularly on the dry leeward side of the islands. In addition to destroying native habitat, these fires provide an opportunity for further invasion of fire-adapted species, thus increasing the fuel load and continuing the wildfire cycle. Conservation objectives included in *Hawaii's Comprehensive Wildlife Conservation Strategy* specifically identify fire threat mitigation as a high priority; the objectives also include establishment of partnerships with private landowners, non-traditional partners, and community groups to facilitate implementation of conservation actions.

The communities of Puako, Waikoloa, and Kohala (Kahua), in particular, have been identified as areas subject to ongoing wildfire-related threats. Puako is surrounded by a dense forest comprised of *kiawe* (*Prosopis pallida*) and buffel grass (*Cenchrus ciliaris*); this vegetation is highly flammable, supporting extremely high temperatures, long flame lengths, and rapid rates of wildfire spread. Similarly, Waikoloa is surrounded by hazardous fuels, including fountain grass (*Cenchrus setaceus*) and *haole koa* (*Leucaena leucocephala*). These vegetative fuels, combined with frequent high winds and sloping terrain, increase the community's vulnerability to wildfire. Similar threats exist in Kohala (Kahua), where large housing developments are located adjacent to wildland areas with hazardous fuel loads, including kiawe and buffel grass. In addition to the residential and commercial developments in these communities, the islands' remaining dryland forests, including those near Waikoloa and Pu'u Anahulu also remain highly vulnerable to wildfire. Actions to protect these areas from wildfire-related hazards have been identified as a high priority in the *Community Wildfire Protection Plan for Northwest Hawaii Island*, which was adopted by Hawai'i County and signed by representatives from Hawai'i County Civil Defense and the State of Hawai'i DLNR Division of Forestry and Wildlife (DOFAW). Therefore, action is needed to reduce the risk of wildfire in West Hawai'i.

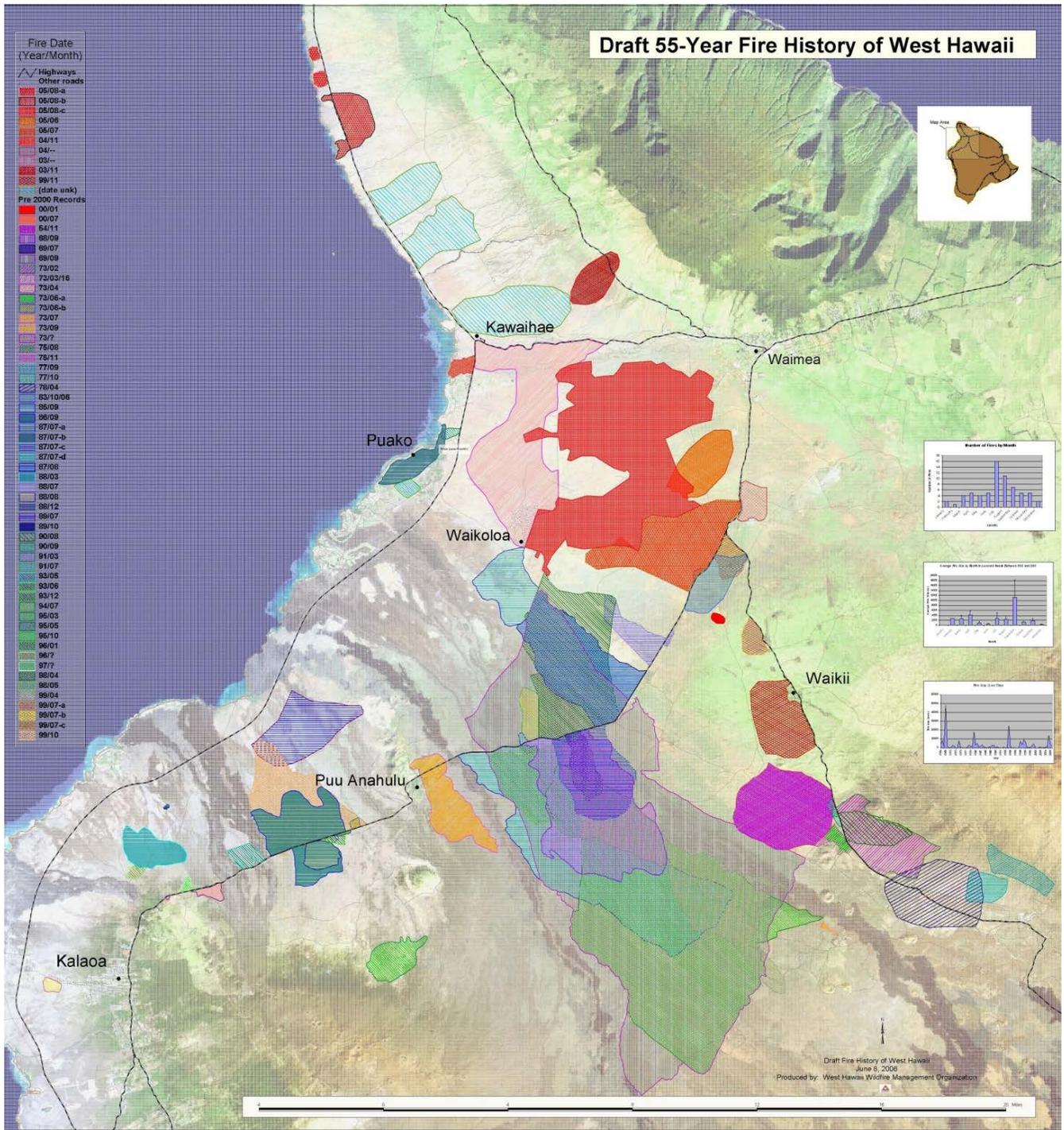


Figure 1 Recorded Wildfire Events in West Hawai'i, 1957-2012

(Source: Hawai'i Wildfire Management Organization)

2.0 Description of Proposed Action and Alternatives

HWMO is proposing to use FEMA HMGP funding to reduce wildfire hazards and improve wildfire suppression capabilities in several communities on the west side of Hawai'i Island. The priorities and proposed measures to reduce wildfire hazards and improve wildfire suppression capabilities were developed by the HWMO with input from federal, state, and private stakeholders as documented in the *Community Wildfire Protection Plan for Northwest Hawaii Island* (HWMO, 2007); a copy of this plan is included as Appendix A. The proposed measures and locations for implementing those measures were developed based on historic wildfire patterns, location of hazardous fuel loads, and current availability of wildfire suppression resources. Because the measures included in the Proposed Action were developed through a collaborative effort among the various stakeholders, they are considered to be an effective and efficient approach to addressing wildfire-related hazards in West Hawai'i. Nonetheless, HWMO considered reducing the scope of the HMGP application to avoid additional costs and delays associated with mitigation for potential historic properties at two sites. Thus the Reduced Scope Alternative was created. As such, the analysis in this EA is limited to the environmental consequences of the Proposed Action, the Reduced Scope Alternative, and the No Action alternative.

2.1 Proposed Action

As part of the Proposed Action, FEMA would provide grant funding to HWMO to implement fuel break management and to add dip tanks in the areas around several communities in West Hawai'i. The fuel break management measures would involve reducing hazardous vegetation in designated wildland-urban interface areas to mitigate the spread of wildfire toward the communities of Puako and Waikoloa. The dip tank measures would involve installation of five new dip tanks near Waikoloa, Kohala (Kahua), Waimea, and Pu'u Anahulu to provide readily available sources of water for use in wildfire suppression activities in these areas. Each measure would be implemented by HWMO in coordination and with ongoing maintenance performed by a local partner (generally the landowner or lessee). For each site, a Memorandum of Agreement (MOA) detailing the maintenance responsibility would be signed before work commences. In the event of a wildfire, the dip tanks would be used, as appropriate, by responders from the Hawai'i County Fire Department and the DOFAW Fire Management Program.

The fuel break management and dip tank measures (including the respective landowners and local partners) are summarized in Table 1, with additional detail provided in the following sections. The general location of each measure is depicted in Figure 2, with a more detailed view of each site provided in Figure 3 through Figure 9. In addition, photographs of the sites are provided in Figure 10.

Table 1
Summary of Proposed Fuel Break Management and Dip Tank Measures

Project Site	Proposed Activity	Tax Map Key (TMK)	Landowner	Local Partner
Waikoloa Fuel Break	Trim existing vegetation with weed-whackers and/or hand tools within 0.5-mile-long fuel break (approximately 30 feet wide), with new fuel break tying into existing fuel break around apartment complex on Pua Melia Street; maintain trimmed vegetation within both new and existing fuel break.	368003030, 368003037, 368003029, 368003028, 368002016, 368002051	Waikoloa Village Association	Waikoloa Village Association
Puako Fuel Break	Clear vegetation, grade, and place mulch in western half of existing 2-mile-long fuel break (approximately 100 feet wide); work has already been completed by others within eastern half of fuel break; maintain cleared vegetation within entire fuel break.	369001017, 369001015, 369002027, 369002023	State of Hawai'i	Puako Community Association
Kuainiho Dip Tank	Install 12-foot diameter dip tank within existing staging area used for wildfire suppression activities; tank to be filled with water delivered via water truck.	371004001	State of Hawai'i	DOFAW
1859 Flow Dip Tank	Clear and grade area (approximately 20 feet by 20 feet) along existing access road; install 12-foot-diameter dip tank; install 1- to 2-inch-diameter aboveground pipeline within existing access road to deliver water to tank from nearby cattle trough.	371004018	State of Hawai'i (leased by private rancher)	DOFAW (in coordination with private rancher)
Waikoloa Dip Tank	Clear and grade area (approximately 20 feet by 20 feet) along existing access road; install 12-foot-diameter dip tank; tank to be filled using existing water line.	368002015	Waikoloa Village Association	Waikoloa Dryland Forest Initiative
Ponoholo Dip Tank	Clear and grade area (approximately 20 feet by 20 feet); smooth grade along approximately 500-foot-long dirt access road; install 12-foot-diameter dip tank; install 1- to 2-inch-diameter pipeline in shallow trench to deliver water to tank from existing water line.	359003004	Private landowner	Ponoholo Ranch
Lalamilo Dip Tank	Grade area (approximately 20 feet by 20 feet); smooth grade along 0.5-mile-long dirt access road; install 12-foot-diameter dip tank; install 1- to 2-inch-diameter aboveground pipeline to deliver water to tank from adjacent property.	366001002	State of Hawai'i (leased by private rancher)	Private rancher

2.1.1 Fuel Break Management Measures

Fuel break management measures would be implemented to reduce hazardous vegetation within designated wildland-urban interface areas surrounding Puako and Waikoloa. Vegetation that would be removed is primarily comprised of invasive, non-native grasses (e.g., fountain grass and buffel grass) and woody shrubs (e.g., *kiawe* and *haole koa*); these types of vegetation are highly flammable and can result in rapid rates of wildfire spread. In addition to decreasing hazardous fuel loads, the fuel breaks would create defensible space to help stop or slow the spread of wildfire toward the adjacent communities. The specific measures proposed for each of the fuel breaks are described below.

- Waikoloa Fuel Break:** This measure would be located along the *mauka* (toward the mountains) side of Pua Melia Street on the southern edge of Waikoloa, on land owned by the Waikoloa Village Association. In total, the fuel break would be approximately 0.5 mile long and 30 feet wide (spanning from the intersection with Waikoloa Road to an apartment complex on Pua Melia Street) and would tie-in with an existing fuel break that is maintained around the perimeter of the apartment complex (see Figure 3).

The fuel break site is primarily vegetated with fountain grass and haole koa. Fuel break management activities would involve trimming existing herbaceous vegetation with hand-held mechanical equipment and woody vegetation with hand tools. Trimmed materials would be chipped and spread onsite; hazardous fuels (e.g., haole koa) would be disposed of at an offsite, permitted location. The existing vegetation within the fuel break is already relatively sparse due to a recent wildfire, therefore extensive vegetation trimming would not initially be required. To minimize erosion associated with soils that were exposed by this wildfire, herbaceous vegetation would be allowed to grow back, but would be trimmed to a minimal height above the ground surface. Dead fuel load (e.g., branches on the ground) would also be removed from the site. No heavy equipment (e.g., bulldozers) or herbicide would be used, and the ground surface would not be disturbed.

Initial vegetation clearing activities would be conducted by HWMO staff in coordination with Waikoloa Village Association staff; future efforts to maintain the fuel break would be conducted by Waikoloa Village Association staff. Follow-up vegetation trimming is expected to be required approximately once per year to maintain the fuel break.

- **Puako Fuel Break:** This measure would be performed within an existing fuel break established by the Hawai'i County Fire Department as part of an emergency response to a 2007 wildfire. The existing fuel break is approximately 2 miles long by 100 feet wide and is located along the *mauka* side of Puako Beach Road on land owned by the State of Hawai'i. As depicted in Figure 4, the eastern-most portion of the fuel break is located directly adjacent to Puako Beach Road; the remainder of the fuel break is located along a fire access road behind houses on Puako Beach Road.

Fuel break management activities have already been conducted by the Puako Community Association within the eastern portion of the fuel break; this work involved clearing new vegetation growth, grading the fuel break to provide a relatively level surface, and adding approximately 18 inches of mulch (to minimize erosion and dust, and to suppress future vegetation growth). The Puako Community Association coordinated with the various landowners and acquired the necessary permits to complete the work.

As part of the Proposed Action, similar fuel break management activities would be conducted within the western portion of the fuel break; a small bulldozer would be used to complete the work. Maintenance would be conducted along the entire length of the fuel break on an as-needed basis; maintenance activities are expected to involve the use of hand-held mechanical equipment to remove future vegetation growth. All fuel break management activities would be conducted by the Puako Community Association.

2.1.2 Dip Tanks

Dip tanks would be installed to provide immediate access to water for helicopters deployed to suppress wildfire around the Pu'u Anahulu, Waikoloa, Kohala (Kahua) and Waimea communities. Most of the wildfires in these areas must be treated from the air due to the uneven terrain, as well as the potential presence of unexploded ordnance remaining from past military training exercises. Reducing the travel time between bucket drops for helicopters greatly improves wildfire suppression, decreasing the likelihood that a wildfire will accelerate, and thus reducing the risk of catastrophic wildfire events in these areas.

Dip tanks are proposed to be installed in five strategic locations, as further described below. Each dip tank would be 12 feet in diameter and 8 feet in height, with a total capacity of 6,700 gallons. In each location, a 6-inch-thick, ring-shaped foundation would be installed to support the perimeter of tank; the

foundation would extend approximately 6 inches beyond edge of tank. The dip tank would be prefabricated and delivered to the respective sites, where it would be secured to the foundation. Following installation, testing would be conducted in coordination with the Hawai'i County Fire Department and DOFAW; testing would involve a single helicopter dip to ensure the tank is securely installed. In the event of a wildfire, the dip tanks would be used, as appropriate, by responders from the Hawai'i County Fire Department and the DOFAW Fire Management Program.

- **Kuainiho Dip Tank:** Would be located on land that is actively managed by DOFAW for wildfire control purposes. The dip tank would be installed within an existing staging area used for wildfire suppression activities, located directly adjacent to Māmalahoa Highway as depicted in Figure 5. Minimal grading would be required to ensure that the base is adequately level before installation of the tank. The dip tank would be covered to minimize evaporation; if necessary, a helicopter could land within the existing staging area to allow responders to uncover the tank. DOFAW would be responsible for filling the dip tank, then subsequently checking and maintaining water levels; water would be provided via a water truck.
- **1859 Flow Dip Tank:** Would be located on land within the State of Hawai'i's Pu'u Anahulu Game Management Area. The dip tank would be installed within a vegetated area, located directly adjacent to a dirt access road, approximately 850 feet *mauka* of Mamalahoa Highway as depicted in Figure 6. A small area (approximately 20 feet by 20 feet) would be cleared and graded using a bulldozer to provide a level surface for installation of the tank. The adjacent area is actively grazed by a local rancher; this operation includes a cattle trough filled with water from Pu'u Wa'awa'a well. An aboveground pipeline (1 to 2 inches in diameter) would be used to deliver water from the trough to the dip tank; the rancher would be responsible for monitoring and maintaining water levels in the tank. The dip tank would be covered to minimize evaporation; if necessary, a helicopter could land on the existing access road to allow the responders to uncover the tank.
- **Waikoloa Dip Tank:** Would be located within the Waikoloa Dryland Forest Initiative (WDFI) site, on lands owned by Waikoloa Village Association (see Figure 7). WDFI is a managed site that provides habitat for approximately 13 *uhiuhi* trees and 80 *wiliwili* trees. *Uhiuhi* (*Mezoneuron kavaiense*) is federally listed as an endangered species, and *wiliwili* (*Erythrina sandwicensis*) is considered rare; both species are highly vulnerable to wildfire. The dip tank would be located in a rocky, unvegetated area located directly adjacent to an existing access road. A bulldozer would be used to crush the rock substrate and establish a level surface for the tank (approximately 20 foot by 20 foot area). An existing water line used to provide irrigation to the WDFI site would be used to fill the dip tank; WDFI staff would be responsible for monitoring and maintaining water levels in the tank. The dip tank would be covered to minimize evaporation; if necessary, a helicopter could land on the existing access road to allow the responders to uncover the tank.
- **Ponoholo Dip Tank:** Would be installed on privately-owned land that is currently used for cattle grazing (Ponoholo Ranch), located near the northern edge of the Kohala Ranch housing development (see Figure 8). Access to the dip tank site would be provided via Kohala Ranch. From the edge of the Kohala Ranch development, a dirt access road extends toward the dip tank site. A bulldozer would be used to smooth the grade along the access road (approximately 500 feet long). The dip tank site is sparsely vegetated with kiawe and buffel grass. A bulldozer would be used to clear and level a small area for the dip tank (approximately 20 feet by 20 feet). An existing water line is located on the ranch lands, approximately one mile *mauka* of the proposed dip tank location; a small pipeline would be installed in a shallow trench to deliver water from the water line to the dip tank. The rancher would be responsible for monitoring and maintaining

water levels in the dip tank. The dip tank would be uncovered, so no helicopter landing areas would be required.

