DAVID Y. IGE
Governor

SHAN S. TSUTSUI
Lt. Governor



JAMES J. NAKATANI
Executive Director

STATE OF HAWAII
**AGRIBUSINESS DEVELOPMENT CORPORATION**
235 S. Beretania Street, Room 205
Honolulu, HI 96813
Phone: (808) 586-0186 Fax: (808) 586-0189

January 4, 2017

Director Scott Glenn
Office of Environmental Quality Control
Department of Health, State of Hawaii
235 S. Beretania St., Room 702
Honolulu, HI 96813

Dear Director Glenn:

With this letter, the Agribusiness Development Corporation hereby transmits the draft environmental assessment and anticipated finding of no significant impact (DEA-AFONSI) for the Waiahole Reservoir System–Reservoir 155 & 255 Improvement Project situated at Tax Map Keys: 9-2-01-01 and 9-4-03-01 in the Ewa District on the island of Oahu for publication in the next available edition of the Environmental Notice.

Enclosed is a completed OEQC Publication Form, one copy of the DEA-AFONSI, an Adobe Acrobat PDF file of the same, and an electronic copy of the publication form in MS Word. Simultaneous with this letter, we have submitted the summary of the action in a text file by electronic mail to your office.

Please provide copies of all correspondence and inquiries relating to the draft environmental assessment to Derek Chow at derek.j.chow@usace.army.mil. Written correspondence can be sent to United States Army Corp of Engineers, Fort Shafter, Building 230, Honolulu, HI 96858; Attn: Derek Chow, Chief, Civil & Public Works Branch.

If there are any questions, please call Ken Nakamoto at 586-0087.

Sincerely,

James J. Nakatani
Executive Director

Enclosure

#17-294

# AGENCY
## PUBLICATION FORM

| | | |
|---|---|---|
| Project Name: | Waiahole Reservoir System Reservoirs 155 and 225 Improvements Project | |
| Project Short Name: | (please use no more than five succinct words; count not to include document status, e.g., EA)<br><br>Waiahole Reservoir System Improvements Project | |
| HRS §343-5 Trigger(s): | Propose the use of state or county lands or the use of state or county funds. | |
| Island(s): | O'ahu | |
| Judicial District(s): | Ewa | |
| TMK(s): | TMK (1) 9-2-001: Parcel 001, TMK (1) 9-4-003: Parcel 001 | |
| Permit(s)/Approval(s): | Clean Water Act Section 401 Water Quality Certification, NPDES General Construction Permit; Grading, City and County of Honolulu Department of Planning and Permitting Grading, Grubbing and Stockpiling Permit | |
| Proposing/Determining Agency: | Proposing/Determining Agency: State of Hawaii, Agribusiness Development Corporation | Co-Proponent: U.S. Army Corps of Engineers |
| *Contact Name, Email, Telephone, Address* | Ken Nakamoto<br>ken.t.nakamoto@hawaii.gov<br>(808) 586-0087<br><br>235 S. Beretania St., Room 205<br>Honolulu, Hawai'i 96813 | Derek Chow<br>derek.j.chow@usace.army.mil<br>(808) 835-4026<br><br>Fort Shafter, Building 230<br>Honolulu, Hawai'i 96858 |
| Accepting Authority: | (for EIS submittals only) | |
| *Contact Name, Email, Telephone, Address* | | |
| Consultant: | HDR, Inc. | |
| *Contact Name, Email, Telephone, Address* | Linda Fisher<br>linda.fisher@hdrinc.com<br>(916) 817-4962<br><br>1132 Bishop Street, Suite 1200<br>Honolulu, Hawai'i 96813 | |

| **Status (select one)** | **Submittal Requirements** |
|---|---|
| __X__ DEA-AFNSI | Submit 1) the proposing agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEA, and 4) a searchable PDF of the DEA; a 30-day comment period follows from the date of publication in the Notice. |
| ____ FEA-FONSI | Submit 1) the proposing agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; no comment period follows from publication in the Notice. |
| ____ FEA-EISPN | Submit 1) the proposing agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; a 30-day comment period follows from the date of publication in the Notice. |
| ____ Act 172-12 EISPN ("Direct to EIS") | Submit 1) the proposing agency notice of determination letter on agency letterhead and 2) this completed OEQC publication form as a Word file; no EA is required and a 30-day comment period follows from the date of publication in the Notice. |
| ____ DEIS | Submit 1) a transmittal letter to the OEQC and to the accepting authority, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEIS, 4) a searchable PDF of the DEIS, and 5) a searchable PDF of the distribution list; a 45-day comment period follows from the date of publication in the Notice. |

| | |
|---|---|
| ____ FEIS | Submit 1) a transmittal letter to the OEQC and to the accepting authority, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEIS, 4) a searchable PDF of the FEIS, and 5) a searchable PDF of the distribution list; no comment period follows from publication in the Notice. |
| ____ FEIS Acceptance Determination | The accepting authority simultaneously transmits to both the OEQC and the proposing agency a letter of its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS; no comment period ensues upon publication in the Notice. |
| FEIS Statutory Acceptance | Timely statutory acceptance of the FEIS under Section 343-5(c), HRS, is not applicable to agency actions. |
| ____ Supplemental EIS Determination | The accepting authority simultaneously transmits its notice to both the proposing agency and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that a supplemental EIS is or is not required; no EA is required and no comment period ensues upon publication in the Notice. |
| ____ Withdrawal | Identify the specific document(s) to withdraw and explain in the project summary section. |
| ____ Other | Contact the OEQC if your action is not one of the above items. |

**Project Summary**

Provide a description of the proposed action and purpose and need in 200 words or less.

Reservoirs 155 and 225, within the Waiahole Ditch Irrigation System, have lost holding capacity due to years of sediment accumulation. Both reservoirs are unlined, earthen storage basins used to store irrigation water for adjacent farmers. The 1999 Dam Safety Inspection of Reservoir 155 Report summarized a Phase 1 inspection by USACE to determine the current state of the reservoir in meeting the State of Hawaii criteria. The results showed deficiencies associated with erosion at the stop logs, intakes, and spillway, excessive vegetation on the slopes and crown, and oversteepened slopes. Reservoir 225 is assumed to have similar deficiencies as Reservoir 155 due to the proximity, size, and common history of both reservoirs. In order to increase safety and reduce risk of failure, the Proposed Action would lower the reservoirs to eliminate erosion sites at the dam crest, remove vegetation and fill any existing holes with compacted fill, and flatten the slopes. The Proposed Action would include excavation of the existing embankments, removal of sediment from the interior of the reservoirs, reconstruction of the embankments, reduction in water storage capacities of both reservoirs, and lining the reservoirs to reduce water losses and leakage in the system.

To request copies of, or to provide comments on the Draft EA and AFNSI, please contact: Derek Chow at derek.j.chow@usace.army.mil. Written correspondence can be sent to US Army Corps of Engineers, Fort Shafter, Building 230, Honolulu, Hawaii 96858; Attn: Derek Chow, Chief, Civil & Public Works Branch.

# Draft Environmental Assessment

for

## Waiahole Reservoir System Reservoirs 155 and 225 Improvements Project O'ahu, Hawai'i

Prepared for:

**U.S. Army Corps of Engineers**

December 2016

To request copies of, or to provide comments on the Draft EA and AFNSI, please contact:

Derek Chow
Chief, Civil & Public Works Branch
US Army Corps of Engineers
Fort Shafter, Building 230
Honolulu, Hawaii 96858
Derek.j.chow@usace.army.mil

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# Draft Environmental Assessment

For

## Waiahole Reservoir System Reservoirs 155 and 225 Improvements Project
## O'ahu, Hawai'i

Prepared for:

**U.S. Army Corps of Engineers**

Prepared by:

**HDR, Inc.**
1132 Bishop Street, Suite 1200
Honolulu, HI 96813-2822

December 2016

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**Anticipated Finding of No Significant Impact for the U.S. Army Corps of Engineers**

**Waiahole Reservoir System – Reservoirs 155 and 225 Improvements Project,**

**December 2016**

AUTHORITY: Pursuant to the National Environmental Policy Act (NEPA), as amended (42 USC 4347, Section 102 (2)(C), and the Hawaii Environmental Policy Act (HEPA), Chapter 343 of the Hawaii Revised Statutes (HRS); the implementing regulations issued by the Council on Environmental Quality (CEQ) (40 CFR 1500-1508); and Environmental Analysis of Army Actions (32 CFR 651), the Department of the Army gives notice that an Environmental Assessment (EA) has been prepared for proposed Waiahole Reservoir System – Reservoirs 155 and 225 Improvements Project, Ewa District, O'ahu, Hawaii situated at TMK (1) 9-2-001:001 [por.] and (1) 9-4-003:001 [por.]), in the City and County of Honolulu on the island of O'ahu. This draft EA was prepared to comply with both the NEPA and HEPA process in determining whether or not the Proposed Action would have significant adverse effects on the human environment.

PROPOSED ACTION: Reservoirs 155 and 225, within the Waiahole Ditch Irrigation System, have lost holding capacity due to years of sediment accumulation. Both reservoirs are unlined, earthen storage basins used to store irrigation water for adjacent farmers. The 1999 Dam Safety Inspection of Reservoir 155 Report summarized a Phase 1 inspection by the U.S. Army Corps of Engineers (USACE) to determine the current state of the reservoir in meeting the State of Hawaii criteria. The results showed deficiencies associated with erosion at the stop logs, intakes, and spillway, excessive vegetation on the slopes and crown, and oversteepened slopes. In order to increase safety and reduce risk of failure, the Proposed Action would lower the reservoir to eliminate erosion sites at the dam crest, remove vegetation and fill any existing holes with compacted fill, and flatten the slopes. Reservoir 225 is assumed to have similar deficiencies as Reservoir 155 due to the proximity, size, and common history of both reservoirs; the Proposed Action includes the same recommendations for Reservoirs 155 and 225. The Proposed Action would include excavation of the existing embankments, removal of sediment from the interior of the reservoirs, reconstruction of the embankments, reduction in water storage capacities of both reservoirs, and lining the reservoirs to reduce water losses and leakage in the system.

ALTERNATIVES CONSIDERED: The two alternatives considered are the Proposed Action and the No Action Alternative. The No Action Alternative would consist of keeping the reservoir embankments in their current alignment and making no improvements. The No Action Alternative would not reduce the risk of failure of the embankment slopes, and would provide no additional protection for populations potentially impacted in the event of a failure. In addition, the No Action Alternative would not correct the identified deficiencies at both reservoirs associated with erosion at the stop logs, intakes, and spillway, excessive vegetation on the slopes and crown, and oversteepened slopes.

SUMMARY OF FINDINGS: This Draft EA analyzes the potential impacts resulting from implementation of the Proposed Action. The Proposed Action would result in less than significant impacts for the following resource areas analyzed in the draft EA: geology and soils; drainage and flooding; surface water, groundwater, and water quality; biological resources; historic and cultural resources; land use and agriculture; aesthetics; hazardous, toxic, and radioactive wastes; noise; air quality; long-term socioeconomics; public services and utilities; and traffic and circulation. Mitigation measures, and standard construction best management practices (BMPs), where applicable, have been incorporated into the Proposed Action to ensure that impacts remain less than significant. The Proposed Action would result in no impacts for climate and precipitation; and recreational resources. The Proposed Action would result in short-term, beneficial impacts for socioeconomics.

DECISION: Based on information compiled and analyzed during preparation of the EA, the U.S. Army Corps of Engineers finds that the Proposed Action would not result in significant adverse impacts on either the man-made or natural environment. Therefore, an environmental impact statement will not be required.

PUBLIC COMMENTS: A notice of availability of the Draft EA and Anticipated Finding of No Significant Impact (AFNSI) will be published in the State of Hawai‘i Department of Health, Office of Environmental Quality Control publication, *The Environmental Notice*, on January 23, 2017, followed by a 30-day comment period (January 23, 2017 through February 22, 2017). During this period, the USACE will accept public comments on the Draft EA and AFNSI. Copies of the Draft EA and AFNSI can be obtained by contacting:

Derek Chow
Chief, Civil & Public Works Branch
US Army Corps of Engineers
Fort Shafter, Building 230
Honolulu, Hawaii 96858
Derek.j.chow@usace.army.mil.

Copies of the Draft EA and AFNSI are also available for review at the following libraries:

| | |
|---|---|
| Ewa Beach Public and School Library<br>91-950 North Road,<br>Ewa Beach, HI 96706 | Kapolei Public Library<br>1020 Manawai Street<br>Kapolei, HI 96707 |
| Mililani Public Library<br>95-450 Makaimoimo Street<br>Mililani, HI 96789 | Wahiawa Public Library<br>820 California Avenue<br>Wahiawa, HI 96786 |

Comments on the Draft EA and the AFNSI should be submitted to the Chief, Civil & Public Works Branch at the mailing address or email addresses above. Following the close of the comment period, comments will be considered, addressed, and incorporated where applicable into the EA or FNSI.

Approved By:

James D. Hoyman
Lieutenant Colonel, U.S. Army
District Engineer

## Executive Summary

In light of recent increased emphasis on dam safety, the United States Army Corps of Engineers (USACE) is proposing to improve the safety and operation of two reservoirs (Reservoir 155 and Reservoir 225) along the existing Waiahole Ditch Irrigation System in Oahu (Proposed Action, or project). In accordance with the Hawaii Dam Safety Act of 2007, the State of Hawaii Department of Land and Natural Resources (DLNR) has jurisdiction over the enlargement, repair, and alteration of jurisdictional dams, in order to protect the health, safety, and welfare of the citizens of the State of Hawaii by reducing the risk of failure of the dams and reservoirs. The USACE is working with the DLNR to ensure that all proposed modifications are consistent with state law.

The Proposed Action is authorized under Section 1(a)(4) of the Consolidated Appropriations Act of 2001 (Public Law 106-554, Appendix D, Chapter 5 (114 STAT 2763A-190)), which authorized and directed use of $2 million of appropriated Construction General Funds to initiate design and construction of the project. The 905(b) Report was approved by Headquarters USACE on 12 February 2003, allowing implementation of design and construction of repairs and rehabilitation of publicly owned irrigation systems to the extent of the funds appropriated.

The Waiahole Ditch Irrigation System was constructed between 1912 and 1916 to irrigate sugar cane fields on the western side of Oahu, and consists of a 26 mile-long transmission system of ditches, tunnels, siphons and reservoirs that provides a source of irrigation water to local farmers from the windward side of the island of Oahu. The State of Hawaii Agribusiness Development Corporation (ADC), an attached agency to the Hawaii Department of Agriculture (HDOA), operates and maintains the Waiahole Ditch Irrigation System, including two reservoirs within the system: Reservoirs 155 and 225, both of which are unlined, earthen storage basins used to store irrigation water for adjacent farmers and fed directly by the Waiahole Ditch. These reservoirs have lost holding capacity due to years of sediment accumulation.

Reservoir 155 is a regulated dam located within agricultural fields west of Kunia Road (State Route 750), approximately 1.0 miles from the roadway. Reservoir 155 is classified as a high hazard, small dam due to the following factors: a total height of 25 feet (ft), a holding capacity greater than 50 acre-feet (ac-ft), and potential downstream impacts in the event of a failure. Per the Hawaii Administrative Rules (HAR) Chapter 13-190.1, a "high hazard" dam classification is defined as that in which the failure of the dam or reservoir will result in probable loss of human life.

Reservoir 225 is located east of Kunia Road, adjacent to the roadway and is not currently listed as a regulated dam. However, recent calculations show that Reservoir 225 exceeds a capacity of 50 ac-ft, which would result in the reservoir being listed as a regulatory dam and require DLNR to take jurisdiction over the reservoir.

Several historic studies, reports and inspection forms were reviewed to determine the existing conditions of the two reservoirs for the purposes of project design. In general, the identified deficiencies include oversteepened slopes, uneven and marginal crown width, excessive vegetation, inadequate outlet and spillway works, and compaction/stability of the earthen embankment. Recent preliminary work performed in advance of the design has reinforced these identified deficiencies. The main purpose of the

Proposed Action is to ensure that each reservoir meets dam safety criteria. To meet this purpose the water storage capacities of Reservoir 155 and Reservoir 225 would both be reduced. In addition, the reservoirs would be lined to reduce water losses and leakage in the system.

This draft Environmental Assessment (EA) was prepared to comply with both the National Environmental Policy Act (NEPA) and the Hawaii Environmental Policy Act (HEPA) process in determining whether or not the Proposed Action would have significant adverse effects on the human environment. The USACE is the lead agency for the Proposed Action under NEPA. This EA follows the guidance outlined in 33 Code of Federal Regulations (CFR), Part 230, for implementation of the procedural provisions of NEPA for the Civil Works Program of the USACE. Under HEPA, agency actions or government actions are carried about by the proposing agency, which in this case is HDOA. The proposing agency is responsible for preparing the EA and defining the reasons to support the determination on the EA.

This Draft EA analyzes the potential impacts resulting from implementation of the Proposed Action. The Proposed Action would result in less than significant impacts for the following resource areas analyzed in the draft EA: geology and soils; drainage and flooding; surface water, groundwater, and water quality; biological resources; historic and cultural resources; land use and agriculture; aesthetics; hazardous, toxic, and radioactive wastes; noise; air quality; long-term socioeconomics; public services and utilities; and traffic and circulation. Mitigation measures, and standard construction best management practices (BMPs), where applicable, have been incorporated into the Proposed Action to ensure that impacts remain less than significant. . The Proposed Action would result in no impacts for climate and precipitation; and recreational resources. The Proposed Action would result in short-term, beneficial impacts for socioeconomics.

## Table of Contents

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# ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| $\mu g/m^3$ | micrograms per cubic meter |
| ac-ft | acre-feet |
| ADC | Agribusiness Development Corporation |
| AFONSI | Anticipated Finding of No Significant Impact |
| AQCR | Air Quality Control Region |
| BMP | Best Management Practice |
| BWS | Board of Water Supply |
| CAA | Clean Air Act |
| CCH | City and County of Honolulu |
| CFR | Code of Federal Regulations |
| CO | carbon monoxide |
| CWB | Clean Water Branch |
| CZM | Coastal Zone Management |
| CZMA | Coastal Zone Management Act |
| dBA | A-weighted decibels |
| DLNR | Department of Land and Natural Resources |
| DOH | Department of Health |
| DOT | Department of Transportation |
| DPP | Department of Planning and Permitting |
| EA | Environmental Assessment |
| ECP | Erosion Control Plan |
| EIS | Environmental Impact Statement |
| EISPN | Environmental Impact Statement Preparation Notice |
| EMD | Environmental Management Division |

| | |
|---|---|
| FONSI | Finding of No Significant Impact |
| ft | foot, feet |
| HAR | Hawaii Administrative Rules |
| HDOA | Hawaii Department of Agriculture |
| HDPE | high density polyethylene |
| HECO | Hawaii Electric Company |
| HEER | Hazard Evaluation and Emergency Response |
| HEPA | Hawaii Environmental Policy Act |
| HRS | Hawaii Revised Statutes |
| $H_2S$ | hydrogen sulfide |
| KyA, KyC | Kunia silty clay |
| LSB | Land Study Bureau |
| LUC | Land Use Commission |
| LUO | Land Use Ordinance |
| mgd | million gallons per day |
| msl | mean sea level |
| NAAQS | National Ambient Air Quality Standards |
| NEPA | National Environmental Policy Act |
| $NO_2$ | nitrogen dioxide |
| NOI | Notice of Intent |
| $NO_X$ | nitrogen oxides |
| NPDES | National Pollutant Discharge Elimination System |
| NRCS | Natural Resource Conservation Service |
| NWI | National Wetland Inventory |

| | |
|---|---|
| NWS | National Weather Service |
| $O_3$ | ozone |
| ORTP | Oahu Regional Transportation Plan |
| OSC | Oahu Sugar Company |
| OSHA | Occupational Safety and Health Administration |
| Pb | Lead |
| $PM_{10}$ | particulate matter < 10 microns in diameter |
| $PM_{2.5}$ | particulate matter < 2.5 microns in diameter |
| ppm | parts per million |
| RCRA | Resource Conservation and Recovery Act |
| SHWB | Solid and Hazardous Waste Branch |
| SHPD | State Historic Preservation Division |
| SHPO | State Historic Preservation Officer |
| $SO_2$ | Sulfur Dioxide |
| $SO_X$ | sulfur oxides |
| SWPPP | Stormwater Pollution Prevention Plan |
| TMK | Tax Map Key |
| UH | University of Hawaii |
| USACE | United States Army Corps of Engineers |
| USC | United States Code |
| USEPA | United States Environmental Protection Agency |
| USFWS | United States Fish and Wildlife Service |
| USGS | United States Geological Survey |
| UST | Underground Storage Tank |

| | |
|---|---|
| VOC | volatile organic compound |
| WaC | Wahiawa silty clay |
| WQC | Water Quality Certification |
| WRCC | Western Region Climate Center |

# 1 INTRODUCTION

## 1.1 Project Background

Since the failure of the Ka Loko Reservoir's earthen dam in 2006, the State of Hawaii has placed an increased emphasis on dam safety. The Ka Loko Reservoir was constructed in the late 19th century for agricultural water storage, and its failure resulted in the release of approximately 400 million gallons of water that flooded several homes, towns, and villages, causing extensive damages and seven deaths. The failure was preceded by unusually heavy rain and was largely attributed to a lack of overall maintenance and inspection of the earthen embankment and appurtenant features.

In light of this increased emphasis on dam safety, the United States Army Corps of Engineers (USACE) is proposing to improve the safety and operation of two reservoirs (Reservoir 155 and Reservoir 225) along the existing Waiahole Ditch Irrigation System in Oahu (Proposed Action, or project). The Proposed Action is authorized under Section 1(a)(4) of the Consolidated Appropriations Act of 2001 (Public Law 106-554, Appendix D, Chapter 5 (114 STAT 2763A-190)), which authorized and directed use of $2 million of appropriated Construction General Funds to initiate design and construction of the project. The 905(b) Report was approved by Headquarters USACE on 12 February 2003, allowing implementation of design and construction of repairs and rehabilitation of publicly owned irrigation systems to the extent of the funds appropriated. In accordance with the Hawaii Dam Safety Act of 2007, the State of Hawaii Department of Land and Natural Resources (DLNR) has jurisdiction over the enlargement, repair, and alteration of jurisdictional dams, in order to protect the health, safety, and welfare of the citizens of the State of Hawaii by reducing the risk of failure of the dams and reservoirs. The USACE is working with the DLNR to ensure that all proposed modifications are consistent with state law.

## 1.2 Project Overview

The Waiahole Ditch Irrigation System was constructed between 1912 and 1916 to irrigate sugar cane fields on the western side of Oahu. The irrigation system consists of a 26-mile-long transmission system of ditches, tunnels, siphons and reservoirs that provides a source of irrigation water to local farmers from the windward side of the island of Oahu. Water is collected both as surface water and from tunnels in the Koʻolau Mountains. After collection, the water is transported through tunnels and ditches and stored in reservoirs for approximately 3,000 acres of diversified agriculture and approximately 2,000 acres of pineapple irrigation. Increased use of water is expected with the expansion of diversified agriculture. In addition, water from the Waiahole Ditch is increasingly being used to restore water to Windward Oahu streams.

The State of Hawaii Agribusiness Development Corporation (ADC), an attached agency to the Hawaii Department of Agriculture (HDOA), operates and maintains the Waiahole Ditch Irrigation System, including two reservoirs within the system: Reservoirs 155 and 225, both of which are unlined, earthen storage basins used to store irrigation water for adjacent farmers and which are fed directly by the Waiahole Ditch. These reservoirs have lost holding capacity due to years of sediment accumulation.

Reservoir 155 is a regulated dam located within agricultural fields west of Kunia Road (State Route 750), approximately 1.0 miles from the roadway. Reservoir 155 is classified as a high hazard, small

dam due to the following factors: a total height of 25 feet (ft), a holding capacity greater than 50 acre-feet (ac-ft), and potential downstream impacts in the event of a failure. Per the Hawaii Administrative Rules (HAR) Chapter 13-190.1, a "high hazard" dam classification is defined as that in which the failure of the dam or reservoir will result in probable loss of human life.

Current agricultural water supply operations at Reservoir 155 are driven by hydraulic pressure needs from downstream water users, rather than water supply capacity needs. Therefore, since the purpose of Reservoir 155 is not solely for water supply capacity, there is greater flexibility in potential remedial designs of the reservoir.

Reservoir 225 is located east of Kunia Road, adjacent to the roadway and is not currently listed as a regulated dam. However, recent calculations show that Reservoir 225 exceeds a capacity of 50 ac-ft, which would result in the reservoir being listed as a regulatory dam and require DLNR to take jurisdiction over the reservoir. Similar to Reservoir 155, Reservoir 225 operations are driven by hydraulic pressure for agricultural water supply uses. However, Reservoir 225 is also used for water storage in order to ensure consistent supply of water downstream in periods when the flow in Waiahole Ditch is reduced.

A set of criteria related to the design and performance of the reservoirs was prepared in order to satisfy the USACE, the DLNR/HDOA, as well as local stakeholders. The criteria included: design requirements for slope inclination, crest width, and fill placement; safety requirements for hydrology/hydraulics and geotechnical evaluations; and, operation maintenance criteria for the completed structure. The criteria were taken from various regulatory agency guidance documents, in general using the more stringent criteria where the guidance documents overlapped. The overall goal of the project design criteria was to reduce the risk of failure of the embankments while meeting the goals and objectives of various State and Federal regulatory agencies.

Several historic studies, reports and inspection forms were reviewed to determine the existing conditions of the two reservoirs for the purposes of the design. In general, the identified deficiencies include oversteepened slopes, uneven and marginal crown width, excessive vegetation, inadequate outlet and spillway works, and compaction/stability of the earthen embankment. Recent preliminary work performed in advance of the design has reinforced these identified deficiencies. In addition, the reservoirs have lost holding capacity due to years of sediment accumulation.

## 1.3 Purpose and Need

### 1.3.1 Need for Proposed Action

The Dam Safety Inspection of Reservoir 155 Report (USACE 1999) summarized a Phase 1 inspection of the reservoir by the USACE in accordance with the Hawaii Dam Safety Act of 1987. The purpose of the investigation was to determine the current state of the reservoir in meeting the State of Hawaii criteria. The inspection was limited to a visual inspection of the reservoir to identify any deficiencies and recommend measures for remediation.

The dam was classified as a small dam (having a holding capacity between 50 and 1,000 ac-ft and a height between 25 and 40 ft). At the time of the inspection, the hazard potential of the dam was low due to its location in a largely rural and agricultural area, although more recent documents have assigned a

high hazard potential due to proposed future land uses for an Agricultural Park and an expanded housing development in downstream areas. The water level observed during the inspection was 18.5 ft deep per the staff gage in the reservoir.

The results of the inspection showed deficiencies associated with erosion at the stop logs, intakes, and spillway, excessive vegetation on the slopes and crown, and oversteepened slopes when compared against State of Hawaii criteria for high hazard dams. The Proposed Action has been designed to implement the recommendations of the Dam Safety Inspection, which include lowering the reservoir to eliminate erosion sites at the dam crest, removing vegetation and filling any existing holes with compacted fill, and flattening the slopes.

Although not formally inspected by the USACE, Reservoir 225 is assumed to have similar deficiencies as described above for Reservoir 155 due to the proximity, size, and common history of both reservoirs. In order to increase the safety and reduce risk of failure, the same recommendations for remediation are proposed for Reservoir 225 as described above for Reservoir 155.

### 1.3.2 Purpose of Proposed Action

The increased use of water for the expansion of diversified agriculture and for restoration of water to Windward Oahu streams has resulted in a reduction of the available water in the Waiahole Ditch Irrigation System. The main purpose of the Proposed Action is to ensure that each reservoir meets dam safety criteria. To meet this purpose the water storage capacities of Reservoir 155 and Reservoir 225 would both be reduced. In addition, the reservoirs would be lined to reduce water losses and leakage in the system.

## 1.4 Regulatory Context

This Draft Environmental Assessment (EA) was prepared to comply with both the National Environmental Policy Act (NEPA) and the Hawaii Environmental Policy Act (HEPA) process in determining whether or not the Proposed Action would have significant adverse effects on the human environment.

The USACE is the lead agency for the Proposed Action under NEPA. This EA follows the guidance outlined in 33 Code of Federal Regulations (CFR), Part 230, for implementation of the procedural provisions of NEPA for the Civil Works Program of the USACE.

Under HEPA, agency actions or government actions are carried about by the proposing agency. The proposing agency is responsible for preparing the EA and defining the reasons to support the determination on the EA. For the Proposed Action, HDOA is the proposing agency.

HEPA is codified in Chapter 343 of the Hawaii Revised Statutes (HRS). HEPA outlines statutory trigger conditions, which are specific instances when a proposing or approving agency must prepare an EA. In accordance with Chapter 343, HRS, Section 5, the Proposed Action includes the following "trigger" that requires the preparation of an EA under HEPA:

*Propose the use of state or county lands or the use of state or county funds.*

The environmental review conducted in support of this Draft EA, and the comments received in response to it, will help decision-makers consider the potential environmental effects of the project before deciding how to proceed. The Draft EA process provides the public, affected landowners, agencies, and interested Native Hawaiian organizations with an opportunity to review potential project effects and solicits constructive comments that could help the USACE and HDOA refine the project design to minimize these effects.

If it is determined that the Proposed Action would not have a significant effect on the environment, then the Draft EA process would conclude with the USACE preparing a Finding of No Significant Impact (FONSI) under NEPA and HDOA preparing an Anticipated Finding of No Significant Impact (AFONSI) under HEPA. The Final EA would consider and incorporate public comments on the Draft EA. If it is determined that the Proposed Action would not have a significant effect on the environment, then the Final EA process would conclude with the USACE and HDOA preparing a FONSI under both NEPA and HEPA. If it is determined that the Proposed Action could have a significant effect on the environment, then the Final EA process would conclude with the USACE preparing a Notice of Intent (NOI) to prepare an Environmental Impact Statement (EIS) under NEPA and HEPA.

## 1.5 Project Location and Setting

As described above, Reservoirs 155 and 225 are part of the Waiahole Ditch Irrigation System, which is a gravity irrigation water supply system that moves surface water and groundwater from the windward side of Oahu to agricultural areas on the leeward and central parts of Oahu. The project area is in western O‘ahu near Waipahu, approximately five miles northwest of Pearl Harbor and approximately 3.5 miles southwest of the area of Waikele, on the Schofield Plateau at the base of the Wai‘anae Range.

The project area includes four discontinuous areas: 1) Reservoir 155 and an adjoining staging area; 2) a borrow site immediately northeast of Reservoir 155; 3) Reservoir 225; and 4) a staging area situated northeast of Reservoir 225. Figure 1 shows the regional setting and the locations of both reservoirs.

### 1.5.1 Reservoir 155

Reservoir 155 is located at 94-400 Kunia Road within the 1,829 acres of land owned by Monsanto Company and designated as Tax Map Key (TMK) (1) 9-2-001: Parcel 001 (City and County of Honolulu [CCH], 2013). The reservoir is located at the end of the water delivery system, on the west side of Kunia Road, approximately five miles northwest of Pearl Harbor and approximately 3.5 miles southwest of the area of Waikele, Hawaii, in the central part of the island of Oahu, on the Schofield Plateau. Access to the dam is via private roads accessed from Kunia Road.

Reservoir 155 is an earthen embankment reservoir designed by the Oahu Sugar Company (OSC) and constructed in 1916 for storage of irrigation water for the OSC sugarcane plantation. Documentation on the original design of the dam is not available. Reservoir 155 occupies approximately 3.6 acres and has a storage capacity of approximately 61.4 ac-ft. Flow into Reservoir 155 is via the Waiahole Ditch Irrigation System.

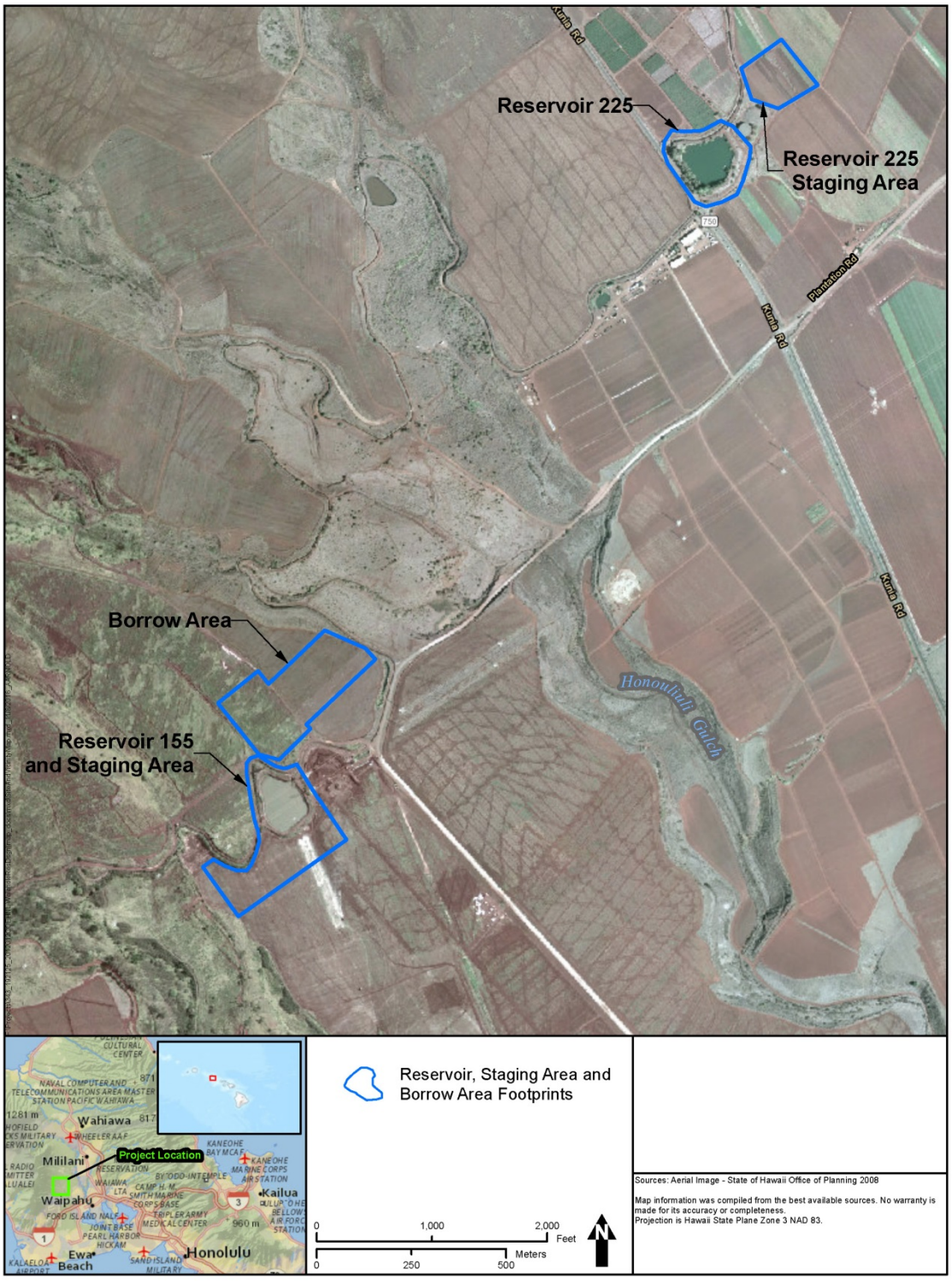


**Figure 1 Project Location and Regional Vicinity**

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The dam consists of a 25-ft high crescent-shaped earthen embankment with a 900 ft crest length. It is assumed because of the age of the structure that it was constructed with adjacent earthen fill material. The reservoir is approximately 20 ft deep at its deepest point and the elevation at the top bank of the reservoir ranges from 629 to 635ft above mean sea level (msl). The inlet to the reservoir consists of two 33-inch concrete pipes located on the northeast bank. Three submerged outlet pipes are stationed on flotation rafts in the reservoir that converge to a single pipe extending through the embankment to pumping facilities at the downstream toe. An overflow channel is located on the west bank of the reservoir and discharges water to the unlined portion of the Waiahole Ditch.

