FHWA-HI-SEIS-09-01-D

DRAFT
SUPPLEMENTAL ENVIRONMENTAL IMPACT STATEMENT

Saddle Road (State Route 200)
Mamalahoa Highway (State Route 190) to Milepost 41

County of Hawai‘i, State of Hawai‘i
FHWA Project No. 200(00)

November 2009

Ke‘āmuku, South Kohala District
Ka‘ohe, Hamakua District
Hawai‘i Island, State of Hawai‘i
TMK (3rd): 6-7-001-041, 4-4-015:008 and 014

Hawai‘i Department of Transportation
Highways Division

and

U.S. Department of Transportation
Federal Highway Administration
Central Federal Lands Highway Division

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Submitted Pursuant to Section 42 U.S.C. 4332(2)(c)
and Chapter 343, Hawai'i Revised Statutes by the

U.S. DEPARTMENT OF TRANSPORTATION
Federal Highway Administration (FHWA)
Central Federal Lands Highway Division
and
STATE OF HAWAI'I
Department of Transportation (HDOT)
Highways Division

Cooperating Agencies
U.S. Army Garrison, Hawai'i

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October 29, 2009
Date

Mr. Brennon Morioka, Director
Hawai'i Department of Transportation

11-4-09
Date

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The Draft SEIS and all ancillary documents were prepared under the State of Hawaii, Department of Transportation's direction or supervision, and the information submitted, to the best of the Department's knowledge, fully addresses the document content requirements as set forth in sections 11-200-17 and 11-200-18, Hawai'i Administrative Rules.

Brennon T. Morioka, Ph.D., P.E.
Director
Department of Transportation

11-4-09
Date

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ABSTRACT

This draft Supplemental Environmental Impact Statement (SEIS) describes and evaluates the impacts associated with a new alternative alignment for the proposed improvement of Section I of Saddle Road, which extends from Mamalahoa Highway (SR 190) near Milepost 53 to Milepost 41, making up the western end of Saddle Road (Figure S-1). Saddle Road extends between Mileposts 6 and 53. Sections II and III of Saddle Road, between Mileposts 8.5 and 41, have already been completed or are advancing towards completion along the alignments identified in the 1999 Final EIS for the entire project. Section IV is currently in final design, leaving Section I as the last piece planned for construction.

In 2006, the Department of the Army (the Army) purchased for military training a property known as the Keʻāmuku parcel. The alignment selected for Section I of the improved Saddle Road in the 1999 Record of Decision (ROD), termed W-3, essentially divides the Keʻāmuku parcel in half (see Figure S-1). In order to provide a safe separation of civilian transportation and military training, the Army requested that the Federal Highway Administration and the Hawaiʻi Department of Transportation find another alternative alignment near the southern boundary of Keʻāmuku for the realignment of this section of Saddle Road. Because reducing conflicts with and hazards related to military operations is an element of the purpose and need of the project, FHWA and HDOT are studying this new proposed alignment of Saddle Road, which has been termed W-7, in this SEIS.

In Section I, the existing Saddle Road is a narrow, winding, two-lane road with steep grades, sharp curves, poor pavement conditions, and no shoulders. As with W-3, W-7 would be a new two-lane roadway with shoulders, climbing lanes where necessary, and a design speed of 60 miles per hour. The realigned highway would improve pavement conditions, increase safety and capacity, improve quality of traffic flow, decrease cross-island travel times, and stimulate economic growth and development.

Environmental impacts related to wildfire potential, protected species of flora and fauna, and archaeological resources have been avoided or greatly reduced through design or can be otherwise mitigated to acceptable levels. The No Action Alternative, which was not selected in the 1999 EIS for reasons of safety for motorists and non-motorized traffic, circulation, and land use impacts, would continue use of the existing alignment. As it has already been rejected, the No Action Alternative is not under consideration in this SEIS and is referenced for baseline purposes only, as is W-3. If it is not feasible to construct W-7, FHWA and DOT expect to build W-3, the alternative selected in the 1999 ROD.

Comments on this SDEIS are due on or before the close of business January 7, 2010, and may be sent to the persons and addresses previously indicated.

ERRATA SHEET

The following text was inadvertently omitted as the first sentence of the first paragraph of Page S-8, Section S.3.1, and Page 3-1, Section 3.1.1:

"The property directly involved in Section I of the Saddle Road includes TMKs (3rd) 6-7-001-041, 4-4-015:008 and 014. The former is owned by the U.S. Army and the others are owned by the State of Hawai‘i and leased to the U.S. Army."

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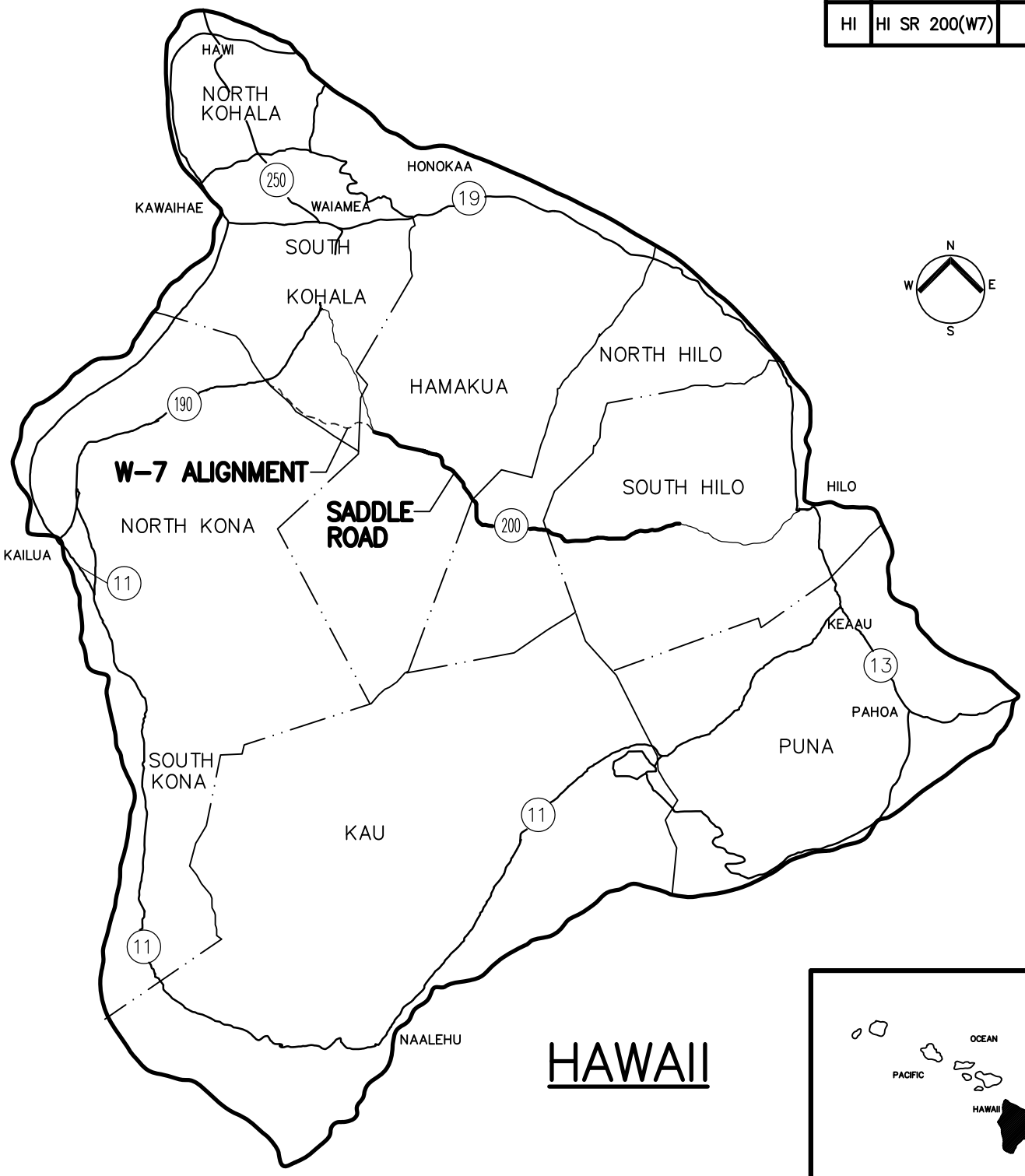
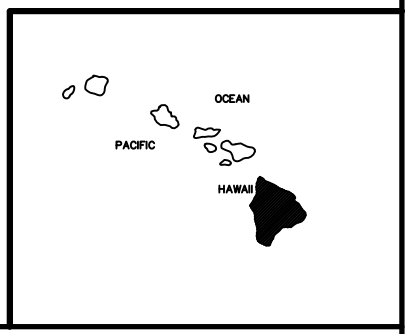
STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(W7)		





0 5 10 20
GRAPHIC SCALE IN MILES

U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

FIGURE A-1
OVERVIEW OF SADDLE ROAD

Scale: As Noted Date: Oct. 2009

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Note: Units of measurement used in this SEIS are English; the 1999 EIS used metric units.

LIST OF ABBREVIATIONS

AASHTO .....American Association of State Highway and Transportation Officials
ACC/MVM .....accidents per million vehicle miles
ADT ..... average daily traffic
ALISH..... Agricultural Lands of Importance to the State of Hawai‘i
APE ..... Area of Potential Effect
ASTM .....American Society of Testing and Materials
BA .....Biological Assessment
BCE.....before the Common Era
BMP .....best management practice
BO .....Biological Opinion
BRD .....Biological Resources Division
CAA .....Federal Clean Air Act
CAAA .....1990 Clean Air Act Amendments
CDP.....Community Development Plan *or* Census Designated Place
CDUA/P..... Conservation District Use Application/Permit
CE .....Common Era
CFR.....Code of Federal Regulations
CO .....carbon monoxide
CWA .....Clean Water Act
CZM.....Hawai‘i Coastal Zone Management
DAR .....Defense Access Road
dB..... decibels
dBA..... A-weighted decibel scale
DEIS..... Draft Environmental Impact Statement
DHHL ..... State of Hawai‘i Department of Hawaiian Home Lands
DLNR.....State of Hawai‘i Department of Land and Natural Resources
DHHS..... State of Hawai‘i Department of Health and Human Services
DOA.....U.S. Department of the Army
DOD.....U.S. Department of Defense
DOFAW.....State of Hawai‘i Division of Forestry and Wildlife
DOH..... State of Hawai‘i Department of Health
DU.....depleted uranium
EIS.....Environmental Impact Statement
EMP .....Ecosystem Management Program
EO-PTA .....Environmental Office of the PTA
EPA.....Environmental Protection Agency
ESA..... Endangered Species Act
FEIS ..... Final Environmental Impact Statement
FEMA .....Federal Emergency Management Agency
FHWA.....Federal Highway Administration
GMA ..... Game Management Area
HAR .....Hawai‘i Administrative Rules
HCM ..... Highway Capacity Manual

HDLIR ..... State of Hawai‘i Department of Labor and Industrial Relations
HDOT .....State of Hawai‘i Department of Transportation
HELCO ..... Hawaiian Electric Light Company, Inc.
HFBS..... Hawai‘i Forest Bird Survey
HHCA .....Hawaiian Homes Commission Act
HHL ..... Hawaiian Home Land
HHLP ..... Hawaiian Home Land Program
HLRLTP ..... Hawai‘i Long Range Land Transportation Plan
HRS..... Hawai‘i Revised Statutes
IfA .....Institute for Astronomy (University of Hawai‘i)
IWFMP .....Integrated Wildland Fire Management Plan (Oahu and Pohakuloa Training Areas)
kV..... kilovolt
L ..... liters
LEDPA.....Least Environmentally Damaging Practicable Alternative
L_{eq}..... average noise level over a 1-hour period
LOS ..... Level of Service
LUPAG ..... Land Use Pattern Allocation Guide
m .....meters
m^3 ..... cubic meters
mm ..... millimeters
MOA ..... Memorandum of Agreement (Section 106)
MOU .....Memorandum of Understanding (Palila MOU)
MP.....milepost
mph ..... miles per hour
MPO..... Metropolitan Planning Organizations
MTMC .....Military Traffic Management Command
NAAQS.....National Ambient Air Quality Standards
NAC ..... Noise Abatement Criteria
NEPA .....National Environmental Policy Act
NHPA..... National Historic Preservation Act
NOAA .....National Oceanic and Atmospheric Administration
NOI ..... (federal EIS) Notice of Intent
NPDES..... National Pollutant Discharge Elimination System
NPL ..... National Priority List
NPS ..... National Park Service
NRC ..... National Research Council
NRCS .....U.S. Natural Resources Conservation Service
NRHP ..... National Register of Historic Places
NWI..... National Wetlands Inventory
OBL..... Obligate Wetland (Vegetation)
OHA ..... Office of Hawaiian Affairs
OMKM.....Office of Mauna KEA Management
PCB .....Polychlorinated Biphenyl
PLF..... Pahoehoe Lava Flows
PM_{10} .....particulate matter smaller than ten microns in diameter
PTA ..... Pohakuloa Training Area

RCRA ..... Resource Conservation Recovery Act
RCRIS ..... Resource Conservation and Recovery Information System
ref ..... cross reference
ROD ..... Record of Decision
ROW ..... right-of-way
RPW ..... Relatively Permanent Water
RSA ..... Resource Study Area (cumulative impacts)
SBCT ..... Stryker Brigade Combat Team
SDDC ..... Surface Deployment and Distribution Command [formerly MTMC]
SEE Team ..... Social, Economic, and Environmental Study Team
SEIS ..... Supplemental Environmental Impact Statement
SEISPN ..... Supplemental Environmental Impact Statement Preparation Notice
SHPD ..... State Historic Preservation Division
SHPO ..... State Historic Preservation Officer
SIPs ..... State Implementation Plans
SLU ..... State Land Use
SMA ..... Special Management Area
SO_2 ..... sulfur dioxide
SR 200 ..... State Route 200 (Saddle Road)
SR 190 ..... State Route 190 (Mamalahoa Highway)
SR 19 ..... State Route 19
SR 11 ..... State Route 11
SRTF ..... Saddle Road Community Task Force
SWPPP ..... Stormwater Pollution Prevention Plan
TNW ..... Traditional Navigable Water
TRB ..... Transportation Research Board
URARPAPA ..... Uniform Relocation Assistance and Real Property Acquisition Policies Act
U.S. DOT ..... U.S. Department of Transportation
USACE ..... U.S. Army Corps of Engineers
USAG-HI ..... U.S. Army Garrison, Hawai‘i
USARPAC ..... U.S. Army Pacific Command
USFWS ..... U.S. Fish and Wildlife Service
USGS ..... U.S. Geological Survey
UST ..... underground storage tanks
vpd ..... vehicles per day
VMT ..... vehicles miles travelled
WMA ..... Waikoloa Maneuver Area

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EXECUTIVE SUMMARY

S.1.1 BACKGROUND

Saddle Road is the shortest and most direct route across the island of Hawai‘i, linking the historical main population centers of the island in East Hawai‘i with the growing west side, where the economy is anchored by tourism. It extends 47 miles from Kaumana, above Hilo, to an intersection with Mamalahoa Highway 7 miles south of Waimea (Figure S-1). It is the only road serving the Pohakuloa Training Area (PTA), the Mauna Kea Astronomical Observatory Complex, the Mauna Loa atmospheric observatory complex, the ranching and residential areas of Waiki‘i Ranch and Kaumana City, Mauna Kea State Park and other recreational areas.

Built by the military to access PTA during World War II, Saddle Road was not originally designed to State highway standards. In 1992, when the planning stage for project began, the entire Saddle Road was a narrow, winding, two-lane road with steep grades, sharp curves, poor pavement conditions, substandard drainage, and high accident rates. Despite its poor conditions, Saddle Road was becoming increasingly important for access to PTA, Mauna Kea, and outdoor recreation areas. Furthermore, its role was increasing as a cross-island transportation route linking East and West Hawai‘i for business travel, the transport of goods and services, tourism/recreation, shopping, and for daily commuting.

In response to these problems, the Federal Highway Administration, Central Federal Lands Highway Division (FHWA), in cooperation with the Hawai‘i State Department of Transportation (HDOT) and the U.S. Department of the Army (the Army), Surface Deployment and Distribution Command (SDDC), initiated the Saddle Road Improvement Project. In 1994, the Environmental Impact Statement (EIS) process began. The EIS was funded through the Defense Access Road (DAR) program, in which FHWA served as co-administrator with SDDC.

A Draft EIS released in 1997 examined the No Action Alternative and twelve action alternatives incorporating various combinations of the existing alignment and potential new alignments in four different sections of the road, Sections I, II, III and IV. All action alternatives planned to reconstruct the roadway to a two-lane highway with climbing lanes where appropriate, paved shoulders, and a design speed of 60 miles per hour (MPH). All alternative alignments included improved pavement conditions, increased safety and capacity, improved quality of traffic flow, decreased cross-island travel times, and the stimulation of economic growth and development. Two alternative alignments were evaluated for Section I, the area under consideration in this document. Alignment W-2 traversed northwest through the center of a property known as the Ke‘āmuku parcel, which then belonged to Parker Ranch, and terminated on Mamalahoa Highway at the Waikoloa Road intersection (see Figure S-1). Alignment W-3 headed more directly west, terminating on Mamalahoa Highway about three miles south of Waikoloa Road. The Final EIS was released in September 1999, presenting a Recommended Alternative that included Alignment W-3 in Section I. The Record of Decision (ROD) was released in October 1999, officially selecting Alignment W-3 as the Section I alternative.

After this time, final highway design proceeded and the necessary construction and land use permits were obtained to begin construction. The first segment built was a 6.5-mile portion of Saddle Road in Section II from Milepost (MP) 28 to 35 within PTA, which was opened to traffic in May 2007. Construction for the portion in Section III between MP 19 and 28 was completed in October 2008. The final part of Section II, north of the PTA cantonment area from MP 35 to 41, was completed and opened in August 2009. A portion of Section III between MP 11 and 19 is scheduled to begin construction in late 2009 and be completed in 2011. The remainder of the eastern side of project – i.e., the portion in Sections III and IV from MP 6 to MP 11 – is in final design but has not yet been fully funded for construction.

In 2006, the Army purchased the Keʻāmuku parcel for military training. The W-3 alignment selected for Section I of the improved Saddle Road in the 1999 ROD essentially divides the Keʻāmuku parcel in half (see Figure S-1). In order to provide a safe separation of civilian transportation and military training, the Army requested that FHWA and HDOT research another alternative alignment near the southern boundary of Keʻāmuku for the realignment of this section of Saddle Road.

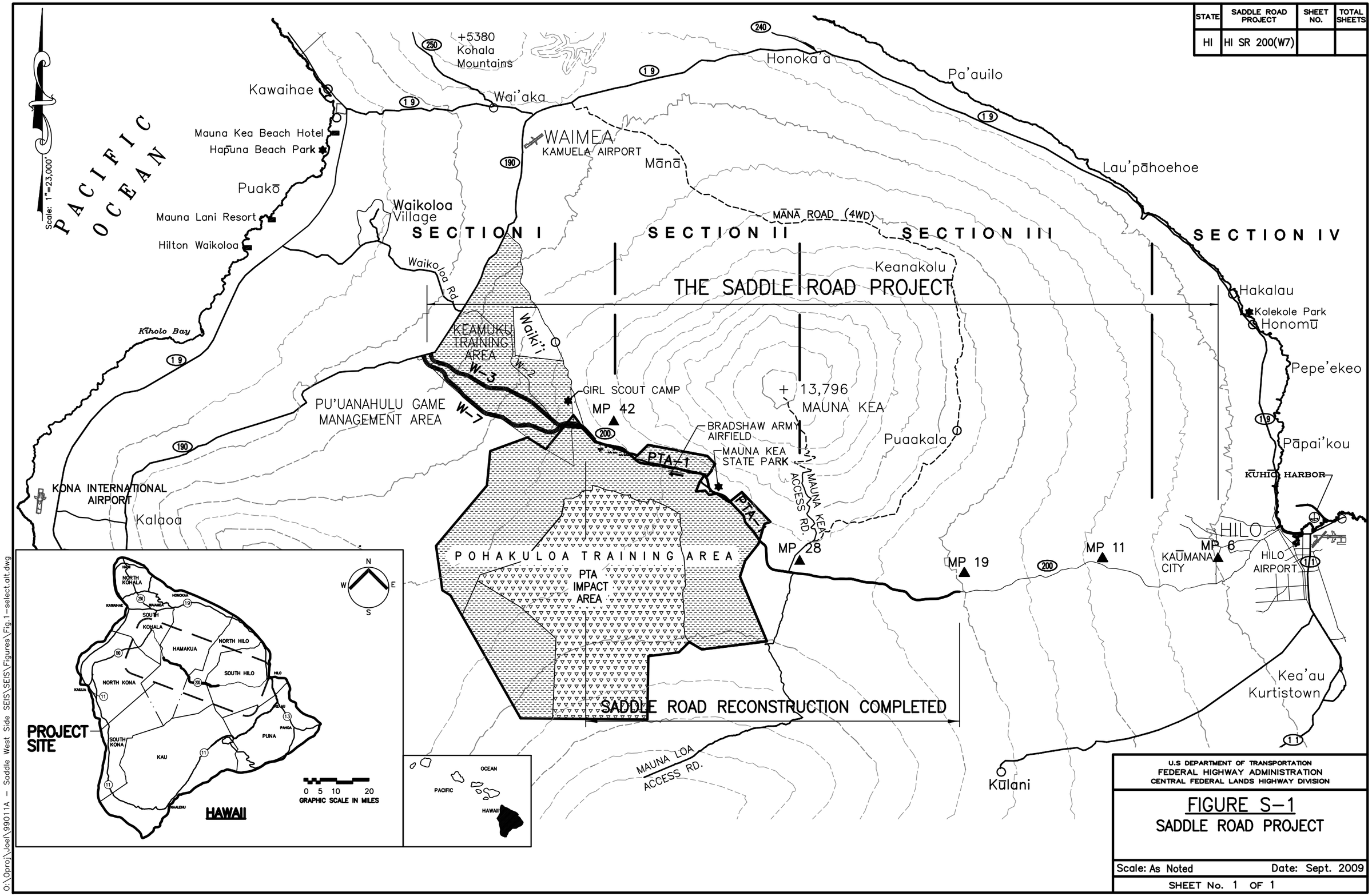
This Draft Supplemental Environmental Impact Statement (DSEIS) describes and evaluates the impacts associated with a new alternative alignment, termed W-7, for the proposed improvement of Section I of Saddle Road. Section I of Saddle Road extends MP 41 to the junction with Mamalahoa Highway (SR 190) near MP 53. The existing Saddle Road, which passes through the ranching community of Waikiʻi, would remain open.