- **Lalamilo Dip Tank:** Would be located on state-owned land that is actively grazed as part of a private ranching operation (see Figure 9). Access to the dip tank site would be via a dirt access road; a minimal amount of grading may be required to smooth the grade along portions of the road. In addition, a minimal amount of grading would be required to level the dip tank site. Both state and county (non-potable) water is available on adjacent properties. One of these water sources would be tapped and water would be delivered via a new pipeline to the dip tank site; approximately one mile of aboveground pipeline would be installed. The rancher would be responsible for monitoring and maintaining water levels in the dip tank. The dip tank would be uncovered, so no helicopter landing areas would be required.

2.2 Justification for Proposed Action

The measures included in the Proposed Action were identified based on the priority actions presented in the *Community Wildfire Protection Plan for Northwest Hawaii Island* (HWMO, 2007), which was developed by the HWMO with input from federal, state, and private stakeholders. Because the *Community Wildfire Protection Plan for Northwest Hawaii Island* has been vetted by the public and subject matter experts that are actively involved in fire prevention and fire-fighting activities, alternative measures beyond those described in the plan were not originally considered. A copy of the *Community Wildfire Protection Plan for Northwest Hawaii Island* is included in Appendix A.

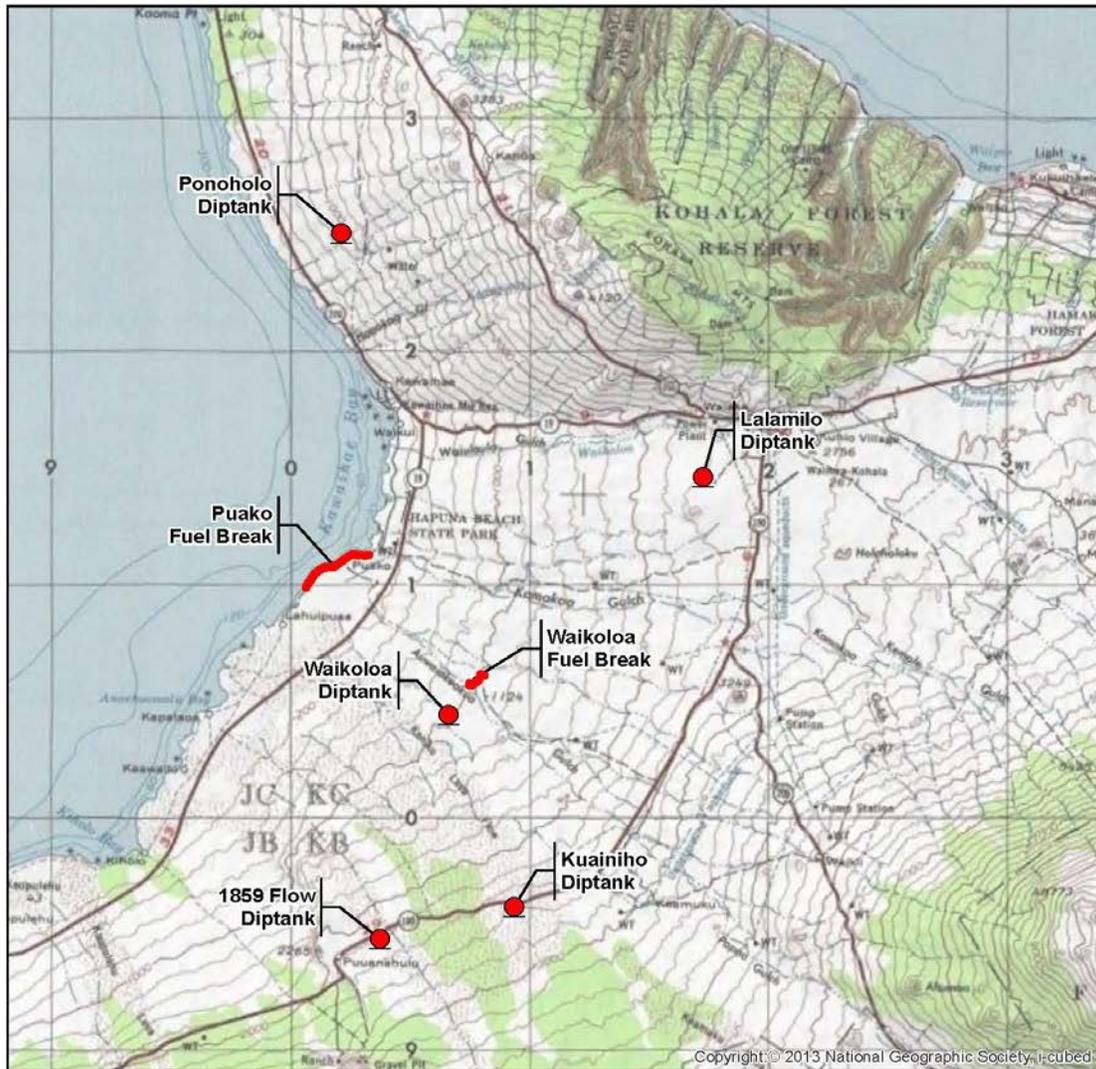
As previously noted, the measures described in the *Community Wildfire Protection Plan for Northwest Hawaii Island* were developed based on historic wildfire patterns, location of hazardous fuel loads, and current availability of wildfire suppression resources. They were generally sited in areas that are controlled by HWMO's local partners, accessible by emergency response teams and proximate to available water sources. The specific location for each measure was determined through a micrositing process, based on factors including implementation safety and environmental impacts. In particular, this process was used to identify locations where prevailing wind direction and topography would maximize safe helicopter flight patterns and landing locations. In addition, field observations of biological and cultural resources, as well as views from surrounding areas, were considered so as to avoid and minimize environmental impacts to the extent possible.

2.3 Reduced Scope Alternative

As further discussed in Section 3.5, an archaeological inventory assessment was conducted within each of the project sites, and the results indicated the presence of archaeological resources at the Ponohele and Lalamilo dip tank sites. Given the perceptions that these archaeological resources may be historically significant under various criteria, unidentified archaeological resources are likely to be discovered, archaeological resources may be adversely affected, and impacts to archaeological resources would need to be mitigated, HWMO considered a reduced scope in order to avoid increased costs and further delays associated with protracted consultation, report preparation, archaeological monitoring, and other mitigation activities. The reduced scope alternative is commensurate with the Proposed Action (as described in Section 2.1 and shown in Figures 3 through 7), except that it would not include implementation of the Ponohele or Lalamilo dip tank measures. Figure 11 shows the fuel break management and dip tank measures included in the Reduced Scope Alternative.

2.4 No Action Alternative

The No Action alternative is defined as not performing the Proposed Action or Reduced Scope Alternative. The No Action alternative provides a benchmark against which the Proposed Action and Reduced Scope Alternative can be evaluated. In the case of the Proposed Action and Reduced Scope Alternative, the No Action alternative assumes that HWMO would be unable to implement the Proposed Action or Reduced Scope Alternative for lack of federal assistance and the existing wildfire hazards would not be mitigated. If the fuel break management measures are not implemented, more fuel would be available and wildfires would be more likely to impact the communities of West Hawai`i. Without the five dip tanks, helicopters would need to travel farther to obtain water, which would reduce wildfire suppression capabilities and increase the risk of wildfire acceleration in these areas. The No Action alternative is in conflict with FEMA's mission and the purpose of the HMGP, which is to implement long-term hazard mitigation measures to reduce losses and protect life and property from natural disasters.



LEGEND
 ● Dip Tank
 — Fuel Break

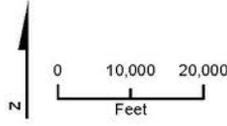
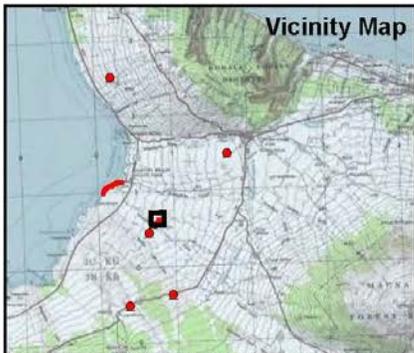


FIGURE 2
 Location of Proposed Action
 FEMA HMGP Diptank and
 Fuel Break Project, Hawaii

CH2MHILL.

C:\PROJECTS\ICDM_FEMA_HIIMXD\FIGURE_02_PROJECTLOCATION.MXD HPERRY 11/26/2013 9:36:57 AM

Figure 2 Location of Proposed Action



LEGEND
 — Fuel Break

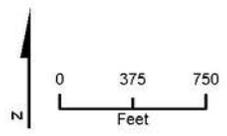
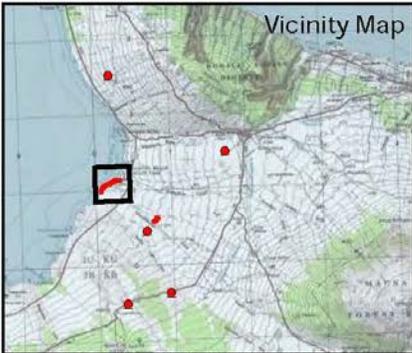


FIGURE 3
 Waikoloa Fuel Break
 FEMA HMGP Driptank and
 Fuel Break Project, Hawaii



W:\WORK\FILE\PROJECTS\FEMA_HRM\XO\FIGURE_03_WAIKOLOA_FUEL_BREAK.MXD HPERRY 12/4/2012 1:46:45 PM

Figure 3 Waikoloa Fuel Break



LEGEND
 — Fuel Break (Eastern Portion)
 — Fuel Break (Western Portion)

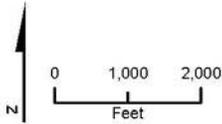
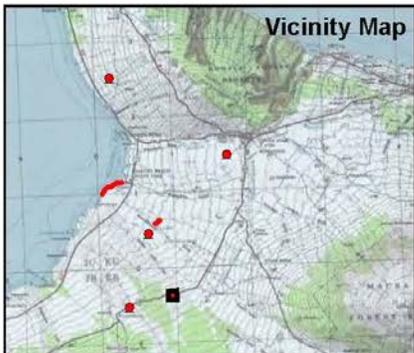
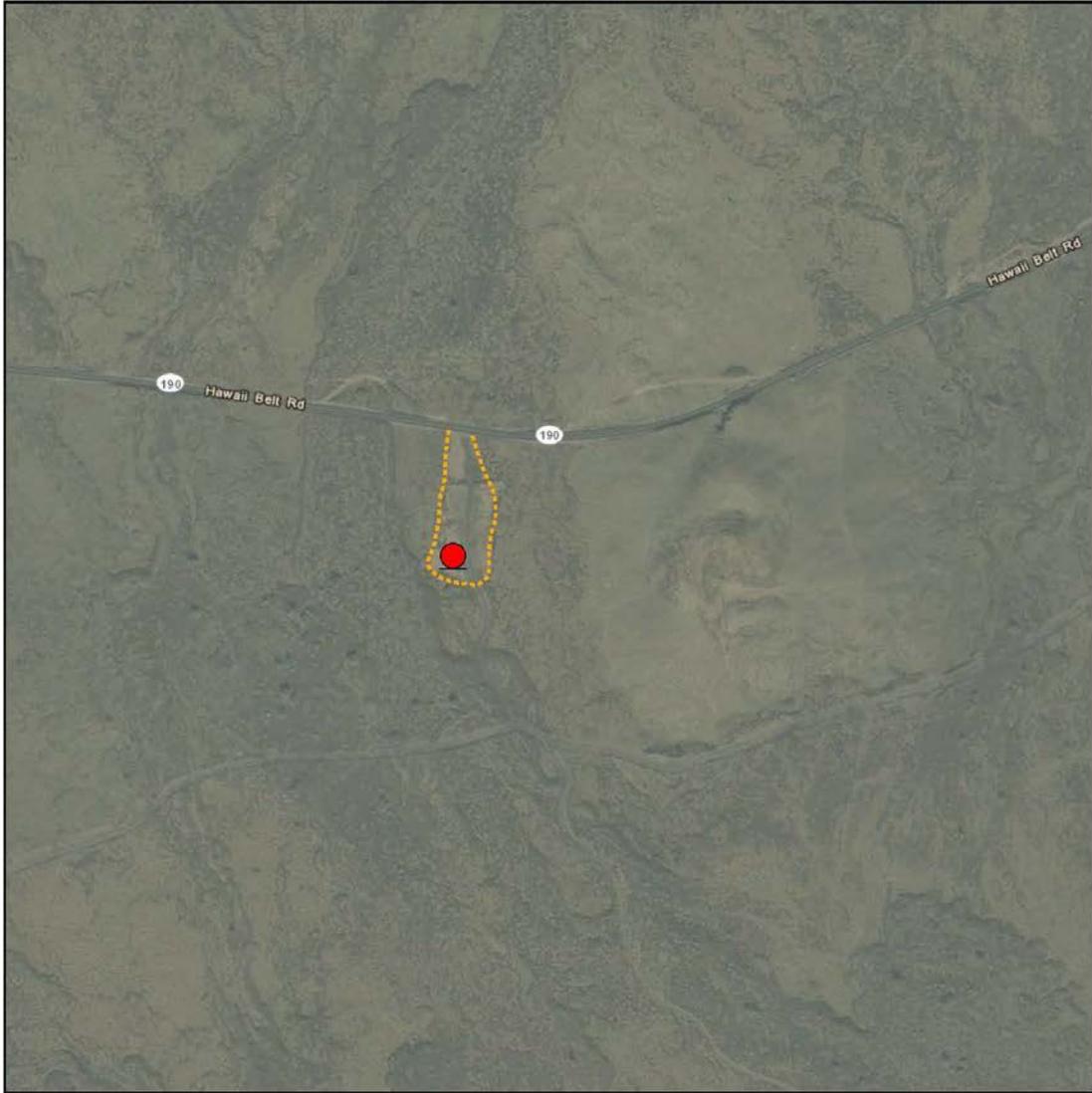