### 1.5.2 Reservoir 225

Reservoir 225 is located at 94-2101 E Kunia Road within the 882 acres of land owned by Robinson Kunia Land, LLC and designated as TMK (1) 9-4-003: Parcel 001 (CCH, 2013). The reservoir is located approximately one mile northeast of Reservoir 155, directly adjacent to the east side of Kunia Road.

Reservoir 225 is an earthen reservoir designed by OSC and constructed in 1916 for storage of irrigation water for the OSC sugarcane plantation. Documentation on the original design of the dam is not available. Reservoir 225 occupies approximately 3.8 acres and has a storage capacity of approximately 63.2 ac-ft. Flow into Reservoir 225 is via the Waiahole Ditch Irrigation System.

The dam consists of a less than 25-ft high crescent-shaped earthen embankment. It is assumed because of the age of the structure that it was constructed with adjacent earthen fill material. The reservoir is approximately 20 ft deep at its deepest point and the elevation at the top bank of the reservoir ranges from 650 to 653 ft above msl. The inlet to the reservoir consists of a 24-inch pipe located on the northeast bank. Two submerged outlet pipes are stationed on flotation rafts in the reservoir that manifold into a single pipe through the embankment. An overflow channel and outlet pipe are located on the west bank that release to Waiahole Ditch

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# 2 DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

## 2.1 Alternatives Evaluated in Detail

### 2.1.1 No Action Alternative

The No Action Alternative would consist of keeping the reservoir embankments in their current alignment and making no improvements. Both reservoirs would be classified as jurisdictional dams due to their capacity. The No Action Alternative would not reduce the risk of failure of the embankment slopes, and would provide no additional protection for populations potentially impacted in the event of a failure. This alternative would not meet the objectives of the Proposed Action to comply with the requirements of the USACE and DLNR for dam safety. In addition, the No Action Alternative would not correct the identified deficiencies at both reservoirs associated with erosion at the stop logs, intakes, and spillway, excessive vegetation on the slopes and crown, and oversteepened slopes.

### 2.1.2 Proposed Action: Embankment Reconstruction

The Proposed Action would include the excavation of the existing embankments, removal of sediment from the interior of the reservoirs, and the reconstruction of the embankments to meet USACE and DLNR design criteria. The Proposed Action would include new inlet, outlet and intake, and spillway facilities, in addition to a high density polyethylene (HDPE) reservoir liner, as described in further detail below. Reservoir 155 would be reduced in size to remove its jurisdictional dam classification. Thus, the operating capacity of Reservoir 155 would be reduced to 33.0 ac-ft., which would still accommodate irrigation needs. The operating capacity of Reservoir 225 would also be reduced to 33.7 ac-ft., which would keep the reservoir out of jurisdictional dam classification while still accommodating irrigation needs.

***Reservoir 155***

The proposed improvements to Reservoir 155 would include the following activities:

- Remediation measures, identified in the previous inspection report for Reservoir 155 (Gannett Flemming, 2009) would be implemented. These would include removing vegetation, repairing deteriorating structures, providing upstream closure structures, repairing damaged slopes, and regrading the embankment crest.
- Bypass existing reservoir and dewater site, including draining of reservoir. Bypass will occur via pipeline from the existing Waiahole Ditch to the nearby pump station for continued irrigation use.
- Excavate all remaining roots and stumps from embankment crest and slopes.
- Dredge sediments from reservoir and blend for reuse in backfill.
- Excavate embankment to construct inspection trench and shear key. Regrade the embankment in areas where roots and stumps were previously removed but the entire embankment was not excavated.
- Construct new embankment using excavated material as deemed suitable, supplemented with imported fill as required.
- Construct internal drainage system.

- Construct new inlet, outlet and spillway properly sized to meet dam safety requirements.
- Relocate existing pipes to a sufficient distance from embankment toe; existing pump station will remain in place.
- Install HDPE liner on upstream slopes.
- Revegetate downstream slope with appropriate mix of native grasses.
- Construct access ramp on northeast corner of reservoir and place all-weather aggregate surfacing on dam crest.
- Construct diversion berm at southwest corner of reservoir to protect against overflow of Waiahole Ditch.

Figure 2 shows the existing topography and demolition plan for Reservoir 155. Figure 3 shows the site plan and proposed improvements for Reservoir 155.

***Reservoir 225***

The proposed improvements to Reservoir 225 would include the following activities:

- Similar remediation measures would be implemented as described above for Reservoir 155. These would include removing vegetation, repairing deteriorating structures, providing upstream closure structures, repairing damaged slopes, and regrading the embankment crest.
- Bypass existing reservoir and dewater site, including draining of reservoir. Bypass will occur via pipeline from the existing Waiahole Ditch to the nearby pump station for continued irrigation use.
- Excavate all remaining roots and stumps from areas that had been previously cleared of vegetation.
- Remove large boulders from northeastern toe of embankment.
- Remove debris and detritus from dam crest and slopes.
- Dredge sediments from reservoir and blend for reuse in backfill.
- Excavate unstable ground where vegetation and dredge spoils have been stockpiled. Excavate embankment to construct inspection trench and shear key.
- Construct new embankment using excavated material as deemed suitable, supplemented with imported fill as required.
- Construct internal drainage system.
- Construct new inlet, outlet and spillway properly sized to meet dam safety requirements.
- Install HDPE liner on upstream slopes.
- Revegetate downstream slope of embankment with appropriate mix of native grasses.
- Construct access ramp on southwest corner of reservoir, and place all-weather aggregate surfacing on dam crest.

- Construct diversion berm at northwest corner of reservoir to protect against overflow of Waiahole Ditch

Figure 4 shows the existing topography and demolition plan for Reservoir 225. Figure 5 shows the site plan and proposed improvements for Reservoir 225.

## 2.2 Other Construction Details

### 2.2.1 Temporary Water Supply During Construction

The water supply in the reservoirs would be exhausted for irrigation uses prior to the initiation of ground-disturbing construction activities. During construction, the inlets to the reservoirs from Waiahole Ditch and the spillway outlets into Waiahole Ditch would be closed off to allow water to pass freely within the ditch limits around the construction sites. No discharge from the construction sites would be allowed to enter the ditch. Water accumulated within the construction limits would be discharged to an approved collection point in accordance with the project Stormwater Pollution Prevention Plan (SWPPP).

A temporary water supply system would be constructed at each reservoir, and would be operational prior to taking the existing facilities out of service. The details pertaining to the temporary water supply at each reservoir are discussed further below.

***Reservoir 155 Water Supply***

The temporary water supply system at Reservoir 155 would include a temporary weir in Waiahole Ditch that would be used to maintain consistent water supply in the system to provide continued service to the various users. Average water use at Reservoir 155 is 1.4 million gallons per day (MGD) but can reach up to 2.6 MGD. The temporary water supply system would be designed to provide up to 5 MGD during construction.

The temporary weir would be located on the southwestern side of the reservoir in the unlined portion of Waiahole Ditch. The water surface in the ditch would be maintained at or near the current operating pool level in the reservoir. A temporary pump would be placed in Waiahole Ditch and a pipe would be installed over the ditch bank to convey water from the ditch to a temporary valve box located near the existing facilities.

Figure 6 shows the temporary water supply plan for Reservoir 155. Figure 7 shows the temporary water supply details for Reservoir 155.

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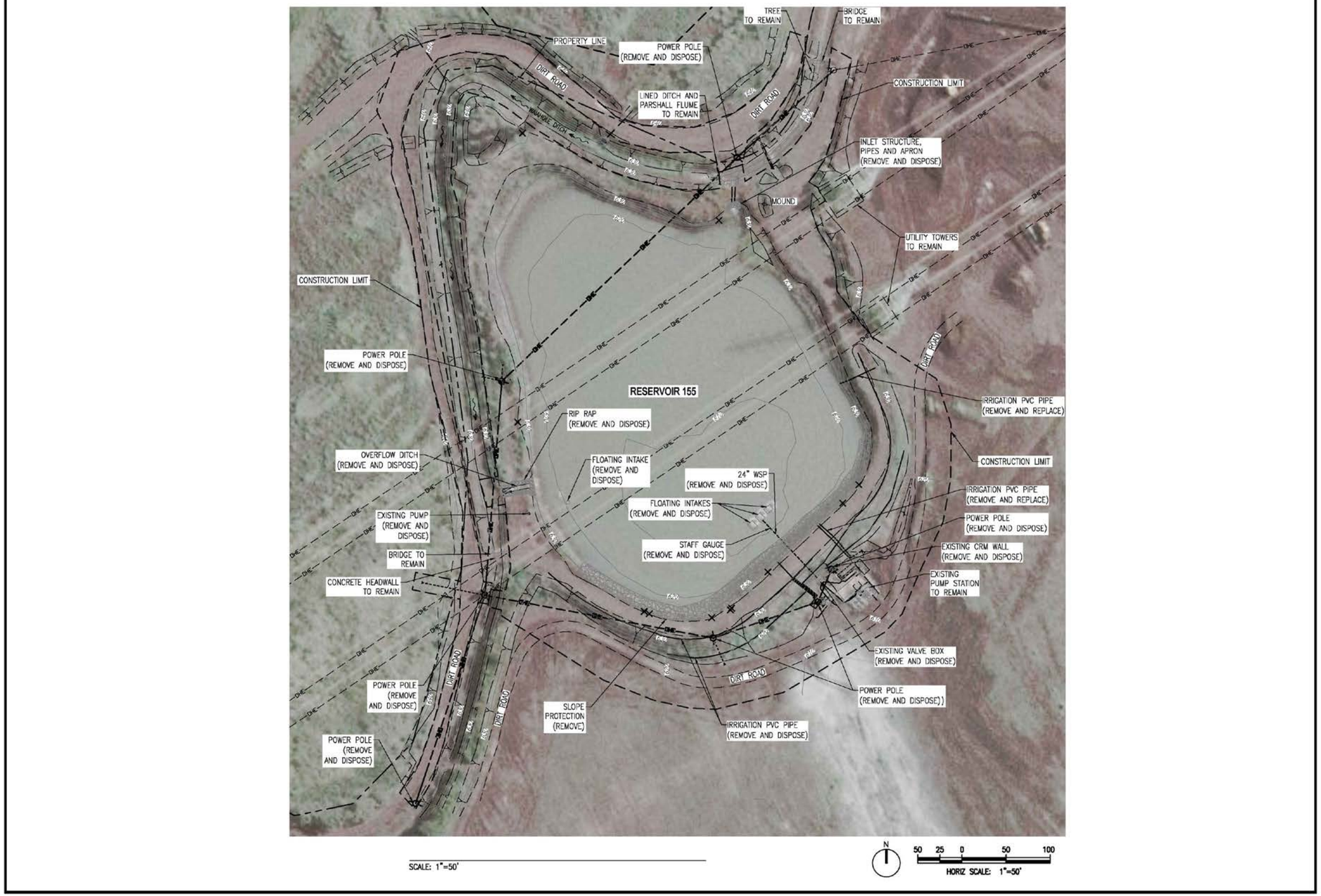


**Figure 2 Existing Topography and Demolition Plan for Reservoir 155**

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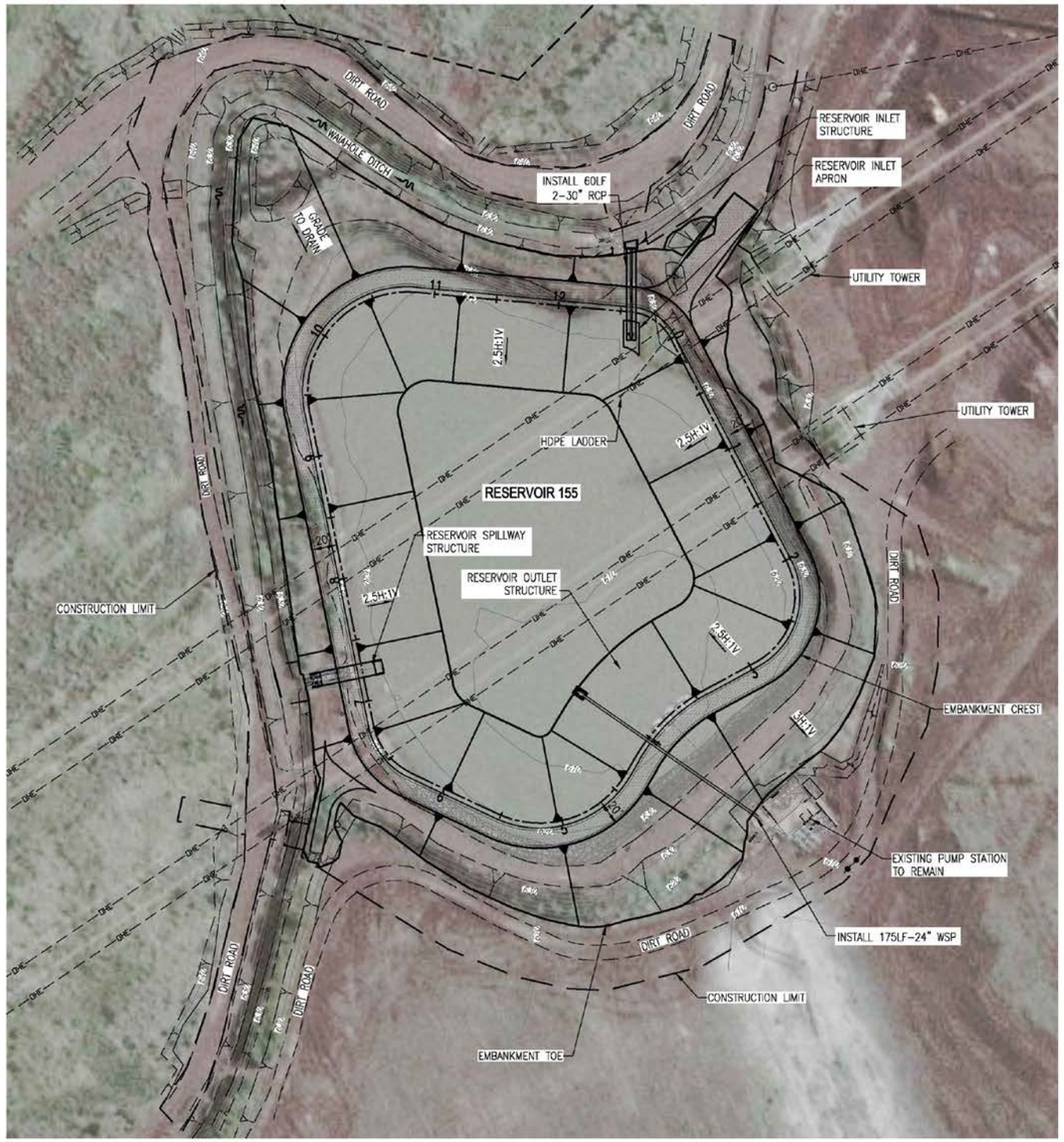


**Figure 3 Site Plan and Proposed Improvements for Reservoir 155**

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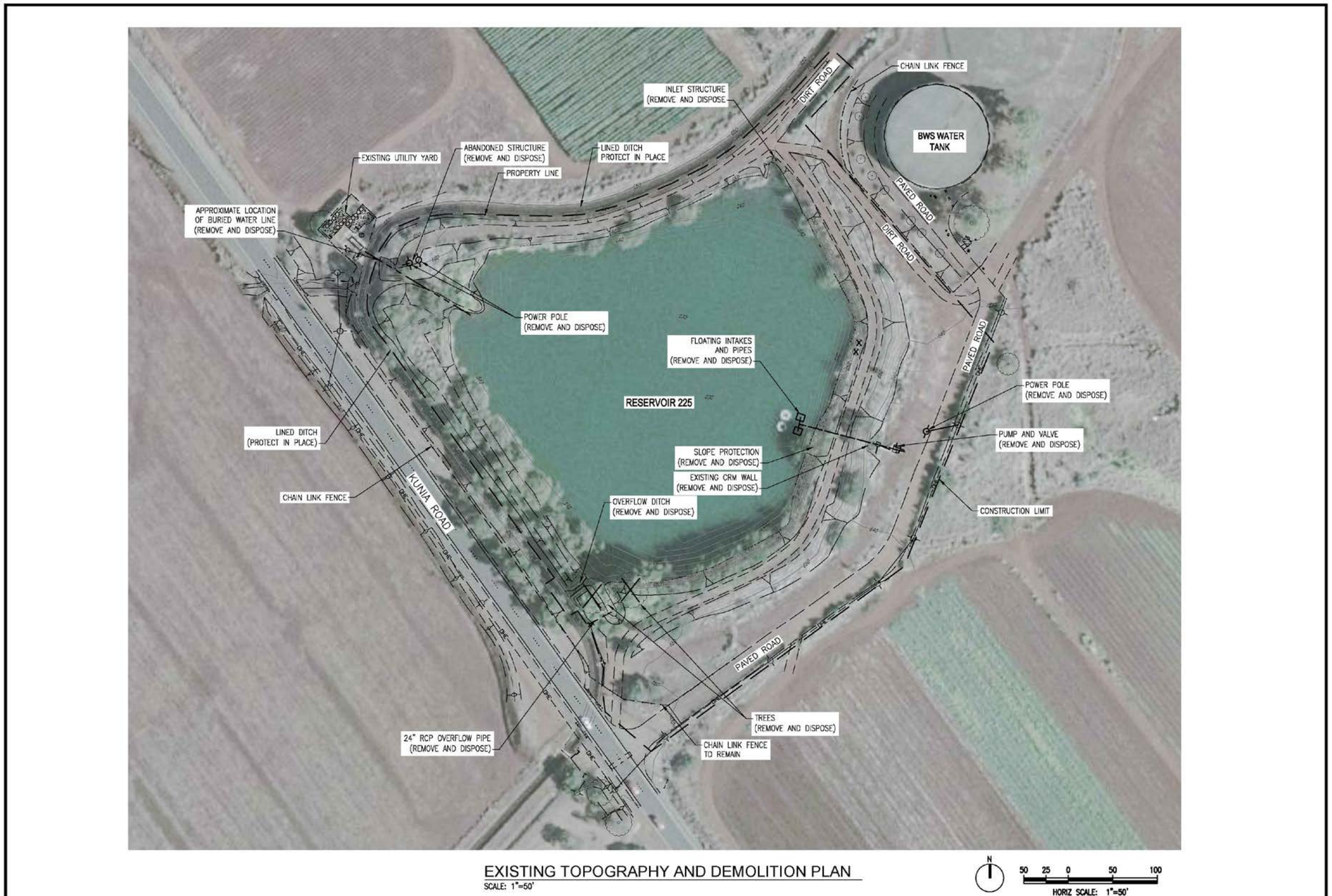


**Figure 4 Existing Topography and Demolition Plan for Reservior 225**

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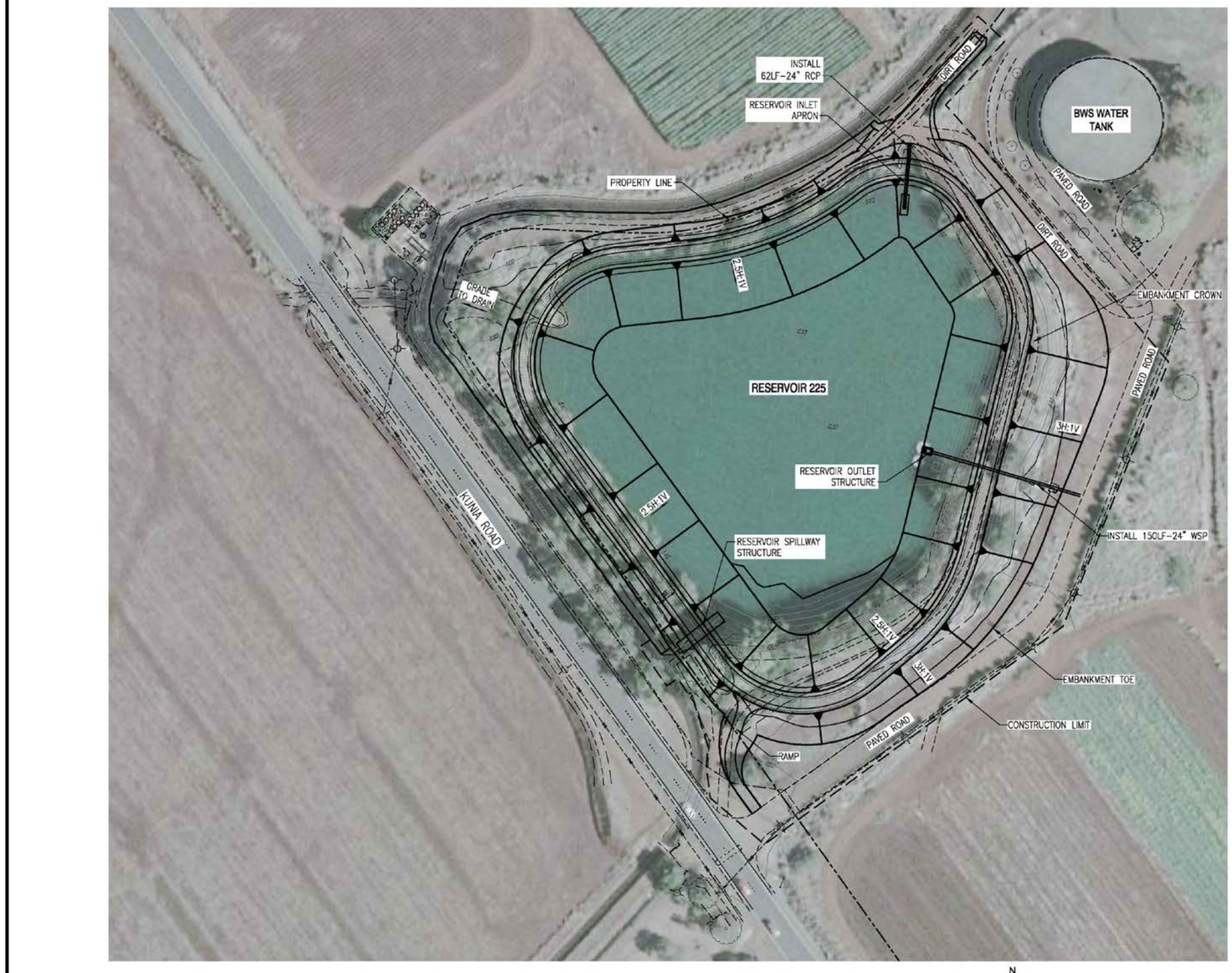


**Figure 5 Site Plan and Proposed Improvements for Reservoir 225**

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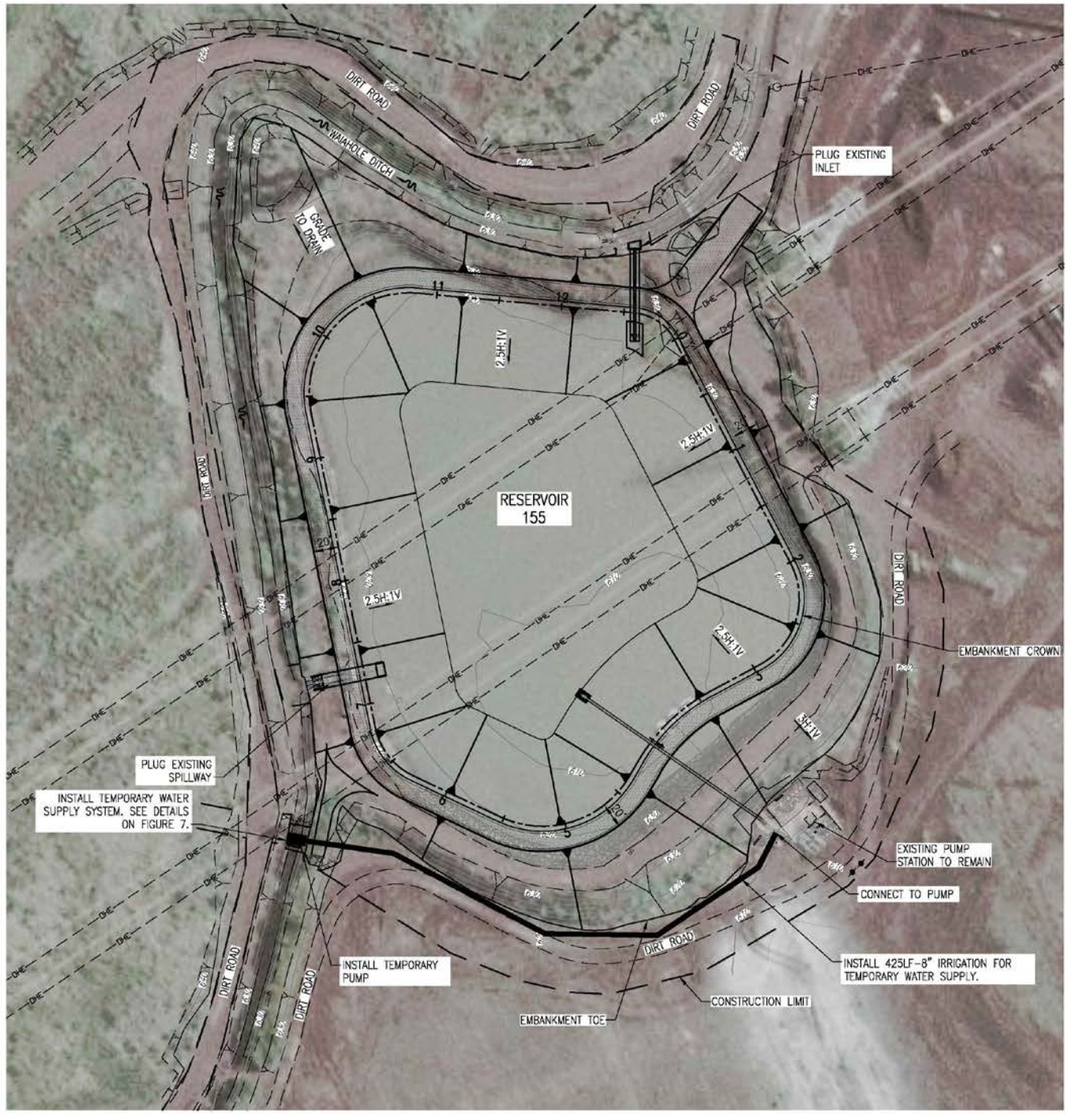


TEMPORARY WATER SUPPLY PLAN
SCALE: 1"=50'

**Figure 6 Temporary Water Supply Plan for Reservoir 155**

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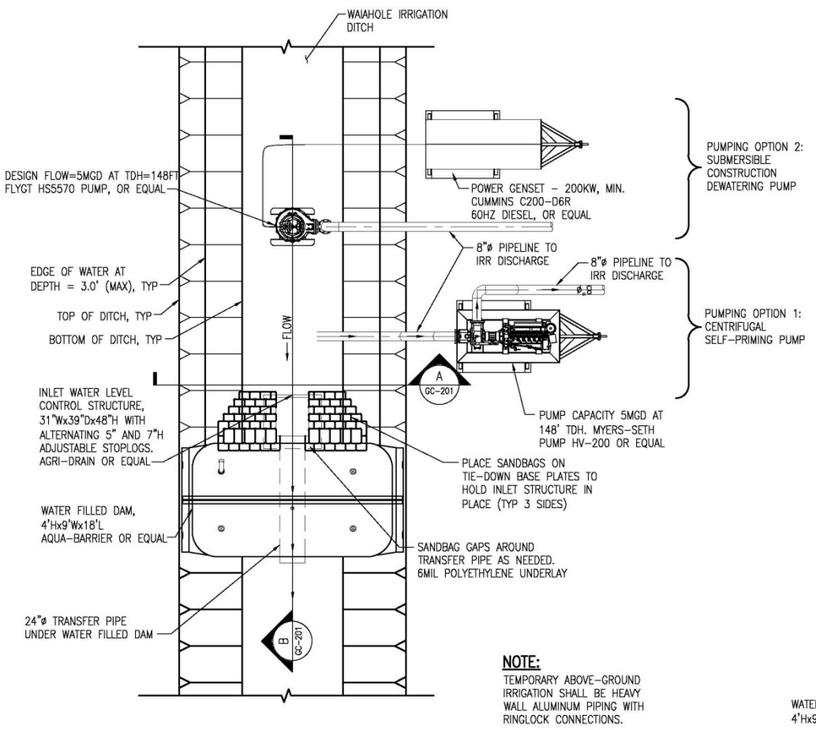
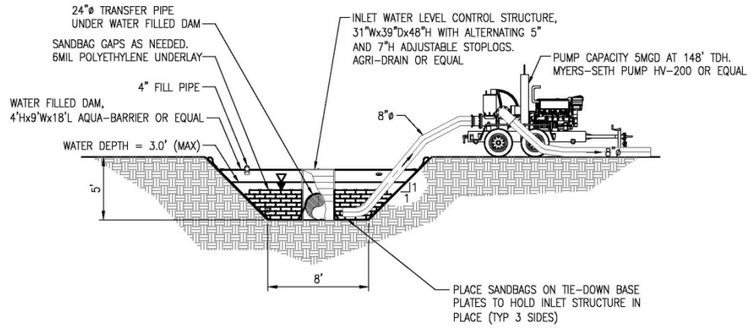
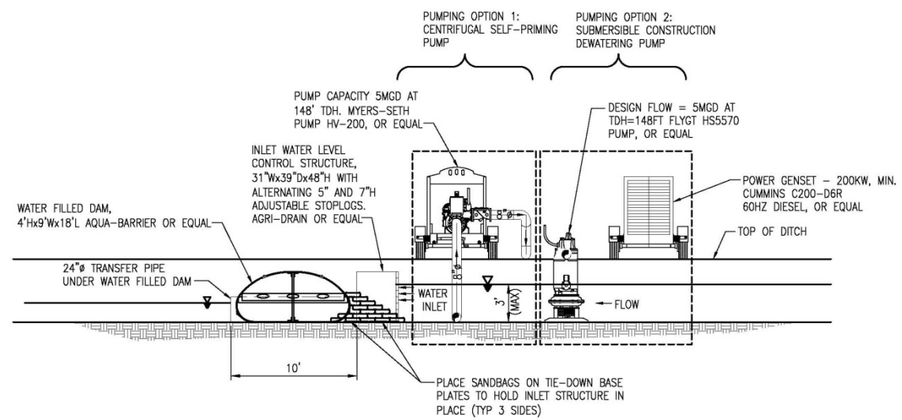



**NOTE:**
TEMPORARY ABOVE–GROUND IRRIGATION SHALL BE HEAVY WALL ALUMINUM PIPING WITH RINGLOCK CONNECTIONS.

1 TEMPORARY WATER SUPPLY AND DIVERSION PLAN
NTS




A TEMPORARY WATER SUPPLY AND DIVERSION DETAIL
NTS




B TEMPORARY WATER SUPPLY AND DIVERSION DETAIL
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**Figure 7 Temporary Water Supply Details for Reservoir 155**

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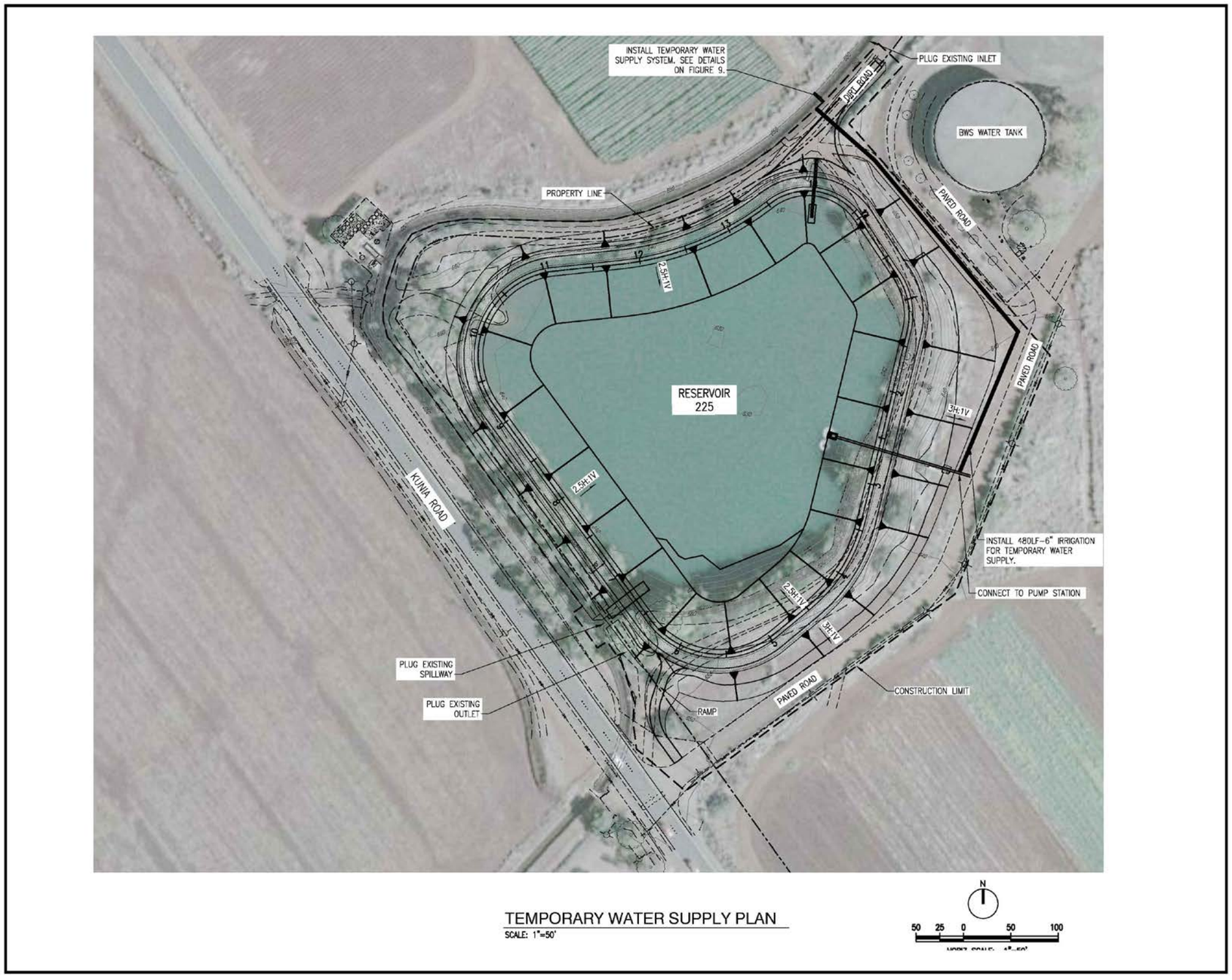


**Figure 8 Temporary Water Supply Plan for Reservoir 225**

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***Reservoir 225 Water Supply***

The temporary water supply system at Reservoir 225 would include a temporary weir in Waiahole Ditch that would be used to create temporary storage. Average water use at Reservoir 225 is 0.5 MGD. However, the temporary water supply system would be designed to provide up to 2 MGD during construction. The temporary weir would be located on the northeastern side of the reservoir. A temporary pump would be placed in Waiahole Ditch and a pipe would be installed over the ditch embankment to convey water from the ditch along the eastern side of the reservoir within the limits of the existing dirt road to a temporary valve box located near the existing facilities. In addition, the temporary water supply system would allow 10 MGD to bypass the weir within the ditch during construction to support downstream water uses.