The improvements within Section II have been totally funded through the DAR program; DAR funding must be authorized and appropriated by Congress on an annual basis. The improvements within Section III and IV are being funded with HDOT Federal-aid highway funds. HDOT has also committed to funding Section I. Additional or other funding of construction within Section I is pending the outcome of this SEIS, which will determine whether W-7 is an acceptable substitute for the 1999 ROD-selected W-3.

S.1.2 PURPOSE AND NEED

The purpose of the overall Saddle Road Improvement Project is to provide a safe and efficient route for access to land uses along Saddle Road and for cross-island traffic between East and West Hawaiʻi. The ongoing and planned improvements to Saddle Road would also address five general types of needs: roadway deficiencies; conflicts and hazards with military operations; capacity; safety; and social demand and economic development.

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(W7)		



U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

FIGURE S-1
SADDLE ROAD PROJECT

Scale: As Noted | Date: Sept. 2009

SHEET No. 1 OF 1

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Roadway Deficiencies

With horizontal and vertical alignment deficiencies, the unimproved sections of Saddle Road have steep grades and sharp curves, which in many places prevent motorists from being able to see an adequate distance ahead to stop safely. Deterioration of the pavement has reduced much of the road to one asphalt travel lane, 12 to 15 feet wide, with deteriorated shoulders two feet in width. Motorists tend to drive in the center of the road, increasing the potential for accidents, including head-on collisions. The 11-mile stretch of Saddle Road in Section I also contains eight one-lane bridges.

Conflicts/Hazards with Military Operations

Prior to the realignment of Saddle Road in Section II, live fire and aerial and ground exercises created conflict between the traveling public and military training, which presented serious safety hazards to both the motoring public and military units training at PTA. The conflicts also reduced the quality of some of the training undertaken at PTA. To address this safety concern and impacts to training, Saddle Road was realigned to north of the base in Section II to avoid having public traffic pass through PTA. In response to the Army's acquisition of the Keʻāmuku parcel in 2006, a realignment is now sought for Section I to reduce similar conflicts that would occur if the highway was built on the W-3 alignment.

Capacity

The existing capacity is currently inadequate. Level of Service, which measures the quality of traffic flow, is currently E, or poor. Without improvements, LOS is expected to decline to F, the worst level. Traffic volumes are expected to almost triple from the current average daily traffic (ADT) of 1,400 to 4,058 by 2013, because of improvements taking place in the other sections of Saddle Road. After this, traffic volumes would depend on whether the highway is realigned:

- If Section I is realigned on either W-3 or W-7, ADT would increase on the realigned highway to 4,211 by 2020, and to 6,500 by 2034. The existing Saddle Road would remain in use mainly for residences and local access, and would see a drop to 840 ADT after construction. After this, it would grow slowly, to 1,053 by 2020 and 1,625 (just above current levels) by 2034.
- If the highway is not realigned and improved in Section I, ADT is forecast to rise to about 4,172 by 2020 and 4,400 by 2034.

With realignment and improvements, LOS would be at B upon completion of the improvements, and would still be LOS C, which is acceptable, as late as 2034, on the realigned highway.

Safety

Roadway deficiencies, conflicts/hazards with military operations, and capacity limitations contribute to safety concerns on Saddle Road. An analysis of accidents indicated that the most important factors are the horizontal and vertical alignment (leading to limited sight distance), road width, and pavement conditions. Roadway deficiencies also hinder the response of emergency vehicles responding to fires, accidents, and other incidents along Saddle Road.

Social Demand and Economic Development

A safe and efficient Saddle Road is needed for access to employment and recreation areas located between Mauna Kea and Mauna Loa, and more importantly, as a cross-island transportation route to connect East and West Hawai‘i for business travel, the transport of goods and services, tourism/recreation, shopping, and commuting. East and West Hawai‘i differ in economic and development patterns and opportunities. Most government functions and the main University of Hawai‘i system campus on the island are located in Hilo, where housing costs are generally lower. Over the last thirty years, however, much of the tourism-related growth in employment and the economy has been occurring in West Hawai‘i. Tourists currently do not have easy access to the interior of the island. Even with the improvements made to date, some automobile rental agencies still restrict or prohibit use of their vehicles on Saddle Road due to the condition of the unimproved sections, preventing many tourists from easily traveling between East and West Hawai‘i and experiencing the attractions within the saddle area.

S.1.3 OTHER RELEVANT TRANSPORTATION PROJECTS

Related transportation projects that are complemented by the Saddle Road Improvement project include the Kawaihae Road Bypass near Waimea; the Saddle Road Extension, which would extend from the western terminus of Saddle Road to the Queen Ka‘ahumanu Highway (SR 19); and the Puainako Street Widening and Extension project, which joins the eastern end of Saddle Road in Hilo (see Figure S-1 for town locations).

S.1.4 REQUIRED PERMITS AND APPROVALS

The following permits and approvals are required:

- State Department of Land and Natural Resources (DLNR), Historic Preservation Division: Historic Sites Review
- State Department of Transportation State Highways Permit
- DLNR Conservation District Use Permit (obtained)
- State Department of Health (DOH): Permit to Construct an Air Pollution Source
- State DOH: National Pollutant Discharge Elimination System (NPDES)
- County Planning Department: Subdivision Approval

- County Dept. of Public Works: Grading, Grubbing, Excavating and Stockpiling Permits
- Hawai‘i Coastal Zone Management (CZM) Program: CZM Federal Consistency

S.2 ALTERNATIVES

This SEIS considers only Section I of Saddle Road, as the remainder of Saddle Road has already mostly been built using the alternative alignments selected in the 1999 ROD. Various alternatives for Section I that were conceptualized as part of the 1999 FEIS or later were initially considered in the SEIS process for their potential to satisfy the purpose and need. In the end, only one alternative, W-7, has been advanced for consideration. W-7 traverses the Ke‘āmuku parcel in a westerly direction, roughly paralleling the southern boundary of Ke‘āmuku until near Mamalahoa Highway, where it veers slightly north to take advantage of more favorable terrain for a major highway intersection. W-7 would have a maximum grade of 8.0 percent and an average grade of about 6.0 percent. About 250 acres of right-of-way would be required. Mamalahoa Highway would be crossed at-grade or by a grade-separated structure. The total length is approximately 10.3 miles. Construction would cost about $58 million (2007 dollars).

Three Typical Sections were developed for the project, each designed to reduce wildfire impacts in ways specific to the segments of Section I through which they pass. All share base characteristics of two 12-foot travel lanes, two 8-foot paved shoulders. Because of the grades, a passing lane will be present for most of the length, allowing eastbound military convoys to utilize Saddle Road without congesting civilian traffic. In the middle segment, a four-inch high extruded asphalt curb is added to the outside of the shoulder. From the eastern boundary of the Ke‘āmuku parcel and approximately MP 41, there would be an 8-foot strip of pavement on the north side of the highway, which would serve as an additional firebreak, with a four-inch high curb on the outside, and on the outside edge of the firebreak, a four-foot high metal wire fence with metal posts to prevent motor vehicles from straying off the paved surface.

The No Action Alternative, which was not selected in the 1999 ROD for reasons of safety for motorists and non-motorized traffic, circulation, and land use impacts, would continue use of the existing alignment. As it has already been rejected, the No Action Alternative is not under consideration in this SEIS and is referenced for baseline purposes only, as is W-3. If it is not feasible to construct W-7, FHWA and DOT expect to build W-3. However, W-3 does not meet the purpose and need for the project as well as W-7. For this reason, W-7 is preferred.

S.3 AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION MEASURES

Sections S.3.1 through S.3.23 briefly summarize existing conditions, impacts, and mitigation measures on a resource-by-resource basis.

S.3.1 LAND USE AND RELATED GOVERNMENTAL PLANS AND POLICIES

Existing land uses along Section I of Saddle Road involve military training, ranching, and public hunting land, with limited residential uses. However, all land in and around the W-7 corridor is now controlled by the Army and planned for military training. To the north, Parker Ranch and various landowners also control land within or adjacent to the existing Saddle Road, and the State of Hawai‘i’s Pu‘uanahulu Game Management Area is located directly to the south.

Land use impacts include temporary construction-related impacts, direct impacts associated with use of military land, and indirect impacts resulting from changes in the character and use of the road. Construction and use of the highway would also insert a civilian transportation project within an area where land use is currently dedicated to military training. There may be some increased opportunities for development at the Saddle Road-Mamalahoa Highway intersection. However, any such development would be severely limited by the lack of infrastructure, especially potable water supply, and would require approval by the State Land Use Commission and/or County Planning Commissions.

The proposed Saddle Road project complies with appropriate State and County land use policies, plans, goals, objectives and controls. It would facilitate implementation of the State Plan, the Transportation Functional Plan, the Island of Hawai‘i Long Range Highway Plan, the County of Hawai‘i General Plan, the Kona and South Kohala Community Development Plans, and land use controls and regulations established pursuant to the State Land Use Law and the Hawai‘i County Zoning Code. No State Land Use District Boundary Amendment or change of zone is required. The following mitigation measure will be incorporated into the project:

- Construction contract conditions will require access to be maintained at all times to public use and recreation areas, ranching operations, residences, and PTA.

S.3.2 FARMLAND

A Farmland Conversion Impact Rating assessment was completed in 1999 pursuant to the Federal Farmland Protection Policy Act for the Section I alternatives that were under consideration at that time. The farmland ratings for Saddle Road were below the 160-point threshold requiring consideration of alternatives less harmful to farming activities. After acquisition of the Ke‘āmuku parcel by the Army, the property became entirely dedicated to military training, and the issue of conversion of farmland to non-farming uses is no longer relevant. No adverse effect of conversion of farmland would occur under development of the W-7 alignment. No mitigation measures will be required for impacts to farmland.

S.3.3 SOCIAL

Saddle Road serves a variety of purposes for the residents of the island of Hawai‘i including access to PTA, Mauna Kea and Mauna Loa, and a connection between East and West Hawai‘i.

The purposes of travel include recreation, shopping, business, and limited commuting. Astronomers, support staff, and suppliers with bases in Hilo or Waimea use the road as access to Mauna Kea and its 13 observatories. Hunters, hikers, and recreationalists also use Saddle Road.

Construction and use of Section I of Saddle Road would not adversely affect any community group, as the road is distant from any population center. The increased safety and reduced travel times would benefit the population. Construction would require less than five percent of the local workforce, well within the capacity of the island to supply labor. Improvement and realignment of Saddle Road would affect travel choices of both residents and visitors. It could affect residential distribution patterns only slightly. However, completing Saddle Road by building Section I is not likely to attract new residents to the island or change the total resident and visitor populations. The expected changes in the sites of visitor purchases would not lead to any substantial increases in visitor spending.

Minor temporary impacts to recreation associated with construction of the project would occur. In the long-term, the project would improve access to recreational areas along Saddle Road, including Mauna Kea State Park, the hunting areas throughout Saddle Road, and Mauna Kea.

The improved highway would result in a decrease in response time for emergency vehicles responding to Saddle Road incidents. The improved road would substantially improve the ability of PTA, the Hawaiʻi Fire Department and the Hawaiʻi County Police Department to respond to road, fire and medical emergencies because of shorter distances as well as straighter, better paved and wider roadways. The project would also provide a superior alternate route or evacuation route in case accidents, floods or landslides block SR 19 along the Hamakua Coast.

There are no concentrations of minority or low-income groups in the project area that would experience disproportionately high and adverse impacts from construction, ROW-acquisition, noise and air quality, or other direct, indirect or cumulative impacts from the implementation of the project. Public involvement has included intensive efforts to outreach into the minority and low-income populations of the island, and especially West Hawaiʻi. These efforts have involved not only conventional newspaper ads and email messages but also outreach to community leaders and posting of flyers at non-traditional locations such as laundromats, community centers, day care facilities, union halls, Hawaiian Home Lands centers, and elderly facilities.

No *mamane* forest, *kipuka*, trails, *heiau* (temple) sites, burial sites, water sources, or sensitive landforms such as cinder cones are present or would be affected. Some native Hawaiian groups may have concerns that negative cultural impacts would result from project implementation due to the belief that within the Saddle area there exist detrimental residual forces. Another belief is that human intrusion in areas not previously despoiled or developed would result in the release of negative energy, without the proper protocol (ritual) of “release” or “sanctification.”

W-7, combined with other Saddle Road improvements, would shorten the travel distance between Hilo and coastal West Hawaiʻi by approximately 30 minutes. The road would be safer

and easier to drive than the existing road, and less likely to be congested than the other circum-island routes. At peak drive times, the difference could be much greater. All of the following users would be beneficially affected:

- Visitors traveling between West Hawai‘i and the Kilauea Volcano area;
- East Hawai’i residents commuting to and from work in West Hawai‘i;
- Residents of either side of the island, making occasional cross-island trips;
- Residents of Waiki‘i, whose subdivision is adjacent to the existing Saddle Road;
- Visitors and residents traveling from West Hawai‘i to the Mauna Kea Access Road; and
- Workers at Pohakuloa Training Area and the Mauna Kea and Mauna Loa observatories.

Attendees at public meetings, respondents to surveys, and EIS commenters have consistently expressed the idea that the Island of Hawai‘i makes up one large community, despite the divisive forces of distance and unequal economies, and that better transportation would enhance mutual community support, and balanced economic growth.

The following mitigation measures will be incorporated into the project:

- HDOT will install signage to remind visitors that there are no services on Saddle Road.
- A traffic control plan will be developed outlining steps needed to minimize congestion and maintain access to adjacent properties during construction, and also to maintain access to areas of Saddle Road that serve recreation, including hunting units.
- As feasible, construction-related delays will be minimized during commuting hours.
- Since construction work on W-7 would avoid the existing Saddle Road alignment, construction impacts are expected to be minimal on cross-island traffic. However, if delays or closures are anticipated at the project corridor’s intersections with Mamalahoa Highway or Saddle Road, information will be publicized on a regular, on-going basis through posted advertisements, radio and newspaper bulletins, and road signs at each end of Saddle Road and along Mamalahoa Highway (SR 190) and Kaumana Drive in Hilo.
- Emergency service providers, including the Hawai‘i Fire Department, the Hawai‘i Police Department, and PTA, will be kept informed on the location and schedule of construction along the length of the project.
- Traffic control plans prepared for construction of Saddle Road will include provisions for allowing emergency vehicles to pass through construction zones without delays and to have unimpeded access to roadside facilities at all times.
- As has occurred previously when newly-constructed segments of Saddle Road are opened for public use, proper cultural protocol will be completed by a native Hawaiian who follows the ways of the old culture to release and sanctify or bless the project.

S.3.4 ECONOMIC

Construction of the realigned highway would involve construction labor over a period of about two years and would cost approximately $58 million, in 2007 dollars. Direct jobs are created in the firms tasked with construction. Some may be located in offices and baseyards, not at the work site. Indirect and induced jobs are also created by the expenditure of capital in the regional economy. That spending would occur over a longer period than the anticipated two-year construction schedule, and over a wider area, not just in Hawai‘i County. Although maintenance of the highway would require labor, no new continuing jobs are anticipated.

The County and State of Hawai‘i depend on several types of taxes for revenue to support public programs and facilities. Major sources of government income are real property tax for the County and income and excise taxes for the State. Revenues for State highway construction and maintenance come from the State Highways Fund and Federal sources. For the State of Hawai‘i, the net impact of building W-7 from the cash flows estimated here would be positive – although it could be less than the State’s share of Saddle Road construction costs, depending on how the project is funded. For the County of Hawai‘i, reduced fuel consumption could result in lower fuel tax revenues totaling at least $1.3 million (2008 dollars) over a twenty-year period.

Completion of this segment of the project, combined with the already improved portions of Saddle Road, would likely induce more rental car companies to remove driving restrictions on Saddle Road. Improvements would decrease the travel time for tourists traveling between the east and west sides of the island. An improved Saddle Road would increase the number of tourists visiting the east side of the island since, at present, only about one-third include the Hilo area in their itineraries. Visitation to attractions accessed by Saddle Road would also increase. Tourist expenditures on the east side of the island would increase with more visitation.

Other important economic benefits are associated with safety and time savings. Improving safety saves lives and also dollars, through reduced accidents and fatalities. Using W-7, the travel time between Hilo and Waikoloa would be reduced by approximately 30 minutes. This savings would be higher during rush-hour or busy weekend traffic. Time savings has an economic value for both business and non-business travelers. Less time spent driving may be used to increase productivity in the work place, increase leisure activities, and allow more family time. No economic mitigation measures are necessary.

S.3.5 RIGHT-OF-WAY AND RELOCATION

Construction of Section I of Saddle Road using the W-7 alignment would not require any relocations, but it would require acquisition of a limited area of private property within currently unoccupied ranch lots associated with intersection improvements west of Mamalahoa Highway. Right-of-way (ROW) within the Army’s Ke‘āmuku parcel would be acquired through perpetual easement. In the Ke‘eke‘e section of PTA, which the Army leases from the State, HDOT would acquire ROW from DLNR, which would be subdivided out of the parent parcel.

The following mitigation measures will be incorporated into the project:

- The acquisition of property necessitated by the project will be completed in accordance with the Federal Uniform Relocation and Real Property Acquisition Policies Act of 1970 (P.L. 91-646), as amended, and applicable State regulations.

S.3.6 PEDESTRIAN AND BICYCLE FACILITIES AND USE

Saddle Road has not been used extensively by bicyclists, pedestrians, or other non-motorized modes of transportation. A motorist on a typical trip across the Saddle will observe very few, if any, pedestrians, bicyclists, or equestrians above Kaumana City. There are no developed bike or pedestrian trails within the project corridor. Substantial change in elevation along the length of the road, foggy and rainy weather, and the lack of adequate shoulders produce difficult conditions. HDOT's *Bike Plan* identifies Saddle Road as a future "Shared, Signed Proposed Bike Route." A signed shared roadway is a street or highway that is specifically designated by signs as a preferred route for bicycle use.

The following mitigation measures will be incorporated into the project:

- The project will accommodate bicycles and pedestrians through a signed, shared route on the shoulder.
- Project construction will include provisions for pedestrian and bicycle crossings of Saddle Road during construction periods.

S.3.7 AIR QUALITY

There are no non-attainment areas for air quality in the State of Hawai‘i, and air quality monitoring data are thus very limited. Except for periodic vog (volcano-related air pollution) and occasional localized impacts from traffic congestion, local industrial sources, and dust from farms and ranches during very windy periods, the present air quality of the project area is believed to be relatively good. Calculations of criteria air pollutants performed for the 1999 Final EIS indicated that predicted concentrations were extremely low and would not exceed either Federal or State standards. Furthermore, as projected traffic volumes for 2034 are now substantially lower than those estimated in the 1999 FEIS, emission of criteria pollutants would likely be less than the former estimate.