FIGURE 4
 Puako Fuel Break
 FEMA HMGP Diptank and
 Fuel Break Project, Hawaii

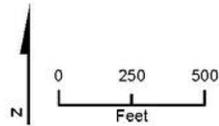
CH2MHILL

Figure 4 Puako Fuel Break



LEGEND

- Dip Tank
- Existing Staging Area



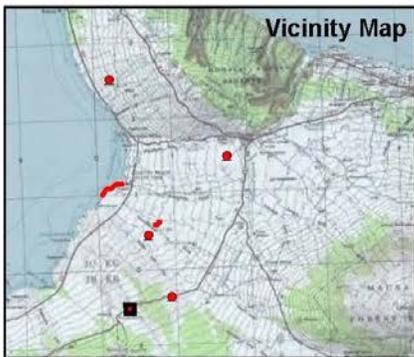
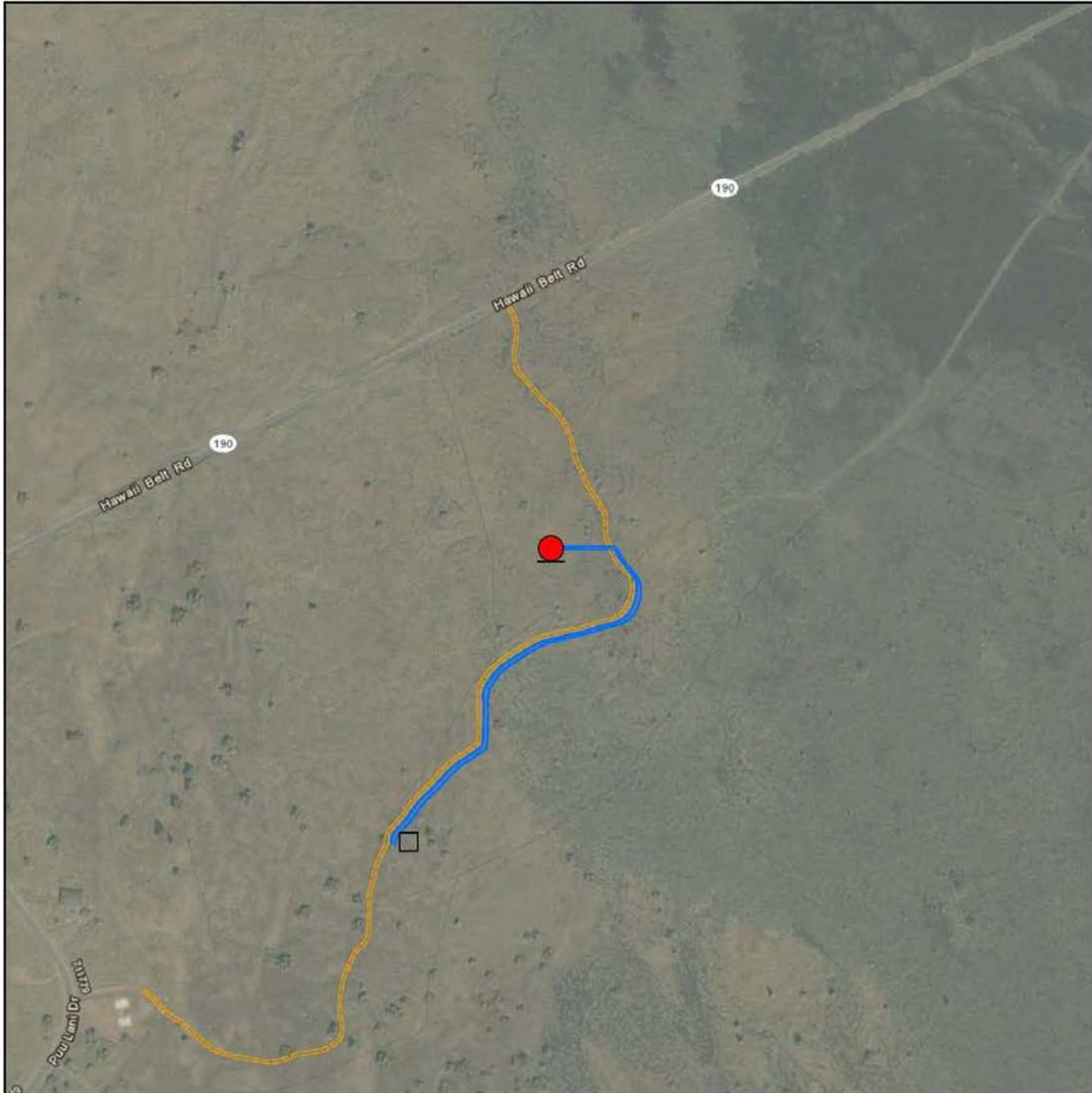
Note:
Water to fill the dip tank will be delivered via a water truck; therefore, a new pipeline will not be installed at the site.

FIGURE 5
Kuainiho Dip Tank
FEMA HMGP Diptank and Fuel Break Project, Hawaii

CH2MHILL.

\\HORIHELIPROJ\CDM_FEMA_HIMXD\FIGURE_05_KUAINIHODIPTANK.MXD HPERRY 5/24/2013 9:30:46 AM

Figure 5 Kuainiho Dip Tank



LEGEND

- Dip Tank
- Existing Access Road
- Existing Water Source for Filling Dip Tank
- Corridor for Pipeline (along existing access road)
(1-2" Diameter HDPE)

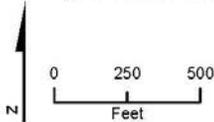
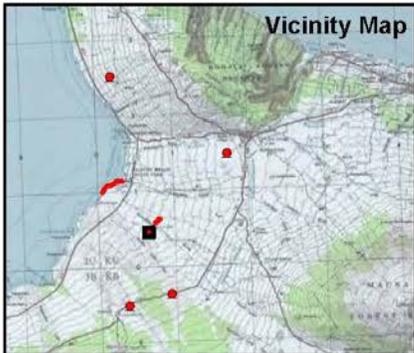
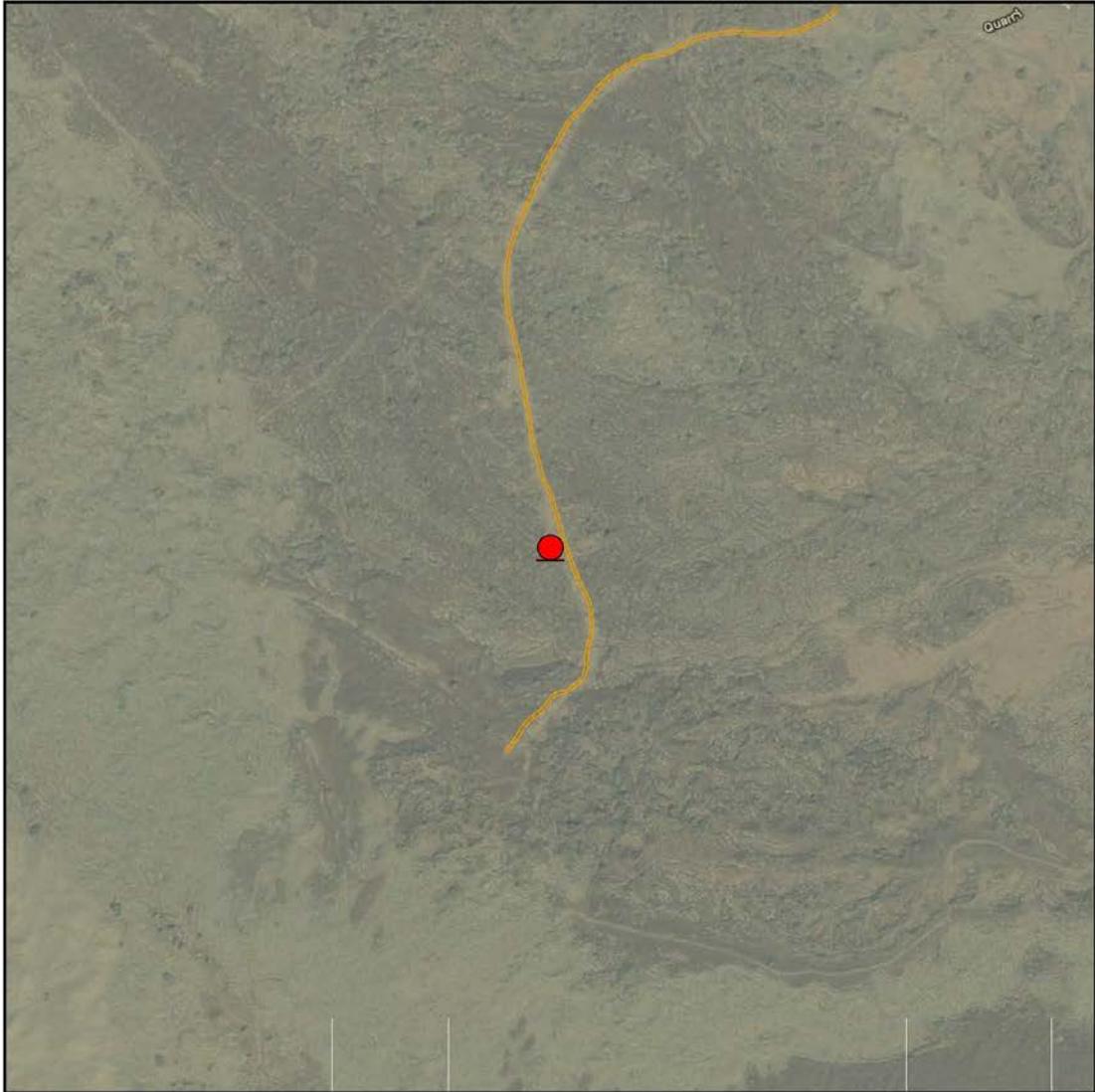


FIGURE 6
1859 Flow Dip Tank
FEMA HMGP Diptank and
Fuel Break Project, Hawaii

CH2MHILL.

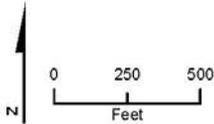
W:\HORHEL\PROJ\CDM_FEMA_HIM\XD\FIGURE_06_1859FLOWDIPTANK.MXD HPERRY 5/24/2013 9:46:28 AM

Figure 6 1859 Flow Dip Tank



LEGEND

- Dip Tank
- Existing Access Road



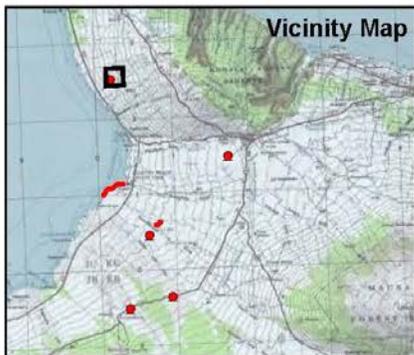
Note:
Water to fill the dip tank will be delivered via an existing water line; therefore, a new pipeline will not be installed at the site.

FIGURE 7
Waikoloa Dip Tank
FEMA HMGP Diptank and
Fuel Break Project, Hawaii

CH2MHILL.

\\THORHELIPROJ\CDM_FEMA_HIMXD\FIGURE_07_WAIKOLOADIPTANK.MXD HPERRY 5/24/2013 11:00:36 AM

Figure 7 Waikoloa Dip Tank



LEGEND

- Dip Tank
- Existing Access Road
- Existing Water Source for Filling Dip Tank
- Corridor for Pipeline (1-2" Diameter HDPE)

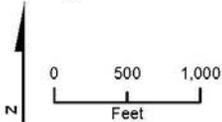
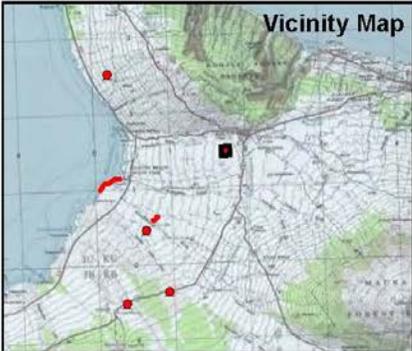


FIGURE 8
 Ponooho Dip Tank
 FEMA HMGP Diptank and
 Fuel Break Project, Hawaii

CH2MHILL

W:\HOR\HELIPROJ\FEMA_HIM\XD\FIGURE_08_PONOHOLODIPTANK.MXD HPERRY 1/7/2013 1:19:50 PM

Figure 8 Ponooho Dip Tank



- LEGEND**
- Dip Tank
 - Existing Access Road
 - Corridor for Pipeline (1-2" Diameter HDPE)

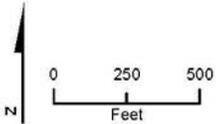


FIGURE 9
 Lalamilo Dip Tank
 FEMA HMGP Diptank and
 Fuel Break Project, Hawaii

CH2MHILL.

W:\HORHEL\PROJ\FEMA_HI\MXD\FIGURE_09_LALAMILODIPTANK.MXD HPERRY 1/31/2013 2:05:35 PM

Figure 9 Lalamilo Dip Tank



A. Looking northeast along Pua Melia Street at proposed Waikoloa fuel break site (extending in from edge of sidewalk)



B. Looking southwest along Pua Melia Street at proposed Waikoloa fuel break site (fuel break extends to the apartment complex in background).

Figure 10
Photographs of Project Sites
Hawaii Fuel Break and Dip Tank Project

CH2MHILL

Figure 10 Photographs of Project Sites



C. Looking west at portion of existing Puako fuel break site that has already been cleared and mulched (note equipment that is being used to complete work in foreground)



D. Looking east at portion of Puako fuel break site that still needs to be cleared and mulched

Figure 10
Photographs of Project Sites
Hawaii Fuel Break and Dip Tank Project

CH2MHILL

Figure 10 Photographs of Project Sites Page 2



E. Looking northeast at proposed Kuainiho dip tank site within existing staging area



F. Looking west across access road toward proposed 1859 Flow dip tank site

Figure 10
Photographs of Project Sites
Hawaii Fuel Break and Dip Tank Project

CH2MHILL

Figure 10 Photographs of Project Sites Page 3



G. Looking west toward Waikoloa dip tank site (note existing water line in the foreground)



H. Looking north toward Ponoholo dip tank site

Figure 10
Photographs of Project Sites
Hawaii Fuel Break and Dip Tank Project

CH2MHILL

Figure 10 Photographs of Project Sites Page 4

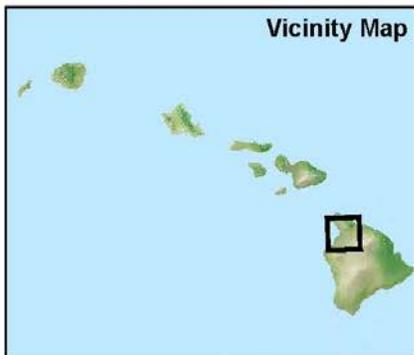


I. Looking southwest toward Lalamilo diptank site

Figure 10
Photographs of Project Sites
Hawaii Fuel Break and Dip Tank Project

CH2MHILL

Figure 10 Photographs of Project Sites Page 5



LEGEND

- Dip Tank
- Fuel Break

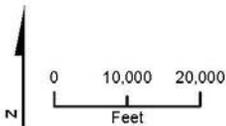


FIGURE 11

Location of Reduced Scope Alternative FEMA HMGP Diptank and Fuel Break Project, Hawaii

CH2MHILL.

C:\PROJECTS\CDM_FEMA_HIM\FIGURE_11_REDUCEDSCOPE\LAMILOPONOHOLO.MXD HPERRY 11/26/2013 9:49:25 AM

Figure 11 Location of Reduced Scope Alternative

3.0 Affected Environment and Environmental Consequences

The following section describes the affected environment and potential consequences of the Proposed Action, Reduced Scope Alternative, and No Action Alternative, as well as the mitigation measures or best management practices (BMPs) that would be implemented to avoid or minimize potential impacts. Relevant resource issues were determined according to federal law and relative impacts to the natural environment or human quality of life. Identified resources were categorized based on their potential environmental impact, using the following terminology:

- A negligible impact is defined as an environmental effect that is so small it would be difficult to measure and is insignificant enough to be disregarded.
- A minor impact is defined as an environmental effect that is measurable, yet is unlikely to adversely affect human health or the environment.
- A moderate impact is an environmental effect that is measurable and may affect human health or the environment.
- A significant impact is measurable and could cause a major impact to human health or the environment.

The information presented below was gathered from site visits, interviews, existing documentation, and correspondence with federal, state, and local agencies.

3.1 Geology, Soils and Seismicity

3.1.1 Affected Environment

Geology and Soils

The U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) identifies Major Land Resource Areas (MLRAs) that consist of relatively consistent geomorphic patterns (e.g., soils, surficial geologic and soil parent materials, and geomorphic and soil forming processes), sub-regional physiographic landforms, and predominant vegetation types and structure. For each MLRA, NRCS summarizes the dominant land uses, soils, and surficial geological features that are important for land use planning. The project sites are located within the Lava Flows and Rock Outcrops MLRA (NRCS, 2013). Dominant soil orders in this MLRA are Andisols, Mollisols, Aridisols, Histosols, Oxisols, and Inceptisols, with a significant proportion of the MLRA comprised of volcanic rock, which is classified as nonsoil. The soils in the MLRA are formed in weathered volcanic ash and basalt on uplands.

In general, the geologic substrate in the project sites are late Pleistocene-era and Holocene era lava flows from Hualalai, Mauna Loa, Mauna Kea and Kohala volcanoes (Wolfe and Morris, 2001). The ground surface is comprised of *‘a‘a* (clinkery lava) and/or *pahoehoe* (smooth or ropy lava), often heavily weathered to a more rounded surface and covered in some areas with soil formed in-situ or through wind-blown deposits.

The geology and soils specific to each of the project sites are summarized below.

- **Waikoloa Fuel Break:** This site is located on the leeward coastal plains of Mauna Kea volcano at an elevation ranging from approximately 930 to 1,010 feet above sea level. The soils are comprised of Kawaihae extremely stony very fine sandy loam on 6 to 12 percent slopes, which are characterized

by a surface layer of sandy loam and a subsurface layer of silt loam and loam overlying *pahoehoe* bedrock (Sato et al., 1973). The underlying *pahoehoe* lava was deposited by Hamakua Volcanics between 65,000 and 250,000 years ago (Wolfe and Morris, 2001).