Figure 8 shows the temporary water supply plan for Reservoir 225. Figure 9 shows the temporary water supply details for Reservoir 155.

### 2.2.2 Staging Areas and Access

Staging areas and site access must be established for both reservoirs to provide room for the use and distribution of materials and equipment. The staging areas would contain contractor's trailers, parking, fencing, and storage of equipment and materials. The staging area for Reservoir 155 is located approximately 500 ft west of Reservoir 155. The staging area for Reservoir 225 is located approximately 700 ft northeast of the reservoir.

It is anticipated that personnel, equipment, and imported materials would access the project area via Interstate H-1, Interstate H-2, Kunia Road, and Plantation Road. All access roadways with the exception of Plantation Road are paved. Plantation Road has an aggregate surfacing. Figure 10 shows the proposed construction access routes to the reservoirs, staging areas, and borrow site.

Construction of the Proposed Action would be coordinated with the local landowners to ensure that access to their parcels is maintained during construction activities.

### 2.2.3 Borrow Site

Approximately 110,000 cubic yards of fill material would be needed for reconstruction of the reservoirs. Of the 110,000 cubic yards of fill material, approximately 51,000 cubic yards of fill material would be excavated from the existing reservoirs and reused. Therefore, approximately 62,000 cubic yards of additional fill material would be required for reconstruction of Reservoirs 155 and 225. Fill materials for construction would be obtained from a borrow site located approximately 350 ft north of Reservoir 155 on property owned by Syngenta Global. It is estimated that the borrow site contains approximately 31,000 cubic yards of fill material. Figure 10 shows the borrow site location. Upon completion of the proposed construction activities, the borrow site would be cleared of all equipment, materials, and project refuse, then re-graded and restored. The remainder of fill material (approximately 26,000 cubic yards) needed for reconstruction of the reservoirs would be imported in from sources within the Honolulu area.

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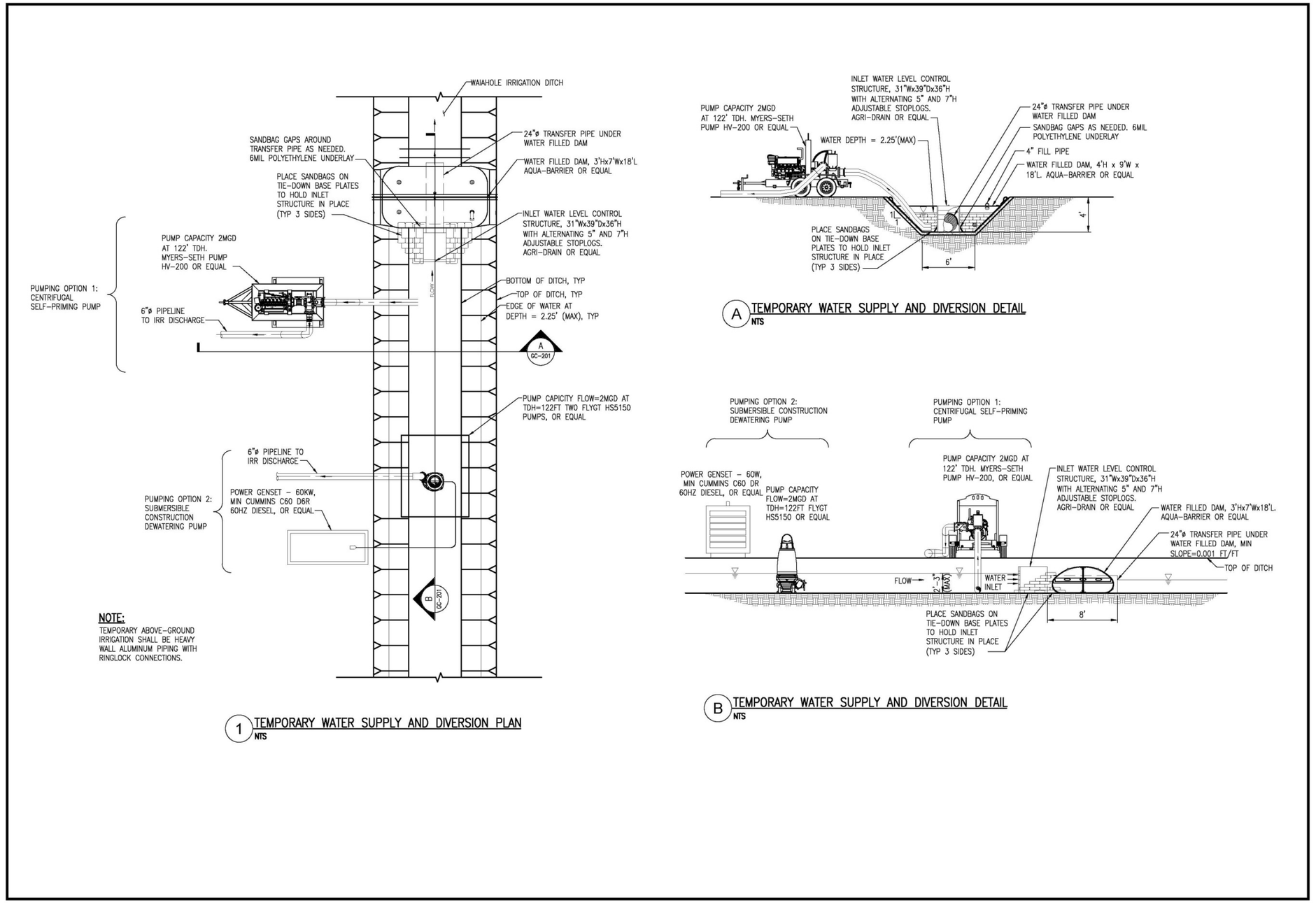


**Figure 9 Temporary Water Supply Details for Reservoir 225**

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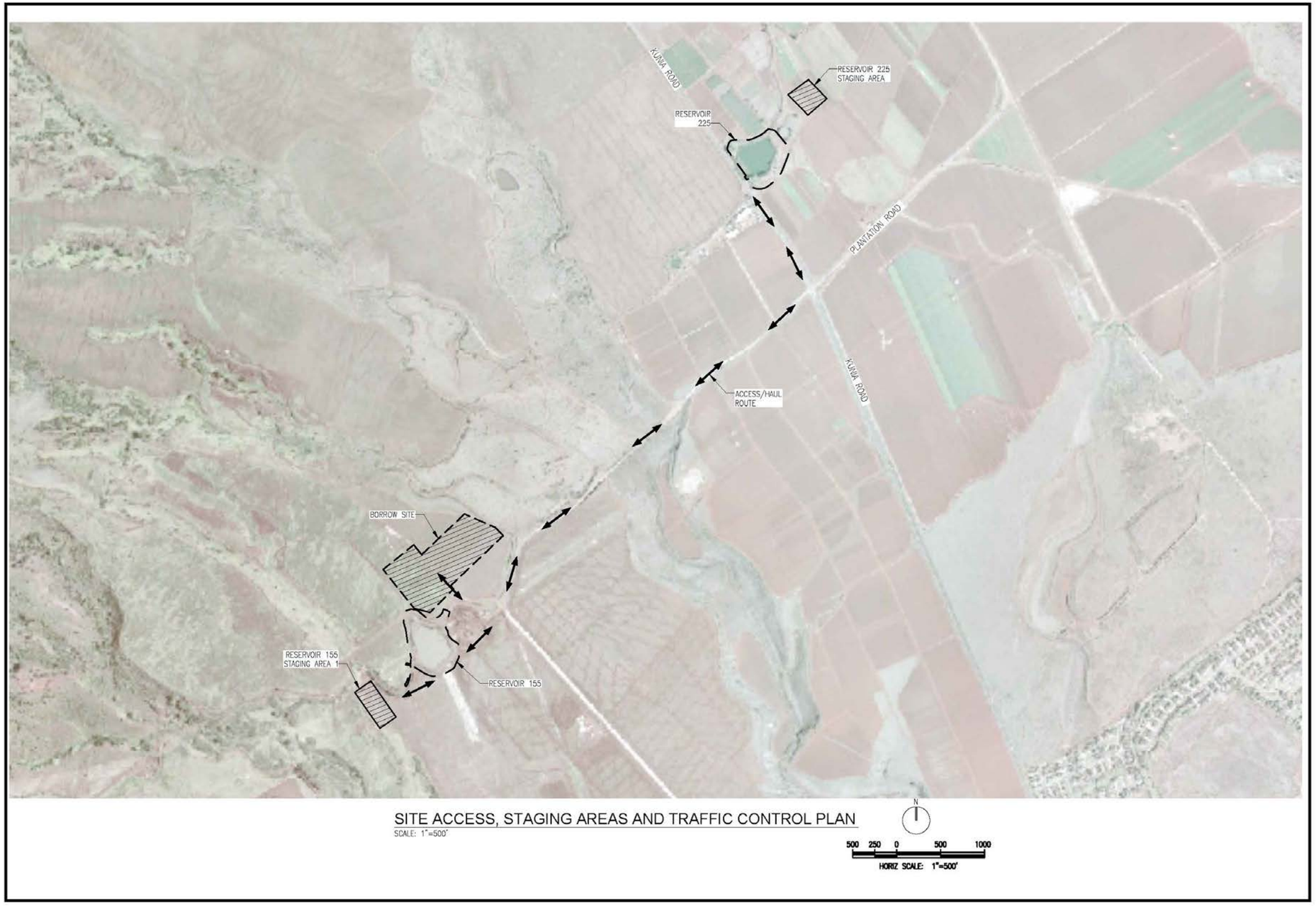


**Figure 10 Site Access, Staging Areas, and Borrow Site**

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### 2.2.4 Construction Scheduling

A construction period of approximately six months is planned for each reservoir. ADC has required that Reservoir 225 be constructed prior to Reservoir 155 in order to maintain irrigation water supply, resulting in a construction window of up to 12 months. Therefore, construction is anticipated to begin in May 2017 and end in May 2018. Estimated work hours are from 7:30am to 4:00pm, Monday through Friday.

### 2.2.5 Construction Equipment

Table 1 provides a description of the types of equipment likely to be used during construction of the Proposed Action. Additional equipment may include air compressors to operate tools and other equipment; welding equipment; pumps and piping; communications and safety equipment; and vehicles used to deliver and move equipment, materials, and personnel.

**Table 1 Construction Equipment**

| Equipment | Construction Purpose |
|---|---|
| Backhoe/Front-end Loader | Soil Manipulation and Drainage Work |
| Bobcat | Distribution of Fill |
| Dozer | Soil Manipulation and Earthwork Construction |
| Scraper | Soil Manipulation and Earthwork Construction |
| Compactor | Soil Manipulation and Earthwork Construction |
| Grader | Soil Manipulation and Earthwork Construction |
| Concrete Truck | Concrete Delivery and Pouring |
| Haul Truck | Earthwork Construction and Clearing/Grubbing |
| Hydraulic Crane | Box Culverts Placement |
| Water Truck | Construction Site and Plantation Road Watering for Dust Control and Irrigation Spraying at Restoration Areas |

### 2.2.6 Construction-Related Traffic

As noted above, personnel, equipment, and imported materials would reach the project reservoirs, staging areas, and borrow site via Kunia Road and Plantation Road. These roadways may require repair after construction use due to anticipated heavy loads. The construction labor force is estimated to average 10-15 persons per reservoir per work day over the 12 month construction period.

Construction-related traffic would be spread over the duration of the construction schedule and would be relatively minimal on a daily basis. In addition, the majority of construction truck traffic would move between the staging areas, borrow site, and the project reservoirs. These routes do not cross any major roads and therefore, would not impact local vehicle traffic. However, materials and equipment would need to be brought to the site from sources within the Honolulu area. Delivery of these materials and equipment would utilize Kunia Road and either Interstate H-1 or Interstate H-2, depending on the location of materials. In addition, some materials and equipment needed for the project would be pre-

assembled prior to transport to the project reservoirs. The project could generate up to 2,600 total truck trips on Kunia Road and either Interstate H-1 or Interstate H-2 for the import of materials. The majority of these trips would occur during the mobilization phase of construction when materials are brought to the reservoirs and staging areas.

Material and soil removed at both reservoirs would be reused to the maximum extent possible in construction. Any construction debris and waste materials would be disposed of off-site at a permitted and approved waste disposal site. It is anticipated that the project could generate up to 1,000 total truck trips on Kunia Road and either Interstate H-1 or Interstate H-2 over the construction period for the export of materials from the construction sites. Therefore, the project could generate up to 3,600 total truck trips on Kunia Road and either Interstate H-1 or Interstate H-2 over the construction period.

### 2.2.7 Operation and Maintenance

The project would lessen the long-term burden of maintenance and repairs at each reservoir and would not result in substantial changes to current operation and maintenance activities. The Proposed Action includes installing an HDPE liner in the interior of each reservoir. The HDPE liner would prevent infiltration within the reservoir in addition to reducing the maintenance requirements of the upstream slope. Other maintenance activities would largely remain unchanged, generally consisting of vegetation maintenance on the downstream slope, clearing of sediment in the interior of the reservoir, and controlling invasive vegetation in the reservoir and ditch. Maintenance would also include operating and maintaining the reservoir inlet and outlet facilities.

### 2.2.8 Utility Relocation and Coordination

The only utilities currently identified in the vicinity of the reservoirs are power poles and overhead lines providing service to the existing pumps. Based on discussions with the Hawaii Electric Company (HECO), the existing poles do not show up on their records. Additional research showed that the poles are privately owned, and HECO is only involved at the tie in point to the system near Kunia Road.

There are existing power poles and overhead lines located within the Reservoir 155 construction limits. The poles and lines would be removed prior to construction. The proposed method for relocating the service is to construct an underground electrical line that extends from an existing pole on the northeast side of Reservoir 155 to new power poles adjacent to the existing pumping facilities. Two existing transformers would be reused, along with the existing control panels and meters, for the existing pumps. A new pole and transformer would be required for the relocated pump that currently sits on the crest of the reservoir along the western embankment.

Reservoir 225 would require one new pole as well as new transformers for the new irrigation pump and ADC's pump to drain the reservoir.

## 2.3 Anticipated Permits and Approvals

The anticipated permits and approvals for the Proposed Action are summarized in Table 2, below.

**Table 2 Anticipated Permits and Approvals**

| Agency | Permit/Review/Approval |
|---|---|
| **State** | |
| Department of Land and Natural Resources | State Historic Preservation Division:<br>Consultation for effect determination (Section 106 of the National Historic Preservation Act) |
| Department of Health | Clean Water Branch:<br>National Pollutant Discharge Elimination System (NPDES) General Construction Permit |
| **Local** | |
| City and County of Honolulu | Department of Planning and Permitting:<br>Construction plan review and approval<br>Erosion control plan review<br>Grading, Grubbing, and Stockpiling Permit |

## 2.4 Alternatives Eliminated from Detailed Discussion

Considerations in developing project alternatives included evaluating various methods to correct the deficiencies identified in the Dam Safety Inspection, while providing continuity of design and minimizing impacts to natural resources and land uses in the project area. The USACE considered alternatives that would meet the project's purpose and need. Alternative 1 included the decommissioning of the reservoirs and replacing each with enclosed tanks to provide irrigation water to adjacent landowners. The tanks would have similar capacity to the existing reservoirs and would require additional pumping facilities in order to operate. These operation and maintenance costs would become the responsibility of the adjacent landowners. The costs associated with the enclosed tanks would be higher than those anticipated for the Embankment Reconstruction Alternative (Proposed Action). Transferring the operation and maintenance costs of the enclosed tanks to the adjacent landowners would increase their operating costs and in turn reduce their income. This would result in disproportional socioeconomic effects. Therefore, Alternative 1 was not considered further.

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# 3 AFFECTED ENVIRONMENT AND ENVIRONMENTAL CONSEQUENCES

This section describes the existing environmental resources in the project area, and how these resources may be affected by the Proposed Action. Sections 3.1 through 3.15 provide a detailed analysis of each resource of concern. Resources of concern were identified based on the potential for project actions to result in a significant impact on these resources.

Under HEPA implementation guidelines, in most cases, an agency determines that an action may have a significant impact on the environment if it meets any of the following criteria, as outlined in Section 11-200-12, HAR:

A. Involves an irrevocable commitment to loss or destruction of any natural or cultural resource;

B. Curtails the range of beneficial uses of the environment;

C. Conflicts with the state's long-term environmental policies or goals and guidelines as expressed in [Chapter] 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders;

D. Substantially affects the economic or social welfare of the community or State;

E. Substantially affects public health;

F. Involves substantial secondary impacts, such as population changes or effects on public facilities;

G. Involves a substantial degradation of environmental quality;

H. Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions;

I. Substantially affects a rare, threatened, or endangered species, or its habitat;

J. Detrimentally affects air or water quality or ambient noise levels;

K. Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water or coastal waters;

L. Substantially affects scenic vistas and view planes identified in county or state plans or studies;

M. Requires substantial energy consumption.

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## 3.1 Geology and Soils

### 3.1.1 Affected Environment

***Regional Geology and Soils***

The island of Oahu is the third largest in the state of Hawaii, and is approximately 44 miles wide and 30 miles long. The island is divided into four main areas: the Waianae Range, the Ko'olau Range, the Schofield Plateau, and the coastal plains. The Waianae mountain range is an old volcanic remnant, and the Ko'olau Mountains are the remains of the younger eastern volcano, which deposited ash, lava, and slide debris upon the flank of the Waianae volcano to form the Schofield Plateau (U.S. Geological Survey [USGS] 2001).

The Schofield Plateau is located between the Ko'olau and Waianae Ranges. Based on geomorphic evidence, such as stream diversion, the plateau resulted from the ponding of lava streams from the Ko'olau Range against the eroded slope of the Waianae Range (Stearns and Vaksvik 1935). In addition, the plateau has received enormous deposits of detritus from the Waianae Range. The Honouliuli Stream, located between the Reservoirs cut deeply into the south end of the Schofield Plateau, exposing geologic units of consolidated and unconsolidated alluvial deposits and Ko'olau volcanic rock. The Schofield Plateau is characterized as being in a youthful stage of erosion.

***Project Area Geologic and Soil Conditions***

The project sites are located on the south portion of the Schofield Plateau, and the soils on the plateau are well suited to cultivation. According to the Natural Resource Conservation Service (NRCS), the naturally occurring soil in the vicinity of the project sites is Kunia silty clay (KyA) 0 to 3 percent slopes within Reservoir 155; and Kunia silty clay (KyA) 0- 3 percent slopes, Kunia silty clay (KyC) 8 to 15 percent slopes, and Wahiawa silty clay (WaC) 8 to 15 percent slopes within Reservoir 225 (NRCS 2014). A description of the project area soil types and maps of the soil types at each reservoir site are provided below.

- KyA, 0 to 3 percent slopes, is generally found on broad, smooth slopes. In a typical profile, the surface layer is approximately 22 inches of reddish-brown silty clay. The subsoil is approximately 40 to 71 inches of dark reddish-brown silty clay and silty clay loam. The substratum is dark reddish-brown gravelly silty clay. Permeability is moderate, runoff is slow, and the erosion hazard is no more than slight.
- KyC, 8 to 15 percent slopes, is generally found on narrow side slopes, mainly along drainageways. In a typical profile, the surface layer is approximately 22 inches of reddish-brown silty clay. The subsoil is approximately 40 to 71 inches of dark reddish-brown silty clay and silty clay loam. The substratum is dark reddish-brown gravelly silty clay. Permeability is moderate, runoff is medium, and the erosion hazard is moderate.
- WaC, 8 to 15 percent slopes, consists of well-drained soils on uplands. In a typical profile, the surface layer is approximately 12 inches of very dusky red and dusky red silty clay. The subsoil is approximately 12 to 48 inches of dark reddish-brown silty clay. The substratum is weathered basic igneous rock. Permeability is moderate rapid, runoff is medium, and the erosion hazard is moderate.

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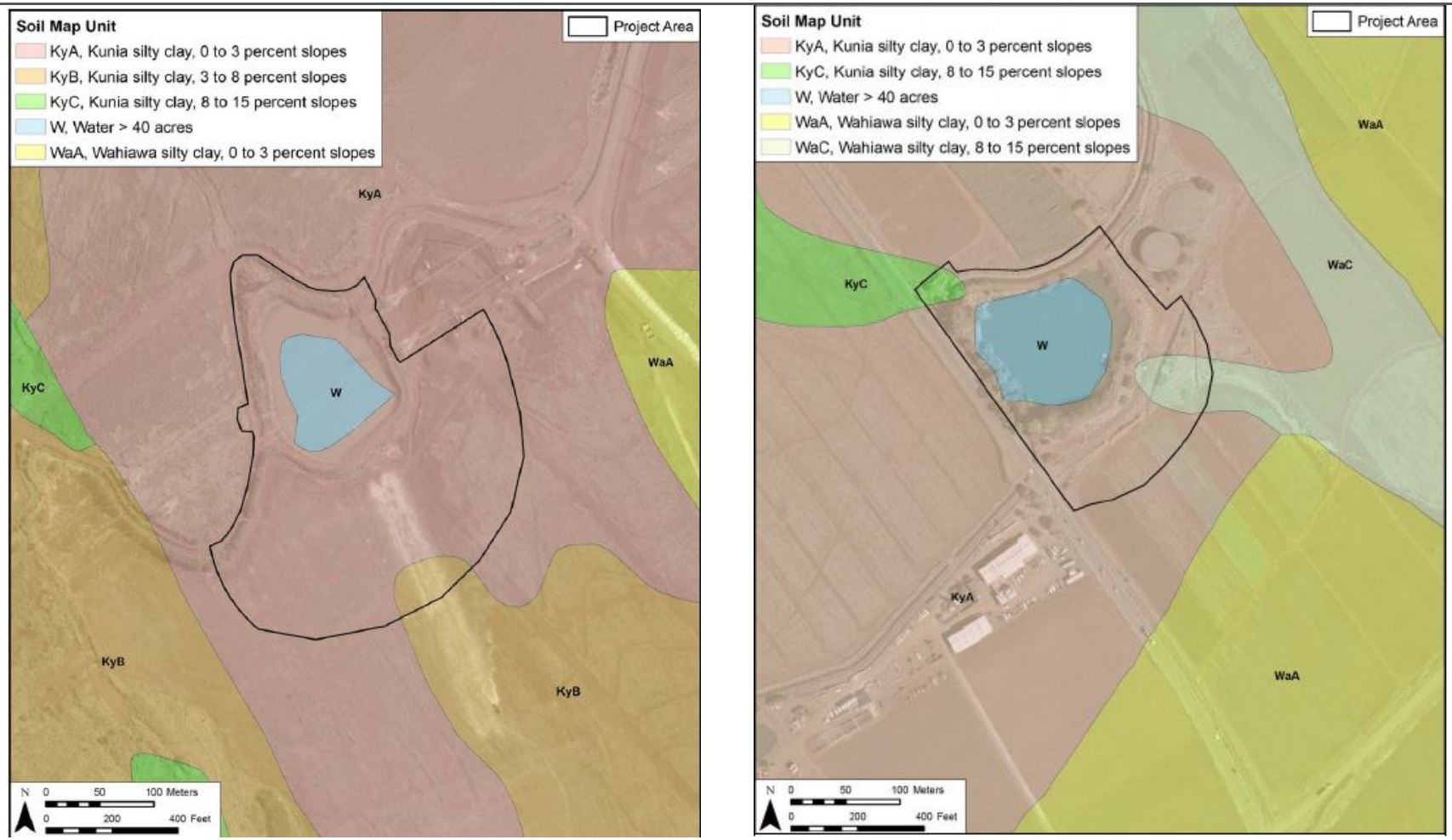


**Figure 11 Soil Type Distribution in the Project Area**

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### *Seismic Activity*

The Hawaiian Islands experience thousands of earthquakes each year. Although on the island of Oahu, most earthquakes are small enough that they can only be detected by instruments, some are strong enough to be felt and may cause minor to moderate damage. Most of Hawaii's earthquake activity is centered on or near the island of Hawaii, and is related to volcanic activity (USGS 2002).According to a 1978 Phase I Inspection Report of Nuuanu Reservoir No. 4 on Oahu, submitted by the Corps of Engineers, explorations by geophysical methods have shown that faults and rift zones cut through the major islands and that these faults are branches of a gigantic fracture system known as the Molokai Fracture Zone (Gannett Fleming 2009). It also concludes that seismic risk for Oahu should be determined from the major earthquakes that have occurred close to the Molokai Fracture Zone and not from earthquakes that have their epicenters close to the very seismically active areas close to the Island of Hawaii (Big Island) (Gannett Fleming 2009).

The USGS list of historic earthquakes for Hawaii does not list any significant earthquakes for the Island of Oahu. The vast majority of recent earthquakes (1990-2008) have occurred on or near the Island of Hawaii. During the most recent large earthquake (magnitude 6.7) on the Island of Hawaii in October 2006, the Island of Oahu experienced ground shaking equivalent to a Modified Mercalli rating of IV to V. In 1973, a tremor was felt on Oahu from a magnitude 6.2 earthquake which generated an equivalent of 0.02g at a seismograph station on the island. According to USGS maps for Oahu, a horizontal ground acceleration of 0.20 to 0.28g has a probability of exceedance of 2% in 50 years. The International Building Code (2006) states that for a 1.0-second spectral response acceleration (5% of critical damping), Oahu has a maximum ground motion of between 0.15g and 0.20g.

A tsunami is a series of ocean waves generated by deep sea earthquakes or underwater landslides, and can pose a year-round threat and hazard to all shoreline areas of Hawaii. The project area is outside of the tsunami evacuation zone for the island of Oahu (Hawaii State Civil Defense 2014).

### *Regulatory Setting*

#### Oahu General Plan

The Oahu General Plan, issued in 1992 and amended in 2002, sets forth the long-range objectives and policies for the general welfare and, together with the regional development plans, provides a direction and framework to guide the programs and activities of the CCH. The following General Plan objectives and policies are applicable to the Proposed Action.

Objective A: To protect and preserve the natural environment.

Policy 4: Require development projects to give due consideration to natural features such as slope, flood and erosion hazards, water- recharge areas, distinctive land forms, and existing vegetation.

#### Section 402 of the Clean Water Act/NPDES

Section 402 of the Clean Water Act establishes a framework for regulating municipal and industrial storm water discharges under the NPDES program. The United States Environmental Protection

Agency (USEPA) has delegated responsibility for implementation of the NPDES program in Hawaii to the Clean Water Branch (CWB) of the Department of Health (DOH). The CWB has established a construction general permit that can be applied to most construction activities in the State, for projects covering one or more acres of land. Coverage under the general permit requires applicants to prepare a SWPPP/Best Management Practice (BMP) Plan (as defined in HAR Chapter 11-55 Appendix C), which describes the BMPs that would be implemented to avoid adverse effects on receiving water quality as a result of construction activities, including earthwork.

**Dam Safety Act of 2007**

In accordance with the Hawaii Dam Safety Act of 2007, the State of Hawaii DLNR has jurisdiction over the enlargement, repair, and alteration of jurisdictional dams, in order to protect the health, safety, and welfare of the citizens of the State of Hawaii by reducing the risk of failure of the dams and reservoirs.

**CCH Erosion Control Plan (ECP)**

The CCH's erosion control recommendations and requirements are based on the regulations of Revised Ordinances of Honolulu (ROH) Chapter 14 and the HAR Chapter 11-55 Appendix C (NPDES General Permit Authorizing Discharges of Storm Water Associated with Construction Activity). Based on these regulations, projects will fall under one of five categories depending on their size, and will have a minimum BMP requirement. Categories 1 and 2 are considered Small Projects and Categories 3, 4, and 5 are considered Large Projects. The Proposed Action falls under Category 5 and is considered a Large Project. Category 5 projects are defined as:

> "Projects which require a grading permit where the total area including any areas developed incrementally that is to be graded is one (1) acre or greater of disturbed area or which require a NPDES General Permit Authorizing Discharges of Storm Water Associated with Construction Activity issued by the DOH."

A Drainage and ECP is also required for Category 5 projects. As specified in ROH Chapter 14, the minimum required elements of an ECP include: administrative requirements, existing site conditions, site conditions during construction, and site conditions at final stabilization.

**CCH Grading, Grubbing and Stockpiling Permit**

Projects that include grading which (1) changes the drainage pattern with respect to abutting properties, (2) exceed 50 cubic yards of cut or fill, or (3) exceed 3 ft in vertical height at its deepest point must comply with CCH grading permit procedures and must obtain a Grading, Grubbing, and Stockpiling Permit (CCH 2012).

### 3.1.2 Environmental Consequences

***No Action Alternative***

The No Action Alternative would consist of retaining Reservoirs 155 and 225 in their current condition. No construction or ground disturbing activities that could directly or indirectly affect geologic

resources would occur. Under the No Action Alternative, routine maintenance activities would continue to occur, as necessary. Furthermore, if improvements to the reservoirs were not made, it is reasonable to assume that the long-term burden of maintenance and repairs at each reservoir would increase, and the benefits of increased safety and reduced risk of failure would not be realized.

***Proposed Action Alternative***

As described in Section 1 Introduction, the Dam Safety Inspection of Reservoir 155 Report (USACE 1999) summarized a Phase 1 inspection of the reservoir by the USACE in accordance with the Hawaii Dam Safety Act of 1987. The results of the inspection showed deficiencies associated with erosion at the stop logs, intakes, and spillway, excessive vegetation on the slopes and crown, and oversteepened slopes when compared to State of Hawaii criteria for high hazard dams. Although not formally inspected by the USACE, Reservoir 225 was assumed to have similar deficiencies as Reservoir 155 due to the proximity, size, and common history of both reservoirs. In order to increase the safety and reduce risk of failure, the same recommendations for remediation are proposed for Reservoir 225 as for Reservoir 155, as described in Section 2 Description of Proposed Action and Alternatives.

The Proposed Action would include excavation of the existing embankments, removal of sediment from the interior of the reservoirs, and the reconstruction of the embankments to meet USACE and DLNR design criteria. The Proposed Action would include new inlet, outlet and intake, and spillway facilities, in addition to a HDPE reservoir liner, as described in further detail below. Reservoir 155 would be reduced in size to remove its jurisdictional dam classification. The USACE is working with the DLNR to ensure that all proposed modifications are consistent with state laws, regulations, and permit requirements related to dam safety.

Approximately 110,000 cubic yards of fill material would be needed for reconstruction of the reservoirs. Of the 110,000 cubic yards of fill material, approximately 50,000 cubic yards of fill material would be excavated from the existing reservoirs and reused. Therefore, approximately 60,000 cubic yards of additional fill material would be required for reconstruction of Reservoirs 155 and 225. Some of this fill materials for construction would be obtained from a borrow site located approximately 350 feet north of Reservoir 155 on property owned by Syngenta Global. It is estimated that the borrow site contains approximately 30,000 cubic yards of fill material. Figure 10 shows the borrow site location. Upon completion of the proposed construction activities, the borrow site would be cleared of all equipment, materials, and project refuse, then re-graded and restored. The remainder of fill material (approximately 30,000 cubic yards) needed for reconstruction of the reservoirs would be imported in from sources within the Honolulu area.

Ground disturbance caused by construction activities has the potential to increase erosion and sedimentation rates above existing conditions. Erosion and storm water pollution control measures would be consistent with NPDES permit requirements and would be included in the ECP and the SWPPP/BMP Plan. Temporary erosion and/or runoff control BMPs are outlined below and would minimize the potential for stormwater pollution resulting from erosion and from sediment migration from the construction and staging areas. After completion of construction activities, temporary facilities related to erosion and/or runoff control would be removed and disturbed areas would be restored and reclaimed as

appropriate. The Proposed Action would also include application for, and compliance with the conditions outlined in the CCH Grading, Grubbing and Stockpiling Permit.

Based on a review of regional seismic conditions, the project area could be subject to earthquake-related hazards such as ground shaking. However, construction activities for the Proposed Action would be temporary and short-term, and would not expose people or structures to any increase in existing potential for substantial effects from earthquake, seismic ground shaking, or tsunamis. Implementing the Proposed Action would result in a less than significant impact.

### 3.1.3 Best Management Practices and Mitigation Measures

Since there would be no significant effects on geology and soils, no mitigation would be required. However, several BMPs have been identified to reduce the temporary effects of construction activities.

The CCH's Minimum BMP Checklist for Large Projects includes the measures outlined below. The Contractor would implement those BMPs that are applicable to features of the Proposed Action.