Another air quality issue that emerged subsequent to the 1999 Final EIS was the potential presence of depleted uranium (DU). The Army conducted training at PTA during the mid-1960s using the M101 spotting round of the Davy Crockett Weapon System. The training missions used depleted uranium to simulate the trajectory of real nuclear rounds. Some fear that these actions may have led to particles of DU dust scattered in the environment, which may lodge in the lungs and cause cancer and other illnesses. Although the Army acknowledges that DU

material is considered a chemical hazard, it maintains that DU at Pohakuloa does not pose a risk to public health and that insufficient quantities have been detected to pose a risk to human health. Prior to the effort conducted for this SEIS, sampling and analytical data for DU were not available in the W-7 alignment area. The project included sampling of soil at five locations, using two independent methods to determine if DU or other forms of uranium above natural levels were present. No above-normal levels were found. A baseline human health risk assessment was performed to evaluate the potential risk posed by the uranium isotopes detected for both construction workers and recreational receptors. Neither risk level exceeded the most conservative U.S. EPA (Environmental Protection Agency) lifetime cancer risk regulatory level of concern or the noncarcinogenic Hazard Index regulatory level of concern.

Mobile Source Air Toxics (MSATs) were also considered. These are compounds emitted from highway vehicles and non-road equipment. Some are present in fuel and emitted when the fuel evaporates, and others are metals that result from engine wear or from impurities in oil or gasoline. It was determined that MSAT emissions in the study area do not pose a risk at present and are likely to be lower in the future in virtually all locations.

The following mitigation measures will be incorporated into the project:

- Standard dust control and construction equipment emission control measures will be implemented as necessary to reduce temporary impacts to air quality during construction activities. Water or a dust palliative will be applied as necessary to minimize particulate pollution. Areas to receive such treatment will include unpaved access roads, staging sites, and construction areas where the movement and operation of construction equipment produces airborne dust.
- Construction equipment will be required to meet all applicable emission standards.
- FHWA and HDOT will keep apprised of the results of monitoring for depleted uranium by the Hawai‘i State DOH and the Army and take any necessary precautionary measures.

S.3.8 NOISE

Ambient noise levels along Saddle Road within most of the existing Section I corridor are generally low, reflecting the light traffic volumes on Saddle Road and the undeveloped and unpopulated nature of much of the landscape. Noise levels in the vicinity of PTA can be periodically high in association with military training activities (e.g., live firing of artillery) and low-flying aircraft, including helicopters and jet fighters. Within the project area in Section I that would be affected by noise on alignment W-7, there is no developed land, as all land is devoted to military use except for a small area of highway and ranching lands at the western terminus. Nor are there any lands for which serenity and quiet are of extraordinary significance and serve an important public need. Therefore, there are no noise-sensitive areas for which noise impacts require study. No mitigation measures for noise are required.

S.3.9 FIRE HAZARD

In addition to the damage wildfire can inflict on urban areas and ranches in dry parts of Hawaiʻi, fire poses a grave threat to Hawaiian ecosystems by converting native habitats into grasslands dominated by nonnative species. As in many other tropical areas, fires in Hawaiʻi are usually caused by human activity. The entire west side of the Big Island between the Kaʻupulehu area of Kona in the south and Waimea in South Kohala in the north is subject to extensive wildfires. Puʻuanahulu is "ground zero" for many of the fires in the last 50 years, which have also affected the southern portion of Keʻāmuku.

Primary responsibility for fighting fires outside PTA rests with the Hawaiʻi DLNR. PTA assists on fires that affect adjacent State and private lands as well. PTA has a fire station with a 25-personnel firefighting detail, extensive firefighting equipment and infrastructure such as dip tanks and a system of firebreaks. In the last five years, the Army has committed to and begun implementation of various actions called for in the *Integrated Wildland Fire Management Plan, Oahu and Pohakuloa Training Areas* (IWFMP). The actions outlined in the IWFMP will minimize the occurrence and size of training-related fires within the Keʻāmuku Maneuver Area in addition to ensuring such fires are prevented from escaping from the PTA boundary. These measures will include fire suppression, resource staffing procedures, training restrictions based on calculated fire danger rating, installation and maintenance of dip sites, fuel modifications, and weather stations.

The proposed Saddle Road within Section I could increase the likelihood of wildfire caused by human activity. Construction equipment used during grading and paving as well as careless construction workers can cause fires. After construction, there would be a permanently heightened risk of wildfire ignition. Improvement of the road would substantially increase the number of vehicles traversing the area. Fires in dry areas of Hawaiʻi have been ignited by construction activities, cigarettes thrown from car windows, by hot catalytic converters of vehicles pulling off of the pavement, and by arsonists. Construction fires can largely be controlled by proper management, and the chief fire risk is the increase in ignition potential from arson or accidental fires within an area that is currently not highly subject to fire starts. The presence of a modern highway within Keʻāmuku would also bring fire-fighting benefits, including provision of a highway firebreak and fuelbreak to impede the spread of fires, and also adequate and rapid access for firefighting equipment and personnel not only to Keʻāmuku but also to the Puʻuanahulu Game Management Area (GMA).

The Typical Sections for the project have been specifically designed to reduce the probability of fire ignition from accidental and purposeful actions. In addition, the following mitigation measures will be incorporated into the project:

- The PTA Fire Department will install additional fire risk signs along Saddle Road at the western boundary of PTA (one is currently present at the eastern end). Sign information will be based upon the National Fire Danger Rating System.
- To minimize the risk of wildfire during construction, the Special Contract Requirements will mandate that all construction activity shall be restricted to within the clearly delineated ROW and that entry and exit into the ROW by all construction personnel and equipment shall be at previously identified and marked non-sensitive areas.

S.3.10 WATER RESOURCES

The receiving ocean waters for runoff in the South Kohala area are classified as "AA", or highest level of water quality. These coastal waters are important for fishing, recreation, visual quality, and traditional practices. The oceanic waters of Hawai‘i also support a number of endangered and threatened animals. Water pollution in certain streams and coastal waters of the State of Hawai‘i is an ongoing problem. The primary sources nowadays are polluted urban and agricultural runoff and groundwater. These coastal waters are a minimum of nine miles from the project area and there are no surface waterways that connect the W-7 corridor to the ocean. This area's drainages are essentially draws between lava flow hummocks that carry water only during very heavy rains. None of the drainages in Ke‘āmuku flow more than a few days a year. These short drainages have accomplished only limited downcutting, and they all outlet onto flats where the water percolates rapidly into the ground, sinking thousands of feet to the basal groundwater lens that underlies the island. Any polluted runoff undergoes extensive natural filtration through percolation of water through soil and rock before reaching the basal (near sea-level) water table.

Long-term, all highway projects increase the extent of impermeable road surface due to a widened road and paved shoulders. An enlarged area of impermeable surfaces would increase surface water runoff during precipitation events. In addition, due to the geometry of roadways, an improved road would be expected to collect and concentrate stormwater runoff, potentially changing overland flow to a series of more concentrated sources. Best management practices (BMPs) will be employed to control runoff, and impacts to surface and groundwater quality are not expected to be significant.

Without the improvement of Saddle Road, the inadequacy of drainage structures under the existing Saddle Road would continue to allow stormwater to overtop the road, resulting in erosion and increased risk to motorists during flooding.

Construction might have limited, short-term effects on surface water quality, particularly an increase in suspended sediments during and shortly after precipitation events during the construction phase. Construction of cuts and fills would remove vegetation, disturb soils, and change overland flow characteristics, intensifying the effects of natural erosion, until soils stabilize. Water would be consumed in the construction process, much of it for dust control. The contractor would determine the specific source of water, which may be Hilo or Waimea.

The Stormwater Pollution Prevention Plan (SWPPP) will include the following types of BMPs as mitigation measures that will be incorporated into the project:

- Practices that prevent erosion, including the stabilization of cut and fill slopes by vegetative as well as non-vegetative means.
- Practices that trap pollutants before they can be discharged, such as silt fences and sedimentation basins.
- Practices that prevent the mixing of pollutants from construction materials and stormwater, such as providing protected storage for chemicals, paints solvents, and other toxic materials.
- During construction, erosion will be minimized by applying temporary measures that will reduce the velocity of the runoff and retain sediment on-site. Examples of these measures may include but are not limited to: silt fences, check dams, mulching, culvert outlet protection, and sedimentation basins. Construction materials will be stored in a protected area with measures in place to contain and clean-up spills.
- Permanent pollution control measures will be applied to minimize degradation of stormwater quality after construction of the road has been completed. These measures include but are not limited to the following examples: providing velocity reducers and/or settlement basins at culvert outlets, vegetating slopes, minimizing the steepness of slopes where possible, providing stream bank stabilization where required, and managing the use of chemicals for roadway maintenance.
- Cut slopes will be revegetated to reduce highway runoff pollution.
- If a major hazardous spill occurs, cleanup efforts will be coordinated through both the County of Hawai‘i Civil Defense Agency and the State of Hawai‘i DOH.

S.3.11 WATERS OF THE U.S./WETLANDS

A detailed study of the hydrology of the W-7 corridor with respect to regulations and policies implementing Section 404 of the Clean Water Act (CWA) determined that no waters of the U.S., including wetlands, lakes or jurisdictional ephemeral streams, are present. No impacts to waters of the U.S. will result from project implementation and no mitigation measures are required. This finding was concurred with by the U.S. Army Corps of Engineers in a jurisdictional determination of September 8, 2009 (see Appendix B).

S.3.12 CLIMATE, GEOLOGY, AND SOILS

The climate of Hawai‘i is generally characterized by mild and fairly uniform seasonal temperatures; cloudy, humid conditions along the eastern coast and clear, dry conditions on the west; and a general dominance of trade-wind flow from the northeast. Section I of Saddle Road is on the west-facing slope of Mauna Kea, which is the leeward, dry slope, with an average annual rainfall of around 20 inches. The elevation of between about 2,600 feet and 5,800 feet above sea level leads to mild temperatures. The proposed project would have no impact on weather or climate along the W-7 corridor or within the region. Driving conditions at high elevations on the Saddle Road can be dangerous due to frequent fog. The proposed realignment may lead to more driving in foggy conditions, although the cross-island alternative, SR 19, also experiences frequent fog between Honoka‘a and Waimea. However, fixing the road deficiencies that make driving in the fog here such a special hazard, along with a realignment of the highway that reduces the elevation of the summit by 200 feet, would lead to a net overall benefit.

The island of Hawai‘i was formed by the activity of five shield volcanoes: Kohala (long extinct); Mauna Kea (active during recent geologic times); Hualālai (last erupted in 1801); and Mauna Loa and Kilauea (both still active). Section I is located mainly along the southwestern flank of Mauna Kea. The western end of W-7 skirts the boundary between Mauna Loa and Mauna Kea lavas. The majority of the surficial soil and rock of the W-7 corridor is derived from ‘a‘a (the Hawaiian word that has become the scientific term for clinkery) lava flows of Mauna Kea Volcano, all older than 10,000 years. Recent historic eruptions from Mauna Loa have flowed north toward Mauna Kea, where they were diverted downslope to the south. They typically consist of pahoehoe (ropy or smooth) lava. A very small extent of these lavas is contained on the southern end of the W-7 corridor.

Lava tubes are characteristic of relatively young pahoehoe lava flows and are important landforms on young volcanoes such as Mauna Loa. The W-7 corridor is mainly on ash-covered ‘a‘a flows from Mauna Kea, and no significant lava tube caves (or any other types of caves) have been observed during field surveys.

The USGS has classified the island into Lava Hazard Zones 1 through 9, in order of decreasing risk. The W-7 project corridor crosses geologically older slopes of the dormant volcano Mauna Kea, within the relatively low risk Lava Hazard Zone 8. The western portion of W-7 is directly adjacent to Mauna Loa flows and is thus also directly adjacent to Lava Hazard Zone 3. Geologic hazards within the W-7 corridor include some steep slopes with a modest potential for instability and minor landslides. Based on the site reconnaissance and literature research conducted for the project, no significant geologic hazards were observed or identified along the proposed segments.

Parts of the improved Saddle Road could be directly damaged in the future by lava flows and earthquake activity, temporarily resulting in road closures to repair damage or rebuild affected sections. This risk exists with or without implementation of the proposed action, since Saddle

Road is an existing transportation corridor through this region. However, because Section I is not highly subject to lava hazard, additional costs would likely be no greater than if W-7 were not constructed.

When wetted, the volcanic ash soils present on much of the site have relatively low strength characteristics and are highly susceptible to erosion in a dry state. If in-situ moisture contents are high enough, these soils become fluid and lose strength temporarily when remolded or disturbed. During construction activities, grubbing and earthwork would expose the soil to increased erosion potential. Soil erosion impacts would be localized and short-term, related to precipitation events during the construction phase. No notable, long-term increase in soil erosion is anticipated with implementation of the action alternatives.

The following mitigation measures will be incorporated into the project:

- Prior to construction, a final review will be conducted to determine the probability of caves or lava tubes in the construction corridor. Should significant caves be present, final design and/or construction techniques will be developed to avoid or minimize impacts.
- If a significant cave or lava tube is inadvertently encountered during construction, all construction activity will cease immediately at the location in question and the Project Engineer will be notified. Consultation will be conducted with appropriate resource or regulatory personnel to ensure that unique biological, cultural, or geological cave resources are investigated and documented, and, if warranted, protected.
- Construction specifications will be incorporated to minimize potential hazards of caves to construction workers.
- During the rainy season, following completion of construction, slopes and denuded areas will be allowed to revegetate with natural seed sources, such as kikuyu grass and ‘a‘ali‘i, in order to minimize soil erosion.
- FHWA will coordinate with HDOT regarding fog warning signs or systems during final design.

S.3.13 BOTANICAL RESOURCES

A total of 91 species of vascular plants was recorded within the study corridor during the field survey. Of these, 15 are endemic to the Hawaiian Islands and 15 are indigenous, meaning they are native to Hawai‘i but occur naturally in other places as well. Sixty-one species are introduced, meaning they were brought to Hawai‘i by people, including one plant of Polynesian introduction.

Only two of the endemic species, *‘aweoweo* (*Chenopodium oahuense*) and hard-stemmed lovegrass (*Eragrostis atropioides*), are common or dominant anywhere in the corridor. These two are dominant only between Ke‘āmuku and the existing Saddle Road. Seven of the 15 endemic species were recorded as uncommon within the corridor, meaning only one or very few

individuals were observed. These findings show that endemic plants have been nearly extirpated from Keʻāmuku during years of cattle-grazing. Nearly all of the Keʻāmuku parcel has been used for cattle production for many years. Thus, the vegetation of most of the area is pasture, made up of introduced grasses with varying numbers of scattered native shrubs, many introduced forbs (weeds) and a few introduced shrubs and trees. The general appearance is of rolling grasslands on the rugged slope of Mauna Kea with some extensive stands of the indigenous shrub *ʻaʻaliʻi* (*Dodonaea viscosa*).

No plants listed as endangered or threatened by the State of Hawaiʻi or the U.S. Fish and Wildlife Service were found within the study area. A few individuals in poor condition of one rare plant, *Chamaesyce olowaluana*, may be present. This species is found in modest numbers further east in PTA, and the isolated patch in the corridor is not significant.

Construction and operation of Saddle Road on W-7 are unlikely to lead to the severe spread of alien plant species in the region, because the area is already heavily invaded by those alien plants that thrive in the region. Furthermore, the general area is already subject to land uses such as highways, grazing, military use, and hunting, which contribute in various degrees to the spread of alien species. As the area is a military base, motorists would not generally be stopping along the corridor. However, the general increase in traffic through the Saddle region would inevitably bring with it more opportunities for transport of alien species seeds, spores, and plant parts.

The following mitigation measures will be incorporated into the project:

- All equipment, material, and support structures will be stored and maintained within the ROW or in designated staging areas that have been approved as being areas where the storing, servicing, and staging of equipment and material will not adversely impact native species. These areas will be clearly demarcated and fenced prior to construction.
- All construction activity will be restricted to the clearly delineated ROW.
- A Project Engineer or representative will be on site at all times during construction to ensure implementation and compliance with environmental mitigation requirements as stated in the contract documents.
- Contractors will be required to participate in an environmental quality control program similar to required safety programs contained in Contract Specifications.
- Immediately after construction in this Section I is completed, in conformance with conditions of the NPDES permit, some areas in the margins of the roadway will be covered with stockpiled grubbed material to allow natural regeneration of vegetation. These areas will be irrigated for 30 days. In some areas of other portions of the Saddle Road project, native species such as *ʻaʻaliʻi* have taken hold in cut slopes with soil.

- After construction, HDOT will maintain the area to keep the unpaved road edges vegetation-free or closely mowed, which will also help reduce the spread of alien weeds.
- The following standard management requirements will be implemented to prevent introduction of noxious weeds:
    - All heavy equipment will be cleaned prior to entering the project area;
    - All equipment entering the project area will be covered when loaded; and
    - All plant material used for erosion control and road maintenance will be certified weed free.

S.3.14 WILDLIFE AND OTHER FAUNAL RESOURCES

A total of 27 different species of birds was recorded during counts that took place at 45 stations in August 2009. Avian diversity and densities were low, consistent with the habitat present within the project area. Two species, Sky Lark (*Alauda arvensis*) and House Finch (*Carpodacus mexicanus*), accounted for slightly less than 54 percent of the total number of birds recorded during station counts. Three of the species recorded, Pacific Golden-Plover (*Pluvialis fulva*), Ruddy Turnstone (*Arenaria interpres*), and Short-eared Owl (*Asio flammeus sandwichensis*), are native species. The Pacific Golden-Plover and Ruddy Turnstone are indigenous migratory shorebird species that nest in the high Arctic during the late spring and summer months, returning to Hawai‘i and the tropical Pacific to spend the fall and winter months each year. They usually leave Hawai‘i for their trip back to the Arctic in late April or the very early part of May each year, though small numbers of both of these species over-summer in Hawai‘i. The Hawaiian endemic sub-species of the Short-eared Owl, or *Pueo*, is a diurnal bird of prey, regularly seen within the grasslands of North and South Kohala. The remaining 24 avian species detected are all considered to be alien to the Hawaiian Islands.

No species currently listed, or proposed for listing under either Federal or State of Hawai‘i endangered species programs, was detected during the course of this survey. The relatively poor habitat and relative lack of native bird species within the W-7 corridor indicates that it is unlikely that any negative impacts on native bird species would result from the construction and operation of the roadway.

Because Hawai‘i has only one endemic terrestrial mammal, the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), the primary purpose of the mammal survey conducted for the project was to determine the extent to which the species inhabits the project area. Although not detected in the survey, it is likely that Hawaiian hoary bats overfly portions of the alignment on a seasonal basis. They may also forage for volant insects over portions of the project area on a seasonal basis, though the xeric nature of the habitat present and the lack of dense vegetation provides little in the way of attractive food resources for a bat, and no adverse impacts are expected. In the course of the survey, a total of nine mammalian species were detected,

including European house mice (*Mus musculus domesticus*), small Indian mongooses (*Herpestes a. auropunctatus*), horses (*Equus c. caballus*), pigs (*Sus s. scrofa*), domestic cattle (*Bos taurus*), feral goats (*Capra h. hirca*), feral sheep (*Ovis aries*), dogs (*Canis f. familiaris*), and cats (*Felis c. catus*). All of these mammalian species were introduced to the Hawaiian Islands by man and can be deleterious to native ecosystems.

Invertebrate surveys conducted in 1996 for the 1999 Final EIS were not repeated. These surveys found no threatened or endangered species, and given the degraded habitat in an area almost identical to W-3, which was surveyed, there was little likelihood of finding them today.

Section I does not harbor many sensitive insect species and there are few concerns. Populations of two relatively common snails, *Succinea konaensis* and a specimen tentatively identified within the genus *Striatura*, might be impacted by construction, but they are widely distributed, so these impacts would not be notable. These species were found in highly localized rocky outcrops. However, it is expected that rock outcrops in similar locations outside the corridor would likely contain similar populations.

Road construction on the new, alternative route would generate a corridor along which introduced species, both plant and animal, would be able more readily to gain access to native habitat. Numerous species of alien wasps and alien ants (including Argentine ants) exist along portions of the existing Saddle Road.

Mitigation measures discussed in the context of botanical resources, above, will assist in avoiding or limiting damage to wildlife and other faunal resources, including spread of invasive species.

S.3.15 FLOODPLAINS AND DRAINAGE

The W-7 alignment traverses an undeveloped area formerly used for pasture that has not been studied for floodplains by the Federal Emergency Management Agency (FEMA), the County, or the State. It is within Zone X, outside of the designated 500-year floodplain. The W-7 corridor crosses several ephemeral drainages, all of which are minor, unnamed, and not mapped on USGS maps. The largest drainage has 796 acres and a 100-year flow of 223 cubic feet per second. The other three tributaries are significantly smaller in drainage area with lower flows. All other sections of W-7 would likely need only relief culverts spaced at intervals to be determined during the design phase. The 50-year design storm would be used for culvert design for the improved Saddle Road. Although bridges are currently not anticipated to be needed, the 100-year design storm would be used for bridge design, if bridges are required. The installation of culverts and bridges would not result in the temporary or permanent loss of riparian vegetation associated with drainageways, as no such riparian vegetation exists within the W-7 corridor. There are no perennial streams within the W-7 corridor, therefore, aquatic wildlife is not sustained. No impacts to aquatic wildlife are anticipated.

The following mitigation measures will be incorporated into the project:

- Saddle Road will be designed as an all-weather facility, with new drainage structures designed to handle the minimum 50-year design storm in accordance with existing State requirements.