- **Puako Fuel Break:** This site is located inland of Puako Beach Road at an elevation ranging between approximately 5 and 10 feet above sea level. The soils are comprised of Kamakoa very fine sandy loam on 0 to 10 percent slopes (Sato et al., 1973), which are characterized by a surface layer of very fine sandy loam and very fine sand, overlying alternating layers of fine, medium and coarse sands and gravel. The basalt substrate occurs approximately 4 to 6 feet below the surface. The underlying lava was deposited from Mauna Loa Volcano between 3,000 to 5,000 years ago (Wolfe and Morris, 2001). The site is located within an existing fuel break that was established as part of an emergency response to a 2007 wildfire; the entire fuel break has been previously bulldozed.
- **Kuainiho Dip Tank:** This site is located west of the Kuainiho cinder cone, at an elevation of approximately 2,580 feet above sea level. The soils in this region are comprised of rock land that consists of lava covered in places by thin soil (Sato et al., 1973). The lava in this area was deposited 3,000 to 5,000 years ago from Mauna Loa Volcano (Wolfe and Morris, 2001). The dip tank site is located entirely within an existing wildfire suppression staging area, which has been previously bulldozed and is comprised of crushed lava rock.
- **1859 Flow Dip Tank:** This site is located at an elevation of approximately 2,200 feet above sea level. The soil type in this area is the same lava rock land described above for the Kuainiho Dip Tank site. The lava in this area was deposited during an 1859 eruption of Mauna Loa (Wolfe and Morris, 2001).
- **Waikoloa Dip Tank:** This site is located at an elevation of approximately 930 feet above sea level. The soil type is *a'a* lava which is described by Sato et al. (1973) as a mass of clinkery, hard, glassy, sharp pieces piled in tumbled heaps. The lava is derived from Mauna Kea Volcano, with the most recent flows dating from 4,400 to 7,100 years ago (Wolfe and Morris, 2001).
- **Ponoholo Dip Tank:** This site is located on the leeward coastal plains of Mauna Kea volcano at elevations ranging from 875 to 1,400 feet above sea level. The terrain is characterized by level to gently sloping soil with scattered surface stones. The soils in this area are comprised of Kawaihae very rocky very fine sandy loam on 6 to 12 percent slopes, which is characterized by a thin surface layer of sandy loam and subsurface layers of silt loam and loam, overlying *pahoehoe* bedrock; rock outcrops occupy 10 to 20 percent of the ground surface (Sato et al., 1973). The underlying lava was deposited from Hawi Volcanics deposited between 120,000 to 230,000 years ago (Wolfe and Morris, 2001).
- **Lalamilo Dip Tank:** This site is located on the leeward slopes of Mauna Kea, Hualalai and the Kohala Mountains at an elevation of approximately 2,500 feet above sea level. The soil in this area is comprised of Pu'u Pa extremely stony, very fine sandy loam on 6 to 20 percent slopes, and is characterized by a surface layer of extremely stony very fine sandy loam and a subsurface layer of very stony, very fine sandy loam, underlain by fragmental *a'a* lava. (Sato et al., 1973). The underlying lava in this area was derived Hamakua volcano lava flows deposited during the Pleistocene Era (Wolfe and Morris, 2001).

Seismicity

In Hawai'i, seismicity is associated with volcanism and earth movement along faults; earthquakes are typically more concentrated in volcanically active areas, with 95 percent of the earthquakes on the island of Hawai'i resulting from volcanism (Fletcher et al., 2002). The majority of the seismicity is related to the movement of magma within Kilauea or Mauna Loa volcano. Thousands of earthquakes are

documented on the island, although most are too small to be noticed; a total of 14 earthquakes with magnitude 6 or greater have occurred since 1868 (Heliker, 1991). Given the extensive history of seismicity on Hawai`i Island, the entire island is within the Uniform Building Code (UBC) seismic zone 4, which is the highest available rating.

3.1.2 Environmental Consequences

Alternative 1: No Action

Under the No Action Alternative, the geology and soils within the project sites would remain the same as existing conditions. However, in the absence of the fuel break and dip tank measures, future wildfires may be more widespread, which could increase the potential for long-term, post-fire erosion.

Alternative 2: Proposed Action

Implementation of the proposed project would not affect geologic resources as all activities would occur on the land surface. The proposed project would involve ground disturbance at several of the sites, which could result in soil erosion. A brief description of the ground-disturbing activities and the associated potential for erosion is detailed below.

- **Waikoloa Fuel Break:** No grading or land disturbing activities would occur at this site as a result of the proposed project. To minimize erosion of soil, herbaceous vegetation would be allowed to grow but would be trimmed to a minimal height above the ground surface; trimmed materials would be chipped and spread onsite.
- **Puako Fuel Break:** The proposed project would involve clearing and grading (to provide a relatively level surface to facilitate maintenance), which has the potential to cause soil erosion. Clearing and grading activities would be followed by placement of approximately 18 inches of mulch to suppress future vegetation growth and reduce erosion.
- **Kuainiho Dip Tank:** The entire site has been previously graded and is actively used as a staging area for wildfire suppression activities. A minimal amount of grading may be required to provide a level surface for dip tank installation. The ground surface is comprised of crushed lava rock; therefore, soil erosion is not anticipated.
- **1859 Flow Dip Tank:** The site would require grading over a small area (approximately 20 feet by 20 feet) to provide a level surface for dip tank installation. The site supports a very limited amount of soil over lava rock; therefore, soil erosion (if any) is expected to be minimal.
- **Waikoloa Dip Tank:** The site would require grading over a small area (approximately 20 feet by 20 feet) to crush the rock substrate and establish a level surface for dip tank installation. The site supports a very limited amount of soil; therefore, soil erosion (if any) is expected to be minimal.
- **Ponoholo Dip Tank:** The site would require grading over a small area (approximately 20 feet by 20 feet) to provide a level surface for dip tank installation and grading to improve the existing access road. Ground disturbance would also be necessary to install a 1- to 2-inch pipeline in a shallow trench from an existing water line to the dip tank. Therefore the potential exists for soil erosion at this site.
- **Lalamilo Dip Tank:** The site would require grading over a small area (approximately 20 feet by 20 feet) to provide a level surface for dip tank installation and grading to improve the existing access road, which has the potential to cause soil erosion. The water pipeline would be installed at the ground surface, so no ground disturbance would occur in association with pipeline installation.

To minimize the potential for soil erosion, ground disturbance would be limited to only those areas required for implementation of the fuel break and dip tank measures, as described above. For dip tank installation, the disturbed ground surface would generally be covered by the dip tank. Several of these measures also require grading for pipeline installation and access road improvements; however, given the small amount of soil present at these sites, these activities are expected to result in a minor amount of erosion. Within the fuel break sites, the proposed activities include the placement of mulch and/or chipped vegetation to further reduce the potential for soil erosion. With inclusion of these mitigation measures, implementation of the proposed project is expected to have a minor short-term impact on soil erosion, with no long-term impacts to soils.

Implementation of the proposed project would not increase any risks associated with known earthquake faults or seismic activities, nor would these events increase any risks associated with the fuel break or dip tank measures; as such, no seismic-related impacts are anticipated as a result of the proposed project.

Alternative 3: Reduced Scope Alternative

Under the Reduced Scope Alternative, the potential for soil erosion would be the same as described for the Proposed Action, except that impacts associated with the Ponooho and Lalamilo dip tank sites would not occur.

3.2 Air Quality and Greenhouse Gas Emissions

3.2.1 Affected Environment

Air Quality

In general, air quality in the State of Hawai'i is some of the best in the nation, primarily because of consistent trade winds and limited emission sources. Consistent with this trend, the existing air quality in the project area is considered to be relatively good because of low levels of commercial development, and exposure to consistently strong winds that work to disperse emissions. The main source of pollutant air emissions in the project area is associated with fuel combustion emissions from vehicles on nearby roads and agricultural operations in the project vicinity.

Under the authority of the Clean Air Act, the U.S. Environmental Protection Agency (USEPA) has established nationwide air quality standards to protect public health and welfare. These federal standards, known as National Ambient Air Quality Standards (NAAQS), represent the maximum allowable atmospheric concentrations for six criteria pollutants: carbon monoxide (CO), nitrogen dioxide (NO₂), sulfur dioxide (SO₂), ozone, lead, and particulate matter (respirable particulate matter less than or equal to 10 micrometers in diameter [PM₁₀] and respirable particulate matter less than or equal to 2.5 micrometers in diameter [PM_{2.5}]). The NAAQS are based primarily on evidence of acute and chronic (or short-term and long-term) health effects, and apply to outdoor locations to which the general public has access. The Clean Air Branch of the State of Hawai'i Department of Health (HDOH) is responsible for implementing air pollution control in the State and has established Hawai'i ambient air quality standards (HAAQS), which in some cases are more stringent than the comparable federal standards or address pollutants that are not covered by the federal standards. The HAAQS are based primarily on health effects data, but also reflect other considerations, such as protection of crops, protection of materials, or avoidance of nuisance conditions (such as objectionable odors).

HDOH and USEPA maintain a network of air quality monitoring stations throughout the islands. Overall, the data collected from these monitoring stations indicate that criteria pollutant levels remain well below the federal and state ambient air quality standards (HDOH, 2011). The following three designations are used to indicate compliance with the NAAQS for specific areas and specific pollutants:

attainment, non-attainment, or maintenance. A recent vent opening on Kīlauea Volcano has resulted in increased emissions of SO₂ and PM_{2.5}, with occasional exceedances of the NAAQS for those pollutants. USEPA considers the volcano to be a natural, uncontrollable event and therefore the state requests exclusion of these NAAQS exceedances from attainment/non-attainment determination. Excluding these exceedances, the State of Hawai'i is currently designated as having attainment status for all criteria pollutants (HDOH, 2011). Therefore, the requirements of the General Conformity Rule of the Clean Air Act do not apply.

Greenhouse Gas Emissions

In addition to criteria air pollutants of direct concern for human health, other air emissions are produced as a result of natural processes and human activities. Specifically, greenhouse gases (including carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O)) are chemical compounds which trap heat in the atmosphere, thus affecting the earth's temperature. Scientific evidence indicates a trend of increasing global temperatures (i.e., global warming) over the past century due to an increase in global greenhouse gas emissions. On February 18, 2010, the CEQ released a memorandum, *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions* (CEQ, 2010), which provides guidance for federal agencies in considering climate change in their decision-making process. The guidance advises that the consideration of climate change address the greenhouse gas emission effects of a proposed action, stating that "if a proposed action would be reasonably anticipated to cause direct emissions of 25,000 metric tons or more of CO₂ [carbon dioxide]-equivalent greenhouse gas emissions on an annual basis, agencies should consider this an indicator that a quantitative and qualitative assessment may be meaningful to decision makers and the public" (CEQ, 2010).

3.2.2 Environmental Consequences

Alternative 1: No Action

Under the No Action Alternative, the fuel break and dip tank measures would not be implemented, and thus would not have an immediate effect on air quality or greenhouse gas emissions. In the absence of the fuel break and dip tank measures, future wildfires may be more widespread, thus increasing wildfire-related emissions, including PM₁₀, PM_{2.5}, CO₂, CO, NO₂, SO₂, and ozone precursors from burning vegetation and fire-fighting equipment. Wildfire-related air emissions have the potential to result in moderate, but short-term, impacts.

Alternative 2: Proposed Action

The proposed project would result in a limited amount of temporary emissions associated with the use of equipment and vehicles for implementation of the fuel break and dip tank measures, including PM₁₀, PM_{2.5}, CO₂, CO, NO₂, SO₂, and ozone precursors. Emissions associated with site preparation for dip tank installation (e.g., grading and leveling) would occur during a single event at each site. Initial vegetation clearing for the fuel break sites would also occur during a single event, with maintenance activities generally occurring on an annual basis. To minimize the emissions associated with these activities, standard BMPs would be implemented; these include proper maintenance of all construction equipment and vehicles in accordance with the manufacturer's specifications, and minimizing the duration and extent of ground disturbing activities to the extent practicable (so as to limit equipment use and vehicle operations). With implementation of these measures, the proposed project would only result in a limited amount of emissions, which would be temporary and localized in nature. In comparison to overall emissions in the region, the contribution by the proposed project would be minimal and would not be expected to affect ambient air quality conditions (or attainment of the federal or state air quality standards). Similarly, the proposed project would result in minimal greenhouse gas emissions from the short-term use of equipment and vehicles during implementation of the measures; these emissions are

anticipated to be well below the 25,000 metric ton threshold described in the CEQ guidance. As such, the proposed project is expected to have a negligible impact on air quality or greenhouse gas emissions.

Over the long-term, implementation of the proposed project may moderately improve air quality by decreasing the amount of wildfire-related emissions due to the reduction of available vegetative fuel and ability for more efficient fire suppression response to reduce the spread and intensity of wildfires in the area. In addition, a minimal decrease of emissions would likely be realized from the reduced distances that helicopters would need to travel to obtain water for fire suppression activities during a wildfire.

Alternative 3: Reduced Scope Alternative

Under the Reduced Scope Alternative, temporary air emissions would be slightly less than those described for the Proposed Action because no activity would occur at the Ponohele or Lalamilo dip tank sites. Over the long-term, the beneficial impacts to air quality would be slightly reduced compared to the Proposed Action because wildfire risk would not be reduced in the Kohala (Kahua) and Waimea areas.

3.3 Water Resources

3.3.1 Affected Environment

Waters of the U.S., Including Wetlands

Pursuant to Section 404 of the Clean Water Act (33 U.S.C. 1344), the U.S. Army Corps of Engineers (USACE) is authorized to regulate the discharge of dredged or fill material into Waters of the U.S., as defined in 33 CFR 328.3. Waters of the U.S. include wetlands, which are defined by the USACE and USEPA as “those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that in normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions.” Wetlands generally include swamps, marshes, bogs, and similar areas. According to the 1987 *Wetland Delineation Manual* (USACE, 1987), for an area to be defined as a jurisdictional wetland, it must, under normal circumstances, possess positive indicators for each of the following three parameters: hydrophytic vegetation, hydric soils, and wetland hydrology. In addition to the regulations under the Clean Water Act, wetlands are further protected under Executive Order (EO) 11990, Protection of Wetlands, which requires federal agencies to minimize damage to wetlands resulting from federal and federally-assisted projects.

The presence of Waters of the U.S., including wetlands, within the project sites was evaluated through desktop analyses of the U.S. Geologic Survey (USGS) National Hydrography Dataset (NHD), U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping, and recent aerial photography. In addition, a reconnaissance site visit was performed in October 2012 to evaluate the potential presence and extent of features that may be considered Waters of the U.S., and therefore subject to regulation under Section 404 of the Clean Water Act. No wetlands or other waterbodies were identified within or immediately surrounding any of the project sites based on the mapping analysis or during the site visit.

Groundwater and Water Supply

Groundwater in West Hawai`i primarily flows from the inland areas towards the coast, and primarily occurs in two forms within an aquifer: (1) as high-level impoundments in inland areas with low aquifer permeability and (2) as freshwater lenses, with lower density fresh water floating on higher density salt water within permeable lava flows near the coast (Oki, 1999). Boundaries of the hydrologic units of the aquifer system have been defined by the Commission on Water Resource Management. The project sites fall within the following hydrologic units: Mahukona (Kohala aquifer sector), Waimea (West Mauna Kea aquifer sector), Anaehoomalu (Northwest Mauna Loa aquifer sector), and Kiholo (Hualalai aquifer

sector). The sustainable yields of these hydrologic units are 17 million gallons per day (mgd), 24 mgd, 30 mgd, and 18 mgd (respectively), with existing water use well below 50 percent of these amounts (Commission on Water Resource Management [CWRM], 2008).

Flood Zones

As part of EO 11988, federal agencies are required to avoid, to the extent possible, the short- and long-term adverse impacts associated with the occupancy and modification of floodplains. If there is no practicable alternative to undertaking an action in a floodplain, any potential adverse impacts must be mitigated. FEMA's regulations for complying with EO 11988 are contained in 44 CFR Part 9. To ensure compliance with EO 11988, FEMA uses an eight-step decision-making process; this process involves public review, consideration of practicable alternatives, identification of impacts and measures to minimize those impacts, and presentation of the findings. The NEPA compliance process involves essentially the same basic decision-making process to meet its objectives. Therefore, the eight-step decision-making process has been integrated into the analysis in this EA.