***Base Measures***

- Stabilized Construction Entrance: All points of egress and ingress to a site shall be protected with a stabilized construction entrance.
- Stockpiles: Stockpiles shall not be located in drainage ways or other areas on concentrated flows. Sediment trapping devices such as fences, traps, basins or barriers shall be used around the base of all stockpiles.
- Dust Control: Dust control should be applied to reduce dust emissions. The Contractor, at his own expense, shall keep the project area and surrounding area free from dust nuisance. The work shall be in conformance with the air pollution control standards contained in Hawaii Administrative Rules: Chapter 11-60, "Air Pollution Control."
- Sediment Fence/Barrier at Toe of Disturbed Area or Stockpile: Sediment Fences or barriers shall be used down slope of all disturbed areas or stockpile areas.
- Slope Protection: Surface flow from above an exposed slope shall not be allowed to flow over the slope without protection. Slope protection shall be used on areas with slopes greater than 50% and on areas of moderate slopes that are prone to erosion.
- Temporary Interceptor Dikes/Swales around Active Work Area: Temporary interceptor dikes and swales shall be installed around the active work areas to intercept storm water runoff from drainage areas above unprotected slopes and direct to a stabilized outlet and also to prevent runoff from leaving the disturbed site.
- Inlet Protection: All storm drain inlets on site, and those offsite which may receive runoff from the site shall use an inlet protection device.
- Sediment Basin: A sediment basin shall be created by excavation or by constructing an embankment. The basin shall be designed to retain or detain runoff to allow excessive sediment to settle.

***Wet Weather Measures***

- Established Grass: Grass shall be established on disturbed areas which are at final grade or will not be worked for longer than 14 days. Alternatives to grass will include 2" minimum straw mulch cover, erosion blankets with anchors, 6-mil plastic sheets, sediment traps or ponds, or interceptor dikes/swales.

***Post Construction Measures***

- Established Ground Cover: Established ground cover or landscape prior to removing erosion control measures.

  **Notes:**

  The maximum period of exposure shall not exceed 14 days. Areas which will be exposed shall be temporarily seeded or stabilized before this period. If after 14 days, the temporarily seeded areas have not attained 98% cover, these areas shall be re-seeded.

  Slopes steeper than 1:3 (vertical: horizontal) shall be sodded or mulched and seeded. Until the slopes are stabilized a sediment fence or barrier shall be installed at the toe of the slope on contours at spacings not to exceed 25 feet.

  Cut and fill slopes shall be protected in 5' vertical sequential increments as construction progresses.

  All earth basins, traps, berms, diversions, waterways, swales, ditches and related structures should be stabilized immediately after they are built. Before a stormwater conveyance structure is made operational, adequate outlet protection and any required lining shall be installed or established.

  The following construction specification BMPs are also recommended for implementation:

- The stabilization practices to be implemented shall include temporary seeding, mulching, geotextiles, sod stabilization, vegetative buffer strips, erosion control mats, protection of trees, and preservation of mature vegetation.
- The Contractor shall provide silt fences as a temporary structural practice to minimize erosion and sediment runoff. Silt fences shall be properly installed to effectively retain sediment immediately after completing each phase of work where erosion would occur in the form of sheet and rill erosion (e.g. clearing and grubbing, excavation, embankment, and grading).
- The Contractor shall provide fiber rolls as a temporary structural practice to reduce water velocity, minimize erosion, and reduce sediment runoff. Rolls shall be properly placed to effectively retain sediment immediately after completing each phase of work (e.g., clearing and grubbing, excavation, embankment, and grading) in each independent runoff area (rolls shall be placed as work progresses, rolls shall be removed, replaced, or relocated as needed for work to progress in the drainage area).
- Rows of fiber rolls shall be provided as follows:

  a) Along the downhill perimeter edge of all areas disturbed.

b) Along the top of the slope or top bank of drainage ditches, channels, swales, etc. that traverse disturbed areas.

c) Along the toe of all cut slopes and fill slopes of the construction areas.

d) Perpendicular to the flow in the bottom of existing drainage ditches, channels, swales, etc. that traverse disturbed areas or carry runoff from disturbed areas. Rows shall be spaced at distances not to exceed 35 feet.

e) At the entrance to culverts that receive runoff from disturbed areas.

f) On steep slopes fiber rolls shall be trenched in slightly and spaced at distances not to exceed 35 feet. Rolls shall be placed at the same elevation contour by survey methods. Placement by survey methods will reduce the possibility of a rill developing along a sloping roll. On steep slopes fiber rolls shall be used with erosion control blankets.

- Temporary stabilized gravel entrances and exits are required for construction sites greater than 1 acre in size. The locations of these entrances are shown on the Plans. The Contractor shall phase his site construction as much as possible to reduce the total amount of exposed areas subject to erosion.
- The Contractor shall prepare a SWPPP and implement Standard BMPs, and Comply with NPDES Permit Conditions.

## 3.2 Climate and Precipitation

### 3.2.1 Affected Environment

The climate on Oahu is generally characterized by mild temperatures, cool and persistent northeasterly winds, and a two-season year—a rainy season from October through April, and a dry season from May through September. According to data from the Western Region Climate Center (WRCC), the climate of the state of Hawaii is unique because it is surrounded by the Pacific Ocean, and is the only state located within the tropics (WRCC 2014).

During the dry season, the persistent northeasterly winds, known as trade winds, blow 80 to 95 percent of the time, and during the rainy season, the trade winds are less persistent and blow 50 to 80 percent of the time. Additionally, southerly winds associated with low-pressure systems can bring heavy rains.

Tropical storms are frequent, yet true hurricanes are rare in Hawaii. However, hurricanes may pass close enough to the islands to yield heavy rains, high winds, and great waves upon the coasts. Hurricanes and tropical storms are not limited to the winter season, but are most likely to occur during the last half of the year, from July through December. High waves from hurricanes generally occur during hurricane season between June 1 and December 1, and most often hit the eastern shores of Oahu. Hurricane generated waves have been recorded in excess of 15 ft along east Oahu and 20 ft on Oahu's southern shores (USGS 2002).

The project area is located within the interior lowlands of Oahu, where cloud cover and showers are very common. Average rainfall observed by the National Weather Service (NWS) Forecast Office at the Kunia Substation in 2014 shows an accumulated rainfall from 2 inches in January to 25 inches in July,

with a monthly average ranging from approximately 1 to 4 inches, with occasional monthly highs of 12 to 13 inches (NWS 2014). The average monthly temperature in the project area ranges from 66 to 80 degrees Fahrenheit.

### 3.2.2 Environmental Consequences

***No Action Alternative***

The No Action Alternative would consist of retaining Reservoirs 155 and 225 in their current condition. No construction or ground disturbing activities that could directly or indirectly affect local climate conditions would occur. Under the No Action Alternative, routine maintenance activities would continue to occur, as necessary. Furthermore, if improvements to the reservoirs were not made, it is reasonable to assume that the long-term burden of maintenance and repairs at each reservoir would increase, and the benefits of increased safety and reduced risk of failure would not be realized.

***Proposed Action Alternative***

The Proposed Action would include the excavation of the existing embankments, removal of sediment from the interior of the reservoirs, and the reconstruction of the embankments to meet USACE and DLNR design criteria. The Proposed Action would include new inlet, outlet and intake, and spillway facilities, in addition to a HDPE reservoir liner.

Implementation of the Proposed Action is not anticipated to affect local climate conditions or contribute to adverse effects resulting from hurricanes. The project sites are no more or less vulnerable than the rest of the island to the potential for destructive winds and torrential rains associated with hurricanes. No impacts are expected under the Proposed Action.

### 3.2.3 Best Management Practices and Mitigation Measures

Since there would be no adverse effects on climate and precipitation, no mitigation would be required.

## 3.3 Drainage and Flooding

### 3.3.1 Affected Environment

Natural drainage flows into the watersheds of the reservoirs from the north, and exits to the south. This drainage pattern is consistent with the northwest-to-southeast slope of the Kunia plateau. The Reservoir 155 watershed is approximately 0.08 square miles. The Reservoir 225 watershed is approximately 0.17 square miles. A map showing the approximate watersheds for both reservoirs is presented in Figure 12.

According to the Federal Emergency Management Agency (FEMA) State of Hawaii, Flood Insurance Rate Map (FIRM) (Panel 15003C0220F), the reservoir sites are designated as Zone D, in which the flood hazards are undetermined, but possible (CCH, 2013). Figure 13 shows the FEMA FIRM Panel Map for both reservoirs.

***Regulatory Setting***

The regulatory setting defined in Section 3.1 Geology and Soils also applies to this Section. Additional regulatory setting information is provided below.

**Oahu General Plan**

The Oahu General Plan, issued in 1992 and amended in 2002, sets forth the long-range objectives and policies for the general welfare and, together with the regional development plans, provides a direction and framework to guide the programs and activities of the City of Honolulu (referred to in this document as the City) and the County of Honolulu. The following General Plan objectives and policies are applicable to the Proposed Action.

Objective A: To protect and preserve the natural environment.

Policy 6: Design surface drainage and flood-control systems in a manner which will help preserve their natural settings.

### 3.3.2 Environmental Consequences

***No Action Alternative***

The No Action Alternative would consist of retaining Reservoirs 155 and 225 in their current condition. There would be no ground-disturbing activities or any modifications to the existing reservoirs. Therefore, no construction activities that could directly or indirectly affect drainage or flood conditions would occur. Under the No Action Alternative, routine maintenance activities would continue to occur, as necessary. Furthermore, if improvements to the reservoirs are not made, it is reasonable to assume that the long-term burden of maintenance and repairs at each reservoir would increase, and the benefits of increased safety and reduced risk of failure would not be realized. If the embankments at Reservoir 155 or 225 failed water would potentially inundate areas downstream depending on the location of the failure and the extent of failure.

***Proposed Action Alternative***

The Proposed Action would include the excavation of the existing embankments, removal of sediment from the interior of the reservoirs, and the reconstruction of the embankments to meet USACE and DLNR design criteria. The Proposed Action would include new inlet, outlet and intake, and spillway facilities, in addition to a HDPE reservoir liner. The USACE is working with the DLNR to ensure that all proposed improvements are consistent with state laws, regulations, and permit requirements related to dam safety.

The Proposed Action is not expected to exacerbate flood conditions in the area. The proposed improvements would rehabilitate both reservoirs to meet USACE and DLNR criteria. The proposed improvements would be able to pass the 100-year storm event without changes to the FEMA flood map. The proposed improvements would not place any existing or proposed housing in a designated flood hazard area.

***Short Term***

Drainage effects related to construction activities would be of short duration and would cease upon completion of the Proposed Action. As stated in Section 2 Description of Proposed Action and Alternatives, the proposed improvements would require ground disturbing activities and the import of fill materials. There would be no increase in impervious surface area as a result of the proposed improvements. Potential short-term effects of the Proposed Action would include the discharge of sediments or other pollutants in construction-related storm water runoff. However, the water supply in the reservoirs would be exhausted for irrigation uses prior to the initiation of ground-disturbing construction activities. The inlet, outlet, and spillway features of each reservoir would also be closed off to prevent flow from the Waiahole Ditch from entering the construction areas.

During construction, project activities would be conducted in compliance with HAR 11-54 Water Quality Standards; HAR 11-55 Water Pollution Control. Because the proposed improvements would result in more than one acre of ground disturbance during construction, project activities would be subject to a NPDES NOI Form C for Storm Water Discharges Associated with Construction Activity from DOH CWB. This permit requires implementation of BMPs, including site management measures (e.g. silt fences, stabilized construction entrance/exit) to reduce pollutants in construction storm water runoff and ensure that the project complies with State water quality standards.

Temporary erosion and/or runoff control BMPs are outlined in Section 3.1 Geology and Soils and would minimize the potential for stormwater pollution resulting from erosion and from sediment migration from the construction and staging areas. After completion of construction activities, temporary facilities related to erosion and/or runoff control would be removed and disturbed areas would be restored and reclaimed as appropriate. Implementing the Proposed Action would result in a less than significant impact.

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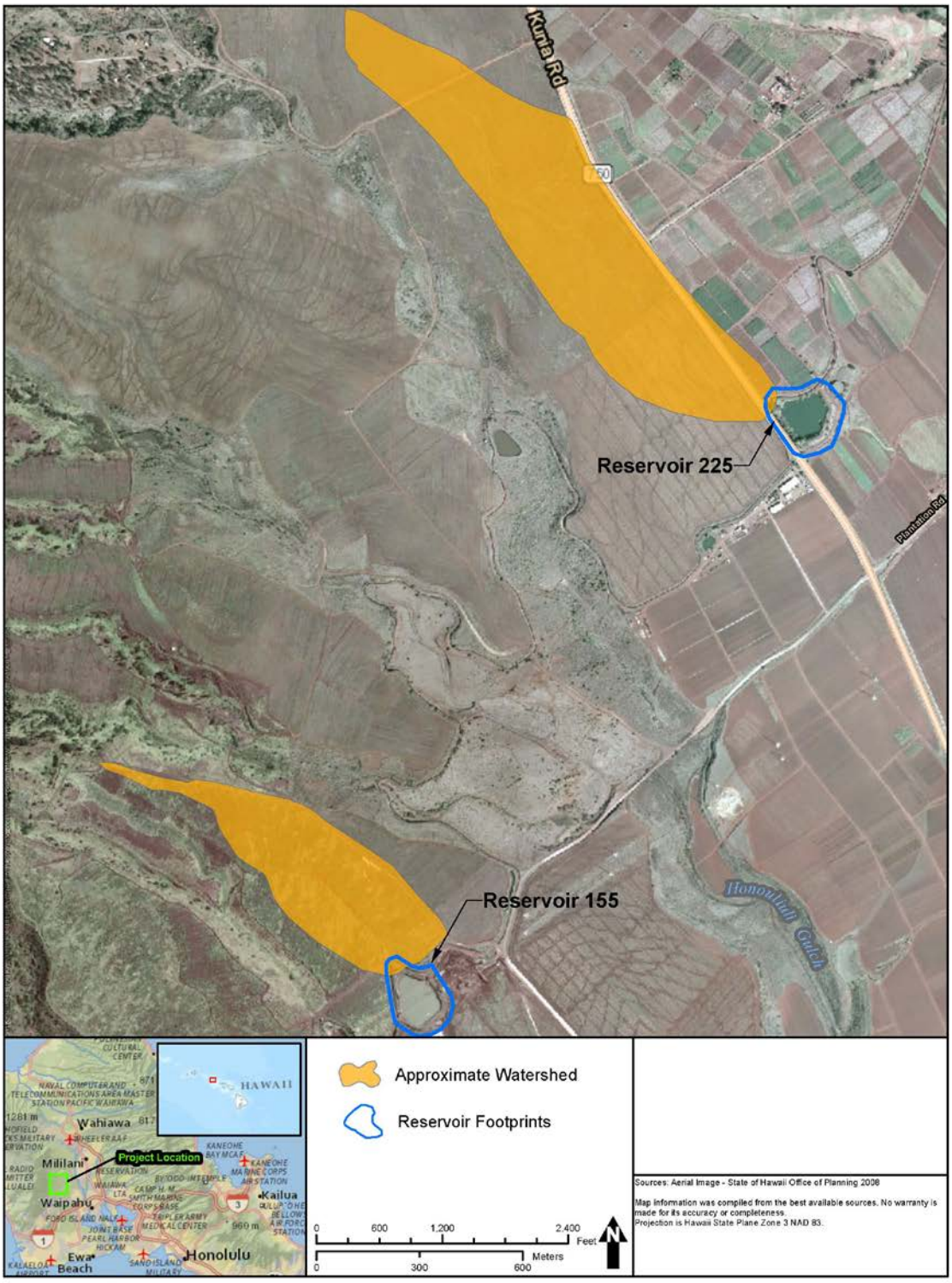


**Figure 12 Reservoirs 155 and 225 Approximate Watersheds**

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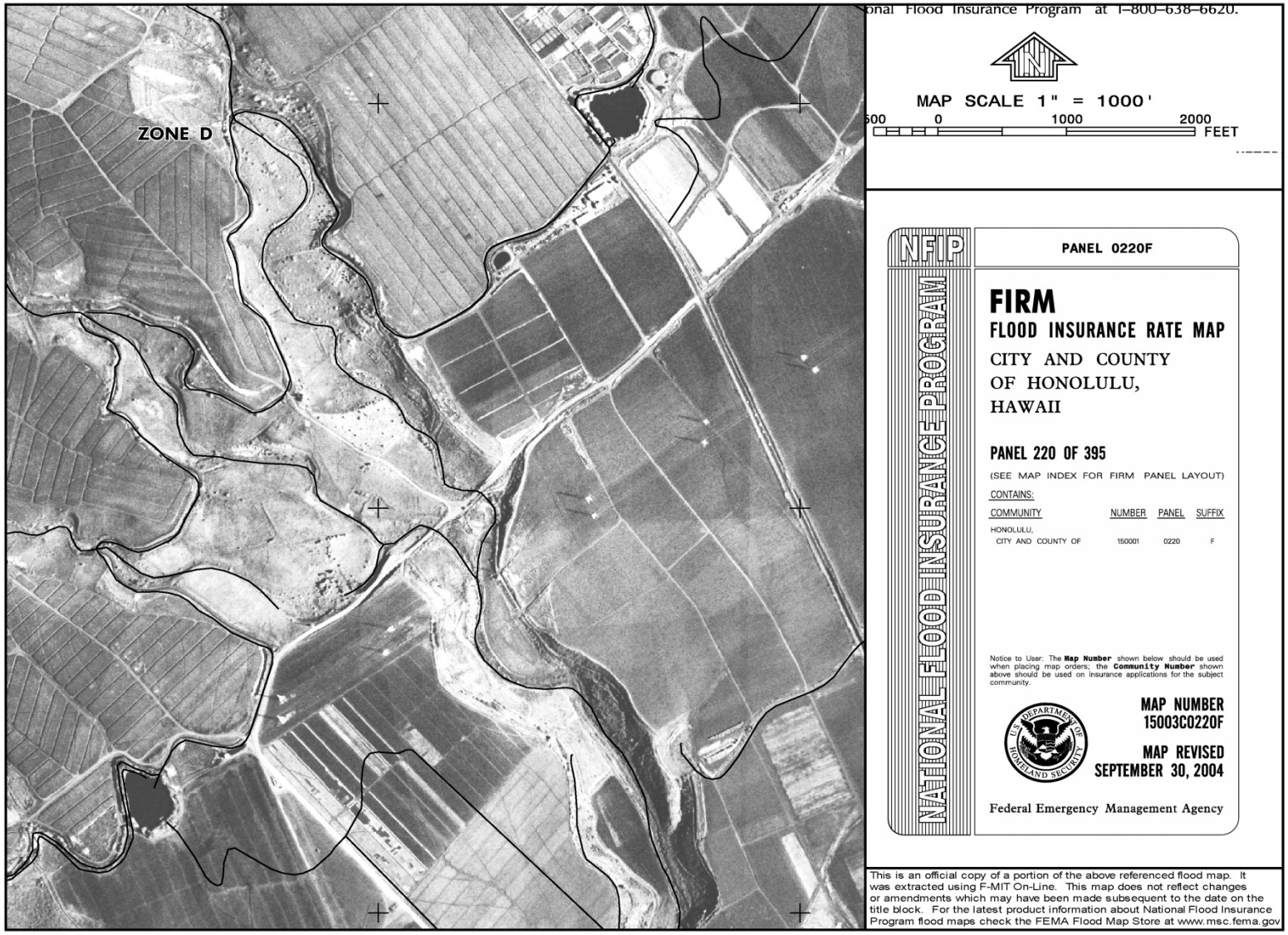


**Figure 13 FEMA FIRM Panel Map for Reservoirs 155 and 225**

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***Long Term***

No long-term impacts to drainage and flooding are anticipated to result from implementation of the Proposed Action. The Proposed Action would lessen the long-term burden of maintenance and repairs at each reservoir and would not result in substantial changes to current operation and maintenance activities.

### 3.3.3 Best Management Practices and Mitigation Measures

Since there would be no significant effects on drainage and flooding, no mitigation would be required. However, several BMPs have been identified in Section 3.1 Geology and Soils to reduce the temporary effects of construction activities. No additional BMPs would be required.

## 3.4 Surface Water, Groundwater, and Water Quality

### 3.4.1 Affected Environment

***Surface Water***

The Waiahole Ditch Irrigation System is one of the main surface-water diversion systems on Oahu and consists of a transmission system that uses surface and groundwater to irrigate farmlands in leeward and central Oahu. The total length of the system is approximately 26 miles and consists mostly of tunnels. The Waiahole tunnel system was originally designed to transport water from streams in windward Oahu to southwestern Oahu for sugarcane cultivation. The Waiahole Ditch opened in 1916 and is owned by the State of Hawaii and its water use is allocated through application to DLNR. The Waiahole Ditch Irrigation System consists of 37 stream intakes connected by tunnels bored through ridges and spurs in windward Oahu, a main transmission tunnel through the Ko'olau Mountain Range, and additional tunnels and ditches in central Oahu. After collection, the water is transported through tunnels and ditches and stored in reservoirs for diversified agriculture irrigation. As noted in Section 1, Introduction, increased use of water is expected with the expansion of diversified agriculture on Oahu. In addition, water from the Waiahole Ditch is increasingly being used to restore water to Windward Oahu streams, which will result in a reduction of the available water in the system. The Waiahole Ditch Irrigation System supplies water directly to Reservoirs 155 and 225. Figure 14 shows the overall Waiahole Ditch Irrigation System.

Following the closure of OSC in 1995, the Waiahole Ditch system continued to divert approximately 23 MGD of water (about 21 MGD groundwater and 2 MGD surface water) from windward Oahu to leeward Oahu (State of Hawaii 2001). Some of this water is currently being restored to streams in windward Oahu in response to instream-flow needs. Therefore, currently as limited by the State Water Commission, the Waiahole Ditch Irrigation System transports 12.57 MGD of water from windward Oahu to fields in Central Oahu and Kunia (CCH 2011).

The Honouliuli Gulch or Stream is located approximately 1,000 feet to the east of Reservoir 155 and 2,750 feet to the west of Reservoir 225. Honouliuli Stream is a tributary to the West Loch of Pearl Harbor, which is located approximately 3.5 miles south-southeast of the reservoir sites and is contiguous with the Pacific Ocean. The Waiahole Ditch terminates at Oahu Reservoir 155. Flows are then discharged into an unnamed branch of the Honouliuli Stream, which then flows into the Pacific Ocean.

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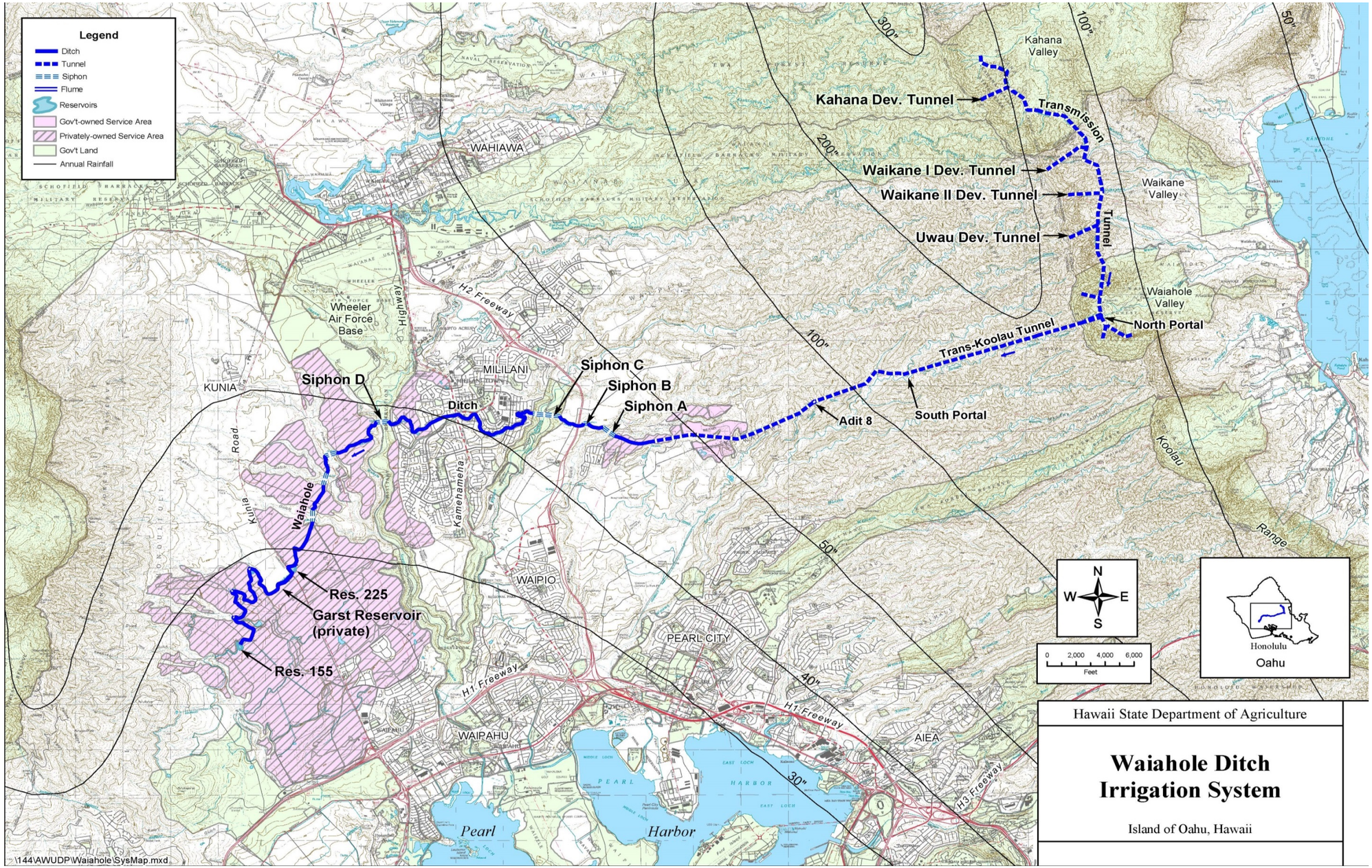


**Figure 14 Waiahole Ditch Irrigation System**

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***Groundwater***

The major fresh groundwater systems in Hawaii are either freshwater-lens or dike-impounded systems (USGS 2000). A freshwater-lens system consists of a lens-shaped freshwater body, an intermediate transition zone of brackish water, and underlying saltwater. A dike-impounded system is found in the rift zones and caldera of a volcano where low-permeability dikes have intruded other rocks.

An important source of groundwater supply for Oahu is an exceptional lens of basal (fresh water in contact with sea water) groundwater in the Honolulu-Pearl Harbor area (USDA, 1972). Southern Oahu's coastal plain is underlain by sedimentary deposits that form a caprock that retards the seaward movement of fresh ground water from the basal aquifer. A caprock is defined as confining units of weathered volcanic rocks and sedimentary deposits in coastal areas, which can impede the discharge of freshwater to the ocean. The Southern Oahu caprock extends along the coastline from 800 to 900 feet below sea level.

Oahu is divided into seven major groundwater areas, primarily on the basis of geologic or hydrologic conditions. The entire project area is located within the designated Southern Oahu Groundwater Area. Water levels in the Southern Oahu Groundwater Area generally range from approximately 25 to 30 feet above sea level inland to approximately 15 to 20 feet above sea level near the shore where the water is under artesian pressure because it is confined by caprock. The caprock impedes the seaward movement of fresh ground water. In the eastern part of the Southern Oahu Groundwater Area, thick valley fill and underlying weathered rocks form partial barriers to groundwater flow. In the western part of the area, the weathered zone near the unconformity separating Koʻolau Basalt from underlying Waiʻanae Volcanics impedes the flow of water between the two volcanic-rock aquifers (USGS, 1999).

Groundwater beneath the reservoir sites occurs within the Ewa Aquifer System (Reservoir 155) and Waipahu Aquifer System (Reservoir 225) of the Pearl Harbor Aquifer Sector. The aquifers occur within flank formations (horizontally extensive lavas), are unconfined, and are identified as basal. The aquifers are fresh water (<250 milligrams per liter chloride) and are highly vulnerable to contamination. The aquifers are currently listed and used as a drinking water source and are also listed as irreplaceable (Mink and Lau, 1990). Based on regional topography, regional groundwater flow direction is expected to be south -southeast towards the west loch of Pearl Harbor.

The DLNR's Commission on Water Resource Management (CWRM) is responsible for collecting basic hydrologic data and conducting water availability analyses statewide, and the USGS collects water level and deep monitor well data through cooperative agreements with CWRM (CWRM, 2014). A deep monitor well penetrates the freshwater basal aquifer into the underlying brackish and salt water. Data from the Kunia Middle and Kunia Mauka deep monitor wells in the project area indicate that groundwater ranges from approximately 15 to 16.5 feet above mean sea level (CWRM, 2014).

The Honolulu Board of Water Supply (BWS) has potable wells, storage tanks and transmission facilities on the Kunia plateau. A major transmission main is located in the right-of-way for Kunia Road, which runs along the western border of Reservoir 225. No wells are located within one mile of the reservoir sites.

***Water Quality***

Water quality is measured by several factors, such as the concentration of dissolved oxygen, bacteria levels, the amount of salt, or the amount of material suspended in the water. The concentration of pesticides, herbicides, heavy metals, and other contaminants may also be measured to determine water quality.

Waiahole Ditch water is a low mineral content source of water, which has chlorides ranging from 12 to 14 parts per million and Total Dissolved Solids ranging from 95 to 105 ppm. The Waiahole Ditch water freshens rather than salts the aquifer by providing a large influx of high quality water that further dilutes the concentration of minerals in the aquifer, freshening the basin, and lowering well water chloride levels. Specific water quality data is not available for Reservoirs 155 and 225.

***Regulatory Setting***

The regulatory setting defined in Section 3.1 Geology and Soils also applies to this Section. Additional regulatory setting information is provided below.

**Oahu General Plan**

The Oahu General Plan, issued in 1992 and amended in 2002, sets forth the long-range objectives and policies for the general welfare and, together with the regional development plans, provides a direction and framework to guide the programs and activities of the City and County of Honolulu. The following General Plan objectives and policies are applicable to the Proposed Action.

Objective A: To protect and preserve the natural environment.

Policy 7: Protect the natural environment from damaging levels of air, water, and noise pollution.

### 3.4.2 Environmental Consequences

***No Action Alternative***

The No Action Alternative would consist of retaining Reservoirs 155 and 225 in their current condition. There would be no ground-disturbing activities or any modifications to the existing reservoirs. Therefore, no construction activities that could directly or indirectly affect hydrologic conditions or surface water and groundwater quality would occur. Under the No Action Alternative, routine maintenance activities would continue to occur, as necessary. Furthermore, if improvements to the reservoirs are not made, it is reasonable to assume that the long-term burden of maintenance and repairs at each reservoir would increase, and the benefits of increased safety and reduced risk of failure would not be realized. If the embankments at Reservoir 155 or 225 failed water would potentially inundate areas downstream depending on the location of the failure and the extent of failure.

***Proposed Action Alternative***

The Proposed Action would include the excavation of the existing embankments, removal of sediment from the interior of the reservoirs, and the reconstruction of the embankments to meet USACE and DLNR design criteria. The Proposed Action would include new inlet, outlet and intake, and spillway

facilities, in addition to a HDPE reservoir liner. Implementation of the Proposed Action is anticipated to result in short-term impacts to surface water and water quality due to construction activities; however, no long-term impacts are anticipated. The Proposed Action would not result in short term or long term impacts to Honouliuli Stream since no construction is proposed within the bed or banks of Honouliuli Stream or within 1,000 feet of the Stream.

The Proposed Action would not result in adverse effects to groundwater in the project area. The project sites are located at approximately 600 foot elevations, and as noted above, groundwater in the project area ranges from 15 to 16.5 feet above mean sea level. Construction of the proposed improvements would not require extensive excavation and would be up to 12 feet below ground surface. Therefore, construction of the proposed improvements is not anticipated to encounter groundwater.

***Short Term***

**Surface Water and Water Quality**

As stated in Section 2, Description of Proposed Action and Alternatives, the proposed improvements would require ground disturbing activities and the import of fill materials. Potential short-term effects of the Proposed Action would include the discharge of sediments or other pollutants in construction-related storm water runoff. However, the water supply in the reservoirs would be exhausted for irrigation uses prior to the initiation of ground-disturbing construction activities. During construction the inlets to the reservoirs from Waiahole Ditch and the spillway outlets into Waiahole Ditch would be closed off to allow water to pass freely within the ditch limits around the construction sites. No discharge from the construction sites would be allowed to enter the ditch. Water accumulated within the construction limits would be discharged to an approved collection point in accordance with the project SWPPP. A temporary water supply system would be constructed at each reservoir prior to the initiation of construction activities. Each temporary system would be operational prior to taking the existing facilities out of service.

As stated in Section 3.1, Geology and Soils, and Section 3.3, Drainage and Flooding, during construction, project activities would be conducted in compliance with HAR 11-54 Water Quality Standards; HAR 11-55 Water Pollution Control. Because the proposed improvements would result in more than one acre of ground disturbance during construction, project activities would be subject to a NPDES NOI Form C for Storm Water Discharges Associated with Construction Activity from DOH, CWB. This permit requires implementation of BMPs to reduce pollutants in construction storm water runoff and ensure that the project complies with State water quality standards.

Temporary erosion and/or runoff control BMPs are outlined in Section 3.1 Geology and Soils and would minimize the potential for stormwater pollution resulting from erosion and from sediment migration from the construction and staging areas. After completion of construction activities, temporary facilities related to erosion and/or runoff control would be removed and disturbed areas would be restored and reclaimed as appropriate. Implementing the Proposed Action would result in a less than significant impact.

***Long Term***

No long-term impacts to surface water, groundwater, or water quality are anticipated to result from implementation of the Proposed Action. The Proposed Action would lessen the long-term burden of maintenance and repairs at each reservoir and would not result in substantial changes to current operation and maintenance activities.

### 3.4.3 Best Management Practices and Mitigation Measures

Since there would be no significant effects on drainage and flooding, no mitigation would be required. However, several BMPs have been identified in Section 3.1 Geology and Soils to reduce the temporary effects of construction activities. No additional BMPs are required.

## 3.5 Biological Resources

### 3.5.1 Affected Environment

For the purposes of documenting existing biological resources, as well as the potential direct and indirect effects on these resources, both a biological resources and a botanical assessment were completed for the project sites. The survey area for these assessments included the areas that would be directly affected by the proposed improvements to Reservoirs 155 and 225, as outlined in Section 2 Description of Proposed Action and Alternatives. The survey area also included the potential staging areas and borrow site.

***Project Setting***

Surveys were conducted in January 2013, May 2014, and June 2014 to document the existing biological resources (LeGrande 2013, 2014). These surveys documented that the majority of the survey area consists of mowed areas dominated by weedy plant species, bare soil, or areas in active cultivation. The areas surrounding the reservoirs have been utilized for agriculture since the late 1800s, previously planted in sugar cane and currently used for diversified agriculture, specifically experimental corn crops. The agricultural crops found in this area were not included in the overall species list. A summary of the vegetation, wildlife, and wetland resources in the survey area is provided below.