S.3.16 WILD AND SCENIC RIVERS

No Wild and Scenic Rivers are located within the project corridor or its vicinity. No impacts to Wild and Scenic Rivers are anticipated from construction and use of the W-7 alignment.

S.3.17 COASTAL BARRIERS/COASTAL ZONES

No Coastal Barriers are present in the State of Hawai‘i. The entire State of Hawai‘i is within the Coastal Zone as defined by the Federal Coastal Zone Management (CZM) Act. Under the CZM program, Federal projects must conform with objectives and polices related to ten areas: recreation resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards, managing development, public participation, beach protection and marine resources. No portion of the project area is within the Special Management Area of the Coastal Zone.

All Federal projects require a determination to ensure that the proposed project is consistent with the objectives and polices of the CZM Program. With implementation of the project mitigation measures, the project was determined in 1999 to be consistent with the objectives and polices of the CZM Program. FHWA and HDOT have determined that there are no differences between the use of W-3 and W-7 with respect to consistency with the Coastal Zone Management Act. This will be confirmed through review of the new corridor by the Hawai‘i CZM program, which has been supplied a copy of this SEIS.

S.3.18 THREATENED AND ENDANGERED SPECIES

As discussed above, the biological surveys conducted along the 500-foot wide W-7 corridor found no botanical, avian or mammalian species currently listed as endangered, threatened or proposed for listing under either the federal or state of Hawai‘i’s endangered species statutes. These findings are not unexpected given the highly degraded nature of the habitat present within the corridor.

Several endangered species are known from the general project area. A contiguous system of Endangered Species Management Units have been established within PTA at Kipuka

Kalawamauna and Puʻu Ka Pele. These are the primary sites where *honohono* (*Haplostachys haplostachya*) survives within the Hawaiian Islands today. Puʻu Ka Pele is about 6,770 feet southeast, and Kipuka Kalawamauna is about 4,700 feet south of the proposed W-7 corridor. A third Endangered Species Management Unit has been designated within Keʻāmuku itself to protect and manage both *Haplostachys haplostachya* and *Stenogyne angustifolia*, another endangered plant. At closest, this area is approximately 500 feet south of the proposed W-7 corridor. These sites are managed by the U.S. Army to protect and recover endangered plant species. All three sites have been fenced to exclude feral ungulates.

Although not detected during the course of the biological surveys conducted as part of the SEIS, the endangered *Nēnē* (*Branta sandwichensis*) has been recorded in low numbers within the Keʻāmuku parcel. Additionally, it is possible that small numbers of the endangered endemic Hawaiian Petrel (*Pterodroma sandwichensis*) and the threatened Newell's Shearwater (*Puffinus auricularis newelli*), over-fly the project area between the months of May and November. The primary cause of mortality in both Hawaiian Petrels and Newell's Shearwaters is thought to be predation by alien mammalian species at the nesting colonies; collision with man-made structures is considered to be the second most significant cause. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by exterior lighting. When disoriented, seabirds often collide with manmade structures, and if they are not killed outright, the dazed or injured birds are easy targets of opportunity for feral mammals. There is no suitable nesting habitat within or close to the proposed project site for either of these pelagic seabird species.

Wildfire could spread to the Endangered Species Management Units within Keʻāmuku and in other parts of PTA from sources within Keʻāmuku, other parts of PTA, and the Puʻuanahulu Game Management Area, destroying endangered plants, which is one of the reasons behind the extensive wildfire mitigation being undertaken by the Army and augmented by project mitigation measures. The new highway, combined with implementation of the IFWMP, will help prevent fires from moving onto the Keʻāmuku parcel and PTA.

If lighting is unshielded, nighttime construction activity or equipment maintenance can attract and disorient Hawaiian Petrels and Newell's Shearwaters. On a permanent basis, unshielded streetlights may have a similar effect.

The following mitigation measures will be incorporated into the project:

- To avoid the potential downing of Hawaiian Petrels and Newell's Shearwaters by their interaction with external construction lighting, no construction or unshielded equipment maintenance lighting will be permitted after dark between the months of April and October. This prohibition will be one of the Special Contract Requirements that will be incorporated in the construction contract documents.

- Any streetlights that may be installed as part of this action will be shielded to reduce the potential for interactions of nocturnally flying Hawaiian Petrels and Newell's Shearwaters with external lights and man-made structures. This minimization measure would both minimize the threat of disorientation and downing of Hawaiian Petrels and Newell's Shearwaters and fully comply with Hawai‘i County Code § 14 – 50 et seq., which requires the shielding of exterior lights so as to lower the ambient glare to the astronomical observatories located on Mauna Kea.
- To minimize collateral damage to areas outside of the ROW and the risk of wildfire during construction, the Special Contract Requirements will mandate that all construction activity shall be restricted to within the clearly delineated ROW and that entry and exit into the ROW by all construction personnel and equipment shall be at previously identified and marked non-sensitive areas.
- Special Contract Requirements will be incorporated into the construction documents directing the contractor's work consistent with specific minimization commitments that are outlined in this section and in consultation documents for the project. The Contracting Officer will have the authority to shut down construction should violations of Special Contract Requirements be detected; furthermore, the project engineer will be responsible for ensuring compliance with all environmental restrictions and minimization measures.

S.3.19 ARCHAEOLOGICAL, HISTORIC, AND TRADITIONAL CULTURAL RESOURCES

An Archaeological Inventory Survey and Traditional Cultural Study for the entire Saddle Road project was completed in 1996, which was supplemented by a 100-percent pedestrian survey of the W-7 corridor and a review of more recent archaeological and ethnographic literature in 2009. The inventory survey determined that there were seven sites in the 500-foot wide W-7 study corridor, of which only 200 feet would be used for right-of-way. One linear site that the W-3 alignment also crossed is the Old Waimea-Kona Belt Road (State Inventory of Historic Places [SIHP] Site 50-10-21-20855. This old roadway is a two-track, unpaved pathway on pahoehoe, built at grade. The other sites include five rock mounds that are Historic-era markers of the boundary between the Ke‘āmuku cattle station lands and ranch lands to the southwest, and remnants of a ranching-era fence. These six sites are outside of the 200-foot right-of-way and would not be affected by the proposed undertaking.

No burials or traditional cultural sites appear to be present in the W-7 corridor. The archaeological report discussing historic properties was provided to various agencies and groups, including the State Historic Preservation Division, the Office of Hawaiian Affairs, Hawaiian Civic Clubs, the Royal Order of Kamehameha, and others, for their comment, as part of consultation under Section 106 of the National Historic Preservation Act. The Final SEIS will present the results of this coordination.

The following mitigation measures will be incorporated into the project:

- An MOA was executed among the FHWA, SHPO, the Advisory Council on Historic Preservation , HDOT, and the Office of Hawaiian Affairs (OHA), agreeing upon a mitigation plan procedures for the historic sites contained in various portions of the Recommended Alternative (which included W-3 in Section I). The MOA stipulated how each archaeological site would be treated and provided a schedule for plan development and review procedures in the mitigation process. Subsequent construction of the improvements to Saddle Road has fulfilled all the requirements of the MOA prior to construction of applicable segments. The remaining task is to amend the MOA for the W-7 Alternative and implement the mitigation plan for the Old Waimea-Kona Belt Road (50-10-21-20855).
- In case of discovery of native Hawaiian burials or ritual sites, construction activities will cease in the vicinity of the site until appropriate regulatory and resource personnel are contacted and a determination has been made. All requirements of Chapter 6E, HRS and the administrative rules relating to burials will be satisfied.
- In order to ensure the protection of archaeological and paleontological remains during construction, Section 107.02, "Protection of Property and Landscape" *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects, FPJ-96, 1996, FHWA* will be followed.
- The FHWA will provide a full-time archaeological monitor during clearing, grubbing, and excavation operations on the proposed project.

S.3.20 HAZARDOUS MATERIALS, TOXIC SUBSTANCES AND UNEXPLODED ORDNANCE

A records search and site reconnaissance of Section I of Saddle Road project area in 1996 conducted for the 1999 Final EIS found no hazardous waste. No activities with the potential to produce recognized environmental conditions have occurred in the area since that time. Visual reconnaissance of the survey corridor in 2009 revealed no conditions or materials. It is therefore unlikely that any adverse impacts from construction or use of Saddle Road in the W-7 alignment would occur related to hazardous materials or toxic substances resulting from existing conditions.

Military training has the potential to introduce hazardous materials or toxic substances. Although in other parts of PTA, such hazards may include ongoing ordnance and explosives and lead and other contaminants from ammunition, live-fire training exercises will not be undertaken in Keʻāmuku. Materials such as fuels, battery fluid, petroleum lubricants, solvents, paint products, and coolants may be used and could potentially spill. Military unit training at PTA includes a 40-hour Hazardous Waste Operations Course, and the units deploy to PTA with spill containment and clean-up kits to immediately address any spills during training exercises.

Unexploded ordnance (UXO) is explosive ordnance that has been primed, fused, armed, or otherwise prepared for action, and that has been fired, dropped, launched, projected or placed in such a manner as to constituted a hazard to operations, installations, personnel, or material and remains unexploded either by malfunction or design or for any other cause. Much of South Kohala is known to contain UXO left over from training during World War II. The U.S. Navy utilized 91,000 acres in Waikoloa in December of 1943 for an artillery firing range and troop maneuvers. Since then, at least two ordnance clearance efforts were conducted, one in 1946 just prior to the departure of the 5th Marine Division, and the other in 1954 following an accident that killed two civilians. UXO continues to be discovered at the former Waikoloa Maneuver Area as land development progresses. Sector 3 of the Waikoloa Maneuver Area study area covers about 28,058 acres of Keʻāmuku, including the area traversed by W-7. Parts of it were once used as a live-fire impact area, but there have been no reported discoveries of UXO in this area, and it is currently considered an area with a low probability of UXO exposure. Until the Army acquired the area, about 1,467 acres were used for military maneuvers and training exercises under a master lease agreement between the Army and Parker Ranch.

The U.S. Army Corps of Engineers (USACE) is conducting a program of UXO removal. Over a seven-year period from 2002-2009, three contracts for UXO removal worth more than $100 million have been awarded. As of June 2009, more than 10,600 acres have been cleared, 2,100 Munitions and Explosives of Concern items and 260 tons of military debris removed, and $82 million expended for all services removed.

Environmental surveys conducted to date by biologists and geologists familiar with the appearance of UXO have not revealed the obvious presence of any UXO in the W-7 corridor. Given the lower risk context, the primary concern would be safety of the construction operation. It should be noted that pre-construction sweeps for work on other parts of the Saddle Road Improvement Project from 2003 to 2009 successfully located and cleared training rounds and UXO, and there have been no UXO-related incidents.

The following mitigation measures will be incorporated into the project:

- If previously unidentified hazardous substances or petroleum products are found within the W-7 corridor that indicate an existing release, a past release, or a material threat of a release of any hazardous substance or petroleum products into the corridor, further investigation will be pursued, as warranted. If previously unidentified hazardous waste is discovered during project construction, work will cease at that location and appropriate regulatory or resource personnel will be contacted.
- In areas where ROW is needed outside of that already surveyed, the project area will be further investigated prior to land acquisition or construction to confirm the absence of hazardous waste.

- Prior to construction, FHWA will conduct an unexploded ordnance survey. If the risk of encountering UXO is low, then the USACE will be consulted to provide UXO construction support. If the risk of encountering UXO is high, then full UXO clearance will be performed to ensure the safety of the site. The Army will document UXO surveys and removal actions in full accordance with applicable laws, regulations, and guidance. All ordnance found will be removed from the project area in accordance with DOA regulations in coordination with USAG-HI.
- In all training activities at Ke‘āmuku and other areas of PTA, the Army will continue to educate soldiers on how to identify UXO and the proper safety procedures for marking and reporting UXO, in order to reduce impacts not only to soldiers but also to motorists on W-7.

S.3.21 VISUAL

A substantial elevational range and open vegetation provide panoramic vistas with interesting landscape features. Rolling hills, cone-shaped *pu‘u* (hills), broad valleys, and mountains are examples of the diverse landforms found within the corridor. Rock outcrops of basaltic lava, native shrublands, and grasslands that change hue from brown to green in times of rain are visible in the natural landscape of the W-7 corridor, which has only subtle cultural modifications, such as rough, unpaved roads, fence lines, and water tanks and troughs.

The majority of the viewers now and in the future would travel the highway by vehicle, viewing the landscape at speeds of about 50-55 MPH. Other viewers are those from military facilities and, on occasion, from the dry hunting land to the south. These groups view the landscape (including the highway) from different viewpoints, and have a stationary view rather than a changing one.

Construction of the proposed highway would result in a substantial change in visual character due to the introduction of a paved road to the existing pastoral setting. The visual impact assessment performed in 1999 predicted that this imposition of a two-lane highway would impact visual character in various ways and severely lower the existing visual quality of the foreground area. This was based partly on the appearance of the paved surface, but also on cut and fill slopes. Over its length, fill slopes would range from 6 to 40 feet, and cut slopes would range from 6 to 35 feet, although treatment of these slope faces would minimize the change in visual quality and character. The sections of Saddle Road that have been improved thus far appear to be more visually compatible with the surrounding environment than originally predicted in the FEIS. In addition, the lack of vantages providing views of the W-7 alignment means that there are virtually no “views” of the area to be adversely affected; in fact, the new highway would open scenic vistas to motorists that have never before been available. The project would not interfere with vistas of Mauna Kea, Mauna Loa, Hualālai, or the Kohala Mountains, the major scenic resources in the area, regardless of viewer location.

The following mitigation measures will be incorporated into the project:

- Final cut and fill slope faces will be made to blend with the surrounding landscape. The natural appearance of the slopes will be improved by rounding the toe and top of slopes, warping, blending the ends of slopes, varying the slope ratios, utilizing staggered ledges, and roughening the face of cut slopes, either by ripping or blasting, where appropriate. (Warping results in a slope face that is not parallel to the roadway. Slope rounding refers to blending the slope into the natural terrain by excavating additional area at the top of the cut slope. Laying back the ends of slopes or blending provides a smooth transition to adjacent cut, fill, or drainage area by flattening the slope ratio at the ends of slopes. Varying slope ratios leaves an irregular, undulating or roughened appearance with staggered ledges rather than a uniform grade. Staggered ledges are benches with varying dimensions and heights on the cut face which do not cross the entire face.) The slope ratios will vary from the top to the bottom of the slope face as well as horizontally along the face, if practicable and feasible.
- Rock slope surface treatment will be applied to cut slopes in competent rock areas as identified in the geotechnical testing results. These treatments include roughening of the cut face to incorporate short, staggered ledges, minor warping, and other irregularities in the rock that take on a natural appearance.
- In areas not recommended for revegetation, the top three feet of lava material in disturbed areas will be stockpiled prior to construction. After construction, the stockpiled material will be used as plating material. The plating material will be placed over slope faces to resemble the adjacent, undisturbed ground surface conditions or used as rip rap material along ledges and outside of ditch backslopes.
- Intercepted drainages on cut slopes will be cut at the angle to existing joints, planes or rock features, and drainage patterns. These features will be incorporated into the NPDES SWPPP.
- Where guardrails are needed, natural-appearing guardrail material, such as naturally weathered steel or a material approved by HDOT, will be used to blend more effectively with the surrounding landscape.
- To reduce contrast and blend more effectively with the surrounding landscape, aesthetic fencing materials will be used, such as naturally weathered metal or steel, or painted or wooden posts, as approved by HDOT.
- Clearing of trees and large shrubs along an irregular edge adjacent to the recovery zone will be done to create a gradual transition or feathered edge.
- As determined appropriate during final design, the project may include informal scenic Typical Sections s with interpretive signage in a few locations, such as the Old Waimea-Kona Road and the overlook above Keʻāmuku Village.

S.3.22 ENERGY

There are two primary energy demands associated with the proposed project. Energy would be consumed in construction activities and in operation of vehicles once the highway is open. The 1999 Final EIS calculated energy expenditures for the entire project based on existing technologies. Energy use per section was not calculated. Based on the generalized working efficiency of various pieces of construction equipment (e.g., grader, roller, D-9 bulldozer, scraper), the estimated fuel consumption for construction of the entire proposed Saddle Road was calculated at approximately 0.6 to 0.7 million gallons. The energy use required for construction of W-7 was not recalculated as part of this EIS, but there are essentially no differences between it and W-3. Although the increase in average daily traffic would increase total fuel consumption for vehicles on the road, the proposed project would conserve fuel in individual vehicles by improving the LOS and travel time, reducing curves and grades, providing safe opportunities for passing, and reducing the trip length to most destinations. The substitution of W-7 for W-3, which are almost equal in length, does not result in any differences with regard to energy consumption in construction or operationally. No mitigation measures are necessary for energy impacts.

S.3.23 CONSTRUCTION IMPACTS

Environmental impacts associated with the construction phase of a project are generally localized and temporary in nature. Anticipated construction impacts include noise from heavy construction equipment, fugitive dust from earthmoving activities, air pollutant emissions from internal combustion engines, and soil erosion and sedimentation. Construction activities would include mobilization, clearing and grubbing, excavating and filling of earth, foundation construction, drainage structure construction or installation, preparation of highway base, paving, and cleaning up. Highway construction also generates solid waste in the form of packaging for building materials, detergents, paint, metals, solvents, and demolition of existing materials at intersections.

Due to the 47-mile length of Saddle Road, it has not been feasible to construct the entire project at one time. Each construction project has improved a 5- to 9-mile section of the highway. Because of the staggering of construction, with implementation of mitigation, construction-related impacts have not been significant and are not expected to be significant for Section I. The mitigation measures that will be employed for construction impacts are extensive, and the reader is referred to Section 3.23 of the main body of this SEIS for a full list.

S.4 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Over the life of the project, the construction phase would likely represent the period of most concentrated impact to the natural, biological, and social environment. Construction-related

impacts, such as soil erosion and sedimentation, the generation of air pollutants and dust, traffic congestion due to detours and delays, and noise from construction equipment, would be considered temporary and would not be expected to affect the area's long-term productivity.

The conversion of existing land uses, the direct loss or displacement of native plants and replacement by aliens, the degradation of historic properties, and the modification of the visual environment would occur immediately; these impacts would not be retrievable for the long-term productivity of the area.

Economic benefits associated with the construction efforts would occur immediately upon initiation of the project. Those economic benefits associated with increased cross-island traffic and time-savings would begin following the construction period and would be expected to increase over time, contributing to the long-term productivity of the area.

Mitigation measures committed for the project would be initiated and maintained over time as appropriate, many of which contribute to the maintenance and enhancement of the region's long-term productivity. No plant or wildlife species are expected to become extinct as a direct result of project activities.

Proposed improvements would enhance safety and reduce travel time for many cross-island motorists. While taking advantage of an existing road facility, the short-term use of project resources represents an efficient means to achieve a primary transportation goal.

S.5 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible and irretrievable commitment of resources for the proposed project include exclusion of future military uses, native species habitat, scenic resources disturbance, project materials such as aggregate for at least the life of the project, and historic-era archaeological resources, soil, and energy on a permanent basis.

S.6 CUMULATIVE IMPACTS

Cumulative impacts encompass the total effect on a natural resource, ecosystem, or human community due to past, present, and future activities or actions of federal, non-federal, public, and private entities. The cumulative impact analysis approach undertaken in this SEIS is derived from several sources (Caltrans 2009; USEPA 1999; and CEQ 1997) and was developed interactively with the direct and indirect impacts analyses from the 1999 FEIS, scoping for the SEIS in 2007, and later resource studies. The early focus on cumulative impacts helped in designing the W-7 alternative so as to avoid or minimize impacts. The analysis for identifying and assessing cumulative impacts followed here consists of seven steps:

1. Identification of resources in consultation with agencies, groups, individuals and reliable information sources.
2. Identification of the direct and indirect impacts of the proposed project that might contribute to a cumulative impact on the identified resources.
3. For all resources that have a potential to be impacted by the project, definition of a geographic boundary or Resource Study Area (RSA) for each resource to be addressed.
4. Description of the current health and the historical context of each resource.
5. Identification of the set of other current and reasonably foreseeable future actions or projects and their associated environmental impacts to include in the cumulative impact analysis.
6. Assessment of the potential cumulative impacts.
7. Assessment of the need for mitigation and the potential to avoid, minimize, rectify or compensate for impacts.

As a result of analyses in Steps 1 and 2, the following resources were found to be impacted by the project in a more than insubstantial way:

Drainage Areas: The project would increase drainage quantities in several swales.
Native Ecosystems: There would be direct loss of 45.0 acres of *Dodonaea* shrubland, 12.1 acres of *Chenopodium* shrubland and 15.5 acres of *Eragrostis* grassland.
Threatened and Endangered Plant Species: Two endangered plants, *Haplostachys haplostachya* and *Stenogyne angustifolia*, are found within 500 feet of W-7, and wildfire poses a potential threat.
Historic Properties (Ranching Features): The project would take a portion of one archaeological site, the Old Waimea-Kona Belt Road, an early 20th century road alignment.
Visual Quality: The project would insert a built landscape in area currently without structures, with the potential for degradation of regional scenic resources.