Flood zone classifications for the project sites were obtained from the Hawai'i National Flood Insurance Program (NFIP) Flood Hazard Assessment Tool (DNLR, 2013). Based on NFIP information, the following flood zone types occur within the project sites:

- Zone X: Areas between the limits of the 1-percent-annual-chance (100-year) flood event and 0.2-percent-annual-chance (or 500-year) flood event.
- Zone AE: Areas subject to inundation by the 1-percent-annual-chance (100-year) flood event; determined by detailed methods (base flood elevations are provided).
- Zone AO: Areas subject to inundation by 1-percent-annual-chance (100-year) shallow flooding (e.g., sheet flow on sloping terrain) where average depths are between one and three feet.

The flood zone classifications for each project site are provided in Table 2. As listed in Table 4, all of the project sites are located outside the limits of the 1-percent-annual-chance (100-year) flood event (Flood Zone X), except for portions of the Puako Fuel Break site, which fall within the 1-percent-annual-chance (100-year) floodplain, as part of the AE and AO flood zones.

Table 2
Flood Zone Classifications

Project Site	Flood Zone
Waikoloa Fuel Break	X
Puako Fuel Break	AE, AO, X
Kuainiho Dip Tank	X
1859 Flow Dip Tank	X
Waikoloa Dip Tank	X
Ponoholo Dip Tank	X
Lalamilo Dip Tank	X

SOURCE:

DLNR, 2013. National Flood Insurance Program for the State of Hawai'i. Available online at: <http://www.hidlnr.org/eng/nfip/>

3.3.2 Environmental Consequences

Alternative 1: No Action

Under the No Action Alternative, the fuel break management and dip tank measures would not be implemented; water necessary for fire suppression activities would be obtained from other sources and the hydrologic resources within the project area would be unaffected.

Alternative 2: Proposed Action

No wetlands or other waterbodies that may qualify as Waters of the U.S. were identified in the project area; therefore, implementation of the proposed project would not directly impact any wetlands or other surface water features, in compliance with EO 11990.

Ground disturbance during construction of the fuel break management and dip tank measures could increase the amount of sediment and other pollutants in stormwater runoff, which could affect water quality in receiving waters. However, as previously described, the extent of ground disturbance would be limited, and with implementation of mitigation measures listed in Section 3.1.2, the potential for erosion is expected to be minimal. Additional measures to minimize the potential for sedimentation and other water quality impacts to receiving waters include the following:

- Disturbance of soil would be minimized during periods of heavy rain
- Implementation would be phased to minimize the extent of soil disturbance at any given time
- Vehicles and equipment would be inspected for leaks and/or contamination on a daily basis
- In the event of a spill/leak of fuel or lubricants from onsite equipment, the materials would be cleaned in a timely manner and disposed at an approved site.

With implementation of these measures, construction-related impacts to receiving waters are expected to be minor and short-term. As wildfires can result in substantial erosion and ash deposition, the proposed project may in fact provide indirect water quality benefits over the long-term through increase wildfire suppression capabilities.

Relative to water supply, the proposed project would utilize water from various municipal and agricultural sources to fill and maintain water levels in the dip tanks. The estimated water volumes and sources for each measure are provided in Table 3. To minimize the potential for impacts related to water supply, water use would be limited to only those volumes required for filling and maintaining the dip tanks for wildfire suppression activities; given that these quantities are extremely small in

comparison to the sustainable groundwater yields identified for these areas, implementation of the proposed project is expected to have a negligible impact on the local aquifers and water supply.

Table 3
Estimated Water Use

Project Site	Volume / Capacity (Gallons)	Water Source	Estimated Refilling Frequency ¹	Estimated Annual Volume (Gallons)
Waikoloa Fuel Break	N/A	N/A	N/A	N/A
Puako Fuel Break	N/A	N/A	N/A	N/A
Kuainiho Dip Tank	6,700	Water truck	Minimal ²	6,700
1859 Flow Dip Tank	6,700	Pu`u Wawa well	Minimal ²	6,700
Waikoloa Dip Tank	6,700	Existing irrigation water line	Minimal ²	6,700
Ponoholo Dip Tank	6,700	Existing water line	Approximately twice per month ³	160,800
Lalamilo Dip Tank	6,700	State or County water source	Approximately twice per month ³	160,800

NOTES:

¹ Estimated refilling frequency pertains to refilling due to estimated evaporation of stored water. This estimate does not include wildfire suppression activities; wildfire occurrences and frequency of dip tank use for wildfire suppression cannot be estimated.

² These dip tanks would be covered to minimize evaporation.

³ These dip tanks would be uncovered, so are expected to require more frequent refilling.

As described above, all of the project sites are located in moderate to low flood risk areas outside the 1-percent-annual-chance (100-year) floodplain (Flood Zone X), except for portions of the Puako Fuel Break site. The Puako Fuel Break site involves the use of an existing fuel break which, along with most of the area surrounding the Puako community, is located within the 1-percent-annual-chance (100-year) floodplain (Flood Zones AE and AO). Given the extent of high risk flood zones surrounding the Puako area, there are no practicable alternatives that would provide fire protection for the community while avoiding floodplain areas. However, implementation of vegetation management within the existing fuel break would not increase the potential for flooding or otherwise impact floodplain function, such that no impacts are anticipated. In accordance with 44 CFR Part 9, FEMA published a cumulative Initial Public Notice for FEMA-1640-DR-HI, and would also ensure that an individual Final Public Notice is published before implementation of the proposed project, in compliance with EO 11988.

Alternative 3: Reduced Scope Alternative

Under the Reduced Scope Alternative, the potential for sedimentation and other water quality impacts would be the same as those described for the Proposed Action, except that impacts associated with the Ponoholo and Lalamilo dip tank sites would not occur. Impacts to the water supply would be substantially less than described for the Proposed Action, because no activity would occur at the Ponoholo or Lalamilo dip tank sites. Impacts to wetlands and floodplains would be identical to those described for the Proposed Action.

3.4 Biological Resources

3.4.1 Existing Environment

Biological resource surveys were conducted for the proposed project in October and November 2012 and April 2013 by Dr. Ron Terry (Geometrician Associates), as a consultant to FEMA. As part of this

effort, both botanical and wildlife surveys were completed within each of the fuel break management and dip tank sites. The botanical survey identified the vegetation within each site, with a focus on rare, threatened or endangered species that are known to occur in nearby locations. The wildlife survey included observation of faunal species, as well as identification of suitable habitat for rare, threatened or endangered faunal species. A copy of the biological survey report is included as Appendix B.

Vegetation and Wildlife

In general, the vegetation within the project area is naturally dry, but it is believed that historically, it was not particularly pyrophytic (fire-adapted) as there was a relatively low frequency of natural fires in Hawai'i. Based on descriptions by Gagne and Cuddihy (1990) of areas with similar geology and elevations, it is expected that the vegetation communities within the project area would have historically been comprised of Lowland Dry Forest, Lowland Dry Shrubland, Lowland Dry Grassland, or Coastal Dry Shrubland. In modern times, wildfire has converted these native habitats into non-native grasslands. Because few native Hawaiian species are adapted to wildfires, they generally perish when exposed to fire and are subsequently outcompeted by aggressive alien species, such as fountain grass (*Cenchrus setaceus*), which are pyrophytic and thrive in the aftermath of fire.

Despite the variation in elevation and substrate among the sites within the project area, all have a high frequency of fire, and the vegetation at each site is now dominated by fire-adapted invasive species including fountain grass, buffel grass (*Cenchrus ciliaris*), kiawe (*Prosopis pallida*) and koa haole (*Leucaena leucocephala*). Of the species found on the seven sites, a total of nine indigenous and two endemic species were identified. These native species are all common in the region and in other areas of the Hawaiian Islands.

The wildlife component of the biological surveys indicated the presence of various feral mammals and introduced reptiles, birds and amphibians, all of which are considered harmful to native flora and fauna. Bird species likely to occur in the action areas are almost exclusively comprised of non-native species, with the exception of some native (but common) species such as the Pacific golden plover (*Pluvialis fulva*) and the short-eared owl (*Asio flammeus sandwichensis*).

A detailed list of the species identified during the biological surveys is presented in the biological survey report (Appendix B).

Special-Status Species

No listed or proposed threatened or endangered plant or wildlife species were documented in the project sites during the biological surveys. A single *uhiuhi* (*Mezoneuron kawaiense*), which is federally listed as endangered, was documented within 100 feet of the proposed Waikoloa dip tank site. Several *wiliwili* (*Erythrina sandwicensis*), which is not a federally listed species but is considered rare, were also documented in the general vicinity. These species are carefully managed as part of the WDFI.

Individuals of tree tobacco (*Nicotiana glauca*), a weed which often emerges after land clearing and is recognized as an occasional host for the federally endangered Blackburn's sphinx moth (*Manduca blackburnii*), have been previously observed in the general vicinity of five of the seven sites. During the biological surveys, the only tree tobacco that was observed was a small patch at the Puako fuel break site, located within a pushpile of dead kiawe; no Blackburn's sphinx moths were observed.

The Hawaiian hawk (*Buteo solitarius*), which is federally endangered, is unlikely to nest within the action area, as there are no tall trees suitable for nesting, with the exception of a limited number of trees at the Puako fuel break site. Although not detected during the survey (which took place in full daylight), the Hawaiian hoary bat (*Lasiurus cinereus semotus*), which is also federally endangered, could also roost

in these trees. Given the small amount of available habitat, the potential for either of these species to occur within the project sites is limited.

3.4.2 Critical Habitat

None of the project sites are located within current USFWS designated critical habitat. However, on October 17, 2012, the USFWS published a proposed rule in the Federal Register (77 FR 63928) to list 15 species as endangered. In addition, the proposed rule would designate critical habitat on Hawai'i Island for one of the proposed plant species - *ko'oko'olau* (*Bidens micrantha* ssp. *ctenophylla*) - and for two previously listed plant species - *uhiuhi* and *wahine noho kula* (*Isodendron pyriformum*). One of the units of the proposed critical habitat (Unit 32; see Figure 12) is located in the area in which the Waikoloa dip tank is proposed.

3.4.3 Environmental Consequences

Alternative 1: No Action

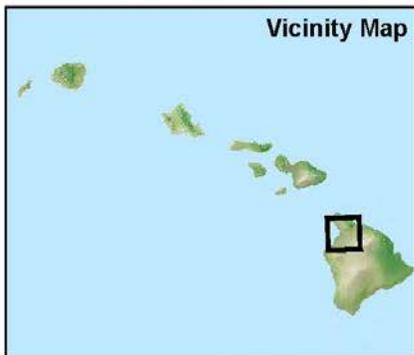
Under the No Action Alternative, the biological resources within the project sites would not be affected by implementation of the fuel break and dip tank measures. Because no action would be taken, there would be a higher likelihood that future wildfires would adversely affect biological resources in the project vicinity, including nearby native dryland forest habitat, federally listed species (e.g., endangered *uhiuhi*), and proposed critical habitat.

Alternative 2: Proposed Action

Implementation of the proposed project would involve vegetation clearing and ground disturbance, which could directly affect the vegetation and wildlife species that occur within each site. However, as documented during the biological surveys, biological resources within the project sites are comprised of non-native or otherwise common species. Specifically, the vegetation within these sites is dominated by fire-adapted invasive species, with only a few native species, all of which are common in the region and in other areas of the Hawaiian Islands. Wildlife species that would likely be present include feral mammals and introduced reptiles, birds and amphibians, all of which are generally harmful to native flora and fauna. As further discussed below, no listed or proposed threatened or endangered plant or wildlife species were observed, or are otherwise expected to occur within the project sites, such that the project is not expected to adversely affect any special-status species. As such, the fuel break and dip tank measures are expected to have a negligible impact on biological resources. Over the long-term, implementation of the proposed project is expected to benefit native species in the project vicinity by limiting the spread of wildfire. In particular, the proposed project is expected to provide protection for dryland forest habitat in the project vicinity, as this habitat is highly imperiled and threatened by wildfire.

Special-Status Species

As described above, no listed or proposed threatened or endangered plant or wildlife species were documented in any of the project sites during the biological surveys. A single *uhiuhi*, which is federally endangered, occurs within 100 feet of the proposed Waikoloa dip tank site. Several *wiliwili*, which is not federally listed but is considered rare, were also documented in the general vicinity. These species are carefully managed as part of the WDFI. The dip tank at this site was specifically located in coordination with WDFI staff so as to have a dip tank readily available to fight wildfires within the preserve but at a sufficient distance so as to avoid adverse impacts to these species. To further avoid impacts to the nearby *uhiuhi*, HWMO would be responsible for having exclusion fencing installed and maintained around the tree throughout the construction period. Over the long-term, the proposed project could result in a beneficial impact to these species by providing an available source of water for fighting wildfires that threaten these populations.



- LEGEND**
- Dip Tank
 - Fuel Break
 - Critical Habitat Unit 32

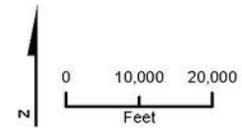


FIGURE 12
Proposed Critical Habitat (Unit 32)
FEMA HMGP Diptank and
Fuel Break Project, Hawaii

CH2MHILL.

C:\PROJECTS\CDM_FEMA_HIM\FIGURE_12_UNIT32.MXD HPERRY 11/26/2013 9:46:20 AM

Figure 12 Proposed Critical Habitat (Unit 32)

The Blackburn's sphinx moth was not observed within the project sites; however, a small patch of tree tobacco, a non-native weed which often emerges after land clearing and is recognized as an occasional host for the moth, was found within a pushpile of dead kiawe at the Puako fuel break site. Tree tobacco may persist for years but often dies in unfavorable environments, and it is uncertain if these plants will persist in this unusual context. However, to minimize the potential for impacts to the Blackburn's sphinx moth, HWMO would be responsible for having the project area inspected by a qualified biologist before project implementation; if potential signs of Blackburn's sphinx moth are found, HWMO would notify SCD and FEMA before any further work occurs, so that FEMA could re-consult with the USFWS.

As described above, Hawaiian hawks are unlikely to nest within the project sites, as there are no tall trees suitable for nesting, with the exception of a limited number of trees at the Puako fuel break site. Although not detected during the survey (which took place in full daylight), the Hawaiian hoary bat could also roost in these trees. Given the small amount of available habitat, the potential for either of these species to occur within the project sites is limited; however, potential impacts will be minimized by restricting vegetation clearing within the Puako fuel break site to outside the Hawaiian hawk breeding season (March through September) and bat birthing and pup rearing season (June through September). With implementation of these measures, potential impacts to Hawaiian hawks and Hawaiian hoary bat are expected to be avoided and/or minimized, such that the impacts would be negligible.

Critical Habitat

None of the project sites are located within currently designated critical habitat. However, on October 17, 2012, the USFWS published a proposed rule in 77 FR 63928 to list several plant species as endangered, and to designate critical habitat for one of the proposed plant species (*ko'oko'olau* [*Bidens micrantha* ssp. *Ctenophylla*]) and two previously listed plant species (*uhiuhi* and *wahine noho kula* [*Isodendron pyrifolium*]). As shown in Figure 11, the Waikoloa dip tank would be located within Unit 32 of the proposed critical habitat. However, as previously described, surveys have been undertaken to ensure that the proposed activities would not directly affect these or other listed species, and the proposed project would help to protect the habitat in the project vicinity from wildfire. Furthermore, the surface alteration necessary for the installation of this dip tank is minimal, and the proposed project would not alter the characteristics of the land in a way that degrades the primary constituent elements that make it suitable as critical habitat. Therefore, the proposed project is not expected to adversely modify the proposed critical habitat, if and when it is designated.

ESA Section 7 Compliance

Based on the summary of impacts and mitigation presented above, FEMA determined that the proposed project is not likely to adversely affect any listed or proposed threatened or endangered species, or designated or proposed critical habitat. In compliance with Section 7 of the Endangered Species Act (ESA), informal consultation was conducted with the USFWS that concluded with a letter of concurrence (dated July 25, 2013) with FEMA's determination. Copies of the consultation correspondence with USFWS are contained in Appendix C.

Alternative 3: Reduced Scope Alternative

Under the Reduced Scope Alternative, the impacts associated with the remaining fuel break management and dip tank measures would be the same as those described for the proposed action. Temporary impacts to non-native and common species would be negligible, as described for the Proposed Action. Over the long-term, the beneficial impacts to native species would be slightly reduced in comparison to the Proposed Action because wildfire risk would not be reduced in the Kohala (Kahua) and Waimea areas. Impacts to special-status species and critical habitat would be identical to those described for the Proposed Action, and consultation with USFWS would not need to be reinitiated.