***Vegetation***

Prior to undertaking field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area. Topographic maps were examined to determine terrain characteristics, access, boundaries, and reference points.

A transect survey method was used for field surveys. The earthen embankments of the reservoirs were walked, and a buffer of up to 300 ft radiating outward was also surveyed, with the exception of areas where active cultivation was in progress (i.e. cornfields were surveyed from the outer margins). The perimeters of the staging areas were walked, as well as transects through them if vegetation was observed. The perimeter of the borrow site was walked, as well as transects roughly 20 ft apart throughout the survey area. During the survey, notes were made on plant associations and distribution, disturbances, topography, substrate types, exposure, drainage, and plant identifications were made in the field.

In general, the areas surveyed around both reservoirs, staging sites, and borrow site were dominated by non-native plant species and agricultural crops. A detailed summary of all plants observed around each of the reservoir sites, staging areas, and borrow site is provided below, and an inventory is included in the biological resources assessment documents in Appendix A.

**Reservoir 155 and Staging Area**

A total of 55 plant species were observed within the survey area. Fifty-three were identified as non-native (introduced) and two were indigenous (native to the Hawaiian Islands and elsewhere). The earthen embankments were dominated by mowed weedy (non-native) species such as lion's ear (*Leonotis nepetifolia*), partridge pea (*Chamaecrista nictitans*), cheeseweed (*Malva parviflora*), spiny amaranth (*Amaranthus spinosus*), ivy gourd (*Coccinea grandis*), and beggar tick (*Bidens alba*). Non-native grass species include sourgrass (*Digitaria insularis*), natal redtop (*Melinis repens*), and swollen fingergrass (*Digitaria insularis*). The flumes/ditches included in the survey area were also dominated by non-native plant species including, Australian saltbush (*Atriplex semibaccata*), coat buttons (*Tridax procumbens*), slender mimosa (*Desmanthus pernambucans*), and creeping indigo (*Indigofera hendecaphylla*). Growing at the base of a large electrical tower within the survey area is a mass of Christmas berry (*Schinus terebinthifololius*) trees.

The outer slopes of the reservoir embankment were mostly bare dirt with dry grass species, as discussed above. Other non-native species observed in the area were castor bean (*Ricinus communis*), koa haole (*Leucaena leucocephala*), and balsam pear (*Momordica charantia*). Portions of the survey area included the agricultural fields that were planted in corn. Two indigenous plant species were observed in the corn fields: popolo (*Solanum americanum*) and uhaloa (*Waltheria indica*).

The proposed staging area that lies to the southwest of Reservoir 155 is dominated by a plowed, fallow (left unseeded) field that is scattered with non-native plant species mainly along the perimeter of the fields, such as uhaloa, rye (*Secale sp.*), sourgrass, swollen fingergrass, and Guinea grass. The only native plant observed uncommonly within the survey area was the indigenous uhaloa.

**Reservoir 225 and Staging Area**

A total of 57 plant species were observed within the survey area. Fifty-four were non-native (introduced) and three were indigenous. Two large mango (*Mangifera indica*) were growing at the edge of the southwest corner of the reservoir. A few small autograph trees (*Clusia rosea*) were growing as epiphytes (non-parasitic plants that grow on other plants) on the trunk mango trees. Along the top and outer slopes of the embankments surrounding the reservoir, weedy plant species dominated including; castor bean, obscure morning-glory (*Ipomoea obscura*), koa haole, Guinea grass (*Panicum maximum*), coat buttons, love-in-a-mist (*Passiflora foetida*), and golden crown-beard (*Verbesina encelioides*). Three indigenous plant species were observed infrequently in the area: ilima (*Sida fallax*), uhaloa, and popolo. All three indigenous species are common and widespread throughout the Hawaiian Islands.

Near the water line on the inner banks of the reservoir, plants observed included non-native primrose willow (*Ludwigia octovalvis*), poinsettia (*Euphorbia pulcherrima*), and balsam pear. Masses of the water plant Brazilian elodea (*Egeria densa*) were observed submerged throughout the reservoir. A low

section of embankment near the northwest corner was dominated by non-native plant species such as Guinea grass and fuzzy rattlepod (*Crotalaria incana*).

The staging area for Reservoir 225 is located to the east in an agricultural field. Currently, the fields are planted in diversified crops such as banana, bean varietals, lemon grass, and basil. The agricultural crops found in this area were not included in the overall species list. Weedy species along the perimeters of the field include swollen fingergrass, golden crown-beard, and Guinea grass.

**Borrow Site**

The borrow site is located to the northeast of Reservoir 155 in an agricultural field planted in corn with some fallow areas. The interior of the borrow site was planted in corn at the time of the survey. Bare ground or plowed areas were mixed in with the corn. An established access road runs through the site and several weedy species were observed along the edges including, spiny amaranth, castor bean, golden crown-beard, rye, klu, coat buttons, and creeping indigo. A perimeter of Guinea grass delineates the eastern boundary of the survey area near the existing drainage canal. Berm areas surrounding the borrow site location are dominated by Guinea grass, castor bean, koa haole, and sourgrass.

***Wildlife***

Wildlife activity was estimated by conducting transect surveys over the project site and noting all individuals of each bird species observed, as well as signs of their presence, such as footprints, droppings, egg shells, and burrows. Special attention and additional survey time was spent in areas most likely to harbor native species. Birds were identified by sight using the naked eye and 10x binoculars, and by call identification. Although focused surveys were not conducted, observations of invertebrates during vegetation and bird surveys were recorded.

The reservoirs and surrounding areas are not suitable habitat for most native birds. The native Hawaiian stilt or ae`o (*Himantopus mexicanus knudseni*) may visit the reservoirs from time to time, as the birds are known to rest or forage at large bodies of freshwater as they travel between roosting and foraging areas during the day, but none were encountered during surveys. No native or non-native mammals were observed during field surveys at either of the reservoirs, the staging areas, or borrow site. Several species of non-native mammals are known to utilize agricultural areas in Hawaii including, mongoose (*Herpestes javanicus*), black rat (*Rattus rattus*), and feral cats (*Felis catus*), and are most likely to reside or forage in or near the habitat present in the project area.

**Reservoir 155 and Staging Area**

Two species of non-native (introduced) birds were recorded during the one survey field day. A flock of spotted doves (*Streptopelia chinensis*) were observed near the corn fields at the edge of the survey area, and a few common Myna (*Acridotheres tristis*) were roosting in the christmas berry trees near the base of the electric towers to the east of Reservoir 155. Several individuals of an introduced dragonfly (*Anax sp*.) were also observed skimming the water in the reservoir as well as the surrounding ditches. Finally, one Familiar Bluet (*Enallagma civile*), an introduced damselfly, was seen along the earthen embankment of the reservoir.

The staging area for Reservoir 155 is located to the southwest; the site is dominated by a plowed agricultural field. Spotted doves were observed flying over and foraging in the field. No other birds or animals were observed in the staging area.

#### Reservoir 225 and Staging Area

Several spotted doves were observed in the surrounding fields near the reservoir. Although no sightings were made during field surveys, it is likely that additional species of introduced birds utilize the areas around the reservoir based on available foraging opportunities and bird identification at Reservoir 155 and borrow site. The staging area for Reservoir 225 is located to the east in an agricultural field. During the field studies, one common myna was observed within the survey area.

#### Borrow Site

The borrow site is located to the northeast of Reservoir 155 in an agricultural field planted in corn (*Zea mays*) with some fallow areas. Birds observed in the area or flying over included common myna, Cattle egret (*Bubulcus ibis*), spotted doves, and flocks of Java sparrow (*Padda oryzivora*).

### *Wetlands*

Based on a review of the U.S. Fish and Wildlife Service's (USFWS) National Wetland Inventory (NWI), Reservoirs 155 and 225 are classified as freshwater ponds, and the Waiahole Ditch is classified as riverine (USFWS 2014). Aside from the reservoirs themselves, no wetlands were encountered during the survey or shown on NWI wetlands maps of the project sites.

### *Regulatory Setting*

#### Federal Endangered Species Act

The USFWS enforces the provisions stipulated within the Federal Endangered Species Act of 1973 (hereafter, "FESA," 16 United States Code (USC), Section 1531 et seq.). Threatened and endangered species on the Federal list (50 CFR, Section 17.11 and 17.12) are protected from take, defined as direct or indirect harm or harassment.

#### Executive Order 11990: Protection of Wetlands

This order establishes a national policy to avoid adverse impacts on wetlands whenever there is a practicable alternative. Specifically, it directs Federal agencies to refrain from assisting in or giving financial support to projects that encroach on publicly or privately owned wetlands. It further requires that Federal agencies support a policy to minimize the destruction, loss, or degradation of wetlands.

#### Oahu General Plan

The Oahu General Plan was issued in 1992 and amended in 2002, and sets forth the long-range objectives and policies for the general welfare and, together with the regional development plans, provides a direction and framework to guide the programs and activities of the CCH (CCH 2002). The following General Plan objectives and policies are applicable to the Proposed Action:

Objective A: To protect and preserve the natural environment.

Policy 8: Protect plants, birds, and other animals that are unique to the State of Hawaii and the Island of Oahu.

### 3.5.2 Environmental Consequences

***No Action Alternative***

The No Action Alternative would consist of retaining Reservoirs 155 and 225 in their current condition. No construction or ground disturbing activities that could directly or indirectly affect vegetation or wildlife would occur. Under the No Action Alternative, routine maintenance activities would continue to occur, as necessary. Furthermore, if improvements to the reservoirs were not made, it is reasonable to assume that the long-term burden of maintenance and repairs at each reservoir would increase, and the benefits of increased safety and reduced risk of failure would not be realized.

***Proposed Action Alternative***

The Proposed Action would include the excavation of the existing embankments, removal of sediment from the interior of the reservoirs, and the reconstruction of the embankments to meet USACE and DLNR design criteria. The Proposed Action would include new inlet, outlet and intake, and spillway facilities, in addition to a HDPE reservoir liner.

The survey area has been impacted over time by human use and the biological resources have been altered from their native state (LeGrande 2014). The majority of the plant species and all of the wildlife species observed within the survey areas for the reservoirs, staging areas, and borrow site were non-native. Sections of the project sites are actively managed and cleared for agricultural use, while the remaining areas are used for the reservoirs, pump equipment, and flumes/ditches.

None of the plant or wildlife species observed during the field surveys are listed as Federal Threatened or Endangered species or as a Species of Concern (La Grande 2014). However, a list of federally-protected species and designated critical habitat that may be present in the project area was requested from the USFWS. Per the response received from the USFWS, there is no federally designated critical habitat within the immediate vicinity of the Proposed Action. The endangered Hawaiian stilt (*Himantopus mexicanus knudseni*), endangered Hawaiian coot (*Fulica alai*), endangered Hawaiian gallinule (*Gallinula galeata sandvicensis*), endangered Hawaiian duck (*Anas wyvilliana*), endangered Hawaiian goose (*Branta sandvicensis*) (collectively referred to as Hawaiian waterbirds); and endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) may occur within the vicinity of the Proposed Action. Copies of communications with the USFWS are included in Appendix A.

Besides the reservoirs themselves, no wetlands were encountered during the survey. The three essential criteria for defining a Federally-recognized wetland – (1) hydrophytic vegetation (adapted to grow in water), (2) hydric soils (visible signs of permanent or seasonal saturation), and (3) wetlands hydrology – were not present in conjunction with any locations within the field survey area. Further, based on communication with the USFWS, the artificial ditches, flumes, and reservoirs of the type represented by the Waiahole Ditch System are not considered Waters of the U.S., and thus Fish and Wildlife Coordination Act engagement would not be required. Therefore, it is assumed that no wetlands

are present, and therefore, implementation of the Proposed Action would not result in adverse impacts to the habitat.

With implementation of the Proposed Action, there is the potential for temporary construction-related disturbance to habitat for vegetation and wildlife within the project area. However, since the project area is not anticipated to contain any habitat for Federally Endangered or Threatened or any other Species of Concern, no adverse effects to special status species are anticipated to result from implementation of the Proposed Action. The Proposed Action would include implementation of the USFWS recommended standard BMPs to minimize the degradation of water quality and minimize the impacts to fish and wildlife resources, as well as avoidance and minimization measures for Hawaiian hoary bat and Hawaiian waterbirds, as outlined in detail below. Further, after completion of construction activities, the staging areas and borrow site would be cleared of all equipment, materials, and project refuse, then re-graded and restored as appropriate. Implementing the Proposed Action would result in a less than significant impact.

### 3.5.3 Best Management Practices and Mitigation Measures

Since no adverse effects on biological resources are anticipated, no mitigation would be required. However, the Proposed Action would include implementation of the USFWS recommended standard BMPs to minimize the degradation of water quality and minimize the impacts to fish and wildlife resources. The recommended standard BMPs would be included in construction specifications for the Proposed Action, and are outlined below.

1. Turbidity and siltation from project-related work shall be minimized and contained within the vicinity of the site through the appropriate use of effective silt containment devices and the curtailment of work during adverse tidal and weather conditions.

2. Dredging/filling in the marine environment shall be scheduled to avoid coral spawning and recruitment periods and sea turtle nesting and hatching periods.

3. Dredging and tilling in the marine/aquatic environment shall be designed to avoid or minimize the loss special aquatic site habitat (beaches, coral reefs, wetlands, etc.) and the function of such habitat shall be replaced.

4. All project-related materials and equipment (dredges, barges, backhoes, etc.) to be placed in the water shall be cleaned of pollutants prior to use.

5. No project-related materials (fill, revetment rock, pipe, etc.) should be stockpiled in the water (intertidal zones, reef flats. stream channels, wetlands, etc.) or on beach habitats.

6. All debris removed from the marine/aquatic environment shall be disposed of at an approved upland or ocean dumping site.

7. No contamination (trash or debris disposal. non-native species introductions, attraction of non-native pests, etc.) of adjacent habitats (reef flats, channels, open ocean, stream channels, wetlands, beaches, forests, etc.) shall result from project-related activities. This shall be

accomplished by implementing a litter-control plan and developing a Hazard Analysis and Critical Control Point Plan to prevent attraction and introduction of non-native species.

8. Fueling of project-related vehicles and equipment should take place away from the water and a contingency plan to control petroleum products accidentally spilled during the project shall be developed. Absorbent pads and containment booms shall be stored onsite, if appropriate, to facilitate the clean-up of accidental petroleum releases.

9. Any under-layer fills used in the project shall be protected from erosion with stones (or core-loc units) as soon after placement as practicable.

10. Any soil exposed near water as part of the project shall be protected from erosion (with plastic sheeting, filter fabric etc.) after exposure and stabilized as soon as practicable (with native or non-invasive vegetation matting, hydroseeding, etc.).

The Proposed Action would also include implementation of the USFWS-recommended avoidance and minimization measures for Hawaiian hoary bat, as outlined below.

- Woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June I through September 15).

- Site clearing should be timed to avoid disturbance to Hawaiian hoary bats in the project area.

Construction specifications for the Proposed Action would also include avoidance and minimization measures for Hawaiian waterbirds, which include the requirement for field personnel to report sightings of waterbirds or nests.

- If a listed Hawaiian waterbird is observed within the project site, or flies into the site while activities are occurring (within 100 feet), all potentially disruptive activities (including human activity, mechanical or construction disturbance) will be stopped until the animal(s) voluntarily leave the area.

## 3.6 Historic and Cultural Resources

### 3.6.1 Affected Environment

For the purposes of documenting existing cultural resources, as well as the potential direct and indirect effects on these resources, an Archaeological Inventory Survey (AIS) was completed for the project sites (Cultural Surveys Hawai‘i, Inc. [CSH]). The survey area or Area of Potential Effects (APE) includes the areas that would be directly affected by the proposed improvements to Reservoirs 155 and 225, as outlined in Section 2 *Description of Proposed Action and Alternatives*. The survey area also includes the potential staging areas and borrow site. The total area of the APE is approximately 64.1 acres.

The majority of the project area consists of the individual reservoirs, which are adjacent to and features of the Waiahole Ditch Irrigation System. Agricultural fields and dirt field roads surround the reservoirs, which are unlined earth-filled dams. This is a commonly constructed type of dam that was

built to irrigate sugar cane plantation fields between 1885 and 1940 (CSH 2014). Reservoir 155 is located to the west of Kunia Road in the adjacent Monsanto Company agricultural fields. Access to the reservoir is via a dirt road that is identified on the 1998 US Geological Survey topographic map as Kupehau Road. The road meanders through adjacent agricultural fields. Reservoir 155 is approximately 3.4 acres (ac); the full Reservoir 155 project area is 17.8 ac. There are three PVC floating intakes in the reservoir, with 12 inch pipes that extend from the reservoir embankment on the southern end. A small pump station is on the northwest side of the reservoir and is used to transport water to adjacent agricultural and ranch lands. A larger pump station is adjacent to the ocean-facing reservoir toe. Reservoir 225 is located east of and adjacent to Kunia Road within Robinson Kunia Land LLC agricultural fields. Access to this reservoir is via an unnamed dirt road that traverses between the two reservoirs. Reservoir 225 is approximately 3.9 ac; the full Reservoir 225 project area is 9.9 ac. A PVC floating intake is in the north portion of the reservoir. A pump station is adjacent to the ocean-facing reservoir toe.

***Historical Background***

The Organic Acts of 1845 and 1846 initiated the process of the Māhele, the division of Hawaiian lands, which introduced private property into Hawaiian society (CSH 2014). In 1848, the crown, the Hawaiian government, and the aliʻi (royalty) received their land titles. The common people (makaʻāinana) began to receive their kuleana awards (individual land parcels) in 1850.

Hawaiians recognize several land divisions in varying scales, including the moku (larger land division consisting of several ahupuaʻa), the kalana (smaller land division than a moku), the ahupuaʻa (smaller land divisions than a kalana), and the ʻili (smaller land divisions within an ahupuaʻa) (CSH 2014). As documented in 1873, Oʻahu was divided into six kalana—Kona, ʻEwa, Waiʻanae, Waialua, Koʻolau Loa and Koʻolau Poko—that were further divided into 86 ahupuaʻa (CSH 2014). Within ʻEwa, there are 12 ahupuaʻa. Modern maps and land divisions still generally follow the ancient system and use the same land divisions. The AIS report covered two of the ahupuaʻa of ʻEwa: Honouliuli (location of Reservoir 155) and Hōʻaeʻae (location of Reservoir 225).

In 1877 James Campbell purchased most of Honouliuli Ahupuaʻa, including the present project area for Reservoir 155, for a total of $95,000. He reintroduced cattle to the lands, and by 1881 operated a prosperous cattle ranch (CSH 2014). Much of the upper grasslands of Hōʻaeʻae, including the project area for Reservoir 225, were also used for cattle pasture. At the end of the nineteenth century, Hōʻaeʻae was still considered a remote location.

In 1889 Campbell leased his property to Benjamin Dillingham, who subsequently formed the Oahu Railway & Land Company (OR&L) in 1890. The first 15 miles of the rail line reached Hōʻaeʻae on July 1, 1890 (CSH 2014). To attract business to his new railroad system, Dillingham subleased all land below 200 ft elevation to William Castle who in turn sublet the area to the Ewa Plantation Company for sugar cane cultivation (CSH 2014). Just north of Ewa Plantation was the Oahu Sugar Company (OSC), established by Dillingham in 1897. The OR&L transported the sugar from both the OSC and the Ewa Plantation Company to Honolulu's docks.

Water to irrigate the upper cane fields was initially pumped to an elevation of 500 feet ASL. The expense of pumping water to the high elevations of the plantation led to the proposal to transport water from the windward side of the Koolau Mountains, which led to the establishment of the Waiahole Water

Company. The Waiahole Water Company was incorporated in 1913 as a subsidiary of the OSC. Construction started in February 1913 and was completed in 1916; the Waiahole Ditch provided sufficient water to allow for sugar cultivation in the arid lands above 575 ft elevation (CSH 2014). The ditch began in Kahana Valley at an elevation of 790 ft, and ran almost entirely through tunnels in the Waikāne and Waiāhole valleys, the Koʻolau Mountains, to central Oʻahu where the water ran through concrete-lined ditches and across gulches by inverted siphons to Reservoir 155 at 600 feet ASL (CSH 2014). Siphons could be inverted to move water uphill; both wood and metal siphons were used beginning in the late 1800s throughout the Waiahole Ditch (CSH 2014).

By 1960, the OSC was the largest sugar producer on Oʻahu, with 75,000 tons annually. The company took control of the Ewa Plantation lands, south of and adjacent to the OSC in 1970 and continued operations until 1995, when sugar cane production in the combined plantation area ended. The Waiahole Water Company changed its name in 1970 to the Waiahole Ditch Irrigation Company. OSC and Waiahole Ditch Irrigation Company later became wholly owned subsidiaries of Amfac/JMB Hawaii. When OSC's sugar cane production ceased in 1995, discussions, as well as law suits, with regard to how best to use the Waiahole Ditch waters ensued. In 1999, the Waiahole Ditch system was purchased by the State of Hawaiʻi, under management by the ADC (CSH 2014). Repairs to the ditch system by the ADC have since been undertaken to prevent water losses due to seepage.

### *Archaeological Inventory Survey*

As described above, the AIS report was prepared for the proposed project in 2014. The AIS includes background research and field work, as described in further detail below. The AIS was prepared to support the proposed project's historic preservation review under Hawaiʻi Revised Statutes (HRS) §6E-8 and HAR §13-13-275.

#### Background Research

Several previous archaeological reports for the area were reviewed, as were historic maps and primary and secondary historical sources. This research provided the environmental, cultural, historical and archaeological background for the project area, and was used to formulate a predictive model regarding the expected types and locations of historic properties in the project area. The previous archaeological studies indicated that surface remains of pre-contact and/or early post-contact (pre-1850) sites exist in gulches and ridges but are not present within former plantation lands. This suggests that most pre-contact and/or early post-contact sites were destroyed by subsequent activities related to plantation agriculture. The historic era sites that were documented consist mainly of plantation era structures including ditches, and flumes.

#### Field Work

On December 13 and 14, 2012, CSH archaeologists surveyed the entire APE (including both reservoir locations) in pedestrian sweeps 10 meters (m) apart. All identified archaeological features were described, measured and photographed, and their locations were recorded with a geographic positioning system (GPS) device. GPS field data was post-processed, yielding horizontal accuracy between 0.5 and 0.3 m. Surveys were also conducted in both of the project-related staging areas, as well as the borrow area. Fieldwork for the project-related staging areas and borrow area involved the same pedestrian sweep-type surveys; no historic properties were observed.

For Waiahole Reservoirs 155 and 225, more intensive documentation occurred. Both Reservoir 155 and Reservoir 225 were treated as components of the Waiahole Ditch Irrigation System previously designated as State Inventory of Historic Places (SIHP) # 50-80-09-2268. A total of 25 sub-features of SIHP # 50-80-09-2268 were identified within the APE (CSH 2014). A total of 16 of the sub-features (CSH-1 through CSH-16 in the AIS) are associated with the Reservoir 155 portion of the APE, and 9 sub-features (CSH-17 through CSH-25 in the AIS) are associated with the Reservoir 225 portion of the APE. All of the sub-features date to the completion of the Waiahole Ditch in 1916. Although research indicates that Reservoir 155 is the terminus of the Waiahole Ditch system, an unlined run-off ditch continues west past Reservoir 155. Eleven of the sub-features are associated with this run-off ditch (CSH-5 through CSH-15 and CSH-16 in the AIS).

Geotechnical testing was also conducted intermittently between April 2013 and June 2013 at Reservoirs 155 and 225 in order to characterize long term stability of sediments. A total of 24 boring test holes were excavated—12 around Reservoir 155 and 12 around Reservoir 225. The results of the testing indicated that the berms surrounding each reservoir were constructed using locally procured sediments from the surrounding landscape.

**Survey Results**

As noted above, for the purposes of the AIS, Reservoirs 155 and 225 were understood as components of the approximately 26 mile-long Waiahole Ditch Irrigation System, and they may or may not be subject to historic preservation determinations for the irrigation system as a whole. The Hawaii Register of Historic Places and the National Register of Historic Places (NRHP) are the official lists of properties worthy of preservation, and these programs are administered by the State Historic Preservation Division (SHPD).

To be considered eligible for listing on the NRHP, a property must be historic and significant. Significance is defined by the National Register Criteria for Evaluation. A property must meet at least one of the following four National Register Criteria regarding significance:

- Criterion A: Association with historic events or activities
- Criterion B: Association with important persons
- Criterion C: Distinctive design or physical characteristics (architecture, landscape architecture and/or engineering)
- Criterion D: Potential to provide important information about prehistory or history (usually through archaeological investigation).

In order to maintain its distinction as a historic property worthy of preservation, a property must retain a majority of the National Park Service's seven aspects of integrity, which include: location, design, setting, materials, workmanship, feeling, and/or association.

As noted above, the Waiahole Ditch Irrigation System was previously identified and designated as SIHP # 50-80-09-2268. The site was previously determined to be eligible for listing in the NRHP

under Criteria A, C, and D. Under Criterion A, the Waiahole Ditch system is significant for historic associations with Plantation-era agricultural infrastructure near the base of the Waianae Range and with the Oahu Sugar Company. Under Criterion C, it is significant for its design and construction. Under Criterion D, it is likely to yield important information for research. Based on the evaluation provided in the draft AIS report, Reservoirs 155 and 225 were assessed as contributing to the significance of the overall system. All of the sub-features of the system are associated with water control and date to the Plantation era, as does the Waiahole Ditch. Water control was essential to OSC, as evidenced by the fact that water was transferred to the plantation from as far away as Waiahole on the windward side of O‘ahu.

The APE does not appear to have been a desirable location for pre-contact habitation, and no kuleana claims were awarded within the project vicinity. Little in the way of intact archaeological resources is to be expected in the vicinity due to land alteration associated with cattle ranching and grazing, 100 years of sugarcane cultivation, and continued use of the area for commercial cultivation.

***Regulatory Setting***

**National Historic Preservation Act**

Section 106 of the National Historic Preservation Act (NHPA) requires Federal agencies to take into account the effects of a proposed undertaking on properties that have been determined to be eligible for listing in, or are listed in, the NRHP.

**Hawaii Revised Statutes**

The adopted State review process for the preservation and protection of history property resources in Hawai’i is outlined in Chapter 6E of the HRS.

**City and County of Honolulu**

Both the CCH General Plan and the Central Oahu Sustainable Communities Plan contain goals and policies for the protection of historic and cultural resources. The applicable goals and policies of each plan are outlined below.

**CCH General Plan**

| | |
|---|---|
| Objective B: | To protect Oahu's cultural, historic, architectural, and archaeological resources. |
| Policy 1: | Encourage the restoration and preservation of early Hawaiian structures, artifacts, and landmarks. |
| Policy 2: | Identify, and to the extent possible, preserve and restore buildings, sites, and areas of social, cultural, historic, architectural, and archaeological significance. |

**Central Oahu Sustainable Communities Plan**

| | |
|---|---|
| Preservation of Historic Features: | Significant historic features from the plantation era and earlier periods should be preserved. |

### 3.6.2 Environmental Consequences

***No Action Alternative***

The No Action Alternative would consist of retaining Reservoirs 155 and 225 in their current condition. No construction or ground disturbing activities that could directly or indirectly affect historic and cultural resources would occur. Therefore, none of the potentially significant resources that have been identified within the APE would be affected. Under the No Action Alternative, routine maintenance activities would continue to occur, as necessary. Furthermore, if improvements to the reservoirs were not made, it is reasonable to assume that the long-term burden of maintenance and repairs at each reservoir would increase, and the benefits of increased safety and reduced risk of failure would not be realized.

***Proposed Action Alternative***

Implementation of the Proposed Action is anticipated to result in disturbance of eligible/significant cultural resources. As stated above, the Waiahole Ditch was previously identified and designated as SIHP # 50-80-09-2268, and was determined to be eligible under Criterion A, Criterion C, and Criterion D of the NRHP evaluation criteria.

The proposed improvements would have an adverse effect under Section 106 and HAR on the integrity of these sub-features as contributing elements to the Waiahole Ditch SIHP # 50-80-09-2268. The USACE has initiated consultation with the SHPD and the State Historic Preservation Officer (SHPO) to determine the eligibility of Reservoirs 155 and 225 and their associated sub-features. Pursuant to HAR §13-275-7, the SHPD's determination is Effect, with proposed mitigation commitments, and the SHPD concurs with the recommendation of archaeological monitoring. Pursuant to 36 CFR 800.4(d)(2), the SHPO concurs with the USACE's determination of adverse effect on historic properties within the APE, for which resolution may occur through consultation and/or completion of a Memorandum of Agreement (MOA). The USACE will continue to work with SHPO/SHPD to finalize the AIS, and the EA will not be finalized until consultation with the SHPO/SHPD has been completed. Copies of communications with the SHPO are included in Appendix B.

In regards to the nearby areas containing the projected borrow site and two staging areas, the AIS concludes that modifications to Reservoirs #155 and #225 would have no effect on historic properties and no subsurface cultural resources are anticipated within the survey area. The project area does not appear to have been a desirable location for pre-contact habitation, and no *kuleana* claims were awarded within the project vicinity. Little in the way of intact archaeological resources is expected in the vicinity due to land alteration associated with cattle ranching and grazing, 100 years of sugarcane cultivation, and continued use of the area for commercial cultivation.

Although the surface of the APE has been heavily altered as a result of past agricultural activity, and while determined to be unlikely, buried or previously unidentified cultural resources could exist in the APE. Therefore, there is the potential that buried resources could be discovered during construction. In order to ensure proper identification and treatment of any significant cultural resources uncovered as a result of project-related ground disturbance, the USACE or its primary construction contractor would implement the best management practices and mitigation measures outlined below. Following construction, operation would not require any activities that could expose or disturb cultural resources.

### 3.6.3 Best Management Practices and Mitigation Measures

The USACE or its primary construction contractor shall implement the following mitigation measure:

- Prior to construction, construction personnel shall be briefed regarding what to do in the event buried cultural materials are encountered. If previously undocumented archaeological materials are encountered during project construction, all ground-disturbing activity shall be suspended temporarily until a qualified professional archaeologist can identify the materials, determine their possible significance, and formulate appropriate protective measures. Ground disturbance in the area of suspended activity shall not recommence without authorization from the archaeologist. Implementing this measure would ensure proper identification and treatment of any significant cultural resources uncovered as a result of project-related ground disturbance.
- Archaeological monitoring is recommended during all ground-disturbing activities.

- It is recommended, Reservoirs #155 and #225 and their associated historic sub-features be documented to Historic American Engineering Record (HAER) and SHPD/DLNR standards to adequately explicate and illustrate the significant contribution of the sub-features to the Waiahole Ditch system before construction commences. This documentation should also adequately discuss how the system of sub-features works, the function of the features and the changes to the features over time.

## 3.7 Land Use and Agriculture

### 3.7.1 Affected Environment

***Regional Context***

The State Land Use Law adopted in 1961 establishes a framework of land use management and regulation in which all lands in the State are classified into one of four land use districts: the Urban District, the Rural District, the Agricultural District, or the Conservation District (Hawaii Land Use Commission [LUC] 2014). The LUC designation for the project area is Agricultural District, as described below.

> "The Agricultural District includes lands for the cultivation of crops, aquaculture, raising livestock, wind energy facility, timber cultivation, agriculture-support activities (i.e., mills, employee quarters, etc.) and land with significant potential for agriculture uses. Golf courses and golf-related activities may also by included in this district, provided the land is not in the highest productivity categories (A or B) of the Land Study Bureau's detailed classification system. Uses permitted in the highest productivity agricultural categories are governed by statute. Uses in the lower-productivity categories – C, D, E or U – are established by the Commission and include those allowed on A or B lands as well as those stated under Section 205-4.5, Hawaii Revised Statutes."

The Land Study Bureau's (LSB) detailed classification system was developed by the University of Hawaii (UH). Officially called the Overall Productivity Rating, the system classifies soils according to five levels, with "A" representing the class of highest productivity and "E" the lowest (CCH 2011b). The

LSB has rated the productive capacity of the project area, the pineapple lands along Kunia Road, as predominately rated as B. Soil maps of the project sites are included in Section 3.1 Geology and Soils.

According to the CCH, recent summaries of land use trends in Oahu indicate that of the island's total 386,188 acres, 101,151 acres are in the Urban District, 128,523 acres are in the Agricultural District, and 156,614 acres are in the Conservation district. Of the acres designated as Agricultural District, there are approximately 42,620 acres of high-quality farmland that is outside the Urban and Rural Community Growth Boundaries designated by the CCH (CCH 2011). This acreage excludes land that is under military control and is not available for farming, and land that is dedicated for wildlife refuge expansion areas. The largest concentrations of high-quality farmland located outside the Community Growth Boundaries are in Kunia, including the project sites, and on the North Shore, considered to be the "core" farmlands which are best-suited for large-scale farming.

CCH records indicate that as of 2008, there were approximately 11,000 acres in crop, including about 6,200 acres for specialty crops (seed corn, pineapple, and floriculture and nursery products); 900 acres in fruits other than pineapple; and 3,900 acres in vegetable and melon crops (CCH 2011b). Seed companies have replaced sugar and pineapple companies as the largest users of farmland on the island.

***Project Area***

The project area and vicinity are located in Central Oahu, within the boundaries of the CCH General Plan area and the Central Oahu Sustainable Communities Plan area. According to the Central Oahu Sustainable Communities Plan, an Urban Community Boundary for Central Oahu "was drawn to give long-range protection from urbanization for prime and unique agricultural lands and for preservation of open space while providing adequate land for residential, commercial and industrial uses needed in Central Oahu for the foreseeable future (CCH 2002)." The project area is located outside of the Urban Community Boundary. However, the project area is located within the Open Space Network, which links large agricultural areas, parks, golf courses, and other open space areas within the Plan area by a network of ravines and greenways. The Mountain and Agricultural Areas of the Open Space Network include the agricultural lands along Kunia Road.

Prime agricultural lands in Central Oahu include those along both sides of Kunia Road in the project area. The protection of these lands came about following the closure of the OSC in 1995, forcing the CCH to consider how the thousands of acres of former sugar lands in Central Oahu should best be used in the future. It was determined that "these prime and unique agricultural lands should be retained in agriculture because they are among the best in the State, are supported by an extensive, well-developed agricultural infrastructure, and are near the major transportation hub for export markets."

Another reason that the former Kunia sugar lands are highly rated is that they have water availability from the Waiahole Ditch, one of the major surface irrigation systems on the island. Current agricultural operations in these lands include the cultivation of seed crops, potatoes, melons, and other truck crops. The CCH of Honolulu indicates that the protection of these lands from urban development creates an opportunity for long-term retention and development of diversified agriculture on small farms, corporate lands, and agricultural parks.