In Step 3, a Resource Study Area (RSA) was defined for each resource for which the project had an adverse impact that might accumulate with impacts from other projects. The RSAs provided a logical unit for analysis of the existing state of a resource and effects to it. The next step in the cumulative impact analysis consisted of describing the current health, condition, or status of each affected resource within its respective RSA, including historical and recent trends. The historic properties (ranching features), visual resources and minor drainages were in a healthy or sustainable state. The biological resources under consideration were more threatened, particularly from historical actions, despite recent successful efforts to stabilize the particular endangered species.

Next, the cumulative impact analysis identified current and reasonably foreseeable transportation and non-transportation projects within the RSA for each resource, and then summarized the manner in impacts from the proposed Saddle Road Improvement project would combine and interact with those of other projects.

Drainage Areas: The project adds up to 50 percent more 50-year storm runoff to drainages that currently have flows between 6 and 135 cubic feet per second. In the context of a very restricted area to be utilized for military maneuvers that would simulate natural and human-altered landscapes in which U.S. military action would occur, this alteration does not cause problems. All additional runoff is expected to be within the capacity of existing drainages, and there are no risks to flooding or other resources.

Native Ecosystems: In the context of existing overall minimum of tens of thousands of acres of *Dodonaea* shrubland, the loss of this community type is negligible. As the loss of the two rarer types – *Chenopodium* shrubland and *Eragrostis* grassland – occurs in the context of degraded habitat areas surrounded by existing roads, the habitat is not highly vulnerable to further fragmentation. All types are included in Endangered Species Management Units within PTA that are being actively managed for native habitat. No unique ecosystem relationships with other organisms are known that would elevate the nature of adverse effects. Introduced plant species may be slightly more invasive, but the effect is not substantial. Wildfire remains a risk.

Threatened and Endangered Plant Species: Although the project has avoided areas with endangered plants and included a 500-foot buffer to the nearest individuals, the Saddle Road combined with training at PTA continues to pose a wildfire risk. PTA has mitigated with Endangered Species Management Units and an Integrated Wildfire Management Plan. The Saddle Road project includes Typical Sections that are designed to minimize the potential for fire and also offers substantial firefighting benefits in terms of a firebreak and access. Overall, the mitigation efforts of PTA specified in the Transformation EIS, the IWFMP, and existing Biological Opinions for training, combined with the W-7 highway design, will result in increased propagation of these species and protection of ESMUs.

Historic Properties (Ranching Features): The destruction of about 120-160 feet (about 0.1 percent) of the Old Waimea-Kona Belt road occurs within the context of historic sites within Keʻāmuku that are protected by the Army. The larger context for ranching sites in this part of West Hawaiʻi is a number of high quality sites preserved in public or private hands. No substantial adverse cumulative impact would occur.

Visual Quality: The project will insert a built element into a landscape that, while largely pristine, will undergo changes in association with the introduction of military training in Keʻāmuku and another probable highway project in the Saddle Road Extension. Limited portions of several thousand acres of proposed Waikoloa development may also be visible in the distance. Although the scenic vistas that are currently enjoyed from most of the existing Saddle Road and Mamalahoa Highway will not be altered, viewsheds for drivers in a limited area near the junction of the realigned Saddle Road and Mamalahoa Highway will be notably altered.

For the resources of historic properties and drainage areas, there are no adverse cumulative impacts that require mitigation. The primary cumulative impact on native ecosystems and threatened and endangered species attributable to the Saddle Road Improvement Project and other foreseeable projects, particularly the Saddle Road Extension and increased military training at PTA, is additional wildfire ignition sources. Extensive wildfire mitigation is in place for military training, as described elsewhere in this SEIS. The Saddle Road Improvement project design has included coordination with the Army to determine Typical Section designs that would be effective in preventing fires and maximizing fire-fighting benefits of the road corridor. Additional proposed mitigation is for the Saddle Road Extension to continue coordination with the Army, the U.S. Fish and Wildlife Service, and the DLNR to formulate Typical Section design, and other mitigation if necessary, that takes into account the cumulative effects on wildfire.

The cumulative impact to visual quality is primarily a concern at and near the junction of the W-7 alignment and Mamalahoa Highway. Design for Saddle Road has included minimization of the amount of cut and fill slopes, revegetation of disturbed areas, and blending any proposed improvements into the surrounding landscape. It is further recommended that the Saddle Road Extension adopt these design methods to minimize visual impact, particularly in the area within a mile of Mamalahoa Highway, where all three highways will be highly visible.

S.7 SECTION 4(F) ANALYSIS

The purpose of 49 U.S.C. Section 103, generally known as Section 4(f), is to ensure that the U.S. DOT makes special efforts to protect public parks and recreation lands, wildlife and waterfowl refuges, and historic properties. The law states that the Secretary of Transportation shall approve a project which requires the use of publicly owned land from a public park, recreation area, wildlife or waterfowl refuge, or from an historic property of significance only if; (1) there is no prudent and feasible alternative to such use, and (2) the project includes all possible planning to minimize harm to the resource being affected by use. There are no public parks, recreation areas, or wildlife or waterfowl refuges in or near Section I of the project area. Of potential Section 4(f) resources, only archaeological sites are present.

One historic property, the Old Waimea-Kona Belt road (Site 50-10-21-20855), is located partially within the W-7 alignment and would be subject to Section 4(f) use. An additional five historic sites within the 500-foot study corridor would be avoided as part of final design of the actual 200-foot ROW corridor.

The Old Waimea-Kona Belt Road has been determined eligible for listing on the National Register of Historic Places. This site is a 39-mile long historic road dating from about 1920 that runs from Waimea to Kona and corresponds in many locations to the Mamalahoa Highway. The Old Waimea-Kona Belt Road intersects the W-7 alignment at Station 9+00. The W-7 alignment ROW is 200 feet wide, and the Old Waimea-Kona Belt Road is 16 feet wide. Consequently, the

W-7 alignment will take 3,200 square feet of the Old Waimea-Kona Belt Road. This Section 4(f) take is approximately 0.1 percent of the total area of the Old Waimea-Kona Belt Road.

The W-3 alignment would also cross the Old Waimea-Kona Belt Road. It would also result in a 4(f) take. Since the W-3 ROW is also 200 feet wide, the W-3 alignment would also result in a 3,200 square foot take. There are no unique features or attributes at either alignment's crossing.

Several other alignments considered in the EIS process that would lie north or south of W-3 or W-7 also could not avoid this resource because of the perpendicular nature of all potential crossings. All alternative alignments would result in the same or very similar amounts of take, because the standard ROW for Saddle Road is 200 feet wide. To avoid the Old Kona-Waimea Belt Road, a new alignment would have to be located several miles to the north or south of the W-7 alignment. It would have to go around the 39-mile length of the site. This would not be prudent because the road would cease to function as a logical cross-island route, which is a primary purpose of the project. Realigning around the historic site would compromise the project to a degree that it would be unreasonable to proceed with the project in light of its stated purpose and need.

Another potential avoidance alternative would be to construct Saddle Road with an overpass for the Old Waimea-Kona Belt Road. However, that alternative would not be prudent. Since there is not a topographic feature that facilitates an overpass, the fill structure needed to raise Saddle Road to go over the road would be very costly (approximately $2.5 million) and would have a footprint of approximately four times the currently proposed footprint, with commensurate impacts to vegetation. In addition, the creation of an overpass without the associated change in terrain would create a severe visual impact associated with a massive out-of-character structure in a relatively undeveloped area.

Consequently there is no feasible or prudent alternative that would avoid the Old Waimea-Kona Belt Road or eliminate a take of 3,200 square feet of this historic property. All potential viable alternatives have the same amount of harm to the Section 4(f) resource. However, the W-7 alternative best meets the project's purpose and need.

For the W-7 alternative, the remaining task is to amend the existing MOA to mitigate the adverse effect of the W-7 Alternative to the Old Waimea-Kona Belt Road (Site 50-10-33-20855). The mitigation plan includes fabrication of an interpretative sign providing a history of the road and a construction of a pull-off adjacent to the Old Waimea-Kona Belt Road for the general public.

S.8 UNRESOLVED ISSUES

No unresolved issues exist.

CHAPTER 1 PURPOSE AND NEED FOR ACTION

1.1 BACKGROUND AND 1999 SADDLE ROAD EIS

The existing Saddle Road, State Route (SR) 200, extends approximately 47 miles between Hilo and the western part of the island of Hawai‘i (Figure 1.1.1). It begins at the Puainako Street Extension six miles west of downtown Hilo and extends to a junction with State Route 190 (SR 190), the Mamalahoa Highway, approximately six miles south of Waimea. All portions of Saddle Road are owned or managed by HDOT through Executive Order, license, or perpetual easement.

Saddle Road is the only paved road serving the Pohakuloa Training Area (PTA), the Mauna Kea Astronomical Observatory Complex, the Mauna Loa atmospheric observatory complex, the ranching and residential areas of Waiki‘i Ranch and Kaumana City, Mauna Kea State Park, and the Kilohana Girl Scout Camp. It also accesses hunting areas on Mauna Kea and Mauna Loa and in the “saddle” between them.

No permanent training units are stationed at the PTA. The facility is a vital light infantry, live-fire training facility in the Pacific Ocean region for the U.S. Army Pacific (USARPAC) and other Pacific Command Units. The transportation of ammunition, training equipment, and troops from harbors on both the west and east side of the island periodically involves long, slow-moving convoys on Saddle Road. About 1,150 military vehicles made trips to PTA in 2008, primarily in convoys between PTA and the port at Kawaihae. The convoys only travel during non-peak periods, are escorted by Hawai‘i County Police Department vehicles in the front and back to enhance safety, and move at 10 miles an hour below posted speed limits. Military trips currently comprise less than one percent of all Saddle Road traffic. Due to continuing overseas deployments, the annual training levels at PTA are lower than previously in the decade, a trend which is expected to reverse within several years. Saddle Road is also used by PTA personnel to commute to and from work.

In 1992, the entire Saddle Road was a narrow, winding, two-lane road with steep grades, sharp curves, poor pavement conditions, and substandard drainage. In the seven years that followed, parts of the easternmost portion were widened and repaved by the County of Hawai‘i, but no attempt was made to correct deficiencies in its pavement structural section or vertical and horizontal alignment, which reflected the original road built during World War II. Saddle Road was becoming increasingly important for access to PTA, Mauna Kea, and outdoor recreation areas. Furthermore, its role was increasing as a cross-island transportation route linking East and West Hawai‘i for business travel, the transport of goods and services, tourism, recreation, shopping, and daily commuting.

Saddle Road passed through key training areas of PTA, creating conflicts between motorists and military training units. These conflicts, along with roadway deficiencies and capacity limitations, contributed to growing safety concerns for both the general public and military personnel. Saddle Road's accident rate of 5.43 accidents per million vehicle miles (ACC/MVM) in 1996 was significantly higher than the average rate for rural two-lane highways throughout the State of Hawai‘i (3.0 ACC/MVM). Roadway deficiencies also hindered the timely response of emergency vehicles responding to fires, accidents, and other emergencies along Saddle Road.

In response to these problems, the Federal Highway Administration, Central Federal Lands Highway Division (FHWA), in cooperation with the Hawai‘i State Department of Transportation (HDOT) and the U.S. Department of the Army (the Army), Surface Deployment and Distribution Command (SDDC), began the Saddle Road Improvement Project in 1992. In 1996, the Environmental Impact Statement (EIS) process began. The EIS was funded through the Defense Access Road (DAR) program, in which FHWA served as co-administrator with SDDC.

The Draft EIS, released on November 8, 1997, examined the No Action Alternative and twelve action alternatives incorporating various combinations of the existing alignment and potential new alignments in four different sections of the road, Sections I, II, III and IV (Figure 1.1.2). All action alternatives planned to reconstruct the roadway to a two-lane highway with climbing lanes where appropriate, paved shoulders, and a design speed of 60 miles per hour (MPH). All alternative alignments included improved pavement conditions, increased safety and capacity, improved quality of traffic flow, decreased cross-island travel times, and the stimulation of economic growth and development. After release of the Draft EIS there was a 45-day comment period that included public hearings in Hilo and Waikoloa.

The release of the Final EIS was announced in the Federal Register on September 3, 1999, and in the Hawai‘i State Office of Environmental Quality Control's *Environmental Notice* on September 8, 1999. The Final EIS presented a Recommended Alternative that consisted of E3 in Section IV, EX-3 in Section II, PTA-1 in Section II, and W-3 in Section I (Figure 1.1.2). The Recommended Alternative minimized conflicts between military and public uses within the PTA, minimized socioeconomic disruption in the Kaumana area of Hilo, and provided an outlet to Mamalahoa Highway that met the destination needs of motorists while minimizing impact to homes in the Waiki‘i area. Substantive environmental issues, which included protected species of flora and fauna, critical habitat for the endangered bird *Palila*, wetlands and biological habitats of importance, archaeological resources, fire hazards, hunting lands, access to trails and roads, and potential noise increases, were investigated and resolved. A Record of Decision (ROD), finalized on October 30, 1999, presented the selection of the Recommended Alternative by the agencies and formalized the mitigation commitments.

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(W7)		

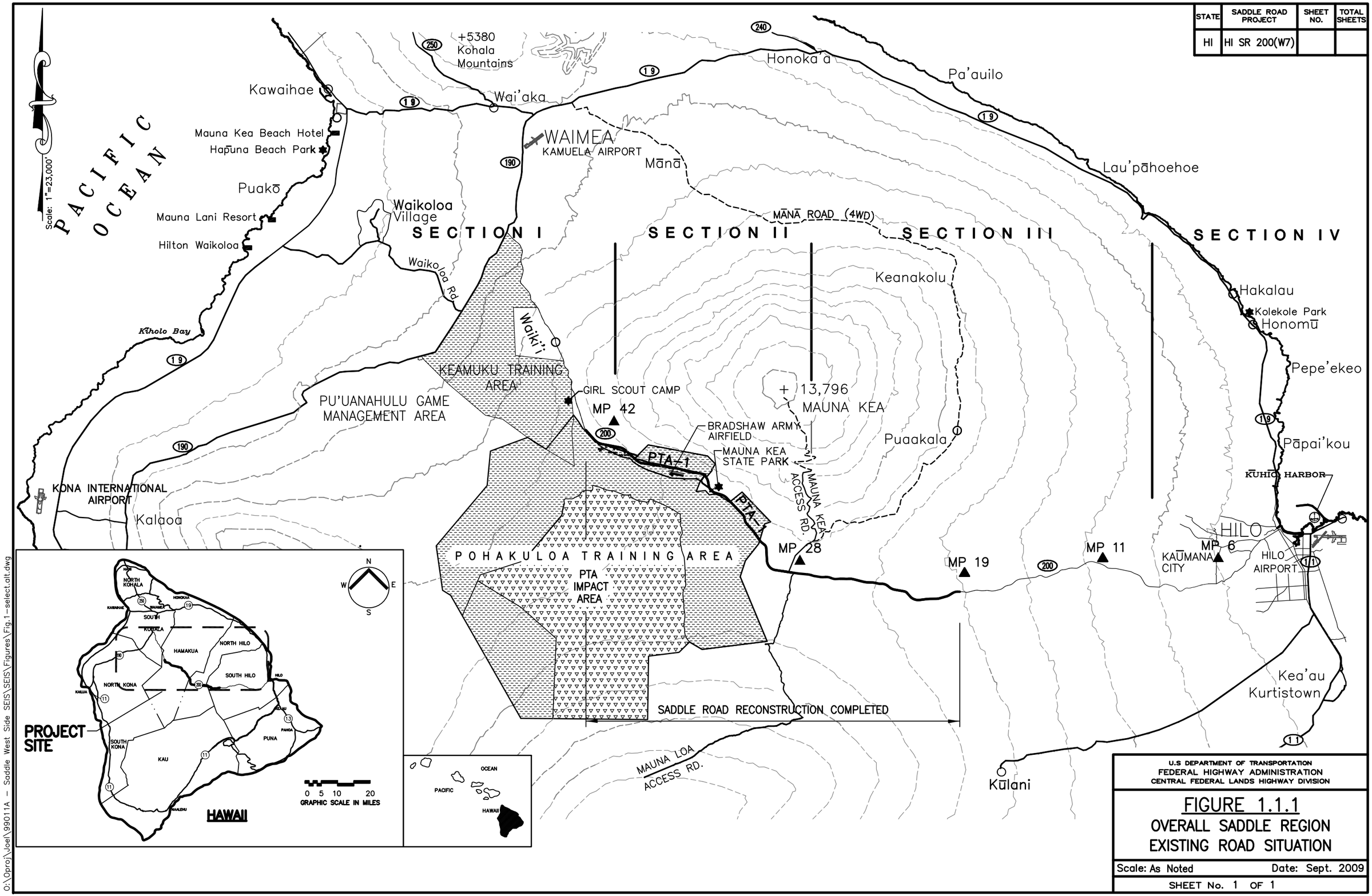

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FIGURE 1.1.1
OVERALL SADDLE REGION EXISTING ROAD SITUATION

Scale: As Noted | Date: Sept. 2009

SHEET No. 1 OF 1

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STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(W7)		

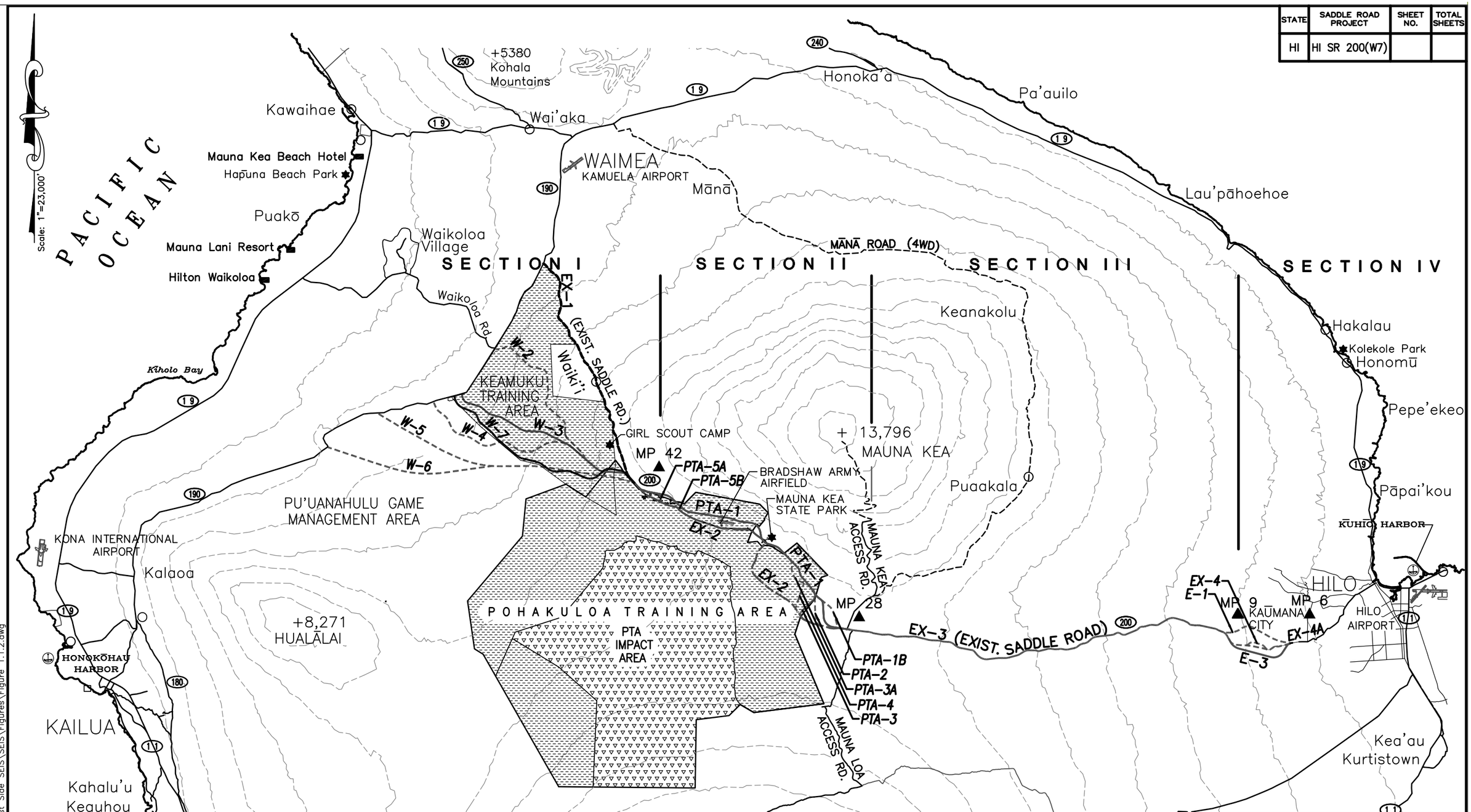

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FIGURE 1.1.2
SADDLE ROAD WITH ALL 1999 EIS ALTERNATIVES

Scale: 1"=23,000' Date: Sept. 2009

SHEET No. 1 OF 1

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During the Final EIS process, the lead agencies determined that implementing the proposed project within any one section or any combination of sections of Saddle Road would improve travel conditions in those sections, whether or not the project was implemented in all sections. Since the alternative alignments identified within each section began and ended at common points on Saddle Road, construction within one section would not adversely affect future construction within another.