3.5 Historic Properties

3.5.1 Existing Environment

Archaeological assessment surveys were conducted in support of the proposed project by Dr. Alan Haun (Haun & Associates), as a consultant to FEMA, in October and November 2012 and March 2013. The work was completed in compliance with the requirements of the NHPA Section 106 and the Programmatic Agreement among FEMA, the Hawai'i State Historic Preservation Officer (SHPO), the State of Hawai'i Department of Defense, and the Advisory Council on Historic Preservation (ACHP). The surveys included all areas within the areas of potential effect (APE), which FEMA defined as those areas subject to construction activities. Copies of the survey reports, which contain a detailed description of the APE, background history and findings relative to each measure site, are presented in Appendix D. In addition to the archaeological assessment surveys, consultation with the SHPO was conducted, as needed to obtain input relative to potential historic properties that may occur within the APE and concurrence with FEMA's definition of the APE and determination of eligibility.

The summary of findings at each project site is as follows:

- **Waikoloa Fuel Break:** No archaeological sites or features were identified with the APE for the Waikoloa fuel break site; the absence of archaeological sites is attributable to the arid conditions and is consistent with the extremely low density of sites found as part of previous archaeological studies for nearby areas.
- **Puako Fuel Break:** No archaeological sites or features were identified within the APE for the Puako fuel break site; the absence of archaeological sites is attributable to the extensive disturbance that previously occurred to establish a fuel break in this area.
- **Kuainiho Dip Tank:** No archaeological sites or features were identified within the APE of the Kuainiho dip tank site; the absence of archaeological sites is attributable to the extensive disturbance that has occurred in the maintained fire suppression staging area.
- **1859 Flow Dip Tank:** No archaeological sites or features were identified within the APE of the 1859 Flow site; the absence of archaeological sites is attributable to the relatively recent lava flow and the arid conditions in the area.
- **Waikoloa Dip Tank:** No archaeological sites or features were identified during the survey of the Waikoloa dip tank site; the absence of sites is attributable to the arid conditions and is consistent with the extremely low density of sites found as part of previous archaeological studies for nearby areas.
- **Ponoholo Dip Tank:** The survey of the Ponoholo dip tank site identified a single site (SIHP No. 29758), consisting of a historic road located in the inland portion of the proposed pipeline corridor. The road is a portion of the Pu'u Hue Trail that connected Pu'u Hue Ranch with the town of Kawaihae; it was also used during World War II for civil defense purposes. It is also probable that the road follows the path of a prehistoric trail that once connected the rich agricultural fields to the north with the coastal settlement at Kawaihae. FEMA has assessed this site as significant based on the national and state evaluation criteria, as having yielded information important for understanding historic land use in the project area (Criterion D). It has also been assessed as culturally significant (based on the State evaluation criteria) as a named historic trail and the route of a probable prehistoric trail. In addition, SHPO, in a letter dated July 22, 2013, believes the site to be significant because of its association with events that have made an important contribution to the broad patterns of our history (Criterion A). A copy of the correspondence with SHPO is included

as part of the Section 106 correspondence provided in Appendix E. Although not located within the APE, Native Hawaiian burial sites have been identified in the project vicinity.

- **Lalamilo Dip Tank:** The survey of the Lalamilo dip tank site identified five archaeological sites (SIHP Nos. 2811, 29754, 29755, 29756 and 29757), comprised of a total of 16 features. These features consist of 14 agricultural mounds, one alignment and one irrigation ditch (*auwai*). Two of the sites are located within the access road corridor and three are in the waterline corridor. The survey also noted seven isolated objects, consisting of an *opih*i shell fragment, fragments of waterworn coral, two basalt adze fragments and a groundstone fragment. The sites were assessed as significant based on both the national and state evaluation criteria, as having yielded information important for understanding prehistoric to historic land use in the project area (Criterion D).

In addition, as part of FEMA’s Section 106 consultation process, FEMA requested input from individuals and Native Hawaiian Organizations (NHOs) that may have an interest in the proposed project. Consultation letters were sent to the following parties:

Office of Hawaiian Affairs (OHA)	Hawai`i Island Burial Council
Hui Malama I Na Kupuna O Hawai`i Nei	Na Ala Hele
KAHEA	Association of Hawaiian Civic Clubs
Kona Hawaiian Civic Club	Royal Order of Kamehameha I
Kailapa Community Association	Pu`u Anahulu Community Association.

The only response received was from OHA, dated August 15, 2013. In their response, OHA provided input on the Lalamilo dip tank site, as further described in the following section. A copy of the correspondence with OHA is included as part of the Section 106 correspondence provided in Appendix E.

3.5.2 Environmental Consequences

Alternative 1: No Action

Under the No Action Alternative, the fuel break management and dip tank measures would not be implemented and archaeological and cultural resources within the project area would not be affected.

Alternative 2: Proposed Action

As described above, no archaeological sites or features were found within the APE for five of the seven project sites (Waikoloa fuel break site, Puako fuel break site, Kuainiho dip tank site, 1859 Flow dip tank site, and Waikoloa dip tank site). For these sites, FEMA made a determination of “no historic properties affected”. In compliance with NHPA Section 106 and the Programmatic Agreement, FEMA conducted consultation with the SHPO, requesting concurrence with its determinations, by letter of June 28, 2013. To date, SHPO has not provided a response relative to these sites; consistent with the Programmatic Agreement, if a response is not provided within 21 days, FEMA’s NHPA Section 106 responsibilities have been met, and FEMA may proceed with funding the undertaking. Copies of the consultation correspondence with SHPO are contained in Appendix E.

Within the APE of the Ponoholo dip tank site, the archaeological survey resulted in identification of one site, a historic road located in the inland portion of the proposed pipeline corridor; the site was assessed as significant under both the national and state evaluation criteria (Criterion D). In compliance with NHPA Section 106 and the Programmatic Agreement, FEMA conducted consultation with the SHPO, requesting concurrence with its determinations, by letter of June 28, 2013. SHPO concurred with FEMA’s definition of the APE and determination of eligibility under Criterion D, but also assessed the site as

eligible under Criterion A, as described above. In addition, SHPO indicated that, because the material components and design of the trail have been previously impacted through mechanical grading activities, impacts to the trail would “not adversely affect” the qualities of the site’s integrity that make it historically significant, such that the character and use of the site “will not be affected” by the proposed project. However, in addition to requesting information regarding FEMA’s efforts to consult with OHA and other NHOs, SHPO requested that an archaeological monitoring plan be prepared and an archaeological monitor be present onsite during ground disturbing activities, including excavation of the pipeline trench because Native Hawaiian burial sites have been previously identified along the trail in the project vicinity (although not in the APE). If the Proposed Action is selected, FEMA would continue to consult with SHPO regarding the Ponoholo dip tank site until FEMA fulfills its responsibilities under the Programmatic Agreement and NHPA Section 106; the results of this consultation would be provided in a supplement to this EA.

Within the APE of the Lalamilo dip tank site, five sites were identified and assessed as significant under Criterion D for both the national and state evaluation criteria. As these sites were documented in the archaeological survey report and no further work or preservation was recommended, FEMA made a determination of “no adverse effect” for this site. In compliance with NHPA Section 106 and the Programmatic Agreement, FEMA conducted consultation with the SHPO, by letter of June 27, 2013. To date, SHPO has not provided a response relative to this site. However, OHA, in a letter dated August 15, 2013, disagreed with FEMA’s determination and suggested that “adequate archaeological documentation” alone should not justify “unnecessary adverse impacts”. If the Proposed Action is selected, FEMA would continue to consult with OHA and SHPO regarding the Lalamilo dip tank site until FEMA fulfills its responsibilities under the Programmatic Agreement and NHPA Section 106; the results of this consultation would be provided in a supplement to this EA.

Alternative 3: Reduced Scope Alternative

Under the Reduced Scope Alternative, no activities would occur at the Ponoholo or Lalamilo dip tank sites. As described for the Proposed Action, FEMA made a determination of “no historic properties affected” for the other five project sites and has fulfilled its responsibilities under NHPA Section 106 and the Programmatic Agreement. If the Reduced Scope Alternative is selected, FEMA would notify SHPO and OHA that no work is proposed at the Ponoholo or Lalamilo dip tank sites and that FEMA’s NHPA Section 106 responsibilities for these sites have been met.

3.6 Land Use

3.6.1 Existing Environment

Land use is typically defined to reflect either natural or human activities that occur, or could occur, at a given location. Land use in Hawai`i is generally controlled by state land use and county zoning designations. Under Hawai`i Revised Statutes (HRS) Chapter 205-2, the State Land Use Commission has the authority to designate all land within the state as one of four districts—urban, rural, agricultural, or conservation—based on the general activities and uses of the land. Land use is also regulated by the various counties through zoning boundaries, within which development standards are specified for various activities. In general, regulation of land use within the conservation district is conducted by the state; regulation of the other districts is generally delegated to the counties.

In addition to the state land use and County zoning boundaries, there are additional designations that are subject to regulation. In particular, the Special Management Area (SMA), a designated area extending inland from the shoreline (ranging from 100 yards to several miles in width) is regulated by the counties under Hawai`i’s Coastal Zone Management (CZM) program. Hawai`i’s CZM program was approved as HRS Chapter 205A in 1977, under the authority of the Coastal Zone Management Act of

1972 (CZMA). Key components of the program include (1) regulation of development within the SMA, (2) a Shoreline Setback Area, which serves as a buffer against coastal hazards and erosion, and protects view planes, and (3) the Federal Consistency provision, which requires that federal activities, permits, and financial assistance be consistent with approved state or territory CZM programs. Pursuant to State of Hawaii CZM Program guidance, FEMA assistance programs, grants or loans do not require review for federal consistency.

Current land uses within and surrounding the project sites were identified based on aerial photographs and maps, as well as observations made during field surveys performed in October 2012. This information is summarized in Table 4, along with the applicable state land use and county zoning designations for each of the measure sites.

Table 4
State Land Use and County Zoning Designations

Project Site	State Land Use District ¹	County Zoning ¹	SMA	Current Land Use
Waikoloa Fuel Break	Agricultural Urban Rural	<ul style="list-style-type: none"> • Agricultural (A-5a) • Open District • Residential and Agricultural District (RA-1a) • Multiple-Family Residential District (RM-1.5) 	No	Located in an undeveloped area outside of Waikoloa town, directly adjacent to a residential community and other community development (e.g., post office)
Puako Fuel Break	Conservation Urban	<ul style="list-style-type: none"> • Agricultural (A-5a) • Resort-Hotel (V-1.25) • Single-Family Residential (RS-10) 	Yes	Located in an undeveloped area that is directly adjacent to a residential community; site was previously established as a fuel break as part of an emergency response to a 2007 wildfire
Kuainiho Dip Tank	Conservation	Open District	No	Located within an existing staging area that is actively used for wildfire suppression activities; Surrounding areas are undeveloped land and are part of the Pu`u Anahulu Game Management Area and the Pōhakuloa Training Area (PTA)
1859 Flow Dip Tank	Conservation	Open District	No	Located within open space area that is part of the Pu`u Anahulu Game Management Area; directly adjacent to area that is actively used for cattle ranching
Waikoloa Dip Tank	Agricultural	Open District	No	Located in open space area that is part of the Waikoloa Dryland Forest Initiative (conservation area for rare and endangered species)
Ponoholo Dip Tank	Agricultural	Agricultural (A-20a)	No	Located within an area actively used for cattle grazing
Lalamilo Dip Tank	Agricultural	Agricultural (A-5a)	No	Located within an area actively used for cattle grazing

SOURCE

¹ State of Hawai`i Office of Planning. 2013. *Hawai`i Statewide GIS Program*. Available online at: <http://planning.hawaii.gov/gis/>

3.6.2 Environmental Consequences

Alternative 1: No Action

Under the No Action Alternative, land use within the project sites would not be affected.

Alternative 2: Proposed Action

Implementation of the project would involve vegetation management within the two fuel break sites, and installation of a 12-foot diameter water tank within five dip tank sites across West Hawai`i. These measures are not expected to displace or otherwise affect existing land uses within and surrounding the project site. The proposed project is also expected to be consistent with the objectives of the underlying

state land use and county zoning designations; required land use approvals, as needed to comply with the applicable state and county land use regulations, would be obtained before construction. In particular, approval for activities within the conservation district and the SMA would be obtained by HWMO as needed from the State and the County of Hawai'i, respectively.

Alternative 3: Reduced Scope Alternative

Under the Reduced Scope Alternative, the impacts would be the same as those described for the Proposed Action.

3.7 Hazardous Materials

3.7.1 Existing Environment

Consideration of hazardous materials includes existing materials in or on the ground or in existing structures (e.g., asbestos or lead-based paint), soil or groundwater contamination (e.g., from a leaking underground storage tank [UST]), as well as materials that would be brought to or generated at the site in association with the project.

The project sites are comprised of undeveloped land, none of which is known to have previously supported any land uses that would have involved or generated hazardous materials. Although portions of West Hawai'i are known to have the potential for unexploded ordnance associated with past military training exercises, all of the measure sites have been previously swept for unexploded ordnance (E. Pickett, pers. comm., October 2012). Additionally, visual surveys of the measure sites and their surroundings did not suggest the use or presence of hazardous materials, including the presence of structures, equipment, or storage containers that might be indicative of hazardous material use. Therefore, based upon prior and present use of the project site, no hazardous substances or hazardous conditions are expected to be present within the project area.

3.7.2 Potential Impacts and Mitigation

Alternative 1: No Action

Under the No Action Alternative, the fuel break management and dip tank measures would not be implemented, and there would be no changes relative to hazardous materials within the project sites.

Alternative 2: Proposed Action

As described above, based on the previous and current land uses, no hazardous substances or hazardous conditions are expected to be present within the project sites.

Some hazardous, flammable, or other dangerous materials, such as fuels and lubricants, would be used for operation of equipment during construction and maintenance of the fuel break and dip tank measures. However, given the limited extent of construction and maintenance activities associated with project implementation, only a minimal amount of these materials would be present onsite. Construction personnel would utilize these materials with proper handling procedures. In addition, BMPs would be implemented, including daily inspection of vehicles and equipment for leaks and/or contamination, as needed to prevent spills or releases of hazardous or other dangerous materials. With implementation of these measures, no impacts are expected to occur relative to hazardous materials.

Alternative 3: Reduced Scope Alternative

Under the Reduced Scope Alternative, the impacts would be the same as those described for the Proposed Action.

3.8 Noise

3.8.1 Affected Environment

Ambient noise levels generally vary with land use throughout West Hawai'i. The project sites and surrounding areas are generally characterized by undeveloped open space, roadways, agricultural operations, and some residential areas. Ambient noise associated with these uses is typically related to both environmental factors and human use. In general, the most prominent source of ambient noise at most of the measure sites is vehicles traveling along nearby roadways.

Although adjacent residential communities contribute to ambient noise levels, they are also considered to be sensitive to high levels of ambient noise. Noise-sensitive receptors in the vicinity of the project area include the residential areas near the Waikoloa and Puako fuel break sites (within approximately 100 feet of the nearest homes), 1859 Flow dip tank site (approximately 0.4 mile to the nearest home), and Ponoholo dip tank site (approximately 0.1 mile to the nearest home).

3.8.2 Environmental Consequences

Alternative 1: No Action

Under the No Action Alternative, noise associated with the implementation of the proposed project would not occur and ambient noise levels would remain the same as existing conditions.

Alternative 2: Proposed Action

Implementation and maintenance of the fuel break and dip tank measures would be expected to result in temporary impacts to noise levels in the project area. The movement and use of construction equipment (e.g., delivery trucks, bulldozers, and handheld equipment) would temporarily increase noise levels in the areas immediately surrounding each site. However, the duration of equipment use is expected to be very short, lasting no more than approximately 5 days in each location.

To reduce noise levels, particularly for nearby residents, construction equipment would be maintained in accordance with the manufacturer's specifications. In addition, construction activities would be restricted to typical working hours, and unnecessary noise would be kept to a minimum. Given the short duration and temporary nature of the proposed activities, and with implementation of these measures, implementation of the proposed project is expected to have only a minor impact on noise.

Alternative 3: Reduced Scope Alternative

Under the Reduced Scope Alternative, the impacts would be the same as those described for the Proposed Action, except that there would be no construction noise at the Ponoholo or Lalamilo dip tank sites.

3.9 Public Services and Recreation

3.9.1 Affected Environment

Public Services and Utilities

Fire protection services for the island of Hawai'i are provided by the Hawai'i Fire Department. The fire department is primarily responsible for fire protection and suppression, pre-hospital emergency medical services, land and sea search and rescue, hazardous materials response, ocean safety, and fire prevention and public education for the County of Hawai'i. It has a variety of full-time fire/medic stations and volunteer fire stations, several of which are in the vicinity of the project sites, including those near Waimea and Waikoloa. Fire suppression activities are also provided by the DOFAW Fire Management Program, particularly within forest reserves, natural area reserves, wildlife and plant sanctuaries, public hunting areas and other wildland areas. The Hawai'i Fire Department and DOFAW

have established a cooperative agreement that specifies primary response and cooperative response areas for each agency.