As limited by the State Water Commission, the Waiahole Irrigation System transports 12.57 MGD of water from windward Oahu to fields in Central Oahu and Kunia (CCH 2011b). During the 1980s when OSC was still operating, the system transported 25 to 30 MGD.

**Land Use, Ownership, and Jurisdiction**

Reservoir 155 is located within Monsanto Company agricultural fields approximately 1.5 miles west of Kunia Road within TMK (1) 9-2-001:001 (por.); it is the terminus of the irrigation system. Reservoir 225 is located on Robinson Kunia Land LLC lands, east of and adjacent to Kunia Road within TMK (1) 9-4-003:001 (por.). Although both Reservoirs 155 and 225 are located on privately-owned land, the irrigation system itself is State-owned. The ADC operates and maintains both reservoirs. Reservoir 225 is located approximately one mile northeast of Reservoir 155. Reservoirs 155 and 225 were designed by OSC and constructed in 1916 for storage of irrigation water for the OSC sugarcane plantation. The designated borrow site is located approximately 350 ft north of Reservoir 155 on property owned by Syngenta Global.

**Land Use Designations and Zoning**

The CCH General Plan and Zoning Ordinance describe the types of land uses in the County, and the permitted activities within each land use. The project area is located within the CCH General Plan area, as well as within the Central Oahu Sustainable Communities Plan area.

According to the CCH Land Use Ordinance (LUO), which is the applicable CCH zoning code, the project area is located within an agricultural district zone (CCH 1990). The zoning designation for the project area is AG-1, and the zoning description for this district, as stated in the LUO, includes:

a) The purpose of the agricultural districts is to maintain a strong agricultural economic base, to prevent unnecessary conflicts among incompatible uses, to minimize the cost of providing public improvements and services and to manage the rate and location of physical development consistent with the City's adopted land use policies. To promote the viability and economic feasibility of an existing agricultural operation, accessory agribusiness activities may be permitted on the same site as an adjunct to agricultural uses. These accessory activities must be compatible with the on-site agricultural operation and surrounding land uses.

b) The intent of the AG-1 restricted agricultural district is to conserve and protect important agricultural lands for the performance of agricultural functions by permitting only those uses which perpetuate the retention of these lands in the production of food, feed, forage, fiber crops and horticultural plants. Only accessory agribusiness activities which meet the above intent shall be permitted in this district.

c) The following guidelines shall be used to identify lands which may be considered for the AG-1 restricted agricultural district:

    1) Lands which are within the state designated agricultural district and designated agricultural by adopted city land use policies;

2) Lands which are predominantly classified as prime or unique under the agricultural lands of importance to the State of Hawaii system; and

3) Lands where a substantial number of parcels are more than five acres in size.

***Regulatory Setting***

**Oahu General Plan**

The Oahu General Plan was issued in 1992 and amended in 2002, and sets forth the long-range objectives and policies for the general welfare and, together with the regional development plans, provides a direction and framework to guide the programs and activities of the CCH (CCH 2002). The following General Plan objectives and policies are applicable to the Proposed Action:

Objective C: To maintain the viability of agriculture on Oahu.

Policy 7: Encourage the use of more efficient production practices by agriculture, including the efficient use of water.

**Central Oahu Sustainable Communities Plan**

The CCH has prepared eight regional plans which provide the vision and implementing policies and guidelines for each of the areas. They guide City land use approvals and infrastructure improvements and private sector investment decisions. The following guidelines, which carry out the general policies and planning principles for regional open space elements, are applicable to the Proposed Action:

- Facilities necessary to support intensive cultivation of arable agricultural lands should be permitted.
- Buildings and other facilities that are accessory to an agricultural operation should be designed and located to minimize impact on nearby urban areas and roadways.

**CCH Department of Planning and Permitting (DPP)**

The DPP is responsible for the CCH's long-range planning, community planning efforts, administration and enforcement of ordinances and regulations governing the development and use of land, various codes pertaining to the construction of buildings, and City standards and regulations pertaining to infrastructure requirements. Within the DPP, both the Building Division and the Site Development Division enforce ordinances and regulations that are applicable to the Proposed Action, including reviewing and approving construction plans, reviewing erosion control plans, and issuing grading permits (described in Section 3.1 Geology and Soils).

**Coastal Zone Management (CZM) Program**

The passage of the Coastal Zone Management Act (CZMA) in 1972 led to the creation of the Federal CZM Program. The state CZM program for Hawaii was established in 1977 to provide a common focus for state and county actions dealing with land and water uses and activities. Because there is no

point of land more than 30 miles from the ocean, the Hawaii CZM area encompasses the entire state (Hawaii CZM Program 2014).

### 3.7.2 Environmental Consequences

***No Action Alternative***

The No Action Alternative would consist of retaining Reservoirs 155 and 225 in their current condition. No construction or ground disturbing activities that could change existing land uses would occur and agriculture designations within the project area would not change. Under the No Action Alternative, routine maintenance activities would continue to occur, as necessary, as would adjacent agricultural uses. Also, approved development consistent with the Oahu General Plan and the Central Oahu Sustainable Communities plan would occur. If improvements to the reservoirs were not made, it is reasonable to assume that the long-term burden of maintenance and repairs at each reservoir would increase, and the benefits of increased safety and reduced risk of failure would not be realized.

***Proposed Action Alternative***

The Proposed Action would include the excavation of the existing embankments, removal of sediment from the interior of the reservoirs, and the reconstruction of the embankments to meet USACE and DLNR design criteria. The Proposed Action would include new inlet, outlet and intake, and spillway facilities, in addition to a HDPE reservoir liner.

The Proposed Action would not result in the removal of land from agricultural production, and would not result in any changes to the existing land uses in the project area. The Proposed Action would be consistent with the objectives, policies, and guidelines outlined in the CCH's General Plan, LUO, and Central Oahu Sustainable Communities Plan; would be consistent with the DPP ordinances and regulations governing the development and use of land; and would be consistent with the Hawaii CZM Program. Coordination with the local landowners would also be undertaken to ensure that access to private parcels is maintained during construction activities. Further, the proposed improvements to the reservoirs would benefit thousands of acres of valuable agricultural lands by ensuring that each reservoir meets dam safety criteria and by reducing water losses and leakage that have been documented in the irrigation system.

As described in Section 2 Description of Proposed Action and Alternatives, it is anticipated that temporary staging areas and a borrow site would be developed on agricultural lands in the project area during project construction. Upon completion of construction, temporarily disturbed areas used for staging areas and the borrow site would be cleared of all equipment, materials, and project refuse, then re-graded and restored. There would be no long term direct conversion of prime farmland to nonagricultural uses within the staging areas or borrow site. Implementing the Proposed Action would result in a less than significant impact.

### 3.7.3 Best Management Practices and Mitigation Measures

Since there would be no adverse effects on land use and agriculture, no mitigation would be required.

## 3.8 Aesthetics

### 3.8.1 Affected Environment

The Proposed Action is located in the CCH, in the Central Oahu plan area of the island of Oahu. The regional viewshed is rural in nature and includes large areas of agricultural development. Potential viewers of the project area primarily include local residents and motorists. Reservoir 225 is currently visible from Kunia Road, a heavily traveled area. Reservoir 155 is only visible from Plantation Road, a less traveled thoroughfare than Kunia Road. Areas adjacent to Kunia Road within the project area contain little topographic variation. However, according to the Central Oahu Sustainable Communities Plan, there are several locations along Kunia Road in the project area that are considered to have panoramic views (CCH 2002). Significant views and vistas that are specifically identified in the Plan include:

- Kunia Road above the Ewa Plain; and
- Views of the Waianae and Ko'olau Mountains from Kunia Road, Kamehameha Highway, and H-2 Freeway.

***Regulatory Setting***

Both the CCH General Plan and the Central Oahu Sustainable Communities Plan contain goals and policies for the protection of scenic resources and open space areas. The applicable goals and policies of each plan are outlined below.

**CCH General Plan**

Objective B: To preserve and enhance the natural monuments and scenic views of Oahu for the benefit of both residents and visitors.

Policy 2: Protect Oahu's scenic views, especially those seen from highly developed and heavily traveled areas.

**Central Oahu Sustainable Communities Plan**

Protection of Vistas: Whenever possible, significant vistas should be retained.

### 3.8.2 Environmental Consequences

***No Action Alternative***

The No Action Alternative would consist of retaining Reservoirs 155 and 225 in their current condition. No construction or ground disturbing activities that could directly or indirectly affect the visual character of the project area would occur. Under the No Action Alternative, routine maintenance activities would continue to occur, as necessary. Furthermore, if improvements to the reservoirs were not made, it is reasonable to assume that the long-term burden of maintenance and repairs at each reservoir would increase, and the benefits of increased safety and reduced risk of failure would not be realized.

***Proposed Action Alternative***

The Proposed Action would include the excavation of the existing embankments, removal of sediment from the interior of the reservoirs, and the reconstruction of the embankments to meet USACE and DLNR design criteria. The Proposed Action would include new inlet, outlet and intake, and spillway facilities, in addition to a HDPE reservoir liner, as described in further detail below.

Construction activities for the Proposed Action would result in short-term, temporary impacts to the visual character of the project area resulting from the presence of construction equipment and staging areas. The staging areas would contain contractor's trailers, parking, fencing, and provide for storage of equipment and materials. The staging area for Reservoir 155 is located approximately 500 ft west of Reservoir 155. The staging area for Reservoir 225 is located approximately 700 ft northeast of Reservoir 225. However, these changes to the viewshed would be isolated and temporary. In addition, most views of construction activities would be of short duration due to vehicle travel speeds and would be limited to a relatively small number of viewers due to the primarily agricultural and rural nature of the project area.

The majority of the proposed improvements would result in minor permanent alterations to the surrounding footprint for each reservoir. Following the completion of construction activities, new project features would be visible to local residents and motorists, but would be fairly consistent with existing pre-construction views and would not substantially alter the existing visual quality of the project area. Implementation of the Proposed Action would be in conformance with Honolulu scenic and open space resources and protection guidelines by maintaining existing identified scenic vistas, and would be consistent with Central Oahu guidelines for protection of scenic resources. No adverse effects on aesthetic resources are anticipated to result from implementation of the Proposed Action. Implementing the Proposed Action would result in a less than significant impact.

### 3.8.3 Best Management Practices and Mitigation Measures

Since there would be no adverse effects on aesthetic resources, no mitigation would be required.

## 3.9 Hazardous, Toxic, and Radioactive Wastes

### 3.9.1 Affected Environment

***Physical Setting***

The Waiahole Ditch Irrigation System was constructed between 1912 and 1916 to irrigate sugar cane fields on the western side of Oahu. The irrigation system consists of a 26-mile-long water supply system of ditches, tunnels, siphons and reservoirs that provides a source of irrigation water to local farmers on the windward side of the island of Oahu. The ADC operates and maintains the Waiahole Ditch Irrigation System, including Reservoirs 155 and 225, both of which are unlined, earthen storage basins. Reservoir 155 is located within agricultural fields west of Kunia Road, approximately 1.5 miles from the roadway; Reservoir 225 is located east of Kunia Road, adjacent to the roadway. Lands surrounding the reservoirs consist mainly of large agricultural parcels.

***Regulatory Setting***

**Federal Regulations**

Federal regulatory agencies include the USEPA, the Occupational Safety and Health Administration (OSHA), and the Department of Transportation (DOT).

- At the Federal level, the principal agency regulating the generation, transport, and disposal of hazardous substances is the USEPA, under the authority of the Resource Conservation and Recovery Act (RCRA). Under RCRA, individual states may implement their own hazardous substance management programs as long as they are consistent with, and at least as strict as, RCRA. The USEPA must approve state programs intended to implement RCRA requirements.
- OSHA is the agency responsible for ensuring worker safety. OSHA sets Federal standards for implementation of training in the work place, exposure limits, and safety procedures in the handling of hazardous substances (as well as other hazards). OSHA also establishes criteria by which each state can implement its own health and safety program.
- DOT regulates the interstate transport of hazardous materials and wastes through implementation of the Hazardous Materials Transportation Act. This act specifies driver-training requirements, load labeling procedures, and container design and safety specifications. Transporters of hazardous wastes must also meet the requirements of additional statutes such as RCRA.

**State Regulations**

The Environmental Health Administration under the DOH oversees the several divisions and offices, including the Hazard Evaluation and Emergency Response (HEER) Office and the Environmental Management Division (EMD).

The HEER Office's mission is to protect human health and the environment. The HEER Office reports directly to the Environmental Health Administration Deputy Director. The HEER Office provides leadership, support, and partnership in preventing, planning for, responding to, and enforcing environmental laws relating to releases or threats of releases of hazardous substances.

EMD is responsible for implementing and maintaining statewide programs for controlling air and water pollution, for assuring safe drinking water, and for the proper management of solid and hazardous waste. The division also regulates the State’s wastewater. The Solid and Hazardous Waste Branch (SHWB) oversees management of all solid waste generated within the State through the promotion of pollution prevention and waste minimization activities, and the development of partnerships with both generators and the regulated community. SHWB also works to prevent releases, or threats of releases, of petroleum, hazardous substances, pollutants or contaminants into the environment through aggressive enforcement of environmental laws and regulations.

**Records Review**

The project site is not currently included on any list of hazardous materials sites. Based on a review of readily ascertainable public information for the project site and vicinity, there are no listed hazardous materials sites or existing hazardous material contamination present. The following databases were reviewed for potential hazardous materials sites or existing hazardous material contamination at or in the vicinity of the project sites:

- Envirofacts is a single point of access to select USEPA data about environmental activities that may affect air, water, and land anywhere in the United States (USEPA 2014). Available topics include air, waste, facility, land, toxic releases, compliance, water, and radiation.
- The DOH, Solid & Hazardous Waste Branch, Underground Storage Tank (UST) Section operates the Environmental Health Warehouse database and Map Viewer, which provides the location of USTs, leaking underground storage tanks, hazardous material generators and transporters, and additional locational information for permitted facilities, such as NPDES permits.

### 3.9.2 Environmental Consequences

***No Action Alternative***

The No Action Alternative would consist of retaining Reservoirs 155 and 225 in their current condition. No construction or ground disturbing activities that could directly or indirectly create hazards for construction employees and the environment would occur. Under the No Action Alternative, routine maintenance activities would continue to occur, as necessary. Furthermore, if improvements to the reservoirs were not made, it is reasonable to assume that the long-term burden of maintenance and repairs at each reservoir would increase, and the benefits of increased safety and reduced risk of failure would not be realized.

***Proposed Action Alternative***

The Proposed Action would include the excavation of the existing embankments, removal of sediment from the interior of the reservoirs, and the reconstruction of the embankments to meet USACE and DLNR design criteria. The Proposed Action would include new inlet, outlet and intake, and spillway facilities, in addition to a HDPE reservoir liner.

Approximately 110,000 cubic yards of fill material would be needed for reconstruction of the reservoirs. Of the 110,000 cubic yards of fill material, approximately 50,000 cubic yards of fill material would be excavated from the existing reservoirs and reused. Therefore, approximately 60,000 cubic yards of additional fill material would be required for reconstruction of Reservoirs 155 and 225. Some of the fill for construction would be obtained from a borrow site located approximately 350 ft north of Reservoir 155 on property owned by Syngenta Global. It is estimated that the borrow site contains approximately 30,000 cubic yards of fill material. The borrow material would be tested for contaminate characterization prior to excavation to verify that the borrow material is clean enough for use as fill. Upon completion of the proposed construction activities, the borrow site would be cleared of all equipment, materials, and project refuse, then re-graded and restored for future agricultural use.

The remainder of fill material (approximately 30,000 cubic yards) needed for reconstruction of the reservoirs would be imported from sources within the Honolulu area. Fill material would be obtained from a permitted source and would be transported to the project area by haul trucks on the identified access routes. See Section 2 Description of Proposed Action and Alternatives and Section 3.15 Traffic and Circulation for additional description of identified access routes. Any excess excavated materials generated by the Proposed Action would be disposed of onsite, or hauled off-site and deposited in a suitable disposal area. Construction debris and excess material requiring disposal in a landfill would be hauled off-site to a suitable facility.

Database searches of Envirofacts and the Environmental Health Warehouse database did not reveal any evidence of significant hazardous waste or petroleum contamination or threat of contamination in or near the project area. Therefore, existing hazards and hazardous materials concerns related to the Proposed Action are not anticipated. However, during excavation grading, and construction activities, it is anticipated that limited quantities of miscellaneous hazardous substances (such as petroleum-based products/fluids, solvents, and oils) would be employed at the project site and staging areas. As with any liquid or solid, the potential for an accidental release exists during handling and transfer from one container to another. Depending on the relative hazard of the material, if a spill were to occur of significant quantity, the accidental release could pose a hazard to both construction employees and the environment, resulting in a significant impact. Compliance with laws and regulations pertaining to the use, handling, storage, disposal, and transportation of hazardous materials would minimize the potential for release and spill of hazardous materials, such as from equipment used during construction activities. Further, implementation of storm water and erosion control BMPs, described in further detail in Section 3.1 Geology and Soils, would also minimize hazards to construction employees and the environment. Implementing the Proposed Action would result in a less than significant impact.

### 3.9.3 Best Management Practices and Mitigation Measures

As noted above, storm water and erosion control BMPs recommended in Section 3.1 Geology and Soils are also applicable to hazardous waste.

Since there would be no adverse effects resulting from hazardous, toxic, and radioactive wastes, no mitigation would be required.

## 3.10 Noise

### 3.10.1 Affected Environment

Within the CCH, major sources of noise include roadway traffic on Hawaii Interstates H-1 and H-2, major arterials, and other roadways; aircraft operations; and fixed noise sources from industrial, commercial, and farming activities. Vehicle traffic and farming activities are the primary noise sources in the project area. The major roadways in the project area are H-1 and Kunia Road. Traffic on project area roadways includes vehicle traffic associated with people traveling between the Honolulu area to the north shore, truck traffic, and movement of agricultural equipment.

Noise-sensitive land uses generally include those uses where exposure would result in adverse effects (e.g., sleep disturbance or annoyance), as well as uses where quiet is an essential element of their intended purpose (e.g., schools or libraries). Residences are of primary concern because of the potential for increased and prolonged exposure of residents to changes in both interior and exterior noise levels. Other land uses typically considered to be “sensitive receptors” to noise include hospitals, parks, lodging facilities, churches, and other uses where low interior noise levels are essential. The project area is located in a more rural portion of the County and is primarily dominated by lands under agricultural use. The nearest sensitive receptors are the Hawaii Country Club Golf Course, located approximately one mile north of Reservoir 225, and the Royal Kunia residential area, located over one mile south of Reservoir 225.

***Regulatory Setting***

Hawaii's Community Noise Control regulations are outlined in HAR Title 11, Chapter 46 (State of Hawaii 1981), and state the maximum permissible sound levels in A-weighted decibels (dBA) for different land use zoning districts. dBA is an overall frequency-weighted sound level in decibels that approximates the frequency response of the human ear. The project sites are located within a Class C zoning district, which includes all areas equivalent to lands zoned agriculture, country, industrial, or of a similar type. The maximum permissible dBA for Class C zoning districts is 70 dBA for both daytime (7am-10pm) and nighttime (10pm-7am). These guidelines apply to stationary noise sources, and equipment related to agricultural, construction, and industrial activities. The maximum permissible sound level for impulsive noise is ten dBA above the Class C maximum identified above.

The Community Noise Control regulations also place limitations on the use of construction equipment, which must have a muffler (with the exception of hand tools weighing less than fifteen pounds), and on-site vehicles, construction equipment, and tools with a motor and/or exhaust system cannot be altered, modified, or repaired without proof of effectiveness. Construction activities are permitted from 7am to 6pm, Monday through Friday and 9am to 6pm on Saturdays, with an approved Community Noise Permit. No construction activities are permitted on Sundays.

### 3.10.2 Environmental Consequences

***No Action Alternative***

The No Action Alternative would consist of retaining Reservoirs 155 and 225 in their current condition. No construction or ground disturbing activities that could create direct noise impacts and/or temporary noise disturbances would occur. The types of noise sources and sensitive receptors would be expected to remain the same as described for the existing conditions. Under the No Action Alternative, routine maintenance activities would continue to occur, as necessary. Furthermore, if improvements to the reservoirs were not made, it is reasonable to assume that the long-term burden of maintenance and repairs at each reservoir would increase, and the benefits of increased safety and reduced risk of failure would not be realized.

***Proposed Action Alternative***

The Proposed Action would include the excavation of the existing embankments, removal of sediment from the interior of the reservoirs, and the reconstruction of the embankments to meet USACE and DLNR design criteria. The Proposed Action would include new inlet, outlet and intake, and spillway facilities, in addition to a HDPE reservoir liner. A construction period of approximately six months is planned for each reservoir. If the reservoirs are constructed concurrently, construction would begin in May 2015 and end in October 2015. If the reservoirs are not constructed concurrently, then construction could take up to 12 months to complete. Estimated work hours are from 7:30am to 4:00pm, Monday through Friday. Implementation of the Proposed Action is anticipated to result in short-term noise impacts resulting from construction activities; however, no long-term operational noise impacts are anticipated.

***Short Term***

Construction activity noise levels associated with the Proposed Action would fluctuate depending on the type, number, and duration of use of various pieces of construction equipment. In addition, construction-related material haul trips would raise ambient noise levels along haul routes, depending on the number of haul trips made and types of vehicles used. Table 3shows typical noise levels produced by various types of construction equipment. As described in Section 2 Proposed Action and Alternatives, the types of equipment likely to be used during construction of the Proposed Action includes a backhoe/front-end loader, bobcat, dozer, scraper, compactor, grader, concrete truck, haul truck, hydraulic crane, and a water truck.

**Table 3 Typical Noise Levels from Construction Equipment**

| Construction Equipment | Noise Level (dBA, Leq* at 50 ft) |
|---|---|
| Truck | 88 |
| Air Compressor | 81 |
| Grader | 85 |
| Scraper | 89 |
| Jack Hammer | 88 |
| Dozer | 85 |
| Generator | 81 |
| Loader | 85 |

Leq: Sound Level (Leq): The equivalent steady-state sound level (average), in a stated period of time would contain the same acoustical energy.

Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment, 2006

Construction activities for the Proposed Action would generate temporary increases in noise levels that could affect sensitive receptors. However, based on the distance of the nearest sensitive receptors, there are no sensitive receptors near the project area that would be exposed to construction noise at or above maximum levels set by the Hawaii Community Noise Control regulations. Further, noise from construction activities generally attenuates (decreases in intensity) at a rate of 6 to 7.5 dBA per doubling of the distance. Therefore, considering the range of typical noise levels from construction equipment identified above in Table 3, at an approximate distance of 150 ft or more, noise levels resulting from construction activities for the Proposed Action would be less than the maximum levels set by the Hawaii Community Noise Control regulations. Although noise from multiple sources at the same location results in louder levels than a single source alone, at a distance of one mile or more, the nearest sensitive receptors would not be exposed to noise levels exceeding the maximum levels identified above.

As described in Section 2 Description of the Proposed Action and Alternatives and above, construction activities for the Proposed Action would also result in a short-term increase in traffic on the local roadway network (see 3.15 Traffic and Circulation for further assessment of impacts on roadways). However, this increase would not be sufficient to significantly increase traffic noise levels. Based on the anticipated construction duration of 6 to 12 months and the anticipated size of the construction labor force, commute-related traffic would be relatively minimal on a daily basis. Based on the estimated number of truck trips, construction-related traffic would be spread over the duration of the construction schedule and would also be relatively minimal on a daily basis. In addition, the majority of construction truck traffic would move between the staging areas, borrow site, and the project reservoirs. These routes

do not cross any major roads and therefore, would not be anticipated to increase noise levels above existing local vehicle traffic.

Any increase in noise levels resulting from implementation of the Proposed Action would be temporary and would cease when construction is complete. Adverse effects from construction noise are not anticipated to pose a hazard to public health and welfare due to the temporary nature of the work and the absence of sensitive land uses in the surrounding area. Further, all project activities would comply with HAR Chapter 11-46, Community Noise Control regulations. Excessive noise levels generated by construction activities would require that a Community Noise Permit application be filed with Hawaii DOH, Noise, Radiation and Indoor Air Quality Branch. The provisions of the noise permit may include measures to further reduce the effects of construction-generated noise, such as properly maintaining construction and noise attenuation equipment. Implementing the Proposed Action would result in a less than significant impact.

***Long Term***

No long-term noise impacts are anticipated to result from implementation of the Proposed Action. The Proposed Action would lessen the long-term burden of maintenance and repairs at each reservoir and would not result in substantial changes to current operation and maintenance activities.

### 3.10.3 Best Management Practices and Mitigation Measures

Since there would be no adverse noise effects, no mitigation would be required.

## 3.11 Air Quality

### 3.11.1 Affected Environment

The Proposed Action is located in the CCH on the island of Oahu. The Hawaii DOH, Clean Air Branch is responsible for implementing and enforcing State and Federal air quality regulations in the state of Hawaii. The air quality in Hawaii has been characterized by the USEPA as unclassified/attainment for all criteria pollutants (USEPA 2014).

***Regulatory Setting***

The Clean Air Act (CAA), as amended in 1990, is the federal law that governs air quality. The CAA sets standards for the concentration of pollutants that can be in the air. The USEPA sets National Ambient Air Quality Standards (NAAQS) to protect public health and welfare from harmful effects of certain commonly occurring pollutants known as "criteria" pollutants, as described in further detail below. The USEPA requires that states monitor the ambient air to determine attainment of the NAAQS and regulate industries that emit these and other pollutants. The air quality in a region is a result of not only the types and quantities of pollutants and pollutant sources in the area, but also surface topography and prevailing meteorological conditions.

The NAAQS represent the maximum allowable concentrations for: ozone ($O_3$) - measured as either volatile organic compounds (VOCs) or total oxides of nitrogen ($NO_X$); carbon monoxide (CO); nitrogen dioxide ($NO_2$); sulfur oxides ($SO_X$); respirable (breathable) particulate matter (including particulate matter equal to or less than 10 microns in diameter [$PM_{10}$] and equal to or less than 2.5

microns in diameter [$PM_{2.5}$]); and lead (Pb; 40 CFR Part 50). The CAA also gives the authority to states to establish air quality rules and regulations.

USEPA classifies air quality in an Air Quality Control Region (AQCR), or in subareas of an AQCR, according to whether the concentrations of criteria pollutants in ambient air (general surrounding conditions) exceed the NAAQS. Areas within each AQCR are therefore designated as either "attainment," "nonattainment," "maintenance," or "unclassified" for each of the six criteria pollutants: $PM_{10}$ and $PM_{2.5}$, $O_3$, CO, $SO_X$, $NO_X$, and Pb. Hawaii has also established a state ambient air standard for hydrogen sulfide ($H_2S$). Attainment means that the air quality within an AQCR meets or exceeds the NAAQS; nonattainment indicates that criteria pollutant levels exceed NAAQS thresholds and as such, air quality is below NAAQS; maintenance indicates that an area was previously designated nonattainment but is now attainment; and an unclassified air quality designation by USEPA means that there is not enough information to appropriately classify an AQCR, so the area is considered attainment.

The EPA sets NAAQS to protect public health and welfare from harmful effects of certain commonly occurring pollutants known as "criteria" pollutants. The EPA requires that states monitor the ambient air to determine attainment of the NAAQS and regulate industries that emit these and other pollutants. Two types of standards have been established. Primary standards set limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. Secondary standards set limits to protect public welfare which includes protection against decreased visibility, and damage to animals, crops, vegetation, and buildings. The State and Federal ambient air quality standards are shown in Table 4.

**Table 4 State and Federal Ambient Air Quality Standards**

| Air Pollutant | Averaging Time | Standards | | |
|---|---|---|---|---|
| | | Hawaii State | Federal Primary [a] | Federal Secondary [b] |
| **Carbon Monoxide (CO)** | 1-hour<br>8-hour | 9 ppm<br>4.4 ppm | 35 ppm<br>9 ppm | None |
| **Nitrogen Dioxide ($NO_2$)** | 1-hour<br>Annual | ---<br>0.04 ppm | 0.100 ppm<br>0.053 ppm | ---<br>0.053 ppm |
| **$PM_{10}$** | 24-hour<br>Annual [c] | 150 µg/$m^3$<br>50 µg/$m^3$ | 150 µg/ $m^3$<br>--- | ---<br>--- |
| **$PM_{2.5}$** | 24-hour<br>Annual | --- | 35 µg/ $m^3$<br>12 µg/ $m^3$ | 35 µg/ $m^3$<br>15 µg/ $m^3$ |
| **Ozone ($O_3$)** | 8-hour | 0.08 ppm | 0.075 ppm | 0.075 ppm |
| **Sulfur Dioxide ($SO_2$)** | 1-hour<br>3-hour<br>24-hour<br>Annual | ---<br>0.5 ppm<br>0.14 ppm<br>0.03 ppm | 0.075 ppm<br>---<br>---<br>--- | ---<br>0.5 ppm<br>---<br>--- |
| **Lead (Pb)** | Rolling 3-month | 1.5 µg/$m^3$ [d] | 0.15 µg/$m^3$ | 0.15 µg/ $m^3$ |
| **Hydrogen Sulfide ($H_2S$)** | 1-hour | 0.025 ppm | None | None |

$PM_{10}$= particulate matter equal to or less than 10 microns in diameter; $PM_{2.5}$= particulate matter equal to or less than 2.5 microns in diameter; ppm=parts per million; µg/m3=micrograms per cubic meter.

a ***Primary Standards*** limits to protect public health, including the health of "sensitive" populations such as asthmatics, children and the elderly.
b ***Secondary Standards*** limits to protect public welfare, including protection against decreased visibility, damage to animals, crops, vegetation, and buildings.
c Due to a lack of evidence linking health problems to long-term exposure to coarse particle pollution, EPA revoked the annual $PM_{10}$ standard effective December 17, 2006. However, the state still has an annual standard.
d The state standard is based on a calendar quarter.

Source: State of Hawaii, Department of Health. 2014.

USEPA has delegated the authority for ensuring compliance with the NAAQS to Hawaii DOH, Clean Air Branch. The Clean Air Branch measures and monitors ambient air concentrations of these pollutants via a statewide monitoring network. The island of Oahu has four monitoring stations: Honolulu, Sand Island, Pearl City, and Kapolei. The Pearl City station is nearest to the project area. According to the Hawaii DOH, most commercial, industrial, and transportation activities and their associated air quality effects occur on Oahu. Excluding pollutant exceedances due to the volcanic activity on the island of Hawaii, in 2013 the State of Hawaii was in attainment of all NAAQS. There were no violations recorded for the island of Oahu.

Air pollution control regulations for the state are outlined in the HAR, Title 11 Chapter 60.1. These regulations state that "no person shall cause or permit visible fugitive dust to become airborne without taking reasonable precautions. Examples of reasonable precautions are:

1) Use of water or suitable chemicals for control of fugitive dust in the demolition of existing buildings or structures, construction operations, the grading of roads, or the clearing of land;

2) Application of asphalt, water, or suitable chemicals on roads, material stockpiles, and other surfaces which may result in fugitive dust;

3) Installation and use of hoods, fans, and fabric filters to enclose and vent the handling of dusty materials. Reasonable containment methods shall be employed during sandblasting or other similar operations;

4) Covering all moving, open-bodied trucks transporting materials which may result in fugitive dust;

5) Conducting agricultural operations, such as tilling of land and the application of fertilizers, in such manner as to reasonably minimize fugitive dust;

6) Maintenance of roadways in a clean manner; and

7) Prompt removal of earth or other materials from paved streets which have been transported there by trucking, earth-moving equipment, erosion, or other means."

### 3.11.2 Environmental Consequences

***No Action Alternative***

The No Action Alternative would consist of retaining Reservoirs 155 and 225 in their current condition. No construction or ground disturbing activities that could directly or indirectly affect local or

regional air quality would occur. Under the No Action Alternative, routine maintenance activities would continue to occur, as necessary, and air quality would continue to be influenced by climatic conditions, vehicle emissions, and agricultural activities. Furthermore, if improvements to the reservoirs were not made, it is reasonable to assume that the long-term burden of maintenance and repairs at each reservoir would increase, and the benefits of increased safety and reduced risk of failure would not be realized.

***Proposed Action Alternative***

The Proposed Action would include the excavation of the existing embankments, removal of sediment from the interior of the reservoirs, and the reconstruction of the embankments to meet USACE and DLNR design criteria. The Proposed Action would include new inlet, outlet and intake, and spillway facilities, in addition to a HDPE reservoir liner. A construction period of approximately six months is planned for each reservoir. If the reservoirs are constructed concurrently, construction would begin in May 2015 and end in October 2015. If the reservoirs are not constructed concurrently, then construction could take up to 12 months to complete. Estimated work hours would be from 7:30am to 4:00pm, Monday through Friday. Implementation of the Proposed Action is anticipated to result in short-term air quality impacts resulting from construction activities; however, no long-term operational air quality impacts are anticipated.

***Short Term***

Implementation of the Proposed Action would result in short-term effects on air quality as a result of construction activities. The operation of construction vehicles and equipment at the project sites would generate fugitive dust and pollution emissions, which could temporarily affect adjacent area. However, these effects would be temporary and would cease when construction is completed.

As described above, air pollution control regulations under HAR, Title 11 Chapter 60.1 require that there be no visible fugitive dust emissions at the construction site boundary. The contractor would prepare and implement a dust control plan for the Proposed Action, which would propose all necessary measures to control fugitive dust emissions from construction activities. Further, implementation of dust control BMPs recommended in Section 3.1 Geology and Soils, would also reduce the temporary effects of construction activities on air quality. Implementing the Proposed Action would result in a less than significant impact.

***Long Term***

No long-term air quality impacts are anticipated to result from implementation of the Proposed Action. The Proposed Action would lessen the long-term burden of maintenance and repairs at each reservoir and would not result in substantial changes to current operation and maintenance activities.

### 3.11.3 Best Management Practices and Mitigation Measures

As noted above, dust control BMPs recommended in Section 3.1 Geology and Soils, are also applicable to air quality.

Since there would be no adverse effects on air quality, no mitigation would be required.