After this time, final highway design proceeded and the necessary construction and land use permits were obtained for a 6.5-mile portion of Saddle Road in Section II from Milepost (MP) 28 to 35 within PTA. Contracts for construction were awarded and highway construction began in 2004, and this portion was opened to traffic in May 2007. Construction for the portion in Section III between MP 19 and 28 was completed in October 2008. The final part of Section II, north of the PTA cantonment area from MP 35 to 41, was completed and opened in August 2009. A portion of Section III between MP 11 and 19 is scheduled to begin construction in late 2009 and be completed in 2011. The remainder of the eastern side of project – i.e., the portion in Sections III and IV from MP 6 to MP 11 – has been partially funded and completion dates are not yet certain. The remainder of the western side (Section I) of the project from the "Seven Steps" near MP 41 to Mamalahoa Highway, the subject area of this SEIS, has not yet been scheduled for design or construction.

1.2 ARMY'S PURCHASE OF KEʻĀMUKU

In 2006, the Department of the Army purchased a Parker Ranch property known as the Keʻāmuku parcel (TMK 3rd. Div., 6-7-001:041). This property included the area planned for the western section (Section I) of the selected alternative alignment – termed W-3 – of the Saddle Road Improvement Project. The U.S. Army (Army) has incorporated the property, including the entire W-3 alignment, within Pohakuloa Training Area and is preparing to use it for military training. The Army prepared an EIS for the Army Transformation of the 2nd Brigade, 25th Infantry Division (Light) to a Stryker Brigade Combat Team (SBCT), which includes plans to utilize Keʻāmuku for training, including training with the Stryker vehicle (U.S. Department of the Army 2004). A decision by the U.S. 9th Circuit Court of Appeals led to preparation of a supplemental EIS that considered locations other than Hawaiʻi for the permanent stationing of the 2/25th SBCT. In a Record of Decision issued in April 2008, the U.S. Army chose to implement the alternative that would station the 2/25th SBCT permanently at Schofield Barracks Military Reserve on the island of Oʻahu. A variety of maneuver training is expected to occur at PTA, including the Keʻāmuku parcel. No live-fire exercises will be permitted on the Keʻāmuku parcel.

Both alternative segments for Section I of Saddle Road studied in the 1999 Saddle Road EIS – W-2 as well as the Selected Alternative Segment, W-3 – pass through the center of Keʻāmuku. Now that the Army has acquired the Keʻāmuku parcel, use of either alignment would create a situation in which civilian traffic would traverse a roughly 10-mile extent of Army land with military training taking place on both sides. To be able to effectively train on both sides of Saddle Road, the military would need a number of underpass or overpass crossings. Although this would permit training on both sides of the new roadway, the effectiveness of such training would likely be restricted and hindered due to the limited number of available crossing locations. Additionally, these crossings are expensive and would increase the total costs for W-3. The W-7 alignment is expected to only require one crossing, the details for which will be determined in cooperation with the Army during final design.

Accordingly, on September 6, 2006, the U.S. Army Garrison, Hawaiʻi, requested that HDOT and FHWA consider relocating the highway about a mile southwest towards the southern boundary of Keʻāmuku (Appendix A3).

1.3 RESPONSIBLE AGENCIES, NEED FOR SUPPLEMENTAL EIS, AND FUNDING

Responsible Agencies

The Federal Highway Administration, Central Federal Lands Highway Division (FHWA) and the State of Hawaiʻi Department of Transportation (HDOT) have cooperated to develop the Saddle Road Improvement project. The Army is also cooperating in the development of those portions of Saddle Road within PTA.

FHWA and HDOT considered the request of the Army to shift the alignment to the south and concluded that it was a reasonable and prudent action, as it would allow the Army to maximize their training opportunities and minimize conflict with the traveling public. The reduction of conflicts between the traveling public and military operations was one of the purposes of the original EIS. The new alignment has been termed W-7, as it is the seventh potential mapped alignment in Section I to receive consideration since 1996 (Figure 1.3.1).

As the lead federal agency for the project, FHWA also serves as the lead agency for compliance with the National Environmental Policy Act of 1969, as amended (NEPA). HDOT serves as the lead agency for compliance with Chapter 343, HRS, the Hawaiʻi Environmental Policy Act.

Need for Supplemental EIS

The administrative rules implementing both NEPA and Chapter 343, HRS, require that a supplemental EIS (SEIS) be prepared whenever there are changes, new information, or further developments on a project which result in significant environmental impacts not identified in the most recently distributed version of the draft or final EIS (40 CFR 1502.9(c)). FHWA and

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(W7)		

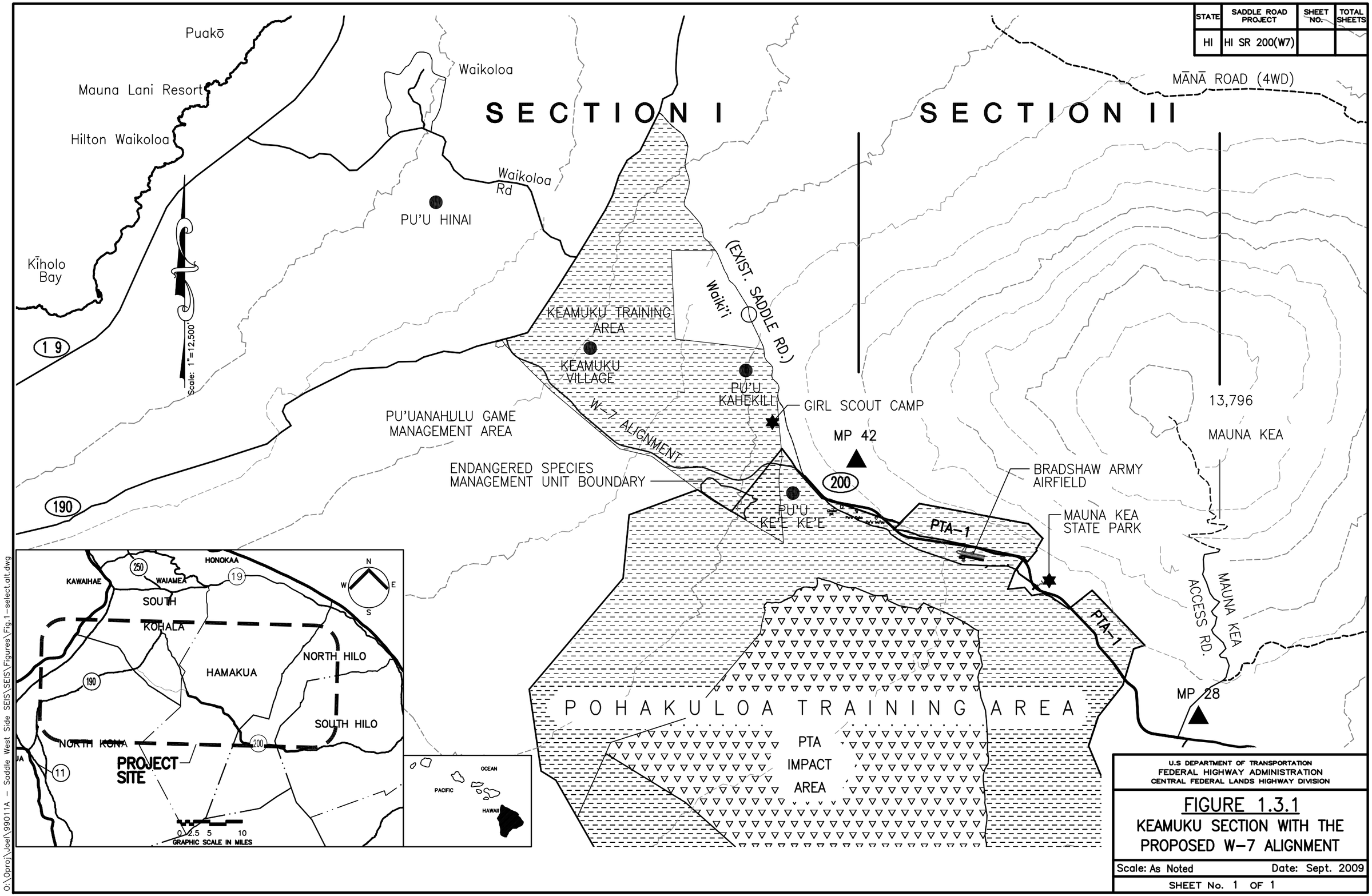

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FIGURE 1.3.1
KEAMUKU SECTION WITH THE PROPOSED W-7 ALIGNMENT

Scale: As Noted | Date: Sept. 2009

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HDOT determined that the substantial shift in alignment of a roughly 10-mile section of the highway to an area that had not yet been surveyed for historic, water resource or biological resources triggered the need for an SEIS.

FHWA and HDOT also re-examined the entire project to determine if there were any other changes, new information, or further developments that were not identified in the 1999 Final EIS. Although there have been changes in laws, regulations, and policies relevant to several areas of Saddle Road (notably policies interpreting the Clean Water Act and the designations of critical habitat in land adjacent to the MP 15-19 portion for certain endangered plants and insects under the Endangered Species Act), HDOT and FHWA are not aware of any new information or further developments that would produce new or significant environmental impacts that require re-examination in an SEIS.

This Draft Supplemental Environmental Impact Statement (Draft SEIS) has been prepared to evaluate the proposed action in accordance with NEPA and HRS 343. This SEIS contains only limited discussion of areas of Saddle Road outside of Section I and resources not directly affected by the proposed shift in alignment, and instead refers readers to the 1999 Final EIS for broader discussions. Furthermore, since this SEIS incorporates the 1999 FEIS by reference, it does not contain a detailed analysis of alternatives already analyzed in the FEIS. An in-depth analysis is presented for W-7 only, although aspects of other alternatives may be referenced for comparison purposes. The purpose of this SEIS is to determine whether it is feasible to implement W-7. If the determination is that it is not, HDOT and FHWA will implement W-3.

Funding

The Hawai‘i Long Range Land Transportation Plan identified the Saddle Road Improvement Project, extending from Kaumana to Mamalahoa Highway (SR 190), as a Tier 1 project. Tier 1 projects comprise those projects considered higher priority. Projects will be added into the federally required State Transportation Improvement Program (STIP) in phases as they are programmed for construction.

The U.S. Department of the Army, Surface Deployment and Distribution Command (SDDC), and the FHWA are co-administrators of the Defense Access Road (DAR) Program. The SDDC previously determined that the design and construction of that portion of the Saddle Road Improvement Project within the then-limits of PTA (approximately MP 28 to 41) were eligible for DAR funds because of the impact of the military operations at the PTA on Saddle Road. The improvements within Section II have been totally funded through the DAR program; DAR funding must be authorized and appropriated by Congress on an annual basis. The improvements within Section III and IV are being funded with HDOT Federal-aid highway funds. Construction within Section I is pending the outcome of this SEIS, which will determine whether W-7 is an acceptable substitute for the 1999 ROD-selected W-3 alignment. A funding

source for construction within Section I has not yet been identified, but Section I is being evaluated by the Army to determine if it is eligible for funding under the DAR program.

1.4 PURPOSE AND NEED

Despite the passage of about eight years since completion of the original EIS, the purpose of the Saddle Road Improvement Project remains the same: to provide a safe and efficient route for access to land uses along Saddle Road and for cross-island traffic between East and West Hawai‘i. The ongoing and planned improvements to Saddle Road would also address five general types of needs: roadway deficiencies; conflicts and hazards with military operations; capacity; safety; and social demand and economic development.

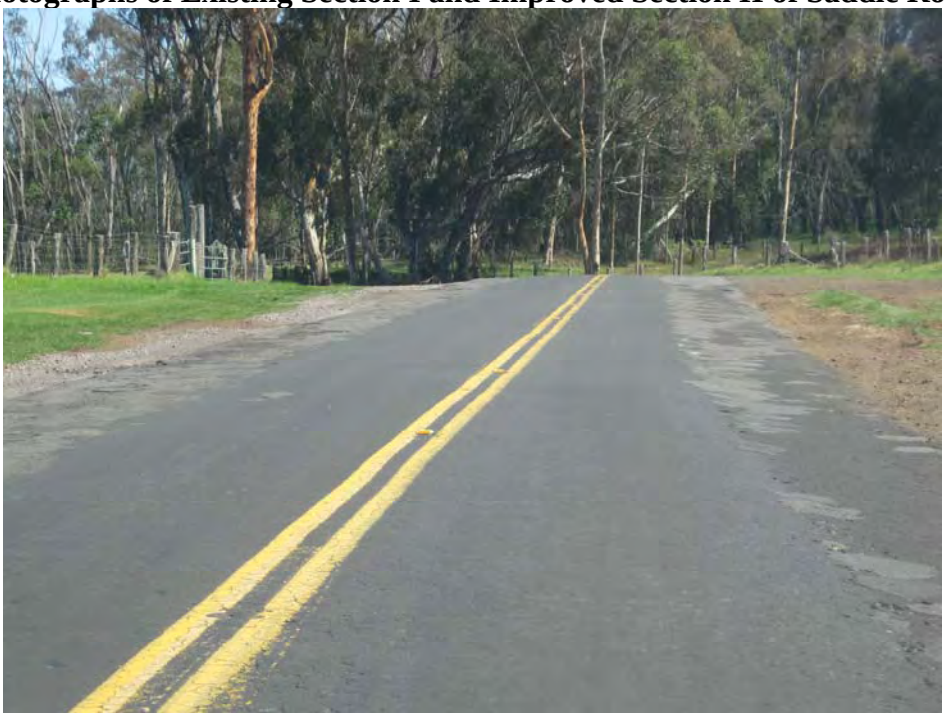
Section 1.6 of the 1999 Final EIS provided a detailed chronological description of how the purpose and need were derived and alternatives were established, which is not repeated in this section, which instead contains a general discussion of the purpose and need. Except as noted, the following discussion focuses on Section I (the western section) of Saddle Road, which is approximately 10.3 miles in length and extends from the Mamalahoa Highway (SR 190) to MP 41, near the area known as Seven Steps. As discussed above in Section 1.1, most of Sections II and III have been or soon will be upgraded, and the three-mile Section IV is still pending final design, certain permits, and funding.

1.4.1 Roadway Deficiencies

Although the existing Saddle Road in Section I is presently two-directional, in practicality, deterioration of the pavement has reduced much of the remaining unimproved sections of the road to one asphalt travel lane, 12 to 15 feet wide, with shoulders 2 feet in width (Figure 1.4.1). Pavement deterioration has compromised the integrity of the shoulders, where pavement is more patchy than continuous. The narrow width and poor pavement conditions encourage motorists to drive in the center of the road, increasing the potential for accidents, including head-on collisions. The 11-mile stretch of Saddle Road between the PTA and the Mamalahoa Highway (SR 190), which would be bypassed by the proposed action, contains eight one-lane bridges. The recent pavement overlays by the County of Hawai‘i on a portion of the existing road will not provide a long-term solution to the west side roadway deficiencies. Unless the structural section is totally reconstructed, the underlying deteriorated existing pavement condition will eventually be reflected upward through the new overlay surface.

With horizontal and vertical alignment deficiencies, the unimproved sections of Saddle Road are characterized by steep grades and sharp curves, which in many places prevent motorists from being able to see an adequate distance ahead to stop safely. The narrow travel lanes, inadequate shoulders, steep grades, sharp curves, and associated substandard sight distances make it very

Figure 1.4.1
Photographs of Existing Section I and Improved Section II of Saddle Road



Existing Section I ▲ ▼Improved Section II

hazardous to pass slow-moving vehicles. In addition, pavement markings and roadway signage are currently inadequate within the unimproved sections of Saddle Road. Drainage structures are undersized or non-existent in critical locations, resulting in periodic flooding of portions of the roadway. Saddle Road is very occasionally closed during major storm events due to flooding and hazardous road conditions.

1.4.2 Conflicts/Hazards with Military Operations

Prior to the realignment of Saddle Road in Section II, live fire and aerial and ground exercises created conflict between the traveling public and military training, which presented serious safety hazards to both the motoring public and military units training at PTA. The conflicts also reduced the quality of some of the training undertaken at PTA. To address this safety concern and impacts to training, Saddle Road was realigned to north of the base to avoid public traffic from passing through PTA in Section II.

As discussed previously, the Army's acquisition of the Keʻāmuku parcel in 2006 resulted in the ROD-selected Section I alignment (W-3) passing through the middle of these lands. Therefore there is a need to reduce the conflict between the military and the traveling public to levels that are acceptable to both interests. The U.S. Army Garrison, Hawaiʻi requested in September 2006 that HDOT and FHWA consider relocating the highway southwesterly towards the southern boundary of Keʻāmuku and that such a relocation would better meet one of the original purposes of the Saddle Road EIS, which was to minimize conflict between civilian and military uses within.

1.4.3 Capacity

Future growth in traffic volumes is projected for Saddle Road whether Section I is completed or not. The 1994 average daily traffic (ADT, the sum of all vehicles in both directions on a daily basis) on Saddle Road was 900 vehicles. A 1994 traffic assessment reported in the 1999 EIS predicted that by 2014, with the No Action Alternative, Saddle Road ADT would increase to 4,400 (Rust 1994). Completion of proposed improvements to Saddle Road was expected to further increase traffic volumes to 14,000 ADT by 2014, a ten-fold increase over existing levels and a three-fold increase over that of the No Action Alternative for 2014. The conclusion based on these predictions was that the level of need far exceeded the road's existing traffic capacity.

In order to update these 14-year old projections, FHWA measured traffic volumes at six locations over two 14-day periods beginning on March 10 and November 20, 2008, and found ADTs of about 1,200 to 1,700, resulting in an average ADT of 1,400. Although this reflects about a 50 percent increase from 1994 levels, the growth is less than either of the scenarios projected in 1994. While the growth predictions made in 1994 were probably over-estimated, the substantial but presumably temporary slowdown in visitor numbers and economic activity in 2008 on the Big Island, as well as reduced military training as a result of overseas deployment of

Hawai‘i-based units since 2001, are also partially responsible for traffic volumes that were lower than predicted.

The updated traffic analysis shows that the upcoming completion of additional segments of Saddle Road in 2009 and 2010 would continue to raise the ADT. It should be noted that traffic impacts from implementing W-3 or W-7 would be identical, as they have the same length and termini. The underlying reason for the projected increase is a variety of demands including: 1) increased commuter traffic; 2) residential development in the Kohala, Waikoloa, and Waiki‘i Ranch areas; 3) tourist traffic; 4) recreational travel; 5) agricultural transportation; 6) military operations; 7) traffic related to the Mauna Kea astronomical and Mauna Loa atmospheric observatory complexes; and 8) growing congestion along alternative cross-island routes. As shown in Table 1.4.1, ADT growth is expected occur regardless of whether the western section is completed because of the increased convenience and safety of the entire route resulting from the improvements being made in Sections II and III (and eventually, Section IV). Traffic volumes would more than double from about 1,400 ADT to 4,058 ADT by 2013.

After 2013, the level of increase in traffic volume would depend on whether Section I of Saddle Road is completed (see Table 1.4.1). Without the realignment and modernization of Section I, traffic would rise to 4,400 by 2034. With construction, total traffic volumes are expected to rise to over 5,000 by 2020 and 8,125 by 2034, with about 6,500 (80 percent) utilizing the realigned section, and 1,625 (20 percent) using the old Saddle Road through Waiki‘i.

Table 1.4.1
ADT Projections

Year	**ADT**		
2008	1,378 [1]		
Completion of Segments of East Side of Saddle Road During 2009-2011			
2011	3,811 [2]		
2013	4,058 [2]		
Completion of West Side of Saddle Road by 2013			
	ADT on W-7 with Section I Realigned	ADT on Existing Section With Section I Realigned	ADT on Existing Saddle Without Section Realigned
2014	3,360 [3]	840 [3]	4,074 [2]
2017	3,743 [3]	936 [3]	4,123 [2]
2020	4,211 [3]	1,053 [3]	4,172 [2]
2025	5,123 [3]	1,281 [3]	4,253 [2]
2031	6,233 [3]	1,558 [3]	4,351 [2]
2034	6,500 [3]	1,625 [3]	4,400 [2]

[1] %Truck/Bus traffic estimated at 1.7%; [2] %Truck/Bus traffic estimated at 2.0%; [3] %Truck/Bus traffic estimated at 5.0%. Source: FHWA-CFLHD.