Police services are provided by the Hawai'i Police Department, with nearby stations located in Kona (approximately 15 miles southwest of the Kuainiho dip tank site) and Kapa`au (approximately 10 miles north of the Ponoholo dip tank site).

Utility infrastructure relates to services such as electric, gas, telephone, sanitary sewer, domestic water, and solid waste management. Existing utilities provided within the County of Hawai'i include electricity, telecommunications, solid waste management, domestic water and wastewater, and storm water drainage facilities. No utility infrastructure (e.g., electrical or wastewater lines) is present within any of the project sites.

Recreation

The Kuainiho and 1859 Flow dip tank sites are both located within the Pu`u Anahulu Game Management Area, which is a designated area managed by DLNR for recreational hunting. Based on a review of the Na Ala Hele trail and access system (Na Ala Hele, 2000), no designated trails are known to occur within any of the project sites. The nearest trail to the project sites, as shown in the Na Ala Hele trail and access system is the Ala Kahakai Trail, located along the shoreline in the Puako area (separated from the fuel break site by Puako Beach Road).

As previously described, the archaeological survey identified a historic road at the Ponoholo site; this road is believed to be a portion of the Pu`u Hue Trail that connected Pu`u Hue Ranch with the town of Kawaihae; it was also used during World War II for civil defense purposes. It is also probable that the road follows the path of a prehistoric trail that once connected the agricultural fields to the north with the coastal settlement at Kawaihae. Although this feature may be historically significant, it is not known to be used for any recreational purposes at the current time.

3.9.2 Environmental Consequences

Alternative 1: No Action

Implementation of the No Action Alternative would not result in a change in current conditions and, therefore, no impacts to public services or utilities would occur. In the event of a wildfire, the proposed fuel breaks and dip tanks would not be available to support wildfire suppression activities, thus potentially increasing the burden on firefighters and emergency responders.

Alternative 2: Proposed Action

Implementation of the proposed project is not expected to affect public services through an interruption of service or by increasing demand (which would require expansion, addition of facilities or increased staffing). In fact, the proposed project is expected to result in potential benefits to public services by providing increased suppression capabilities for the Hawai'i Fire Department and DOFAW wildfire-fighting teams.

Relative to utilities, the proposed project would not impact any existing utility infrastructure, would not result in an interruption of utility service, or increase demand for utility service (thus required expansion or addition of new service). As such, the proposed project is not expected to affect utilities.

Relative to recreation, the only existing recreational activities or resources known to occur within any of the project sites is hunting within the Pu`u Anahulu Game Management Area at the Kuainiho and 1859 Flow dip tank sites. Within the Pu`u Anahulu Game Management Area, placement of the two dip tanks is not expected to displace or otherwise limit hunting activities. As such, the proposed project is not expected to affect recreational resources.

Alternative 3: Reduced Scope Alternative

Under the Reduced Scope Alternative, the impacts to utilities and recreation would be identical to those described for the Proposed Action. The beneficial impacts to public services would be less than those described for the Proposed Action because wildfire risk would not be reduced in the Kohala (Kahua) and Waimea areas.

3.10 Transportation and Traffic

3.10.1 Affected Environment

The roadway system in West Hawai'i includes a series of coastal and inland highways, connected by several major east-west roads, as well as a broad network of smaller, local roadways. The coastal highway consists of Queen Kaahumanu Highway (State Route 19), which turns into Akoni Pule Highway (State Route 270) north of Kawaihae. The inland highway includes Mamalahoa Highway, and Kohala Mountain Road (State Route 250) north of Waimea town. Near Waimea town, Mamalahoa Highway extends to connect with Akoni Pule Highway; Waikoloa Road also connects the coastal and inland highways further to the south. Several of the project sites, including those for the Kuainiho and 1859 Flow dip tanks, are located directly adjacent to these major roadways. The remaining measures sites would be accessed via smaller, local access roadways.

3.10.2 Environmental Consequences

Alternative 1: No Action

Under the No Action Alternative, changes to traffic and transportation would not occur.

Alternative 2: Proposed Action

As part of the proposed project, a variety of highways and local access roads would be used by construction vehicles, including those for transporting construction personnel and equipment delivery. At most, it is estimated that installation of each measure would require a 5-day work period, with up to two round-trip vehicle trips for construction personnel each day, plus three one-time equipment deliveries (delivery of bulldozer, dip tank, and other equipment), resulting in a maximum of 13 vehicle trips for installation of each measure. No lane closures or other modification of traffic patterns is anticipated. Maintenance of the fuel break sites would be conducted on an annual basis, requiring approximately six round-trip vehicle trips for each site (two vehicles per day for a 3-day work period). In general, the dip tanks would not require annual maintenance; however, a water truck would be used to fill the Kuainiho dip tank (no more than once per month), resulting in a maximum of 12 round-trip vehicles trips per year. In total, installation of the measures would require a maximum of 91 round-trip vehicle trips, and maintenance would require a maximum of 24 round-trip vehicle trips per year. As these vehicle trips would be spread out over time and across the network of various roadways in West Hawai'i, they would result in a minimal increase in roadway use, with a negligible impact on traffic conditions.

Alternative 3: Reduced Scope Alternative

Under the Reduced Scope Alternative, both temporary (construction-related) and permanent (maintenance-related) impacts would be slightly less than those described for the Proposed Action, because no activities would occur at the Ponohele or Lalamilo dip tank sites.

3.11 Visual Resources

3.11.1 Affected Environment

A field survey was performed in October 2012 to evaluate the visual characteristics of the project sites. In addition, available data sources and aerial photography were used to identify nearby visually sensitive areas, such as designated scenic highways, scenic trails, and scenic viewpoints. Based on the results of this analysis, no visually sensitive areas were identified in the vicinity of the project sites.

The two fuel break measures are located on the edge of the Waikoloa and Puako communities, as necessary to stop or slow the spread of wildfire toward those population centers. The Waikoloa fuel break is located at the far southern edge of Waikoloa town, along Pua Melia Street. The fuel break itself, and most of the directly adjacent land, is undeveloped and sparsely vegetated, due to a recent wildfire. Nearby development includes the post office and an apartment complex, both of which are located on Pua Melia Street; most of the development associated with Waikoloa town is located to the north, across Waikoloa Road. The Puako fuel break is located along the southern edge of the Puako community, with the eastern half directly adjacent to Puako Beach Road and the western half running behind privately owned homes; the area south of the fuel break is comprised of undeveloped, heavily vegetated land.

In general, the dip tank sites are located in open, undeveloped areas, many of which are used for agricultural purposes. The Kuainiho and 1859 Flow dip tank sites are located within the Pu`u Anahulu Game Management Area; this area is undeveloped and is comprised of relatively recent lava flows and herbaceous vegetation. The Kuainiho dip tank site is located just off Mamalahoa Highway, entirely within an existing staging area used for wildfire suppression activities. The 1859 flow dip tank site is located approximately 800 feet inland from the highway along an existing access road, within an area that is used for livestock grazing; it is approximately 0.4 mile northeast of the residential homes within the Pu`u Anahulu community association. The Waikoloa dip tank site is located with the WDFI site, which is actively managed for habitat conservation; the dip tank would be located in a relatively remote area more than a mile south of Waikoloa town. Both the Ponoholo and Lalamilo dip tank sites would be located on ranch lands that are activity used for cattle grazing. The Ponoholo site is located near the northern edge of the Kohala Ranch housing development; the dip tank would be located approximately 0.1 mile from the nearest home. The Lalamilo site dip tank at the southern edge of Waimea town, in an area that is used for a variety of agricultural purposes; the dip tank would be located approximately 0.3 mile from the nearest structure.

3.11.2 Environmental Consequences

Alternative 1: No Action

Under the No Action Alternative, the visual characteristics of the project area would remain the same as existing conditions. Vegetation within the fuel break sites would continue to grow without the management activities planned as part of the proposed project. A major wildfire has the potential to cause long-term, adverse impacts to visual resources.

Alternative 2: Proposed Action

The project sites do not include any visually sensitive areas, such as national scenic highways, scenic trails, designated scenic areas, or wild and scenic rivers. Implementation of the proposed project would involve minor modifications of the existing landscape, including vegetation removal and placement of the dip tanks; the visual impacts that are anticipated at each site are as follows:

- **Waikoloa Fuel Break:** As a result of a recent wildfire in this area, the existing vegetation within the fuel break is sparse. The remaining woody vegetation would be removed and herbaceous vegetation

will be maintained at a low height; these conditions are expected to be visually commensurate with the existing condition.

- **Puako Fuel Break:** The Puako fuel break was previously established as part of an emergency wildfire response; vegetation clearing to maintain the fuel break has already been conducted within the eastern portion of the site, which is located adjacent to Puako Beach Drive. As part of the proposed project, the vegetation clearing would continue along the western portion of the previously-established fuel break; this area is located behind privately owned homes and is generally not visible from any publically accessible areas.
- **Kuainiho Dip Tank:** This dip tank site is located adjacent to Mamalahoa Highway in an existing staging area used for wildfire suppression activities. Partial views of the dip tank may be possible from passing cars on the highway, but these views would be brief and would not affect any of the surrounding landscape views.
- **1859 Flow Dip Tank:** This dip tank site is located approximately 800 feet from Mamalahoa Highway and approximately 0.4 mile from the Pu`u Anahulu Community Association. The surrounding areas are actively used for livestock grazing, and placement of the dip tank is considered to be visually consistent with the surrounding land use. To minimize views, the dip tank was sited in a naturally depressed area, such that views of the dip tank from the highway and nearby homes are expected to be largely blocked by the topography. The associated pipeline would be installed at the ground surface along the existing access road, and is not expected to be visible from any of the surrounding areas.
- **Waikoloa Dip Tank:** This dip tank site is located within the WDFI site, and is more than one mile from the populated areas of Waikoloa town. The site is generally remote, and the dip tank is not anticipated to be visible from residences or other areas that are regularly accessed by the public.
- **Ponoholo Dip Tank:** This dip tank is located within an area that is actively used for livestock grazing, approximately 0.3 mile from the homes in the Kohala Ranch housing development. The dip tank and associated pipeline may be visible from nearby houses in Kohala Ranch, but are considered to be consistent with the surrounding agricultural land use.
- **Lalamilo Dip Tank:** This dip tank is located within an area that is actively used for livestock grazing. The dip tank and associated pipeline is considered to be consistent with the surrounding agricultural land use, and is not anticipated to be visible from residences or other areas that are regularly accessed by the public.

As described above, the proposed project would generally result in site conditions that would either not be readily visible from publically accessible areas and/or are visually commensurate with existing conditions. To minimize visual impacts associated with the fuel break sites, cleared vegetation will either be disposed offsite or chipped and spread, such that the fuel breaks will be maintained in a clean and debris-free condition. To minimize visual impacts associated with the dip tank sites, to the extent possible, the dip tanks were sited in areas that are not highly visible from populated areas. Furthermore, the dip tanks would be painted to blend with the surrounding environment. Given the nature of the changes relative to the existing environment, and with implementation of the measures described above, the proposed project is expected to result in minor impacts to visual resources.

Alternative 3: Reduced Scope Alternative

Under the Reduced Scope Alternative, the impacts would be the same as those described for the Proposed Action, except that no impacts to visual resources would occur at the Ponoholo or Lalamilo dip tank sites.

3.12 Socioeconomics and Environmental Justice

Environmental justice is the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. It would be achieved when everyone enjoys the same degree of protection from environmental and health hazards, equal access to the decision-making process, and the opportunity to have a healthy environment in which to live, learn, and work. EO 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*) directs federal agencies to ensure that their programs, policies, and activities do not have a disproportionately high and adverse human health and environmental effect on minority or low-income populations. This executive order also tasks federal agencies with ensuring that public notifications regarding environmental issues are concise, understandable, and readily accessible.

Demographic and economic variables can be used to define the socioeconomic conditions within a study area, thus providing a baseline that can be used to evaluate whether a proposed project would have a large or disproportionate impact on any one social or economic class of the population.

3.12.1 Affected Environment

To assess socioeconomic conditions relative to the project area, information about population size, ethnicity, employment and income was obtained from the U.S. Census Bureau (2010). To provide a basis for comparison, these data were assessed at the state, county and census tract levels. The project sites are all located within Hawai'i County; the respective census tracts are as follows:

- Waikoloa Fuel Break: Census Tract 217.04
- Puako Fuel Break: Census Tract 217.04
- Kuainiho Dip Tank: Census Tract 217.02
- 1859 Flow Dip Tank: Census Tract 215.02
- Waikoloa Dip Tank: Census Tract 217.04
- Ponoholo Dip Tank: Census Tract 218
- Lalamilo Dip Tank: Census Tract 217.02

In general, it is expected that the direct impacts of the proposed project would occur within the immediate vicinity of each measure site. However, in the event of a wildfire, it is expected that the increased suppression capabilities would benefit a larger area, including that represented by these census tracts. A basic overview of the demographic and socioeconomic conditions within each of the census tracts is provided in Table 5, followed by a brief description of each.

Table 5
Demographic and Socioeconomic Data for Hawai`i County and Select Census Tracts (2010)

	United States	State of Hawai`i	County of Hawai`i	Census Tract 215.02	Census Tract 217.02	Census Tract 217.04	Census Tract 218
Population Statistics							
Total Population	308,745,538	1,360,301	185,079	4,844	9,540	8,087	6,322
Median age	37.2	38.6	40.9	43.4	37.8	40.4	43.7
Race and Ethnicity¹							
White	74.8%	41.5%	54.8%	68.0%	57.2%	64.8%	56.1%
Black or African American	13.6%	2.9%	1.6%	0.9%	0.8%	1.6%	0.7%
American Indian and Alaska Native	1.7%	2.5%	3.9%	3.3%	3.2%	2.9%	2.9%
Asian	5.6%	57.4%	44.8%	29.4%	42.6%	29.9%	50.0%
Native Hawaiian and other Pacific Islander	0.4%	26.2%	33.8%	29.7%	42.0%	25.9%	37.2%
Hispanic or Latino	16.3%	8.9%	11.6%	12.1%	8.9%	9.3%	14.2%
Other	7.0%	2.5%	2.9%	3.5%	1.8%	3.6%	3.9%
Employment and Income							
Unemployed	7.9%	5.6%	7.7%	7.6%	5.2%	5.3%	5.1%
Median household income	\$51,914	\$66,420	\$54,996	\$65,256	\$77,813	\$76,930	\$56,574
Per capita income	\$27,334	\$28,882	\$26,194	\$34,417	\$32,835	\$41,067	\$24,789
Population below poverty level ²	12.1%	8.8%	13.0%	10.3%	3.5%	6.2%	6.6%

NOTES:

¹ The percentage of each race includes both those persons who reported a single race and those who reported a combination with one or more other races.

² Poverty levels are reported for individuals 18 years of age and over.

As summarized in Table 5, Hawai`i County reported a population of approximately 185,079 people, with the populations in the respective census tracts ranging from 4,844 (Census Tract 215.02) to 9,540 (Census Tract 217.02). The median age in the census tracts ranges from 37.8 to 43.7, as compared to 40.9 within the larger county.

The census data indicate that approximately 71 percent of Hawai`i County's population is of a single race, with approximately 34 percent Caucasian, 22 percent Asian, and 12 percent native Hawaiian or Pacific Islander; the remaining population is reported to be of two or more races. These percentages are similar to those within the respective the census tracts. The percentage of each race (alone or in combination with one or more other races) represented in the various census tracts, as compared to those at the county and state level, is listed in Table 5. In general, these values indicate that the ethnicity of the population within the census tracts is comprised of a larger percentage of Caucasians and a smaller percentage of Asians and African Americans than at the county and state level; the percentage of other minority groups, including Hispanic and American Indian and Alaska Natives is generally commensurate. The percentage of the population comprised of native Hawaiians (and other Pacific Islanders) is relatively comparable, with some census tracts slightly higher and some slightly lower.

As shown in Table 5, the median household income and average per capita income within the census tracts is similar or greater than that at the county and state levels. The unemployment rate within the

census tracts ranges from 5.1 percent to 7.6 percent, which is commensurate with that at the county and state levels (7.7 percent and 5.6 percent, respectively). Approximately 13 percent of the population of Hawai'i County lives below the poverty level compared to the national average of approximately 12 percent; the poverty level within the census tracts ranges from 3.5 to 10.3 percent.

3.12.2 Environmental Consequences

Alternative 1: No Action

Under the No Action Alternative, there are no impacts in regards to socioeconomics or environmental justice.

Alternative 2: Proposed Action

Factors considered in determining whether the proposed project would affect environmental justice included the extent or degree to which its implementation would change any social, economic, physical, environmental, or health conditions so as to disproportionately and adversely affect any particular low-income or minority group. Based on the data listed in Table 5 and as described above, the project area does not appear to include a disproportionately high percentage of a minority or economically disadvantaged population. As such, the proposed project is not expected to result in any environmental justice impacts, in compliance with EO 12898.