## 3.12 Recreational Resources

### 3.12.1 Affected Environment

The Central Oahu region includes many recreational sites, such as the Central Oahu Regional Park, Wahiawa Botanical Garden, Wahiawa Freshwater Park, Waipahu Cultural Garden, neighborhood parks, and golf courses, as described in further detail below (CCH 2002):

- Central Oahu Regional Park is a new 269-acre park being developed on a triangle-shaped area across Kamehameha Highway from the Waipio-Gentry planned community. The park includes a sports complex, picnic areas, and pedestrian paths.
- Wahiawa Botanical Garden is a 27-acre park with a unique collection of plants representing the mid-level rain forest habitat. It is located in a small ravine in the center of Wahiawa and is operated by the City Department of Parks and Recreation.
- Wahiawa Freshwater Park is a 66-acre state recreation area surrounding Lake Wilson, which includes picnic areas and year-round freshwater shoreline and boat fishing areas on Oahu.
- Waipahu Cultural Garden is a 49-acre park owned by the City. The park operates a recreated plantation village and a museum.
- Neighborhood parks in Central Oahu include the Kunia Neighborhood Park, which serves the Royal Kunia master planned community, the Kupuoni Neighborhood Park, and the Hoae‘ae Community Park.
- Central Oahu has eight public and private golf courses, including the City-operated Ted Makalena Golf Course on the Waipio Peninsula and privately-operated Hawaii Country Club, Mililani, Royal Kunia and Waikele golf courses. The U.S. military operates the Leileihua golf course near Wheeler Army Air Field and the Kalakaua golf course at Schofield Barracks.

There are no recreational resources in the project area or vicinity of the reservoirs, as the majority of the project area is reserved for agricultural production and associated land uses. The nearest recreational resources are the Hawaii Country Club Golf Course, located approximately one mile north of Reservoir 225, and the Kunia Neighborhood Park, located approximately 2 miles south of Reservoir 225.

### 3.12.2 Environmental Consequences

***No Action Alternative***

The No Action Alternative would consist of retaining Reservoirs 155 and 225 in their current condition. No construction or ground disturbing activities that could directly or indirectly affect recreational resources would occur. Under the No Action Alternative, routine maintenance activities would continue to occur, as necessary. Furthermore, if improvements to the reservoirs were not made, it is reasonable to assume that the long-term burden of maintenance and repairs at each reservoir would increase, and the benefits of increased safety and reduced risk of failure would not be realized.

***Proposed Action Alternative***

The Proposed Action would include the excavation of the existing embankments, removal of sediment from the interior of the reservoirs, and the reconstruction of the embankments to meet USACE

and DLNR design criteria. The Proposed Action would include new inlet, outlet and intake, and spillway facilities, in addition to a HDPE reservoir liner. No adverse effects to parks and recreational resources are anticipated from implementation of the Proposed Action.

The Proposed Action would not involve the construction of new housing, and therefore, would not increase demand for recreational facilities. The existing reservoirs are used strictly for irrigation purposes and are not utilized by local residents for any recreational purposes. The proposed action would not permanently add, remove, or alter recreational facilities. Therefore, there would be no limitations on the use of existing recreation facilities or reduction in the availability of recreational opportunities in the project area. Implementing the Proposed Action would result in a less than significant impact.

### 3.12.3 Best Management Practices and Mitigation Measures

Since there would be no adverse effects on recreational resources, no mitigation would be required.

## 3.13 Socioeconomics and Environmental Justice

### 3.13.1 Affected Environment

The Proposed Action is located in the CCH, in the Central Oahu plan area of the island of Oahu. The project area is rural in nature and includes large areas of agricultural development.

In 2009, the State Department of Business, Economic Development and Tourism released its latest series of population and economic projections for the counties in 5-year increments to the year 2035 (CCH 2011c). Based on this projection series, the Department of Planning and Permitting projected the likely population distribution among the plan areas (counties).

The population in Central Oahu has grown from 13.3 percent of the total island population in 1980 to 17.7 percent in 2010. Actual population in Central Oahu has grown from 101,685 in 1980 to 168,643 in 2010, and is predicted to continue growth to approximately 181,400 by 2035. Through 2035, the Central Oahu population is anticipated to remain constant at approximately 17 percent of the total island population.

The number of housing units in Central Oahu is anticipated to grow from 45,878 in 2000 to 63,784 by 2035, remaining consistent at 15 percent of Oahu's total housing units. In 2000, the total number of jobs in Central Oahu was 50,525. Of this total, the source of the jobs were 8 percent military, 7 percent government, 6 percent industrial, 46 percent service (service, hotel, finance, insurance, and real estate), 19 percent retail, and 14 percent were categorized as 'other' (agriculture, construction, transportation, communications, and utilities). Total jobs were predicted to increase to 83,586 by 2035.

As designated by the U.S. Census Bureau, the Proposed Action area is located in Census Tract 89.24 (Royal Kunia, includes Reservoir 225) and Census Tract 86.14 (Kunia West, includes Reservoir 155). According to the 2010-2014 American Community Survey (ACS) 5-year estimate, 3.5 percent of the population in Census Tract 89.24 includes persons below the poverty level, and 3.4 percent of the population in Census Tract 86.14 includes persons below the poverty level (U.S. Census Bureau, 2016).

### 3.13.2 Environmental Consequences

***No Action Alternative***

The No Action Alternative would consist of retaining Reservoirs 155 and 225 in their current condition. No construction or ground disturbing activities that could directly or indirectly affect socioeconomic conditions would occur. In addition, as a result of the No Action Alternative, the short-term economic benefits, such as local expenditure of funds and creation of jobs during construction, would not occur. Under the No Action Alternative, routine maintenance activities would continue to occur, as necessary. Furthermore, if improvements to the reservoirs were not made, it is reasonable to assume that the long-term burden of maintenance and repairs at each reservoir would increase, and the benefits of increased safety and reduced risk of failure would not be realized.

***Proposed Action Alternative***

The Proposed Action would include the excavation of the existing embankments, removal of sediment from the interior of the reservoirs, and the reconstruction of the embankments to meet USACE and DLNR design criteria. The Proposed Action would include new inlet, outlet and intake, and spillway facilities, in addition to a HDPE reservoir liner. Short-term economic benefits include local expenditure of funds and creation of jobs during construction. No long-term effects are anticipated to result from implementation of the Proposed Action.

Implementation of the Proposed Action is not anticipated to change the socioeconomic characteristics of Central Oahu or its immediate vicinity. The Proposed Action would add temporary jobs generated by project construction activity. Construction workers would be local and would commute to the project area. Project related construction jobs would not directly or indirectly induce substantial population growth. Following completion of construction, land uses in the project area would remain consistent with current conditions. The Proposed Action would not add any households to the population base of the project area, and would not result in the displacement of any existing households. Implementation of the Proposed Action would not affect current and/or planned population growth patterns within the CCH. Implementing the Proposed Action would result in no impact.

Executive Order 12898 addresses environmental justice in minority populations and low-income populations, and states that "…each Federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations…" While the ACS data for the Proposed Action area indicates that a small percentage of the population falls below the poverty line, this population would not be subject to environmental justice issues as a result of the Proposed Action. The purpose of the Proposed Action is to ensure that each reservoir meets dam safety criteria, for which the long-term impact would be a direct benefit to the local agricultural community.

### 3.13.3 Best Management Practices and Mitigation Measures

Since there would be no adverse socioeconomic effects, no mitigation would be required.

## 3.14 Public Services and Utilities

### 3.14.1 Affected Environment

Public services addressed in this section are limited to emergency services (police, emergency response, and public utilities and service systems). Wastewater and drainage systems are not discussed in detail, as the Proposed Action would not result in the production of wastewater. Drainage systems are discussed in further detail in Section 3.3 Drainage and Flooding. Schools, parks, and other public facilities are not discussed in this EA because the Proposed Action would neither affect these facilities nor result in a need for new or physically altered facilities. There are no established recreational sites in the project area; other recreational resources are discussed in Section 3.12 Recreational Resources.

#### *Law Enforcement*

Law enforcement services in the project area are provided by the Honolulu Police Department (CCH 2002). The District 3 (Pearl City) Community Policing Team serves the Aiea/Pearl City and Waipahu areas, including the project area.

#### *Emergency Response*

Emergency response services in the project area are provided by the Honolulu Fire Department's Waipahu station (CCH 2002).

#### *Solid Waste Disposal*

The CCH's Department of Environmental Services handles the collection and treatment of trash and green waste, as well as wastewater and storm water. The island of Oahu has two landfills: the City-owned Waimanalo Gulch Sanitary Landfill, which is Oahu's only municipal solid waste landfill, and the privately-owned PVT landfill, which is designated for construction and demolition waste only (CCH 2014). There are no landfills located in Central Oahu due to concerns about the potential impacts on Oahu's water supply.

#### *Water Supply*

The Honolulu BWS is responsible for managing Oahu's supply of potable water (CCH 2002). No public surface water transmission system currently serves the project sites.

As discussed in Section 1 Introduction, the Waiahole Irrigation System provides a source of irrigation water for agricultural uses in the project area. The Waiahole Irrigation System consists of a 26-mile-long transmission system of ditches, tunnels, siphons and reservoirs.

#### *Gas and Electric*

The only public utilities identified in the vicinity of the reservoirs are power poles and overhead lines providing electrical service to the existing pumps. However, based on discussions with the HECO, which provides electrical service to the project area, the existing poles do not show up on their records. Additional research indicated that the poles are privately owned, and HECO is only involved at the tie-in point to the system near Kunia Road. There are also existing power poles and overhead lines located

within the Reservoir 155 construction limits. Public utility features located within the project sites are also described in Section 2, Description of the Proposed Action and Alternatives.

Reservoir 225 would also require an additional pole and transformers for the new irrigation pump and ADC's pump to drain the reservoir; these materials would likely be reused from another location.

### 3.14.2 Environmental Consequences

***No Action Alternative***

The No Action Alternative would consist of retaining Reservoirs 155 and 225 in their current condition. No construction or ground disturbing activities that could directly or indirectly affect utilities and public services would occur. Under the No Action Alternative, routine maintenance activities would continue to occur, as necessary. Furthermore, if improvements to the reservoirs were not made, it is reasonable to assume that the long-term burden of maintenance and repairs at each reservoir would increase, and the benefits of increased safety and reduced risk of failure would not be realized.

***Proposed Action Alternative***

The Proposed Action would include the excavation of the existing embankments, removal of sediment from the interior of the reservoirs, and the reconstruction of the embankments to meet USACE and DLNR design criteria. The Proposed Action would include new inlet, outlet and intake, and spillway facilities, in addition to a HDPE reservoir liner. Because the Proposed Action does not include new development, it would not result in demand for increased gas, electric, communication systems, water infrastructure, sewer lines, or solid-waste services beyond their current capacity. Therefore, the evaluation for the potential increased demand for these services is not warranted.

The Proposed Action would not increase demands for law enforcement or emergency response services because it would not include new structures, such as housing or businesses, or indirectly increase the amount of housing or businesses in the project vicinity. The proposed improvements would not change the type or intensity of land uses in the project area, which mainly consist of agricultural uses and low population densities; therefore, the demand for law enforcement and emergency response services under the Proposed Action would be the same as that currently provided on-site. However, project construction would occur over a period of approximately six to twelve months, and roadways to the project area would remain open for emergency access during the construction period. As described below in Section 3.15 Traffic and Circulation, all project area roadways are anticipated to remain open during construction activities.

The Proposed Action would not create any new demand for utilities, public services, or service systems. It would not exceed wastewater requirements, nor would it necessitate expansion of any wastewater treatment facilities or water supply entitlements. The Proposed Action would comply with Federal, state, and local regulations related to solid waste, and would not result in the long-term production of any solid wastes. It is anticipated that the Proposed Action would generate excess materials during construction that would require disposal. Excess excavated materials would be either disposed of on-site, or hauled off-site and deposited in a suitable disposal area. Construction debris and excess material requiring disposal in a landfill would be hauled off-site to a suitable facility.

Based on the location of known utility lines, the utility relocations described below would be necessary for implementation of the Proposed Action. As described in Section 2, Description of Proposed Action and Alternatives, the existing power poles and overhead lines located within the Reservoir 155 construction limits would be removed prior to construction and relocated to avoid service interruption. The proposed method of relocation would be to construct an underground electrical line that would extend from an existing pole to the northeast corner of Reservoir 155 to new power poles that would be located adjacent to the existing pumping facilities. For those existing pumps at Reservoir 155 that are remaining at their current location, the existing transformers, control panels and meters would be reused. A new pole and transformer would be required for one pump that currently sits on the crest of the reservoir along the western embankment but is being relocated as described above.

There is the potential that construction activities associated with the Proposed Action could occur in areas of previously unidentified public utility infrastructure; however, prior to construction, consultation would be initiated with all potential service providers and appropriate agencies and individuals responsible for utility infrastructure to identify any additional facility locations and introduce appropriate protection measures. Consultation would continue during construction to ensure avoidance/protection of these utilities as construction proceeds. Implementing the Proposed Action would result in a less than significant impact.

### 3.14.3 Best Management Practices and Mitigation Measures

Since there would be no adverse effects on public services and utilities, no mitigation would be required.

## 3.15 Traffic and Circulation

### 3.15.1 Affected Environment

It is anticipated that personnel, equipment, and imported materials would arrive at the project area via Interstate H-1 or Interstate H-2, Kunia Road, and Plantation Road. Access to Reservoir 225 would be via Kunia Road from Interstate H-1 and then a partially paved access road surrounding the reservoir. The approach to Reservoir 155 would be via Plantation Road from Reservoir 225 and then a dirt access road surrounding the reservoir.

***Interstate Route H-1 (H-1 Freeway)***

The H-1 Freeway is a five-lane interstate route, which provides access throughout the southern portion of Oahu, including Honolulu and Waikiki. The nearest interchange is the Kunia Interchange, located approximately 2.5 miles south of the project area.

***Interstate Route H-2 (H-2 Freeway)***

Interstate H-2 begins at the Waiawa Interchange at Interstate H-1. The highway heads north/south with four lanes in each direction. The terminus of H-2 is in Wahiawa, near Wheeler Army Airfield and Schofield Barracks. The nearest interchange is the H-1/H-2 Interchange, located over 5 miles southeast of the project area.

***Kunia Road (State Route 750)***

Kunia Road or State Route 750 is one of Oahu's principal north-south roadways. Kunia Road in the project area is a six-lane arterial roadway between Farrington Highway and the H-1 Interchange; a four-lane arterial roadway between H-1 and Anonui Street near the Royal Kunia subdivision; and a two-lane minor roadway from Anonui Street to Schofield Barracks, including the section that would be used to access the project sites. Reservoir 225 is located adjacent to Kunia Road. Figure 10 shows site access to both reservoirs.

As described in Section 4.0 Cumulative Impacts, the Oahu Regional Transportation Plan 2035 includes the Kunia Road Widening and Interchange Improvement Project, which would widen Kunia Road from Wilikina Drive to Farrington Highway.

***Plantation Road***

Plantation Road is a paved minor roadway, which generally runs northeast-southwest between the reservoir sites, with a major intersection located at Kunia Road.

### 3.15.2 Environmental Consequences

***No Action Alternative***

The No Action Alternative would consist of retaining Reservoirs 155 and 225 in their current condition. No construction or ground disturbing activities that could directly or indirectly affect traffic or transportation in the project area would occur. The existing freeway/roadway network, types of traffic, and circulation patterns would be expected to remain the same as described for the existing conditions. Under the No Action Alternative, routine maintenance activities would continue to occur, as necessary. Furthermore, if improvements to the reservoirs were not made, it is reasonable to assume that the long-term burden of maintenance and repairs at each reservoir would increase, and the benefits of increased safety and reduced risk of failure would not be realized.

***Proposed Action Alternative***

The Proposed Action would include the excavation of the existing embankments, removal of sediment from the interior of the reservoirs, and the reconstruction of the embankments to meet USACE and DLNR design criteria. The Proposed Action would include new inlet, outlet and intake, and spillway facilities, in addition to a HDPE reservoir liner. Implementation of the Proposed Action is anticipated to result in short-term traffic impacts to local roadways resulting from construction activities; however, no long-term operational impacts are anticipated.

***Short Term***

As noted above, personnel, equipment, and imported materials would reach the project reservoirs, staging areas, and borrow site via Kunia Road and Plantation Road. Construction activities are anticipated to result in temporary increases in traffic on local roadways, as well as temporary slow-downs along Kunia Road due to the presence of construction vehicles and heavy equipment in the project area. All construction-related traffic effects are temporary, and would cease upon project completion.

The construction labor force is estimated to average 10-15 persons per reservoir per work day over the six to 12 month construction period. The Proposed Action would result in a temporary increase in vehicle trips on project area roadways due to workers traveling to and from work sites, and the transport of construction equipment and fill material during the course of construction. Construction-related traffic would be spread over the duration of the construction schedule and would be relatively minimal on a daily basis. In addition, the majority of construction truck traffic would move between the staging areas, borrow site, and the project reservoirs. These routes do not cross any major roads and therefore, would not impact local vehicle traffic. However, other materials and equipment, as well as a portion of the reservoir fill material, would need to be brought to the site from external sources within the Honolulu area. Delivery of these materials and equipment would utilize Interstates H-1 and H-2. In addition, some materials and equipment needed for the project would be pre-assembled prior to transport to the project reservoirs. The project could generate up to 2,600 total truck trips on Kunia Road and either Interstate H-1 or Interstate H-2 for the import of materials. The majority of these trips would occur during the mobilization phase of construction (the first three months of construction) when materials are brought to the reservoirs and staging areas. During this phase of construction, the project could generate up to 40 one-way truck trips/day on Kunia Road and either Interstate H-1 or Interstate H-2 depending on the location of import materials.

Material and soil removed at both reservoirs would be reused to the extent possible in construction. Any construction debris and waste materials would be disposed of off-site at a permitted and approved waste disposal site. It is anticipated that the project could generate up to 1,000 total truck trips on Kunia Road and either Interstate H-1 or Interstate H-2 over the construction period for the export of materials from the construction sites. The majority of these trips would occur during the demolition phase of construction (the first two months of construction) when the existing reservoir embankments are taken down. During the demolition phase of construction, the project could generate up to 22 one-way truck trips/day on Kunia Road and either Interstate H-1 or Interstate H-2 depending on the location of import materials. Therefore, the project could generate up to 3,600 total one-way truck trips on Kunia Road and Interstate H-1 or Interstate H-2 over the construction period.

A traffic control plan would be prepared by the construction contractor for the Proposed Action and would be submitted to the CCH prior to initiation of construction activities. The traffic control plan would include measures designed to minimize the effect of construction activity on traffic flow conditions throughout the project area. Recommended traffic control measures would include site signage and a flag person to direct traffic while construction vehicles are entering and exiting the project area. Construction of the Proposed Action would also be coordinated with the local landowners to ensure that access to their parcels is maintained during construction activities. Following the completion of construction, repairs would be made for any damages to local roadways resulting from anticipated construction-related heavy loads. With implementation of a traffic control plan and the associated measures described above, short-term adverse effects to local traffic from construction commuting and activities are not anticipated. Implementing the Proposed Action would result in a less than significant impact.

***Long Term***

No long-term traffic impacts are anticipated to result from implementation of the Proposed Action. The Proposed Action would lessen the long-term burden of maintenance and repairs at each reservoir and would not result in substantial changes to current operation and maintenance activities.

### 3.15.3 Best Management Practices and Mitigation Measures

Since there would be no adverse effects on traffic and circulation, no mitigation would be required.

# 4 CUMULATIVE IMPACTS

Cumulative impacts are those that result from past, present, and reasonably foreseeable future actions, combined with the potential impacts of a specific (proposed) project. Cumulative impacts may result from a series of projects that individually do not generate significant adverse effects, but collectively add up to a significant negative impact on the environment.

The cumulative impacts of the Proposed Action along with past and reasonably foreseeable future projects proposed were assessed based upon available information. Potential future projects or ongoing activities that could affect the same resources as, or involve similar impacts to the Proposed Action are listed below:

- Halekua-Kunia, LLC and HRT, Ltd., are owners of approximately 210 acres that are to be developed as the Royal Kunia, Phase II project (Hawaii DOH 2013). Halekua-Kunia has received approval of its application for a Planned Development-Housing permit from the DPP. Plans for Royal Kunia, Phase II include 2,007 single-family and multi-family dwelling units, and will also include several community parks and associated recreational facilities.
- The HDOA has the authority to plan, develop and manage agricultural parks on public lands to increase the supply of diversified agricultural lands. The proposed Kunia Agricultural Park would be located on approximately 150 acres of State lands known to be highly suited to a variety of crops and currently under cultivation (State of Hawai'i 2013). The proposed Kunia Agricultural Park would afford 24 lessees the ability to both farm and live on the property through lease of farm dwelling lots with an associated cluster home to be developed and owned by the State. HDOA will be responsible for developing and maintaining the agricultural infrastructure and for securing irrigation water for the Kunia Agricultural Park. The HDOA's request for an allocation of agricultural water from the Waiahole Ditch is pending before the DLNR, Commission on Water Resource Management.

The Proposed Action is being developed as a single project, and no substantial effect to existing environmental conditions are anticipated to result. The Proposed Action does not involve a commitment to larger actions. Sections in this document have discussed how the Proposed Action would not lead to adverse impacts. Where potentially adverse impacts have been identified, BMPs have been proposed to further reduce adverse effects. Further, anticipated benefits of the Proposed Action include ensuring that each reservoir meets dam safety criteria, and improving each reservoir to reduce water losses and leakage in the system, thereby improving the availability of water resources for agricultural purposes. Therefore, the incremental effects of the Proposed Action combined with the effects of present, past, and probable future projects are not cumulatively considerable.

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# 5 AGENCIES, ORGANIZATIONS, AND INDIVIDUALS CONSULTED

The following agencies and organizations were consulted during the preparation of this Draft Environmental Assessment.

## 5.1 Federal Government

U.S. Army Corps of Engineers

U.S. Fish and Wildlife Service

## 5.2 State of Hawai‘i

Agribusiness Development Corporation (ADC)

Hawaii Department of Agriculture (HDOA)

Department of Land and Natural Resources (DLNR)

Department of Health, Clean Water Branch

Department of Health, Hazard Evaluation and Emergency Response (HEER) Office

State Historic Preservation Division (SHPD)

## 5.3 City and County of Honolulu

Department of Planning and Permitting

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# 6 SIGNIFICANCE DETERMINATION AND FINDINGS

As described in Chapter 1 (Section 1.4 Regulatory Context), this DEA was prepared to comply with both NEPA and HEPA process in determining whether or not the Proposed Action would have significant adverse effects on the human environment. The USACE is the lead agency for the Proposed Action under NEPA. Under HEPA, HDOA is the proposing agency.

## 6.1 HEPA Significance Determination

Based on analysis of the 13 significance criteria described in Chapter 3 Introduction of this DEA, as outlined in HAR 11-200-12, the Proposed Action is not expected to result in significant environmental effects when conducted within the constraints of the required permits and approvals. The Final EA would consider and incorporate public comments received on the Draft EA. Pending any comments received from agencies and the public on this DEA, HDOA anticipates a FONSI.

## 6.2 NEPA and HEPA Findings

In accordance with the provisions set forth under NEPA and HEPA, this assessment has preliminarily determined that the Proposed Action would not result in significant adverse impacts. Anticipated effects would be temporary and would not adversely impact the environmental quality of the area. BMPs would also be implemented to minimize the temporary effects of construction activities. Based on analysis and review of the above factors, it has been preliminarily determined that an EIS will not be required, and it is anticipated that a FONSI should be issued for the Proposed Action.

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# 7 PREPARERS

## 7.1 U.S. Army Corps of Engineers

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Kanalei Shun, Archaeologist

***Civil and Public Works***

Derek Chow, Civil Works Branch Chief

## 7.2 HDOA

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Glenn Okamoto, Agricultural Infrastructure Manager

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Maya LeGrande

***Cultural Resources Specialist***

David Shideler, Principal Investigator

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Marcus Grant, Archaeologist

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# Appendix A Biological Resources

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**DEPARTMENT OF THE ARMY**
**HONOLULU DISTRICT, U.S. ARMY CORPS OF ENGINEERS**
**FORT SHAFTER, HAWAII 96858-5440**

October 11, 2016

Civil and Public Works Branch
Programs and Project Management Division

Dr. Mary Abrams
Field Supervisor
U.S. Fish and Wildlife Service
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawaii 96850

Dear Dr. Abrams:

We are requesting a list of federally-protected species and designated critical habitat that may be present for a proposed project located in Kunia, Island of Oahu, Hawaii (Encl 1). The Honolulu District, U.S. Army Corps of Engineers (USACE), and the State of Hawaii Department of Agriculture, and the State of Hawaii Agribusiness Development Corporation (non-federal sponsors) are planning to repair and rehabilitate two reservoirs along the existing Waiahole Ditch Irrigation System to improve safety (Encl 2). Water storage capacities of the reservoirs would be reduced and embankment geometry modified to ensure that each reservoir meets current life safety and risk criteria. The reservoirs would also be lined to reduce water losses in the system.

A description of the proposed project is provided for your information. The footprint for the proposed project encompasses Reservoirs 155 and 225 of the Waiahole Ditch system, their appurtenances, two staging areas, access roads, and a borrow site to be used during construction (Encl 3). Prior to construction, irrigation water from the ditch system would temporarily bypass the reservoirs. The bypass will occur via pipeline from the existing Waiahole Ditch to a nearby pump station for continued agricultural irrigation use and removed after the reservoirs are placed back into operation. Each reservoir would then be allowed to drain through irrigation use prior to construction. The embankments of the reservoirs would then be excavated, sediment removed from the interiors, and the embankments reconstructed to meet the USACE and State design criteria. The proposed work would also include: an internal drainage system, new inlets and outlets, spillways, and a high density polyethylene reservoir liner to reduce water losses. Reservoir 155 would be reduced in size to an operating capacity of 33.0 ac-ft. The operating capacity of Reservoir 225 would also be reduced to 33.7 ac-ft. The reductions in capacities would still meet agricultural irrigation needs while improving the structures and reducing the risk of failure of the existing reservoirs to downstream communities.

If you have any questions or require additional information, please contact Mr. Derek Chow, Chief of my Civil and Public Works Branch, at (808) 835-4026 or e-mail derek.j.chow@usace.army.mil.

Sincerely,

Stephen N. Cayetano, P.E.
Deputy District Engineer for
Programs and Project Management

Enclosures

# United States Department of the Interior

FISH AND WILDLIFE SERVICE
Pacific Islands Fish and Wildlife Office
300 Ala Moana Boulevard, Room 3-122
Honolulu, Hawai'i 96850

In Reply Refer To:
01EPIF00-2017-SL-0017

NOV 14 2016

Mr. Derek Chow
Chief, Civil and Public Works Branch
Department of the Army
Honolulu District
U.S. Army Corps of Engineers
Fort Shafter, Hawai'i 96858-5440

Subject: Species List Request for the Proposed Waiāhole Ditch System Reservoir Repairs, Kunia, O'ahu

Dear Mr. Chow:

The U.S. Fish and Wildlife Service (Service) received your letter on October 14, 2016, requesting a list of federally-protected species and designated critical habitat within the vicinity of the proposed Waiāhole Ditch System Reservoir Repairs project, located in Kunia, on the island of O'ahu. The Honolulu District, U.S. Army Corps of Engineers (USACE), the State of Hawai'i Department of Agriculture, and the State of Hawai'i Agribusiness Development Corporation (non-federal sponsors) are planning to repair and rehabilitate two reservoirs along the existing Waiāhole Ditch Irrigation System to improve safety. Water storage capacities of the reservoirs would be reduced and embankment geometry modified to ensure that each reservoir meets current life safety and risk criteria. The reservoirs would also be lined to reduce water losses in the system.

The footprint for the proposed project encompasses Reservoirs 155 and 225 of the Waiāhole Ditch system, their appurtenances, two staging areas, access roads, and a borrow site to be used during construction. Prior to construction, irrigation water from the ditch system would temporarily bypass the reservoirs. The bypass will occur via pipeline from the existing Waiāhole Ditch to a nearby pump station for continued agricultural irrigation use and removed after the reservoirs are placed back into operation. Each reservoir would then be allowed to drain through irrigation use prior to construction. The embankments of the reservoirs would then be excavated, sediment removed from the interiors, and the embankments reconstructed to meet the USACE and State design criteria. The proposed work would also include: an internal drainage system, new inlets and outlets, spillways, and a high density polyethylene reservoir liner to reduce water losses. Reservoir 155 would be reduced in size to an operating capacity of 33.0 ac-ft. The

operating capacity of Reservoir 225 would also be reduced to 33.7 ac-ft. The reductions in capacities would still meet agricultural irrigation needs while improving the structures and reducing the risk of failure of the existing reservoirs to downstream communities.

We have reviewed the information you provided and pertinent information in our files, including data compiled by the Hawai'i Biodiversity and Mapping Program as it pertains to listed species and designated critical habitat in accordance with section 7 of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*). There is no federally designated critical habitat within the immediate vicinity of the proposed project. Our data indicate that the endangered Hawaiian stilt (*Himantopus mexicanus knudseni*), endangered Hawaiian coot (*Fulica alai*), endangered Hawaiian gallinule (*Gallinula galeata sandvicensis*), endangered Hawaiian duck (*Anas wyvilliana*), endangered Hawaiian goose (*Branta sandvicensis*) (collectively referred to as Hawaiian waterbirds); and endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) may occur within the vicinity of your proposed project. We offer the following comments to assist you in avoidance and minimization of impacts to federally protected species.

Hawaiian waterbirds

Our records indicate there is a high probability that Hawaiian waterbirds may occur in the vicinity of the proposed project. We recommend you incorporate the following measures into your project description to avoid and minimize impacts to listed Hawaiian waterbirds:

- A biological monitor should conduct Hawaiian waterbird and nest surveys at the proposed project site prior to project initiation.
- Any documented nests or broods within the project vicinity should be reported to the Service within 48 hours.
- A 100-foot buffer should be established and maintained around all active nests and broods until the chicks/ducklings have fledged. No potentially disruptive activities or habitat alteration should occur within this buffer.
- The Service should be notified immediately prior to project initiation and provided with the results of pre-construction Hawaiian waterbird surveys.
- A biological monitor should be present on the project site during all construction or earth moving activities to ensure that Hawaiian waterbirds and nests are not adversely impacted.
- If a listed Hawaiian waterbird is observed within the project site, or flies into the site while activities are occurring (within 100 feet), all potentially disruptive activities (including human activity, mechanical or construction disturbance) will be stopped until the animal(s) voluntarily leave the area.
- A post-construction report should be submitted to the Service with 30 days of the completion of the project. The report should include the results of Hawaiian waterbird surveys, the location and outcome of documented nests, and any other relevant information.

Because the proposed activities may impact water resources that provide habitat for listed Hawaiian waterbirds, we are attaching the Service's recommended Best Management Practices regarding sedimentation and erosion in aquatic environments. We encourage you to incorporate the relevant practices into your project design. We recommend you contact our office when selecting for measures to minimize erosion control, as there have been documented cases of entanglement hazards to Hawaiian geese from matting material.

Hawaiian hoary bat

The Hawaiian hoary bat roosts in both exotic and native woody vegetation and, while foraging, will leave young unattended in "nursery" trees and shrubs when they forage. If trees or shrubs suitable for bat roosting are cleared during the breeding season, there is a risk that young bats could inadvertently be harmed or killed since they are too young to fly or may not move away. To minimize impacts to the endangered Hawaiian hoary bat, woody plants greater than 15 feet (4.6 meters) tall should not be disturbed, removed, or trimmed during the bat birthing and pup rearing season (June 1 through September 15). Site clearing should be timed to avoid disturbance to Hawaiian hoary bats in the project area

We appreciate your efforts to conserve Hawai'i's native species. If you have any questions or concerns regarding this consultation, please contact Jiny Kim, Fish and Wildlife Biologist (phone: 808-792-9400, email: Jiny_Kim@fws.gov).

Sincerely,

Leila Gibson

for Aaron Nadig
Island Team Manager
O'ahu, Kaua'i, Northwestern Hawaiian Islands, and American Samoa

Enclosure: Service BMPs for erosion and sediment control

**U.S. Fish and Wildlife Service**
**Recommended Standard Best Management Practices**

The U.S. Fish and Wildlife Service recommends that the measures below be incorporated into projects to minimize the degradation of water quality and minimize the impacts to fish and wildlife resources.

1. Turbidity and siltation from project-related work shall be minimized and contained within the vicinity of the site through the appropriate use of effective silt containment devices and the curtailment of work during adverse tidal and weather conditions.

2. Dredging/filling in the marine environment shall be scheduled to avoid coral spawning and recruitment periods and sea turtle nesting and hatching periods.

3. Dredging and filling in the marine/aquatic environment shall be designed to avoid or minimize the loss special aquatic site habitat (beaches, coral reefs, wetlands, etc.) and the function of such habitat shall be replaced.

4. All project-related materials and equipment (dredges, barges, backhoes, etc.) to be placed in the water shall be cleaned of pollutants prior to use.

5. No project-related materials (fill, revetment rock, pipe, etc.) should be stockpiled in the water (intertidal zones, reef flats, stream channels, wetlands, etc.) or on beach habitats.

6. All debris removed from the marine/aquatic environment shall be disposed of at an approved upland or ocean dumping site.

7. No contamination (trash or debris disposal, non-native species introductions, attraction of non-native pests, etc.) of adjacent habitats (reef flats, channels, open ocean, stream channels, wetlands, beaches, forests, etc.) shall result from project-related activities. This shall be accomplished by implementing a litter-control plan and developing a Hazard Analysis and Critical Control Point Plan (HACCP – see http://www.haccp-nrm.org/Wizard/default.asp) to prevent attraction and introduction of non-native species.

8. Fueling of project-related vehicles and equipment should take place away from the water and a contingency plan to control petroleum products accidentally spilled during the project shall be developed. Absorbent pads and containment booms shall be stored on-site, if appropriate, to facilitate the clean-up of accidental petroleum releases.

9. Any under-layer fills used in the project shall be protected from erosion with stones (or core-loc units) as soon after placement as practicable.

10. Any soil exposed near water as part of the project shall be protected from erosion (with plastic sheeting, filter fabric etc.) after exposure and stabilized as soon as practicable (with native or non-invasive vegetation matting, hydroseeding, etc.).

# BIOLOGICAL RESOURCES ASSESSMENT

# WAIAHOLE RESERVOIR SYSTEM: RESERVOIRS 155 & 225,

# BORROW SITE & STAGING AREAS

# KUNIA, OAHU

Prepared by:

Maya LeGrande
LeGrande Biological Surveys Inc
68-310 Kikou Street
Waialua HI 96791

Prepared for:

ELEMENT ENVIRONMENTAL, LLC
98-030 Hekaha Street, Unit 9
Aiea, HI 96701

June 2014

TABLE OF CONTENTS

## INTRODUCTION

This report includes the findings of a biological study conducted at two reservoirs of the Waiahole Reservoir System within the Honouliuli Region on the island of Oahu, Hawaii. LeGrande Biological Surveys Inc. carried out a flora and fauna field survey of the Reservoir locations on January 17, 2013 and field survey of the proposed Borrow Site and Staging Areas on May 22 and June 13, 2014. The primary objectives of the field studies were to:

1) provide a general description of the vegetation on the project site;
2) inventory the flora and fauna; and
3) search for threatened and endangered species, as well as species of concern.