Separate from but related to the ADT question is how traffic congestion and the quality of traffic flow would change in the future, with or without improvement of Section I. Without construction of Section I, the transportation of ammunition, training equipment, water trucks, and troops to and from PTA would continue to create occasional long, slow-moving convoys on the existing Saddle Road between Mamalahoa Highway and PTA. With the existing Saddle Road's severely limited passing opportunities, platoons of traffic are created as motorists are trapped behind slow-moving vehicles or military convoys. Construction of the road will provide a safe modern highway with sufficient capacity for expected growth.

The degree of congestion and ease of traffic flow are commonly expressed by *Level of Service* (LOS), a qualitative measure of operational conditions within a traffic stream and motorists' perception of those conditions. It relates to the density of traffic relative to roadway capacity. It expresses conditions of speed, travel time, freedom to maneuver, traffic interruptions, comfort, convenience, and safety. The quality of traffic flow is described in six categories of service, A through F, with LOS A representing traffic in a free flow condition, and LOS F representing serious congestion and considerable delays. On a two-lane road, LOS is primarily determined by the ability to pass, which is largely dependent on the roadway geometrics, percentage of steep grades, traffic volumes, and sight distance. Most experienced motorists are comfortable with LOS C, where roads remain safely below but efficiently close to capacity, and posted speed is maintained.

Using operational analysis procedures presented in the Highway Capacity Manual, Fourth Edition, 2000, the LOS under current conditions was calculated. Based on these procedures, the west side of Saddle Road is currently operating at LOS E in most areas (Table 1.4.2). This is due to the poor condition of the pavement, its narrow width, alignment deficiencies, and poor sight distances. Table 1.4.2 provides the LOS with and without the Section I improvements. With projected traffic growth and no proposed improvements, Saddle Road is expected to remain at LOS E or even deteriorate to LOS F by the year 2034. With LOS E, passing in most locations is unsafe and platooning occurs when slower vehicles or other interruptions are encountered. With the proposed improvements, Saddle Road LOS would be improved, and would remain at LOS C along W-7 as late as the design year 2034. LOS C represents moderate congestion and is considered a more-than-adequate condition.

Table 1.4.2
Current and Future Traffic Level of Service for Section I, Saddle Road

Year	ADT	LOS
2009 Estimated Traffic	1,400	E
No Improvements		
2034 Projected Traffic	4,400	E/F
With Improvements		
2034 Projected Traffic (W-7 Section)	6,500	C
2034 Projected Traffic (Existing Section)	1,625	C

1.4.4 Safety

Roadway deficiencies, conflicts/hazards with military operations, and capacity limitations contribute to safety concerns about Saddle Road. Table 1.4.3 provides data on traffic accidents that occurred on the MP 41-53 (Section I) portion of Saddle Road in the 12-year period from 1995 to 2006, compiled by HDOT in an unpublished 2006 report. The total number of accidents was 136, including 88 involving injury, one fatality, and 47 property-damage-only collisions. Within this time period, 149 persons were injured and one person was killed on Saddle Road. The majority of accidents (76 percent) occurred during daylight, and there were relatively few accidents during rainy conditions. The most important factor appeared to be the horizontal and vertical alignment (leading to limited sight distance), road width, and pavement conditions. Many of the accidents (42 out of 136 accidents) occurred over the half-mile section between MP 45.50 and 46.00, which contains sharp horizontal curves and limited passing sight distance on vertical curves.

Table 1.4.3
Accidents on Section I of Saddle Road, 1995-2006

Year	#Accidents	# Injury Accidents	# Injuries	# Fatality Accidents	# Fatalities
1995	14	8	10	0	0
1996	13	10	16	0	0
1997	14	13	27	0	0
1998	12	6	12	0	0
1999	7	5	9	0	0
2000	11	6	8	0	0
2001	15	10	19	1	1
2002	15	7	11	0	0
2003	6	5	9	0	0
2004	13	5	6	0	0
2005	10	9	16	0	0
2006	6	4	6	0	0
Total	136	88	149	1	1

Source: State of Hawai‘i, Department of Transportation, 2006. *5% Accident Report*. Unpublished.
Note: The State of Hawai‘i, Department of Transportation, has provided this traffic accident information under the protection of 23 USC 402(k) and 409. This information may not be used in any Federal or State court proceeding in any action for damages arising from any occurrence at a location mentioned or addressed in the information provided.

1.4.5 Social Demand and Economic Development

Saddle Road is needed for access to the PTA, Mauna Kea, Mauna Loa, Mauna Kea State Park, outdoor recreation areas along the road including areas used for hunting and gathering, ranch lands, and the communities of Waikiʻi Ranch and Kaumana. It is also important for providing a cross-island transportation route to connect East and West Hawaiʻi for business travel, the transport of goods and services, tourism, recreation, shopping, and commuting. Although the portion of the existing Saddle Road in Section I is just over 11 miles long, extending from the Mamalahoa Highway (SR 190) to MP 41, motorists consider this substandard but key segment perhaps the most unsafe and difficult to drive.

East and West Hawaiʻi differ in economic and development patterns and opportunities. Most government functions and the main University of Hawaiʻi system campus on the island, the University of Hawaiʻi at Hilo, are located on the east end of the island in Hilo, where housing costs are generally lower. Over the last thirty years, however, much of the tourism-related growth in employment and the economy has been occurring in West Hawaiʻi. Without a safe and efficient cross-island route, business opportunities across the island are more limited, and the economies of East and West Hawaiʻi can be expected to continue to diverge. In addition, these conditions create a need for some people to commute cross-island. Decreased cross-island travel times resulting from improvements to Saddle Road would increase the mobility of the labor force.

In addition to Saddle Road, two other routes can be used for travel to cross-island destinations: SR 19 and SR 11 (see Figure 1.1.1). SR 11, however, is 30 to 100 miles longer than the other two routes between Hilo and various destinations in Kona and South Kohala, and is generally not used by frequent travelers. For this reason, SR 19 along the Hamakua Coast is considered the only feasible alternative to Saddle Road for most cross-island traffic. SR 19 is approximately 8 to 12 miles longer than Saddle Road for travel between Hilo and destinations in Kona and South Kohala. Between Hilo and Waimea, SR 19 is the shorter route. However, due to frequent towns and related speed reductions, SR 19 is a less direct route. Because of the roadway deficiencies and a lack of services and roadside amenities on Saddle Road, SR 19 currently carries a larger percentage of the cross-island traffic, resulting in congestion on SR 19 during peak travel hours, increasing the time needed to complete the trip. Widening to more than two lanes is not practical for most of the SR 19 route because of the extremely steep terrain, the many homes adjacent to the right-of-way, and particularly the large number of bridges. This severely limits future capacity and expansion potential.

Tourists currently do not have easy access to the interior of the island. Even with the improvements made to date, some automobile rental agencies still restrict or prohibit use of their vehicles on the road due to the condition of the unimproved sections of Saddle Road, preventing many tourists from experiencing the attractions within the saddle area.

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(W7)		

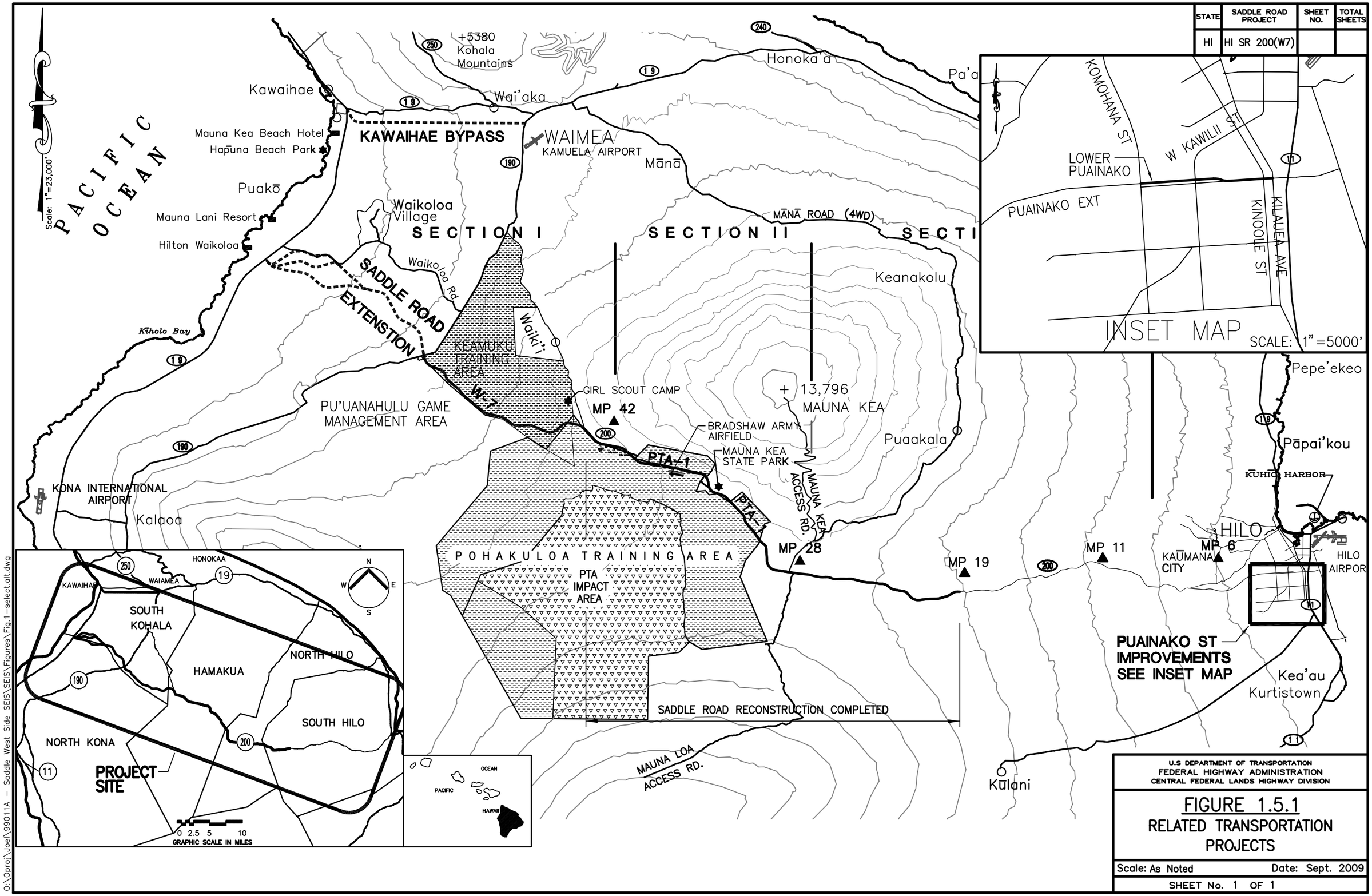


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FIGURE 1.5.1
RELATED TRANSPORTATION PROJECTS

Scale: As Noted | Date: Sept. 2009

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The proposed improvements to Saddle Road would continue to upgrade and modernize this transportation facility as a two-lane highway that would meet contemporary design standards for rural arterials and provide adequate capacity to handle anticipated traffic volumes through 2034 and beyond.

1.5 OTHER RELEVANT TRANSPORTATION PROJECTS

Several State of Hawai‘i or County of Hawai‘i transportation projects are relevant to the improvements on Saddle Road (Figure 1.5.1).

- At the time of the 1999 Saddle Road EIS, the *Puainako Street Widening and Extension* project in Hilo (SR 2000) was still in planning. The Puainako Extension portion of the project was completed in 2004. The Saddle Road Improvement Project begins at the western terminus of the Puainako Street Extension. The second half of the Puainako project, which involves realigning and widening the section between Komohana Street and State Highway 11 to complete the cross-island link, is still in planning.
- In 1998, the EIS began for the proposed *Saddle Road Extension*, a highway connection between the Mamalahoa Highway (SR 190) and Queen Ka‘ahumanu Highway in the vicinity of Waikoloa Road on the west side of the Island. Early alternative studies for the project were conducted, but no major work has proceeded on the project since about 2003. The selection of a western terminus for the Saddle Road project will influence the eastern terminus of the Saddle Road Extension project; however, the W-7 terminus is essentially the same as the W-3 terminus. In the event that HDOT determines that it is not feasible or prudent to locate the Saddle Road Extension project contiguous with the Saddle Road terminus, another alternative will likely be identified.
- The *Kawaihae Road Bypass* project would construct a new 15-mile major arterial highway with truck climbing lanes that realigns the existing Kawaihae Road from Waimea to Kawaihae. Studies for the Draft EIS are currently being conducted. It is anticipated that the Draft EIS will be prepared and submitted by March 2010. Prior to this submittal, a public informational meeting will be held. The eastern terminus of the Kawaihae Road Bypass is currently under active discussion with community groups.

1.6 PROJECT DEVELOPMENT STATUS AND IMPLEMENTATION SCHEDULE

A summary of project development from 1993 to the present is contained in Chapter 8. The SEIS process formally began with the Notice of Intent (NOI) in the Federal Register published on December 10, 2007, and the issuance of Saddle Road SEIS Preparation Notice (SEISPN) on January 8, 2008, initiating a 30-day State of Hawai‘i comment period. The lead agencies prepared responses to commenters (see Appendix A1 for NOI and A2 copies of comments and responses to SEISPN) and planned studies in consideration of the comments.

After this Draft SEIS is issued there will be a 45-day comment period. During this time, two public hearings will occur – one on each side of the island. Following the end of this comment period, the lead agencies will prepare responses to commenters, incorporate relevant information into the Final SEIS and conduct additional studies, if appropriate. The Final SEIS will present the recommended alternative. A legally binding federal Record of Decision (ROD) will then be prepared by FHWA that will summarize the project, identify the selected alternative and the rationale for its selection, and specify mitigation commitments.

1.7 REQUIRED PERMITS AND APPROVALS

A number of permits or other approvals may be necessary prior to implementation of the project. The following list (Table 1.7.1) represents those permits or approvals identified to date. Additional permits might be identified subsequently if warranted by project modifications, mitigation measures, or refinements in final design.

Table 1.7.1
Permits and Approvals

Permit / Approval	Applicable Activities	Applicable Areas	Regulatory Agency
Historic Sites Review	Any construction in the vicinity of a designated historic place or archaeological site.	Sites listed on or eligible for national or State registers of historic places	State Department of Land and Natural Resources (DLNR), Historic Preservation Division
State Highways Permit	Any work.	Within State highway ROW	State DOT
Conservation District Use Permit (CDUP)	Any use of conservation lands.	Lands designated State Land Use Conservation	State DLNR
Permit to Construct an Air Pollution Source	Constructing or installing a new air pollution source or modifying an existing source.	Statewide	State Department of Health (DOH)
National Pollutant Discharge Elimination System (NPDES)	Discharge of any pollutant, altering the quality of any discharge, increasing the quantity of any discharge.	Surface streams and coastal waters of the State	State DOH
Subdivision Approval	Dividing or consolidating parcels of land for right-of-way.	Statewide	County of Hawai‘i Planning Dept.
Grading, Grubbing, Excavating and Stockpiling Permits	Any excavation or fill, removal of vegetation from the surface, or the purposeful accumulation and set-aside of loose soil.	Statewide	County of Hawai‘i Department of Public Works

CHAPTER 2 ALTERNATIVES

As discussed in Section 1.3 above, this SEIS considers only Section I of Saddle Road. The portions of Saddle Road within Sections II and III have already mostly been built using the alternative alignments selected in the 1999 ROD. The remainder of Section III and all of Section IV are in various stages of construction or design using the selected alternative alignments. The No Action Alternative, which was not selected for reasons of safety, circulation, and land use impacts, would continue use of the existing alignment, and traffic on the substandard road through Waikiʻi would continue to increase. Since construction is almost complete in Sections II and III, an overall No Action Alternative is impossible. The reasons for rejection of the No Action Alternative remain valid for Section I, and it is referenced in this EIS for baseline purposes only, as is W-3. If it is not feasible to construct W-7 based on the findings of this SEIS, FHWA and HDOT expect to build W-3 rather than implement the No Action Alternative from the 1999 EIS. However, W-3 does not meet the project purpose and need as well as W-7. For this reason, W-7 is the preferred alternative.

This chapter first briefly reviews the process of developing and evaluating various alternatives for Section I that was undertaken prior to advancing W-3 as the alternative alignment recommended in the 1999 FEIS and selected in the ROD. This is included because those alternatives were briefly reviewed as a part of the current process to reconsider whether they might be appropriate alternatives for further analysis at this time. The second section of the chapter describes the process to select W-7 and the design characteristics of that alternative.

2.1 ALTERNATIVE FORMULATION AND EVALUATION

The 1999 FEIS looked at several alternatives for the westernmost portion of Saddle Road, which were depicted in the previous chapter in Figure 1.1.2. The alternatives initially considered in this SEIS were the following:

- The alternative alignment studied in detail and recommended in the FEIS and selected by the Record of Decision (W-3);
- The alternative alignment that was advanced along with W-3 to the Final EIS but not recommended or selected (W-2);
- Improvements to the existing alignment of Saddle Road in Section 1 (EX-1);
- A series of alternative alignments considered in early phases of the 1999 EIS but eliminated from further consideration (W-4, W-5, and W-6);
- Several variants of a more southerly alignment requested by the Army in 2006 after its purchase of the Keʻāmuku parcel (W-7a-c) (Figure 2.1.1);
- Traffic System Management and Mass Transit Alternatives; and
- No Action.

Most of these alternatives had been carefully studied over a three-year period from 1994 to 1997 for the improvement of Saddle Road. These were developed and refined with the

input and involvement of a Social, Economic, and Environmental Team (SEE Team)[1]; the Saddle Road Task Force; project team specialists, including biologists, botanists, archaeologists, sociologists, economists, land use specialists, water quality specialists, visual resource specialists, and engineers; and government agencies, local residents, landowners, and citizens-at-large.

W-3 Alignment Alternative

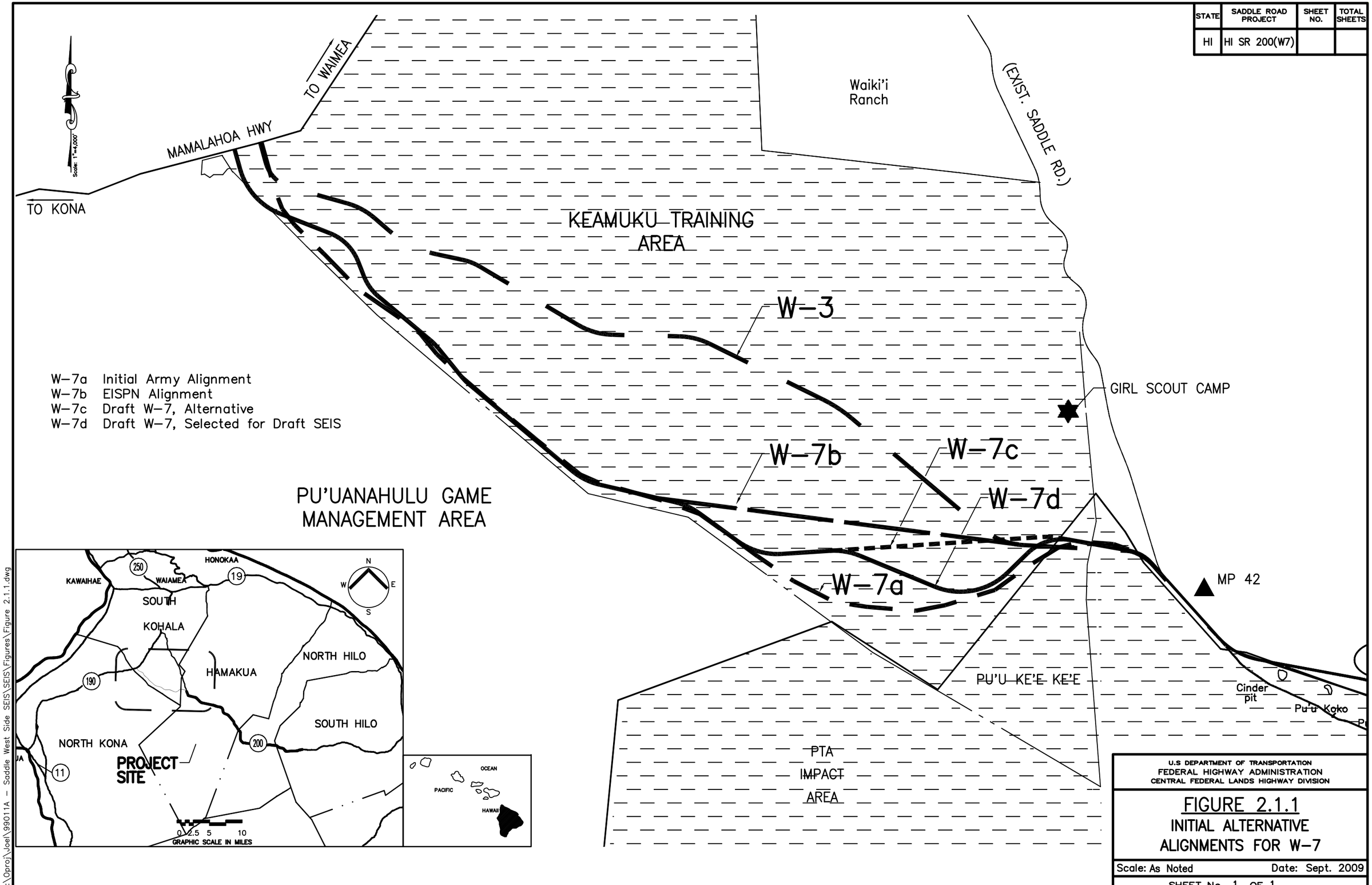
As shown in Figure 1.1.2, this 10.3-mile route extends almost due west from MP 41 for 1.2 miles on the foothill slopes of Puʻu Keʻekeʻe. Once inside the Keʻāmuku parcel, W-3 turns west by northwest and roughly keeps this bearing over the next eight miles to Mamalahoa Highway, passing about a half-mile south of the old Keʻāmuku ranch village. W-3 would have a maximum grade of about 8.0 percent. Construction of W-3 would require ROW land conversion of approximately 250 acres. The estimated construction cost for alternative alignment W-3 was $39,000,000 in 1999 dollars and the estimated cost for mitigation was $500,000. One of the major considerations in the selection of W-3 as the Recommended Alternative in the ROD was its efficiency for serving cross-island traffic, because W-3 (like W-7) angles towards the Kona District, and the largest percentage of motorists using Saddle Road are coming from or going to Kona. In terms of overall time and fuel savings, W-3 resulted in greater benefits to Saddle Road motorists and the community as a whole than the other alternatives identified in the original EIS. However, the reason for this SEIS is that the Army determined that W-3 would substantially impact its training operations and cause interference between civilian and military traffic.