Alternative 3: Reduced Scope Alternative

Under the Reduced Scope Alternative, the impacts would be the same as those described for the Proposed Action.

3.13 Cumulative Impacts

Cumulative impacts are those impacts that result from the incremental impact of the proposed project when added to other past, present, and reasonably foreseeable future projects, regardless of the person or agency that undertakes the other projects. Principles of cumulative impact analysis in the CEQ guide *Considering Cumulative Effects under the National Environmental Policy Act* (CEQ, 1997) states: "for cumulative effects analysis to help the decision maker and inform interested parties, it must be limited through scoping to effects that can be evaluated meaningfully."

The potential for cumulative impacts to the environment from the proposed project was evaluated by reviewing other projects and activities in the region that could affect the same environmental resources; in particular, this evaluation was based on a review of the Office of Environmental Quality Control (OEQC) Online Library of environmental review documents. Actions that were considered include those projects that were recently completed, are currently underway, or are expected programmed to occur in the foreseeable future. No projects were identified within or immediately adjacent to the project area. Projects identified in the vicinity of the project area include the following:

- **Waikoloa Dry Forest Recovery Project:** This recently-completed action included construction of a fence and ungulate removal within a 275-acre area, as part of a long-term conservation effort to restore native dryland forest around a remnant patch of lowland *wiliwili* forest habitat near Waikoloa Village. The Waikoloa dip tank would be within the fenced area.
- **Saddle Road:** The Hawai'i Department of Transportation and the Federal Highway Administration are currently completing the western section of Saddle Road, extending approximately 10 miles east from the intersection with Mamalahoa Highway (approximately 2 miles east of the Kuainiho dip tank site). This section of roadway is the third of four stages of the improvement and realignment of the old Saddle Road between Hilo and Kona.

- Pu`ukapu Hybrid Water System: The Department of Hawaiian Home Lands (DHHL) recently completed water system improvements to provide potable water for domestic and stock watering use for 184 ranch lots in the southern portion of the Pu`ukapu Hawaiian Home Lands subdivision, which is approximately 4 miles east of the Lalamilo dip tank site. The project included installation of water pipelines, two reservoirs, four tanks for fire-fighting purposes and two booster stations, and a 12,000-gallon pressure-breaker tank.
- Ka`ohe Fire Diptank Project: In July 2013, DOFAW published a Final Environmental Assessment and declared a FONSI for construction of water tanks and related infrastructure at two sites in the Ka`ohe Game Management Area, which is approximately 12 miles east of the 1859 Flow dip tank site. Similar in purpose to the proposed project, the Ka`ohe Fire Diptank Project is intended to provide support to the DOFAW Fire Management Team with fire-fighting activities.
- Pōhakuloa Training Area: In 2011, the U.S. Army published a Notice of Availability of a Draft Programmatic Environmental Impact Statement (PEIS) for the Modernization of Training Infrastructure and Construction and Operation of an Infantry Platoon Battle Area at PTA. The Draft PEIS included a programmatic-level analysis of future modernization of ranges, training and support infrastructure. In 2013, the Army issued a Final Environmental Impact Statement, which addresses the construction and operation of an Infantry Platoon Battle Course (IPBC) at the training area. The IPBC would be located approximately 15 miles southeast of the Kuainiho dip tank site.

Cumulative impacts result from implementation of multiple projects that have individually minor but collectively significant impacts that take place over a period of time. As described in this EA, implementation of the Proposed Action is not expected to affect the following resources: (1) biological resources, (2) hazardous materials, (3) land use, (4) public services and recreation, (5) transportation and traffic, and (6) socioeconomics and environmental justice. Therefore, the proposed project would not contribute to cumulative impacts for these resources. Those resources that could be impacted by the Proposed Action include: (1) geology and soils, (2) air quality and greenhouse gas emissions, (3) water resources, (4) noise, (5) visual resources, and (6) historic properties. Implementation of the Reduced Scope Alternative is expected to affect the same resources except that historic properties are not expected to be impacted. The adverse impacts to these resources are expected to be very limited in scale and geographic extent, and measures would be implemented to avoid and minimize the impacts of the Proposed Action and the Reduced Scope Alternative; it is expected that the other projects under consideration include similar measures to minimize and mitigate potential impacts. As such, it is not expected that the negligible and minor impacts associated with the Proposed Action or Reduced Scope Alternative would combine with those of other projects in the vicinity to create substantial adverse cumulative impacts. It is possible that in combination with the Ka`ohe Fire Diptank Project, there would be a cumulative benefit related to increase fire suppression capabilities in West Hawai`i.

3.14 Summary of Impacts and Mitigation

Based on the information presented above, Table 6 summarizes the potential impacts associated with the proposed project, and the measures that would be implemented to avoid or minimize those impacts. Impacts and avoidance or minimization measures specific to the Proposed Action or the Reduced Scope Alternative are noted.

Table 6
Summary of Impacts and Avoidance and Minimization Measures

Resource Category	Significant Impact	Insignificant Impact	No Impact	Activities to Avoid or Minimize Impact
Geology, Soils and Seismicity		x		<p>For both fuel break and dip tank measures, ground disturbance would be limited to only those areas required for implementation. Within the fuel break sites, other measures to further reduce the potential for erosion include:</p> <ul style="list-style-type: none"> • Herbaceous vegetation within the Waikoloa fuel break would be allowed to grow but would be trimmed to a minimal height above the ground surface; trimmed materials would be chipped and spread onsite. • Approximately 18 inches of mulch would be placed within the Puako fuel break.
Air Quality and Greenhouse Gas Emissions		x		<p>To minimize the emissions associated with the proposed project, the following BMPs would be implemented:</p> <ul style="list-style-type: none"> • Proper maintenance of all construction equipment and vehicles in accordance with the manufacturer’s specifications • Minimizing the duration and extent of ground disturbing activities to the extent practicable
Water Resources		x		<p>Measures to minimize the potential for indirect water quality impacts include:</p> <ul style="list-style-type: none"> • Disturbance of soil would be minimized during periods of heavy rain • Implementation would be phased to minimize the extent of soil disturbance at any given time • Vehicles and equipment would be inspected for leaks and/or contamination on a daily basis • In the event that fuel or lubricants from vehicles or equipment spill or leak, cleaning in a timely manner and disposal at an approved site <p>To minimize the potential for impacts related to water supply, water use would be limited to only those volumes required for filling and maintaining the dip tanks for wildfire suppression activities.</p>
Biological Resources		x		<p>Although no federally listed species or critical habitat have been documented within the project sites, the following measures would be implemented to avoid and minimize potential impacts to the Blackburn sphinx moth, Hawaiian hawk, Hawaiian hoary bat and <i>uhiuhi</i>, should they occur:</p> <ul style="list-style-type: none"> • The project area would be inspected by a qualified biologist before project implementation; if potential signs of Blackburn’s sphinx moth are found, SCD and FEMA would be notified such that FEMA could re-consult with the USFWS. • Vegetation clearing within the Puako fuel break site would be restricted to outside the Hawaiian hawk breeding season (March through September) and bat birthing and pup rearing season (June through September). • Exclusion fencing would be installed and maintained around the <i>uhiuhi</i> tree near the Waikoloa dip tank site throughout the construction period.
Archaeological and Cultural Resources		x ²	x ³	<p>The following measures would be implemented to avoid and minimize potential impacts to archaeological and cultural resources:</p> <ul style="list-style-type: none"> • If the Proposed Action is selected, FEMA would continue to consult with SHPO regarding the Ponoaholo dip tank site until FEMA fulfills its responsibilities under the Programmatic Agreement and NHPA Section 106. • If the Proposed Action is selected, FEMA would continue to consult with OHA and SHPO regarding the Lalamilo dip tank site until FEMA fulfills its responsibilities under the Programmatic Agreement and NHPA Section 106.
Land Use			x	No impacts are anticipated.

² Proposed Action

³ Reduced Scope Alternative

Resource Category	Significant Impact	Insignificant Impact	No Impact	Activities to Avoid or Minimize Impact
Hazardous Materials			x	Measures to avoid and minimize release of hazardous materials include use of proper handling procedures, and daily inspection of vehicles and equipment for leaks and/or contamination.
Noise		x		To reduce construction-related noise that could be audible to nearby residents, the following measures would be implemented: <ul style="list-style-type: none"> • The construction equipment would be maintained in accordance with the manufacturer's specifications. • Construction activities would be restricted to typical working (daytime) hours. • Unnecessary noise would be kept to a minimum.
Public Services and Recreation			x	No impacts are anticipated.
Transportation and Traffic			x	Impacts to transportation and traffic are expected to be negligible.
Visual Resources		x		To minimize visual impacts associated with the fuel break sites, cleared vegetation would either be disposed offsite at a permitted location or chipped and spread onsite, such that the fuel breaks would be maintained in a clean and debris-free condition. To minimize visual impacts associated with the dip tank sites, to the extent possible, the dip tanks were sited in areas that are not highly visible from populated areas. In addition, the dip tanks would be painted to blend with the surrounding environment, to further minimize any visual impacts.
Socioeconomics and Environmental Justice			x	No socioeconomic or environmental justice impacts are anticipated.
Cumulative Impacts		x		When considered in combination with other actions, the proposed project could potentially have cumulative impacts to geology and soils, air quality, water resources, hazardous materials, noise, and visual resources. However, avoidance and minimization measures would be implemented, such that cumulative impacts would be negligible or minor.

4.0 Public Participation and Agency Coordination

FEMA is the federal agency responsible for conducting the NEPA compliance process for the proposed project. It is the federal agency's responsibility to expedite the preparation and review of NEPA documents in a way that is responsive to the needs of the public while meeting the spirit and intent of NEPA and complying with all NEPA provisions.

The proposed project is based on the work conducted in support of the Northwest Hawai'i Community Wildfire Protection Plan, which involved a variety of community organizations, federal agencies, and private landowners in the process of identifying measures to reduce wildfire risk. Through the NEPA process, and in compliance with other applicable federal regulations (e.g., ESA and NHPA), FEMA also consulted with various agencies, NHOs and other parties, including:

- SCD
- HWMO
- Waikoloa Village Association
- Puako Community Association
- Waikoloa Dryland Forest Initiative
- Ponoholo Ranch
- Private Ranchers
- USFWS
- DOFAW
- SHPO
- Advisory Council on Historic Preservation
- Hui Mālama I Na Kūpuna O Hawai'i Nei
- Office of Hawaiian Affairs
- Hawai'i Island Burial Council
- Na Ala Hele
- Royal Order of Kamehameha I
- Association of Hawaiian Civic Clubs
- Kona Hawaiian Civic Club
- KAHEA
- Kailapa Community Association
- Pu`u Anahulu Community Association

Input obtained through consultation to date is reflected in the Draft EA. FEMA will circulate the Draft EA for a 30-day public comment period; the document will be made available at FEMA's website, the Office of Environmental Quality Control (OEQC) Environmental Notice, and local repositories. Notification of the Draft EA availability will be made via direct mailing to known interested parties (Appendix F), FEMA's

website, and publication in local newspaper(s). During the public comment period, FEMA will accept written comments on the Draft EA addressed to:

FEMA Region IX
Environmental and Historic Preservation Office
Attn: Draft EA for HMGP 1640-7
1111 Broadway, Suite 1200
Oakland, California 94607
Email: fema-rix-ehp-documents@dhs.gov

At the end of the comment period, FEMA will review the comments and consider them in the decision-making process before notifying the public of its final determination (either a FONSI or a notice that an EIS will be prepared).

5.0 List of Preparers

Alessandro Amaglio (FEMA Region IX), Regional Environmental Officer

G. Morgan Griffin (FEMA Region IX), Deputy Regional Environmental Officer

Gen Tamura (FEMA Region IX), Project Monitor

John Paul Henderson (FEMA Region IX), Regional Counsel

Hank Boucher (CDM Smith), Project Manager

Lisa Kettley (CH2M HILL), Lead Environmental Planner

Darren Bishop (CH2M HILL), Environmental Planner

Heather Perry (CH2M HILL), GIS Specialist

Ron Terry (Geometrician Associates), Lead Biologist

Alan Haun (Haun and Associates), Lead Archaeologist

6.0 References

- Bruegmann, M. M. 1996. Hawai'i's dry forests. *Endangered Species Bulletin* 11:26-27.
- CEQ (Council on Environmental Quality). 1997. *Considering Cumulative Effects under the National Environmental Policy Act*.
- CEQ (Council on Environmental Quality). 2010. Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas Emissions.
- Cordell, S. M. McClellan, Y.Y. Carter, and L.J. Hadway. Towards restoration of Hawaiian tropical dry forests: the Kaupulehu outplanting programme. *PACIFIC CONSERVATION BIOLOGY* Vol. **14**: 279–284. Surrey Beatty & Sons, Sydney. 2008.
- CWRM (State of Hawai'i, Commission on Water Resources Management). 2008. *Hawai'i Water Plan. Water Resource Protection Plan*. Prepared by: Wilson Okamoto Corporation. June.
- DLNR (Department of Land and Natural Resources). 2005. Hawai'i's Comprehensive Wildlife Conservation Strategy. 2005.
- DLNR (Department of Land and Natural Resources). 2013. National Flood Insurance Program for Hawai'i State. Available online at: <http://www.hidlnr.org/eng/nfip/>
- Fletcher, C.H., E.E. Grossman, Richmond, B.M., and A.E. Gibbs. 2002. *Atlas of Natural Hazards in the Hawaiian Coastal Zone*. U.S. Geological Survey. Prepared in cooperation with University of Hawai'i, State of Hawai'i Office of Planning, and National Oceanic and Atmospheric Administration.
- Gagne and Cuddich. 1990. "Vegetation," pp. 45-114 in W.L. Wagner, D.R. Herbst, and S.H. Sohmer, eds., *Manual of the Flowering Plants of Hawai'i*. 2 vols. Honolulu: University of Hawai'i Press.
- HDOH (State of Hawai'i Department of Health). 2011. Clean Air Branch, Annual Summary 2010 Hawai'i Air Quality Data. Available online at: http://health.hawaii.gov/cab/files/2013/05/aqbook_2010.pdf. Accessed June 5, 2013.
- Heliker, C. 1991. Volcanic and seismic hazards on the Island of Hawai'i. USGS General Interest Publication. U.S. Department of the Interior, U. S. Geological Survey.
- HWMO (Hawai'i Wildfire Management Organization). 2007. *Community Wildfire Protection Plan for Northwest Hawai'i Island*. Prepared by Denise Laitinen.
- NRCS (U.S. Department of Agriculture, Natural Resources Conservation Service). 2013. Major Land Resource Areas. <http://soils.usda.gov/survey/geography/mlra>. Accessed May 2012.
- Oki, Delwyn. Geohydrology and Numerical Simulation of the Groundwater System of Kona, Island of Hawai'i. USGS Water Resources Investigations Report 99-4073. <http://pubs.er.usgs.gov/publication/wri994073>
- Pickett, E. 2012. Personal communication with FEMA regarding clearance of unexploded ordnance at each measure site. October.
- Sato, H.H., W. Ikeda, R. Paeth, R. Smythe, and M. Takehiro, Jr. 1973. *Soil Survey of the Island of Hawaii, State of Hawaii*. U.S. Department of Agriculture, Soil Conservation Service and University of Hawaii Agricultural Experiment Station. Washington, D.C.: Government Printing Office.

- USACE (U.S. Army Corps of Engineers). 1987. *Wetland Delineation Manual*.
- U.S. Bureau of Labor Statistics. 2013. County Employment and Wages in Hawai'i - First Quarter 2012. <http://www.bls.gov/ro9/qcewhi.htm>. Accessed May 2012.
- U.S. Census Bureau. 2010. State & County Quick Facts (Hawai'i County, Hawai'i). <http://quickfacts.census.gov/qfd/states/15/15001>. Accessed May 2013.
- U.S. Department of Agriculture, Soil Conservation Service and University of Hawai'i Agricultural Experiment Station. 1973. *Soil Survey of the Island of Hawai'i, State of Hawai'i*. Washington, D.C.: Government Printing Office.
- U.S. Department of Transportation. 2006. Federal Highway Administration (FHWA), Construction Noise Handbook. FHWA-HEP-06-015.
- USEPA (U.S. Environmental Protection Agency). 1974. Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety. Office of Noise Abatement and Control. EPA 550/9-74-004. March 1974. <http://www.nonoise.org/epa/Roll1/roll1doc11.pdf>. Accessed May 2012.
- Wolfe, E., and J. Morris. 2001. Geological Map of the Island of Hawai'i. U.S. Department of the Interior. U.S Geological Survey.