## GENERAL SITE DESCRIPTION

The reservoirs proposed for repair, staging areas, and borrow site are located along the Waiahole Reservoir system in Kunia. Reservoir 155 is approximately three acres and holds about 15 million gallons of water and is located at 94-400 Kunia Road (TMK (1) 9-2-001:001. Reservoir 225 is approximately 2.5 acres and holds approximately 10 million gallons of water and is located at 94-2101 E Kunia Road (TMK (1) 9-4-003:001).

The majority of the survey areas are either mowed areas dominated by weedy plant species, bare soil, or are in active cultivation. The areas surrounding the reservoirs have been utilized for agriculture since the late 1800s, being planted in sugar cane in the past and now in diversified agriculture, currently with experimental corn crops.

## DESCRIPTION OF WILDLIFE

### METHODS

Faunal surveys were conducted by walking over the proposed project area and noting all individuals of each bird species observed, as well as signs of their presence, such as footprints, droppings, egg shells, or burrows. Special attention and more time was spent in areas most likely to harbor native species. Birds were identified by sight using the naked eye and 10x binoculars, and by calls. Invertebrates were observed by chance sightings and noted.

### Reservoir 155 & Staging Area

Two species of alien (introduced) birds were recorded on the one-day field survey. A flock of spotted doves (*Streptopelia chinensis*) were observed near the corn fields at the edge of the survey area. A few common Myna (*Acridotheres tristis*) were roosting in the christmas berry trees near the base of the electric towers to the east of the reservoir. Several individuals of an introduced dragonfly (*Anax* sp.) were observed skimming the water in the reservoir as well as the surrounding ditches. One Familiar Bluet (*Enallagma civile*), an introduced damselfly, was seen along the earthen embankment. The proposed staging area is located to the south west of R155. The site is dominated by a plowed agricultural field. Spotted doves were observed flying over or foraging in the field. No other birds or animals were observed in the staging area site.

Borrow Site

The borrow site is located to the north east of R155 in an agricultural field with fallow areas or planted in corn (*Zea mays*). Birds observed in the area or flying over included common myna, Cattle egret (*Bubulcus ibis*), spotted doves, and flocks of Java sparrow (*Padda oryzivora*).

Reservoir 225 & Staging Area

Several spotted doves were observed in the surrounding fields near the reservoir. It is likely that additional species of introduced birds utilize the areas around the reservoir. The staging area is located to the east of R225 in an agricultural field. One common myna was observed within the survey area.

No mammals were observed at either of the reservoirs, staging areas, or borrow site. Several species of non-native mammals are known to utilize agricultural areas in Hawaii including, mongoose (*Herpestes javanicus*), black rat (*Rattus rattus*), and feral cats (*Felis catus*) most likely reside or forage in or near the project area. The surrounding areas of the reservoirs are not suitable habitat for native birds. The native Hawaiian stilt or ae`o (*Himantopus mexicanus knudseni*) may visit the reservoirs from time to time, as the birds are known to rest or forage at large bodies of freshwater as they traverse from roosting and foraging areas during the day.

DESCRIPTION OF THE VEGETATION

METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area. Topographic maps were examined to determine terrain characteristics, access, boundaries, and reference points.

A walk-through survey method was used. The earthen embankements of the reservoirs were walked along with up to a 300 foot buffer radiating outward was surveyed, except in areas where active cultivation was in progress (i.e. cornfields were surveyed from the outer margins.). The perimeters of the staging areas were walked as well as transects through them if vegetation was observed. The perimeter of the Borrow Site was walked as well as transects roughly 20 feet apart throughout the survey area. Notes were made on plant associations and distribution, disturbances, topography, substrate types, exposure, drainage, etc. Plant identifications were made in the field.

DESCRIPTION OF THE VEGETATION

The survey areas around both reservoirs, staging sites, and borrow site were dominated by non-native plant species and agricultural crops. An inventory of all plants observed around each of the reservoir sites, staging areas, and borrow site is provided in Appendices A and B. Appendix C provides select photographs of the reservoirs' infrastructure and associated plant species and representative pictures of the staging areas and borrow site.

Reservoir 155 & Staging Area

A total of 55 plant species were observed within the survey area. Fifty-three were identified as non-native (introduced) and two were indigenous (native to the Hawaiian Islands and elsewhere). The earthen embankments (Appendix C, Photo 1) were dominated by mowed weedy species such as lion's ear (Leonotis nepetifolia), partridge pea (Chamaecrista nictitans), cheeseweed (Malva parviflora),

spiny amaranth (Amaranthus spinosus), ivy gourd (Coccinea grandis), and beggar tick (Bidens alba). Grass species include sourgrass (Digitaria insularis), natal redtop (Melinis repens), and swollen fingergrass (Digitaria insularis). The flumes/ditches included in the survey area were also dominated by non-native plant species including, Australian saltbush (Atriplex semibaccata), coat buttons (Tridax procumbens), slender mimosa (Desmanthus pernambucans), and creeping indigo (Indigofera hendecaphylla) . Growing at the base of a large electrical tower within the survey area is a mass of Christmas berry (Schinus terebinthifololius) trees.

The outer slopes of the reservoir embankment were mostly bare dirt with dry grass species as previously mentioned. Other species observed in the area were castor bean (Ricinus communis), koa haole (Leucaena leucocephala), and balsam pear (Momordica charantia). Portions of the survey area included the agricultural fields that were planted in corn. The two indigenous plant species observed were; popolo (Solanum americanum) and uhaloa (Waltheria indica).

The proposed staging area that lies to the south west of R155 is dominated by a plowed, fallow field that is scattered with plant species mainly along the perimeter of the fields such as uhaloa, rye (Secale sp.), sourgrass, swollen fingergrass, and Guinea grass. The only native plant observed uncommonly within the survey area was the indigenous uhaloa.

Borrow Site

The borrow site is located to the north east of R155 in an agricultural field with fallow areas or planted in corn. The interior of the borrow site was planted in corn at the time of the survey. Bare ground or plowed areas are mixed in with the corn. An established access road runs through the site and several weedy species were observed along the edges including, spiny amaranth, castor bean, golden crown-beard, rye, klu, coat buttons, and creeping indigo. A perimeter of Guinea grass delineates the eastern boundary of the survey area near the existing drainage canal. Berm areas surrounding the borrow site location are dominated by Guinea grass, castor bean, koa haole, and sourgrass.

Reservoir 225 & Staging Area

A total of 57 plant species were observed within the survey area. Fifty-four were non-native (introduced) and three were indigenous (native to the Hawaiian Islands and elsewhere). Two large mango (Mangifera indica) were growing at the edge of the southwest corner of the reservoir (Appendix C, Photo 4). A few small autograph trees (Clusia rosea) were growing as epiphytes on the trunk mango trees. Along the top and outer slopes of the embankments surrounding the reservoir, weedy plant species dominated including; castor bean, obscure morning-glory (Ipomoea obscura), koa haole, Guinea grass (Panicum maximum), coat buttons, love-in-a-mist (Passiflora foetida), and golden crown-beard (Verbesina encelioides). Three indigenous plant species were observed infrequently in the area; ilima (Sida fallax), uhaloa, and popolo. All three indigenous species are common and widespread throughout the Hawaiian Islands.

Near the water line on the inner banks of the reservoir, plants observed included primrose willow (Ludwigia octovalvis), poinsettia (Euphorbia pulcherrima), and balsam pear. Masses of the water plant Brazilian elodea (Egeria densa) were observed submerged throughout the reservoir. A low section of embankment near the northwest corner was dominated by non-native plant species such as Guinea grass (Panicum maximum) and fuzzy rattlepod (Crotalaria incana).

The proposed staging area for R225 is located to the east of the reservoir in an agricultural field. Currently, the fields are planted in diversified crops such as banana, bean varietals, lemon grass, and basil. The agricultural crops found in this area were not included in the overall species list. Weedy species along the perimeters of the field include swollen fingergrass, golden crown-beard, and Guinea grass.

## DISCUSSION

The survey area has been impacted over time by human use and the biological resources have been altered from their native state. The majority of the plant species and all of animal species observed within the survey areas for the reservoirs, staging areas, and borrow site were non-native (introduced). Sections of the subject property are actively managed and cleared for agricultural use. The remaining areas are used for the reservoirs, pump equipment, and flumes/ditches.

None of the plants or animals observed during the survey are listed as Federal threatened or endangered species or as a species of concern (U.S. Fish and Wildlife Service, 2008). Besides the reservoirs themselves, no wetlands were encountered during this survey. The three essential criteria for defining a Federally recognized wetland – hydrophytic (adapted to grow in water) vegetation, hydric soils, and wetlands hydrology – were not present in conjunction at any locations within the study site.

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**APPENDIX A**
**PLANTS SPECIES INVENTORY**
Waiahole Reservoir System,
**Reservoir 155 & Staging Area & Borrow Site**
Kunia, Oahu, Hawaii

The following checklist is an inventory of all the plant species observed within survey areas for Reservoir 155, the proposed staging area, and borrow site. The plant names are arranged alphabetically by family and then by species into each of two groups: Monocots, and Dicots. The taxonomy and nomenclature of the flowering plants (Monocots and Dicots) are in accordance with Wagner *et al*. (1990), Wagner and Herbst (1999) and Staples and Herbst (2005). Recent name changes are those recorded in the Hawaii Biological Survey series (Evehuis and Eldredge, eds, 1999-2002).

For each species, the following information is provided:

1. Scientific name with author citation;
2. Common English and/or Hawaiian name(s), when known;
3. Biogeographic status; the following symbols are used:
   I= indigenous= native to the Hawaiian Islands and elsewhere;

   X=introduced or alien = all plants brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact (Cook's arrival in the islands in 1778).

WAIAHOLE RESERVOIR 155 & STAGING AREA & BORROW SITE

PLANT SPECIES INVENTORY

| SCIENTIFIC NAME | COMMON NAME | STATUS |
|---|---|---|
| **MONOCOTS** | | |
| POACEAE | | |
| *Brachiaria mutica* (Forssk.) Stapf | California grass | X |
| *Cenchrus ciliaris* L. | buffelgrass | X |
| *Cenchrus echinatus* L. | common sandbur | X |
| *Chloris barbata* (L.) Sw. | swollen fingergrass | X |
| *Cynodon dactylon* (L.) Pers | manienie | X |
| *Digitaria insularis* (L.) Mez ex Ekman | sourgrass | X |
| *Eragrostis tenella* (L.) P.Beauv. Ex Roem.&Schult. | | X |
| *Melinus repens* (Willd.) Zizka | natal redtop | X |
| *Panicum maximum* L. | Guinea grass | X |
| *Secale* sp. | rye | X |
| *Zea mays* L. | corn | X |
| | | |
| **DICOTS** | | |
| ACANTHACEAE | | |
| *Asystasia gangetica* (L.) T. Anderson | Chinese violet | X |
| | | |
| AIZOACEAE | | |
| *Trianthema portulacastrum* L. | | X |
| | | |
| AMARANTHACEAE | | |
| *Alternanthera pungens* Kunth | khaki weed | X |
| *Amaranthus spinosus* L. | spiny amaranth | X |
| *Amaranthus viridis* L. | slender amaranth | X |
| | | |
| ANACARDIACEAE | | |
| *Schinus terebinthifolius* Raddi | Christmas berry | X |
| | | |
| ASTERACEAE | | |
| *Bidens alba* (L.) DC. var. *radiata* (Sch. Bip.) Ballard ex Melchert | beggar tick | X |
| *Bidens pilosa* L. | Spanish needle | X |
| *Emilia fosbergii* Nicolson | red pualele | X |
| *Sonchus oleraceus* L. | pualele | X |
| *Tridax procumbens* (L.) | coat buttons | X |
| *Verbesina encelioides* (Cav.) Benth. & Hook | golden crown-beard | X |
| | | |
| | | |
| CHENOPODIACEAE | | |
| *Atriplex semibaccata* R.Br. | Australian saltbush | X |
| | | |
| CONVOLVULACEAE | | |

| | | |
|---|---|---|
| *Ipomoea obscura* (L.) Ker Gawl. | | X |
| *Merremia aegyptia* (L.) Urb. | hairy merremia | X |
| | | |
| CUCURBITACEAE | | |
| *Coccinea grandis* (L.) Voigt | ivy gourd | X |
| *Momordica charantia* L. | balsam pear | X |
| | | |
| EUPHORBIACEAE | | |
| *Chamaesyce hirta* (L.) Millsp. | hairy spurge, garden spurge | X |
| *Chamaesyce hypercifolia* (L.) Millsp. | graceful spurge | X |
| *Euphorbia heterophylla* L. | kaliko | X |
| *Ricinus communis* L. | castor bean | X |
| | | |
| FABACEAE | | |
| *Acacia farnesiana* (L.) Willd. | klu, aroma, kolu | X |
| *Chamaecrista nictitans* (L.) Moench | partridge pea | X |
| *Crotalaria incana* L. | fuzzy rattlepod | X |
| *Desmanthus pernambucanus* (L.) Thell. | slender or virgate mimosa | X |
| *Indigofera hendecaphylla* Jacq. | creeping indigo | X |
| *Indigofera suffritocosa* Mill. | Iniko | X |
| *Leucaena leucocephala* (Lam.) de Wit | Koa haole | X |
| *Macroptilium lathyroides* (L.) Urb. | wild bean | X |
| | | |
| LAMIACEAE | | |
| *Leonotis nepetifolia* (L.) R.Br. | lion's ear | X |
| | | |
| MALVACEAE | | |
| *Abutilon grandifolium* (Willd.) Sweet | hairy abutilon | X |
| *Malva parviflora* L. | cheese weed | X |
| *Malvastrum coromandelianum* (L.) Garcke | false mallow | X |
| *Sida ciliaris* L. | | X |
| *Sida rhombifolia* L. | | X |
| | | |
| MYRTACEAE | | |
| *Psidium guajva* L. | common guava | X |
| | | |
| ONAGRACEAE | | |
| *Ludwigia octovalvis* (Jacq.) Raven | primrose willow | X |
| | | |
| PASSIFLORACEAE | | |
| *Passiflora foetida* L. | love-in-a-mist | X |
| | | |
| PORTULACACEAE | | |
| *Portulaca oleracea* L. | pigweed | X |
| | | |
| SOLANACEAE | | |
| *Datura stramonium* L. | Jimson weed | X |
| *Solanum americanum* Mill. | glossy nightshade, popolo | I |
| *Solanum lycopersicum* L. var. *cerasiforme* (Dunal) Spooner, G.J. Anderson & R.K. Jansen | cherry tomato | X |

| | | |
|---|---|---|
| STERCULIACEAE | | |
| *Waltheria indica* L. | `uhaloa | I |
| | | |
| VERBENACEAE | | |
| *Stachytarpheta jamaicensis* (L.) Vahl | Jamaican vervain | X |
| | | |

**APPENDIX B**
**PLANTS SPECIES INVENTORY**
Waiahole Reservoir System,
**Reservoir 225 & Staging Area**
Kunia, Oahu, Hawaii

The following checklist is an inventory of all the plant species observed within survey areas for Reservoir 225 and the proposed staging area. The plant names are arranged alphabetically by family and then by species into each of two groups: Monocots, and Dicots. The taxonomy and nomenclature of the flowering plants (Monocots and Dicots) are in accordance with Wagner *et al*. (1990), Wagner and Herbst (1999) and Staples and Herbst (2005). Recent name changes are those recorded in the Hawaii Biological Survey series (Evehuis and Eldredge, eds, 1999-2002).

For each species, the following information is provided:

1. Scientific name with author citation;
2. Common English and/or Hawaiian name(s), when known;.
3. Biogeographic status; the following symbols are used:
   I= indigenous= native to the Hawaiian Islands and elsewhere.

   X=introduced or alien = all those plants brought to the Hawaiian Islands by humans, intentionally or accidentally, after Western contact (Cook's arrival in the islands in 1778).

WAIAHOLE RESERVOIR 225 & STAGING AREA

PLANT SPECIES INVENTORY

| SCIENTIFIC NAME | COMMON NAME | STATUS |
|---|---|---|
| **MONOCOTS** | | |
| HYDROCHARITACEAE | | |
| *Egeria densa* Planch. | Brazilian elodea | X |
| | | |
| POACEAE | | |
| *Brachiaria mutica* (Forssk.) Stapf | California grass | X |
| *Cenchrus ciliaris* L. | buffelgrass | X |
| *Chloris barbata* (L.) Sw. | swollen fingergrass | X |
| *Cynodon dactylon* (L.) Pers | manienie | X |
| *Melinus repens* (Willd.) Zizka | natal redtop | X |
| *Panicum maximum* L. | Guinea grass | X |
| | | |
| **DICOTS** | | |
| **ACANTHACEAE** | | |
| ***Asystasia gangetica* (L.) T. Anderson** | **Chinese violet** | **X** |
| | | |
| **AIZOACEAE** | | |
| ***Trianthema portulacastrum* L.** | | **X** |
| | | |
| **AMARANTHACEAE** | | |
| ***Amaranthus viridis* L.** | **slender amaranth** | **X** |
| | | |
| **ANACARDIACEAE** | | |
| ***Mangifera indica* L.** | **mango** | **X** |
| | | |
| ASTERACEAE | | |
| *Bidens alba* (L.) DC. var. *radiata* (Sch. Bip.) Ballard ex Melchert | beggar tick | X |
| *Bidens pilosa* L. | Spanish needle | X |
| *Emilia fosbergii* Nicolson | red pualele | X |
| *Pluchea carolinensis* (Jacq.) G. Don | sourbush | X |
| *Sonchus oleraceus* L. | pualele | X |
| *Tridax procumbens* (L.) | coat buttons | X |
| *Verbesina encelioides* (Cav.) Benth. & Hook | golden crown-beard | X |
| | | |
| CHENOPODIACEAE | | |
| *Atriplex semibaccata* R.Br. | Australian saltbush | X |
| *Chenopodium murale* L. | aheahea | X |
| | | |
| CLUSIACEAE | | |
| *Clusia rosea* Jacq. | autograph tree | X |
| | | |
| CONVOLVULACEAE | | |
| *Ipomoea obscura* (L.) Ker Gawl. | | X |
| | | |

| | | |
|---|---|---|
| CUCURBITACEAE | | |
| *Coccinea grandis* (L.) Voigt | ivy gourd | X |
| *Momordica charantia* L. | balsam pear | X |
| | | |
| EUPHORBIACEAE | | |
| *Chamaesyce hirta* (L.) Millsp. | hairy spurge, garden spurge | X |
| *Chamaesyce hypercifolia* (L.) Millsp. | graceful spurge | X |
| *Chamaesyce hyssopifolia* (L.) Small | | X |
| *Euphorbia heterophylla* L. | kaliko | X |
| *Euphorbia pulcherrima* | poinsettia | X |
| *Ricinus communis* L. | castor bean | X |
| | | |
| FABACEAE | | |
| *Acacia confusa* L. | formosa koa | X |
| *Acacia farnesiana* (L.) Willd. | klu, aroma, kolu | X |
| *Chamaecrista nictitans* (L.) Moench | partridge pea | X |
| *Crotalaria incana* L. | fuzzy rattlepod | X |
| *Desmanthus pernambucanus* (L.) Thell. | slender or virgate mimosa | X |
| *Desmodium tortuosum* (Sw.) DC | Florida beggarweed | X |
| *Indigofera hendecaphylla* Jacq. | creeping indigo | X |
| *Indigofera suffritocosa* Mill. | Iniko | X |
| *Leucaena leucocephala* (Lam.) de Wit | Koa haole | X |
| *Macroptilium lathyroides* (L.) Urb. | wild bean | X |
| | | |
| LAMIACEAE | | |
| *Leonotis nepetifolia* (L.) R.Br. | lion's ear | X |
| | | |
| MALVACEAE | | |
| *Abutilon grandifolium* (Willd.) Sweet | hairy abutilon | X |
| *Malva parviflora* L. | cheese weed | X |
| *Malvastrum coromandelianum* (L.) Garcke | false mallow | X |
| *Sida ciliaris* L. | | X |
| *Sida fallax* Walp. | `ilima | I |
| *Sida rhombifolia* L. | | X |
| | | |
| MYRTACEAE | | |
| *Psidium guajva* L. | common guava | X |
| ONAGRACEAE | | |
| *Ludwigia octovalvis* (Jacq.) Raven | primrose willow | X |
| | | |
| PASSIFLORACEAE | | |
| *Passiflora foetida* L. | love-in-a-mist | X |
| | | |
| POLYGONACEAE | | |
| *Antigonon leptopus* Hook&Arnott | Mexican creeper | X |
| | | |
| PORTULACACEAE | | |
| *Portulaca oleracea* L. | pigweed | X |
| | | |
| SOLANACEAE | | |
| *Datura stramonium* L. | Jimson weed | X |
| *Solanum americanum* Mill. | glossy nightshade, popolo | I |
| *Solanum lycopersicum* L. var. *cerasiforme* (Dunal) Spooner, | cherry tomato | X |

| | | |
|---|---|---|
| G.J. Anderson & R.K. Jansen | | |
| | | |
| STERCULIACEAE | | |
| *Waltheria indica* L. | `uhaloa | I |
| | | |
| VERBENACEAE | | |
| *Stachytarpheta jamaicensis* (L.) Vahl | Jamaican vervain | X |
| | | |

1

2

# Appendix C
## Site Photographs

Fig. 1. Crescent-shaped earthen embankment lined with blue stone at the southeastern portion of Reservoir 155.

Fig.2. Outer bank of Reservoir 155 with pump equipment. Agriculture fields lie to the south and east of the reservoir.

Fig.3. Mango trees at the southwest corner of Reservoir 225.

Fig.4. Northwestern corner of Reservoir 225 with dilapidated pump equipment.

Fig. 5. Staging area for R155 in fallow plowed field.

Fig. 6. Staging area for R225 currently utilized for diversified agricultural crops. R225 in distance behind water tank.

Fig. 7. Majority of the Borrow site is agricultural fields either planted in corn or fallow with rye at edges of fields.

Fig. 8. Guinea grass on berm at eastern boundary of borrow site near drainage ditch.

# Appendix B Historic and Cultural Resources

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**DEPARTMENT OF THE ARMY**
**HONOLULU DISTRICT, U.S. ARMY CORPS OF ENGINEERS**
**FORT SHAFTER, HAWAII 96858-5440**

June 24, 2016

Civil and Public Works Branch
Programs and Project Management Division

Mr. Alan S. Downer, Ph.D.
Administrator
State Historic Preservation Office
Department of Land and Natural Resources
State of Hawaii
601 Kamokila Boulevard, Suite 555
Kapolei, Hawaii 96707

Dear Dr. Downer:

The Honolulu District, U.S. Army Corps of Engineers (Corps) is requesting official consultation under Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (NHPA; 54 U.S. Code § 306108) and implementing regulations 36 Code of Federal Regulation (CFR) Part 800 for the Waiahole Reservoir System - Reservoirs 155 and 225 Improvements Project (Project). The content of this consultation is also being used for notification and compliance under Chapter 6E of the Hawaii Revised Statutes. The Corps is proposing to improve the safety and operation of Reservoirs 155 and 225 (TMK: (1) 9-2-001:001 [por.] and (1) 9-4-003:001 [por.]). This project was authorized under Section 1(a)(4) of the Consolidated Appropriations Act of 2001 (Public Law 106-554, Appendix D, Chapter 5 (114 STAT 2763A-190). The Area of Potential Effects (APE) for this Project encompasses the two reservoirs, their associated features, the staging areas, access roads, and borrow site associated with the improvements during construction (Encl 1).

The design of the proposed improvements to Reservoirs 155 and 225 have been developed in accordance with the Hawaii Dam Safety Act of 2007, in consultation with; the Corps, the State of Hawaii Department of Land and Natural Resources (DLNR), the Hawaii Department of Agriculture (HDOA), and the State of Hawaii Agribusiness Development Corporation, which operates and maintains the entire Waiahole irrigation system, including the aforementioned reservoirs. This letter includes the proposed plan views of the reservoir improvements (Encl 1, Appendix C). The main purpose of the Project is to ensure that each reservoir meets life safety and risk criteria with consideration given to dam safety criteria as published by the Corps and the DLNR. To meet this purpose, the water storage capacities of Reservoir 155 and Reservoir 225 would be reduced and the embankment geometry would be modified to provide a more robust and reliable structure. In addition, the reservoirs would be lined to reduce water losses and leakage from the system. The Project will be funded through a cost sharing agreement between the HDOA and the Corps. The use of Federal funds for this Project constitutes an undertaking as defined in the NHPA (54 U.S. Code § 300320).

Submitted with this consultation letter, for your review, is an Archaeological Inventory Survey (AIS) report for Reservoirs 155 and 225 (Encl 1). The report contains a project description, research and survey methods, prehistoric and historic contexts, survey fieldwork results, a summary of significance and National Register eligibility recommendations, and a summary of an assessment of project effects and recommended mitigation actions.

The AIS report covers two of the ahupuaa of Ewa: Honouliuli (Reservoir #155) and Hoaeae (Reservoir #225). Hawaiian legends and early historical accounts indicate that Honouliuli was once widely inhabited by pre-contact populations, particularly near the coastline and estuaries. The lowlands of Honouliuli were suitable for wetland taro cultivation, and the upper valley was used for procurement of forest resources and basalt quarrying. Hoaeae contained one of the smallest pre-contact populations of the Ewa District. The south end of Hoaeae was more populated than the northern, barren uplands of the Project area. Beginning in 1877, livestock cultivation was introduced to Honouliuli by James Campbell. In 1897, the Oahu Sugar Company was established on 12,000 leased acres in the area. Irrigating these dry lands from artesian wells was crucial to the success of cane cultivation. Pumping water to the upper fields was expensive and led to the proposal to transport water from the windward side of the Koolau Mountains. The Waiahole Water Company was founded in 1913 for this purpose, and the Waiahole Ditch Irrigation System was completed by 1916. Upon completion, the system was 21.9 miles long, cost $2.3 million, and supplied 32 million gallons of water daily. Water was stored in reservoirs and conveyed to the fields through a series of ditches. The completion of the irrigation system allowed the profitable cultivation of the uplands at 575 feet above mean sea level and higher. The Oahu Sugar Company's production ceased in 1995, and in 1999 the Waiahole Ditch Irrigation System was purchased by the State of Hawaii.

Reservoirs 155 and 225 are components of the current 26-mile long Waiahole Ditch Irrigation System (State Inventory Survey of Historic Properties #50-80-09-2268), which was completed circa 1916, and was previously determined eligible for the National Register of Historic Places listing under Criterion D, as likely to yield important information for research (Goodman and Nees 1991). Subsequent studies determined the system also meets Criteria A and C of the National and Hawaii Registers of Historic Places (Tulchin et al. 2009). Under Criterion A, the Waiahole System is significant for historical associations with Plantation-era agricultural infrastructure near the base of the Waianae Range and with the Oahu Sugar Company. Under Criterion C, it is significant for its design and construction. Based on the present survey, Reservoirs 155 and 225 along with 23 sub-features are recommended as contributing to the significance of the overall system. The AIS found no other prehistoric or historic resources within the APE.

Based on the results of the present survey and the nature of the reservoir improvements, the Corps has applied the criteria of adverse effect (36 CFR 800.5) and determined the undertaking will have Adverse Effects on historic properties. Adverse effects on Reservoirs 155 and 225 and associated sub-features include total embankment

reconstruction, culvert enlargements, and reservoir inlet reconstruction that will reduce the historic integrity of materials, design, workmanship, and overall feeling of the historic properties. The archaeological survey of areas containing the borrow site, two staging areas, and access roads found no cultural materials and the probability for intact archaeological resources in these areas is low.

The Corps submitted a request for informal consultation and a review of the Project to you on September 8, 2014. As a result, there was a field review meeting on September 29, 2014. The field review was attended by Ms. Jessica Puff from the State Historic Preservation Division (SHPD), and Ms. Megan Borthwick from the Hawaii Historic Foundation, as well as the Corps staff and their consultant. A follow-up meeting to the field review occurred on November 5, 2014, and was attended by Dr. Susan Lebo and Ms. Jessica Puff from the SHPD office, the Corps, and the Corps' consultant. As discussed during the September 29, 2014 field review meeting, the Corps is prepared to conduct an archaeological monitoring program during all ground disturbing activities associated with this undertaking. Further discussed during informal consultation with SHPD, the monitoring program will also include documenting the two reservoirs and affected sub-features to the standards of Historic American Engineering Record (HAER) Documentation Level II.

As the nature of the Project is principally to replace Reservoirs 155 and 225, with new construction methods and materials, the Corps has determined it is unable to avoid or minimize adverse effects on these historic properties. Therefore, pursuant to 36 C.F.R. Part 800 the Corps will conduct this undertaking in accordance with the Secretary of the Interior's Standards and Guidelines. Furthermore, the documentation will include: a written history and description following HAER guidance and formats, and based on research associated with previous investigations supplemented with additional research; large format photography of the two reservoirs and a selection of the major affected sub-features; and, if available, existing design or as-built drawings will be photographed or reproduced.

The Corps requests your concurrence on its determinations of eligibility and assessment of effects for this undertaking, and on the proposed measures to mitigate adverse effects on historic properties. If you have any questions regarding this Project or correspondence, please contact Mr. Kanalei Shun, Lead Archaeologist of my Environmental Programs Branch, at (808) 835-4097 or e-mail kanalei.shun@usace.army.mil.

Sincerely,

Stephen N. Cayetano, P.E.
Acting Deputy District Engineer for
Programs and Project Management

Enclosure

**STATE OF HAWAII**
**DEPARTMENT OF LAND AND NATURAL RESOURCES**

STATE HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING
601 KAMOKILA BLVD, STE 555
KAPOLEI, HAWAII 96707



October 20, 2016

IN REPLY REFER TO:
Log No. 2016.01552
Doc. No. 1610JLP08
Archaeology, Architecture

Stephen N. Cayetano, Acting Deputy District Engineer
Programs and Project Management Division
Environmental Programs Branch
US Army Corps of Engineers
Fort Shafter, Hawaii 96858-5440

Dear Mr. Cayetano:

SUBJECT: **Chapter 6E-8 and National Historic Preservation Act (NHPA) Section 106 Review**
**Archaeological Inventory Survey Review & Request for Concurrence of Adverse Effect**
**United States Army Corps of Engineers (USACE)**
**Waiahole Reservoir System – Reservoirs 155 and 225 Improvement Project**
**Honouliuli and Hoaeae Ahupua'a, 'Ewa District, Island of O'ahu**
**TMK: (1) 9-2-001:001 por. and (1) 9-4-003:001 por.**

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Thank you for the opportunity to comment on this request from the United States Army Corps of Engineers (USACE) for consultation, review of the draft archaeological inventory survey (AIS) report completed for the project, and concurrence with the agency's determination of **adverse effect** for the proposed Waiahole Reservoir System – Reservoirs 155 and 225 Improvement Project. The State Historic Preservation Division (SHPD) received this submittal on June 29, 2016. The USACE has evaluated and determined that this project is an undertaking as defined at 36 CFR 800.16(y) and has identified that the Area of Potential Effects (APE) as including the Waiahole Reservoirs 155 and 225, their associated features, the staging areas, access roads, and associated borrow sites.The proposed project also is subject to the Hawaii Revised Statutes (HRS) Chapter 6E-8 historic preservation review process.

The purpose of the project is to ensure that each reservoir meets life safety and risk criteria with consideration given to dam safety criteria as published by the Corps and the Department of Land and Natural Resources. To meet this purpose, the water storage capacities of Reservoir 155 and Reservoir 225 would be reduced and the embankment geometry would be modified to provide a more robust and reliable structure. In addition, the reservoirs would be lined to reduce water losses and leakage from the system.

Reservoirs 155 and 225 are components of the current 26 mile long Waiahole Ditch Irrigation System, State Inventory of Historic Places [SIHP] Site # 50-80-09-2268, which was completed circa 1916, and was previously determined eligible for listing in the National Register of Historic Places under Criteria A, C, and D. Under Criterion A, the Waiahole Ditch system is significant for historic associations with Plantation-era agricultural infrastructure near the base of the Waianae Range and with the Oahu Sugar Company (Tulchin et al 2009). Under Criterion C, it is significant for its design and construction (Tulchin et al 2009). Under Criterion D, it is likely to yield important information for research (Goodman and Nees 1991). Based on the draft AIS report included in the submittal, Reservoirs 155 and 225 assessed as contributing to the significance of the overall system.

As the nature of the Project is principally to replace Reservoirs 155 and 225, with new construction methods and materials, the USACE has determined it is unable to avoid or minimize adverse effects to historic properties. The USACE will conduct the project in accordance with the Secretary of the Interior's Standards and Guidelines for the Treatment of Historic Properties and proposes to document the project site following Historic American Engineering Record (HAER) guidance and formats.

Pursuant to Hawaii Administrative Rules (HAR) §13-275-7, **SHPD's determination is Effect, with proposed mitigation commitments**. SHPD concurs with the draft AIS report recommendation of archaeological monitoring.

Pursuant to 36 CFR 800.4(d)(2), the State Historic Preservation Officer (SHPO) **concurs** with the USACE's determination of **adverse effect** on historic properties within the APE. Adverse effects on Site 50-80-09-2268 within the APE, specifically Reservoirs 155 and 225 and associated sub-features, include total embankment reconstruction, culvert enlargements, and reservoir inlet reconstruction that will reduce the historic integrity of materials, design, workmanship, and overall feeling of the historic properties. The AIS conducted within the areas containing the borrow site, two staging areas, and access roads found no cultural materials and the probability for intact archaeological historic properties in these areas is low.

Resolution of the effect may occur through consultation and/or completion of a Memorandum of Agreement (MOA).

**The Attachment identifies** the issues and concerns in need of revision prior to acceptance of the AIS report. To aid in our rapid review of the revised report, please include a cover letter that specifies the changes made to this document and their page numbers. Please also highlight the changes.

**SHPD looks forward to** receiving a revised AIS report for review and acceptance, as well as continuing consultation to resolve the adverse effect.

Please contact Jessica Puff, Architectural Historian, at (808) 692-8023 for any questions regarding architectural resources, and Susan Lebo, Archaeology Branch Chief, at (808) 692-8019 or at Susan.A.Lebo@hawaii.gov for any changes in the scope of work or APE, or for any questions or concerns regarding archaeological resources or this letter.

Sincerely,

Alan S. Downer, PhD
Administrator, State Historic Preservation Division
Deputy State Historic Preservation Officer

cc: Kiersten Faulkner, Historic Hawaii Foundation, kiersten@historichawaii.org
David Shideler, Cultural Surveys Hawaii, Inc., dshideler@culturalsurveys.com