W-2 Alignment Alternative

W-2 would have a path very similar to W-3 along the first 3.1 miles from MP 41 westward (Figure 1.1.2). After this point, W-2 heads north/northwest in a series of long curves that are necessary to traverse the eroded terrain, leading to a greater overall length than W-3. Alternative alignment W-2 would have a length of 10.6 miles, a maximum grade of 8.0 percent, a base elevation of approximately 2,520 feet above sea level, and a top elevation of approximately 5,480 feet. Construction of W-2 would require additional ROW land conversion of approximately 180 acres. The estimated construction cost for W-2 in 1999 was $39,000,000 and the estimated cost for mitigation was $500,000 in 1999 dollars. W-2 would connect Saddle Road directly to Waikoloa Road and reduce the travel distance between Hilo and Waikoloa/Kona from that of the existing Saddle Road alignment. Residents of Waikoloa Village expressed concern in public meetings about the effect of making Waikoloa Road essentially an extension of Saddle Road.

1 The SEE Team is an interagency project coordination and guidance team established by FHWA at the outset of all projects and, in this instance, consisted of HDOT, Hawai'i County, U.S. Army Corps of Engineers (USACE), U.S. Army [U.S. Army Pacific Command (USARPAC), U.S. Army Garrison, Hawai'i (USAG-HI), and SDDC], USFWS, Environmental Protection Agency (EPA), and FHWA.

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(W7)		



U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

FIGURE 2.1.1
INITIAL ALTERNATIVE ALIGNMENTS FOR W-7

Scale: As Noted Date: Sept. 2009

SHEET No. 1 OF 1

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Furthermore, W-2 also runs close to Waiki‘i Ranch, where community members expressed concern about noise pollution and the commercial viability of their agricultural properties. W-2 also shares with W-3 the severe disadvantage of bisecting Ke‘āmuku, thus failing to meet the critical need of separating military from civilian activities.

EX-1 Alignment

EX-1 would follow along the existing 11.3-mile Saddle Road alignment through Section I (see Figure 1.1.2). It ascends 200 feet higher in elevation than all other alternative alignments and would have a maximum grade of 19 percent without significant earthwork to reduce the grades to acceptable levels. Right-of-way acquisition would be required from existing land uses including ranches. Construction of EX-1 would require the removal of the existing trees that line the road from Waiki’i Ranch to the Mamalahoa Highway. It would require a complete reconstruction of the existing road, involving traffic control and numerous and frequent restrictions or closures for limited periods during construction activities. This would increase the duration of the construction project and could increase construction costs by 8 to 10 percent relative to other alternative alignments, to a total of $53.0 million in 1999 dollars. Operationally, alternative alignment EX-1 would directly impact the existing residential community of Waiki’i. Community impacts would include increased traffic noise and increased traffic volumes. Higher traffic volumes and speeds along with a wider roadway footprint would create a more intrusive barrier to this community, making crossings of Saddle Road by automobile, bicycles, and pedestrians more hazardous. Because this alternative alignment is closer to the *Palila* (*Loxioides bailleui*, a federally listed endangered bird) critical habitat, the risk of fire would have increased potential adverse impacts to this endangered species. Considering these factors, EX-1 was eliminated from consideration by the SEE Team in 1998 and was not advanced to the Draft EIS in 1999.

W-4, W-5 and W-6 Alternative Alignments

W-4 exits Ke‘āmuku and enters vacant State land within areas of Pu‘uanahulu that have never been used for grazing or ranching (Figure 1.1.2). Although able to separate military and civilian activities, this alignment traverses important stands of native dryland forest and *kipuka*, areas of mature vegetation isolated by more recent lava flows. Several federally listed endangered plant species occur in lava flows traversed by W-4, and the prevalence of fountain grass and the inaccessibility of the areas lead to extremely high fire risk. Finally, the alignment might traverse habitats for sensitive species of invertebrates. Although construction costs estimates were not undertaken for this alternative alignment as part of the 1999 EIS, the increased length would clearly lead to higher costs than the 10.3-mile W-3. Despite this, it would provide no greater reduction in distance from Kailua-Kona to MP 6 than that of W-3. For these reasons, W-4 was eliminated from further consideration by the SEE Team in 1998.

W-5 and W-6 have paths that result in very similar characteristics (Figure 1.1.2). W-5 extends westerly from MP 41 on the existing Saddle Road to a point on Mamalahoa Highway near Pu‘uanahulu. W-6 intersects Mamalahoa Highway (SR 190) approximately 6.4 miles north of Palani Junction and joined W-5 from the south. Major concerns were identified with these two alternative alignments: potential impacts on the Pu‘uanahulu Game Management Area, cultural resource areas, open space, and threatened and endangered plants and animals, as well as increased fire danger. Like W-4, W-5 and W-6 swing off of the Ke‘āmuku parcel and onto State land that has never been used for grazing or ranching. These alignments traverse important stands of native dryland forest and *kipuka*. A Federally listed endangered plant species occurs in lava flows on W-5 and W-6, and the alignments might traverse habitats for a listed species of invertebrate. These alternative alignments would be more costly than W-3 with respect to both environmental mitigation and construction. Alternative alignments W-5 and W-6 support traffic movements toward Kailua-Kona but significantly increase distances to the South Kohala resort areas, Waikoloa Village and Waimea. As a result, it is likely that the existing Saddle Road section between MP 41 and Mamalahoa Highway (SR 190) would require improvement as well, further increasing project costs for these alternatives. For these reasons, these two alternative alignments were eliminated from further consideration by the SEE Team in 1998.

Transportation System Management (TSM) Alternatives and Mass Transit

Transportation System Management (TSM) and mass transit alternatives were not considered reasonable or feasible to satisfy the purpose and need for the proposed action in the 1999 EIS. Saddle Road is a rural arterial highway. Current and projected traffic levels for this roadway do not justify the development of TSM alternatives, such as high-occupancy vehicle lanes, or minor changes to roads such as use of existing shoulders for through or travel lanes or the application of better signalization to optimize queuing. Without improvements to the roadway structure and geometrics, high occupancy vehicle (HOV) lanes could not be developed along Saddle Road. In any case, the transportation problem underlying the purpose and need for this project is not peak-hour congestion, which HOV lanes may be effective at solving, but the lack of a safe, modern highway through the center of the island between East and West Hawai‘i. TSM approaches do not address the basic problem of an indirect connection.

The public transportation system on the island of Hawai‘i consists of a County bus system, a vanpool system and a rideshare program that involves a database matching drivers to passengers. Of the fleet of 50 buses serving the County (nine more are on order), 11 buses go back and forth each day between East and West Hawai‘i. According to Transportation Specialist Tom Brown of the Hawai‘i Mass Transit Agency (pers. commun. to Ron Terry, 6/18/09), the buses usually run at 60-90 percent occupancy. The majority of riders are workers commuting between East Hawai‘i and Waimea and the Waikoloa resorts, and the system is effective for getting workers to their jobs, which are concentrated in one location. Relatively few riders other than workers use the five South Kohala buses, but general public use is growing. It is expected that the bus and rideshare

system will continue to expand to meet this important demand – the resort industry in South Kohala supports between 1,000 and 2,000 jobs. Regardless of improvements to Saddle Road, the buses would continue using the Hamakua coast route, as this is where a large portion of the major users, the resort workers, reside.

However, the majority of motor vehicle traffic utilizing the other major cross-island route, SR 19, is derived from sources other than commuters or others utilizing mass transit. Visitor travel (including rental cars and tour buses), business travel, cargo and service trucks, shopping, and recreation are important sources of traffic for consideration in this analysis. According to discussions with Hawai‘i County Mass Transit Agency officials, there appears to be little potential to substitute mass transit for these components, which require flexibility, multiple stops, cargo capacity, and out-of-the-way destinations. And just as with the TDM/TSM strategy, mass transit does not provide more efficient connections between rural regions with sparse road networks, as is the case here. Furthermore, mass transit cannot meet the growing demands of commercial and military users of the road. Mass transit would benefit from a new roadway in the project region, but it cannot substitute for this project. For the reasons stated above, the TSM and Mass Transit Alternatives were dismissed from further consideration in the 1999 EIS.

No Action Alternative

The No Action Alternative would have maintained the westernmost section of Saddle Road as it was prior to the start of the project and included the completion of short-term, or minor, maintenance and restoration activities. The No Action Alternative was rejected because of the following major consequences.

- This portion of Saddle Road would not be upgraded to the standards necessary to render a design speed of 60 MPH and provide for improved cross-island commuter travel.
- Sharp curves, restricted sight distances, roadside hazards, and inadequate shoulders common to this section of roadway would not be corrected, leading to a potential for higher accident rates as traffic volumes increase.
- No uphill passing lanes, truck escape ramps, or scenic Typical Sections s would be provided in this section to accommodate increased traffic volumes.
- The sight distance needed to safely avoid obstacles on the road and roadside hazards or to safely pass slow-moving vehicles on this section would not be improved, and LOS would deteriorate sharply as a result of normal traffic increases.
- Steep grades, some in excess of 15 percent, would not be improved or bypassed, further impacting roadway capacity as traffic volumes increase.
- Poor roadway pavement, which currently encourages motorists to drive in the center of the road, would not be reconstructed in this section and would continue to deteriorate, thus increasing maintenance costs as traffic increases.
- Existing substandard drainage culverts and eight existing one-lane bridges (including at least one structure with legal load restrictions) in this section would not be improved.

- Existing signing and pavement markings in this section would not be improved.
- Conflicts between the traveling public and the PTA military traffic in this section would not be reduced or minimized and would increase with the projected increase in traffic volume.
- The response time of emergency vehicles to accidents and emergencies would not be improved and would instead increase due to projected growth in traffic volumes and reduced LOS and operating speeds.
- Traffic volumes would continue to grow with this alternative, but at a slower rate than with the action alternatives. The future traffic volume for Saddle Road without construction of the Section I portion has been estimated at 4,400 by 2034 With this growth in traffic and without proposed improvements to Saddle Road, the quality of traffic flow on Saddle Road would be expected to deteriorate, from LOS D to LOS E or even F. This increased volume on the existing facility would also result in increased maintenance costs for the existing pavement structure, higher accident rates, increased fire risk, and increased noise levels at Waiki‘i and PTA.
- As cross-island traffic increases as a result of the economic expansion of West Hawai‘i, there would be increased congestion along SR 19.
- There would be no improvements to shoulder areas for safe stopping or resting.
- Fire risk to *Palila* habitat from the proximity of the existing road would not be decreased and might increase as a result of normal traffic growth.

Table 2.2.1 summarizes the benefits provided by each alternative from the 1999 FEIS.

Table 2.2.1
Alignments Comparison Matrix for 1999 FEIS Alternatives

	W-3	W-2	Ex-1	W-4	W-5	W-6	NoAc
Eliminate substandard roadway design elements and geometric deficiencies	■	■	○	■	■	■	□
Minimize conflict between the traveling public and PTA military training operations	□	□	■	○	○	○	○
Provide improved east/west access enhancing operational function and traffic flow	■	■	○	■	■	■	□
Improve emergency vehicle and firefighting access.	■	■	○	■	■	■	□
Accommodate present and future traffic levels	■	■	■	■	■	■	□
Minimize impacts to biological resources	■	■	■	□	□	□	■
Minimize fire risk on PTA and adjacent areas	○	○	○	□	□	□	□
Minimize impacts to historic properties and cultural resources	■	■	○	○*	○*	○*	■
Minimize impacts to hunting	■	■	■	□	□	□	○
Minimize construction and mitigation costs	■	■	□	○	○	○	■

Suitability: ■ Favorable ○ Neutral □ Unfavorable * not assessed.

A detailed description of the Action Alternatives and analyses is provided in the 1999 FEIS. In summary, however, the W-3 alternative was selected since it best met the various components of the purpose and need.

This SEIS addresses the potential impacts of the W-7 alignment, which is being investigated because of the Army's purchase of the Keʻāmuku parcel and the request to shift the alignment to the south of the parcel. The lead agencies for the project developed and refined alternative alignments based on known environmental resources within the southernmost portion of Keʻāmuku, with assistance from the Saddle Road Task Force (a group of citizens requested by U.S. Senator Daniel K. Inouye to provide citizen input to the project), government agencies, the Army, local residents, landowners, and citizens at large. The purpose and need discussed in Section 1.4, which deals with roadway deficiencies, conflicts and hazards with military operations, traffic volume capacity, safety, and social demand and economic development, was considered during conceptualization of the alternative alignments.

W-7 Alignment Alternatives

In response to the need to investigate the conditions towards the southern boundary of Keʻāmuku, the area between W-3 and the boundary of Keʻāmuku with Puʻuanahulu was researched in 2007-2008. Beyond this boundary lies the Puʻuanahulu Game Management Area (GMA), State land within the Conservation District. The Puʻuanahulu GMA is a hunting reserve with a number of endangered plants and extremely high fire danger. These considerations had precluded advancing any alternative alignments within Puʻuanahulu in 1999 in accordance with recommendations by the Hawaiʻi Department of Land and Natural Resources and the U.S. Fish and Wildlife Service, and they continued to be valid reasons to avoid this area in 2009 (see discussion above on W-4, W-5 and W-6).

Several different variations on the W-7 route were initially investigated (Figure 2.1.1). All variants of W-7 branch off from the proposed W-3 route at a point about 1.2 miles west of the existing Saddle Road at MP 41. They would then traverse the Keʻāmuku parcel in a westerly direction, roughly paralleling the southern boundary of Keʻāmuku until near Mamalahoa Highway, where they would veer slightly north to take advantage of more favorable terrain for a major highway intersection. W-7 would have a maximum grade of 8.0 percent and an average grade of about 6.0 percent. About 250 acres of right-of-way would be required. Mamalahoa Highway would be intersected at-grade or by a grade-separated structure. The total length is approximately 10.3 miles, about the same as W-3. Construction would cost about $58 million in 2007 dollars.

The main differences in the alignments were the degree to which they approached the southern boundary, particularly on the eastern end of PTA. W-7a was the conceptual alignment proposed by the Army in its letter of September 6, 2006 (Appendix A3). As soon as it crosses from the Keʻekeʻe area into Keʻāmuku, it extends southwest towards the southern boundary of Keʻāmuku, and has a total length of 10.3 miles. It follows the

southern boundary closely until the western edge of Keʻāmuku, where it unites with the last 0.3 miles of the W-3 alignment and shares a common terminus on Mamalahoa Highway. Upon reviewing the alignment, the project team determined that its eastern end appeared to cross through habitat for the endangered *Haplostachys haplostachya* plant, which was later confirmed by field studies. Furthermore, on the western end, the W-3 terminus had been determined during post-EIS design to be technically impractical. For this reason, another conceptual alignment, W-7b, was developed as part of the Supplemental Environmental Impact Statement Preparation Notice (SEISPN) process in 2007. This 9.9-mile alignment "cut the corner" of the southeastern edge of Keʻāmuku and connected to Mamalahoa Highway at a location determined to be practical from an engineering standpoint. After detailed topography and initial field studies were conducted, another 10.26-mile alignment was developed, W-7c, that moved the eastern end of the alignment closer to the southern border and also avoided difficult terrain near the western end. Upon review of W-7c, the Army requested a further shift south at the eastern end to provide greater training area. Detailed botanical studies were conducted in the area containing *Haplostachys haplostachya* to determine the edge of the habitat so that the Endangered Species Management Unit containing these endangered plants could be protected with a 500-foot buffer. This resulted in a shift to the south and the 10.31-mile alignment termed W-7d.

After this range of alignments was developed, each one was evaluated again according to criteria derived from purpose and need and environmental considerations (Table 2.2.2).

Table 2.2.2
SEIS Alignments Comparison Matrix

	W-3	W-7a	W-7b	W-7c	W-7d	NoAc
Eliminate substandard roadway design elements and geometric deficiencies	■	■	■	■	■	□
Minimize conflict between the traveling public and PTA military training operations	□	○	□	□	○	○
Provide improved east/west access enhancing operational function and traffic flow	■	■	■	■	■	□
Improve emergency vehicle and firefighting access.	■	■	■	■	■	□
Accommodate present and future traffic levels	■	■	■	■	■	□
Minimize impacts to biological resources	■	□	■	■	■	■
Minimize fire risk on PTA and adjacent areas	○	○	○	○	○	□
Minimize impacts to historic properties and cultural resources	■	■**	■**	■**	■	■
Minimize impacts to hunting	■	■	■	■	■	○
Minimize construction and mitigation costs	■	■	■	■	■	■

Suitability: ■ Favorable ○ Neutral □ Unfavorable ** not fully assessed.

Based on environmental, cost, and feasibility considerations, the alternative most capable of effectively satisfying the purpose and need of the project was W-7d. ***W-7d was the final alignment chosen for advancement to the SEIS and is now simply termed W-7.*** The choice of the final alignment for W-7 was based on its reduction of conflict between military and civilian traffic (in that it minimized encroachment into important military training area that would require troops and vehicles to cross the highway), its avoidance of endangered plants located in the extreme southeast of the Keʻāmuku parcel, and its avoidance of major topographic features that would raise construction costs and disrupt the landscape. W-3 still meets the purpose and need of the project on the whole, but W-7 better satisfies more aspects of the purpose and need.

The No Action Alternative, which was not selected in the 1999 ROD for reasons of safety, circulation, and land use impacts, would continue use of the existing alignment. As it has already been rejected and continues to be unacceptable for meeting the purpose and need outlined above, the No Action Alternative is referenced in this EIS for baseline purposes only, as is W-3. If it is not feasible to construct W-7, FHWA and DOT expect to build W-3 rather than implement the No Action Alternative from the 1999 EIS.

2.2 ADVANCED ALTERNATIVE (W-7) DESCRIPTION

2.2.1 Design Criteria

The proposed project is intended to upgrade and modernize the westernmost portion of Saddle Road as a two-lane highway that would meet contemporary design standards for rural arterials and provide enough capacity to safely handle both current and projected traffic volumes up to the design year 2034.

Design parameters for Saddle Road were agreed upon at the project outset in the 1990s. The road is being developed to rural arterial standards, as defined by AASHTO (the American Association of State Highway and Transportation Officials), incorporating design controls presented in Table 2.2.3, *Design Criteria*. Uphill passing lanes, truck escape ramps, scenic and rest Typical Sections s, and military vehicle crossings would be incorporated as needed into project designs to enhance safety and to improve the projected level of service. The details of the intersection with the Mamalahoa Highway will be determined during final design.

Table 2.2.3
Design Criteria

Design Speed	60 mph [1]
Minimum Curve Radius	750 feet
Maximum Superelevation	8 percent
Curves	Simple curves with 67 percent of runoff on tangent
Maximum Grade	8 percent

[1] Design speed may be increased up to 62 MPH in areas where feasible.

The three Typical Sections developed for the project are depicted in Figures 2.2.1a-b. Plan sheets showing the entire route are provided in Figures 2.2.2a-e. These plan sheets also provide station numbers referenced in other parts of this SEIS.

The Typical Sections have been specially designed to reduce wildfire impacts, in ways specific to the segments of Section I through which they pass. All share the base characteristics of Typical Section A (Figure 2.2.1.a), which extends east from Mamalahoa Highway. It incorporates two 12-foot travel lanes, two 8-foot paved shoulders, and because of the grades, a passing lane for most of the length. In contrast to the present condition, this climbing lane would allow eastbound military convoys to utilize Saddle Road without congesting civilian traffic.

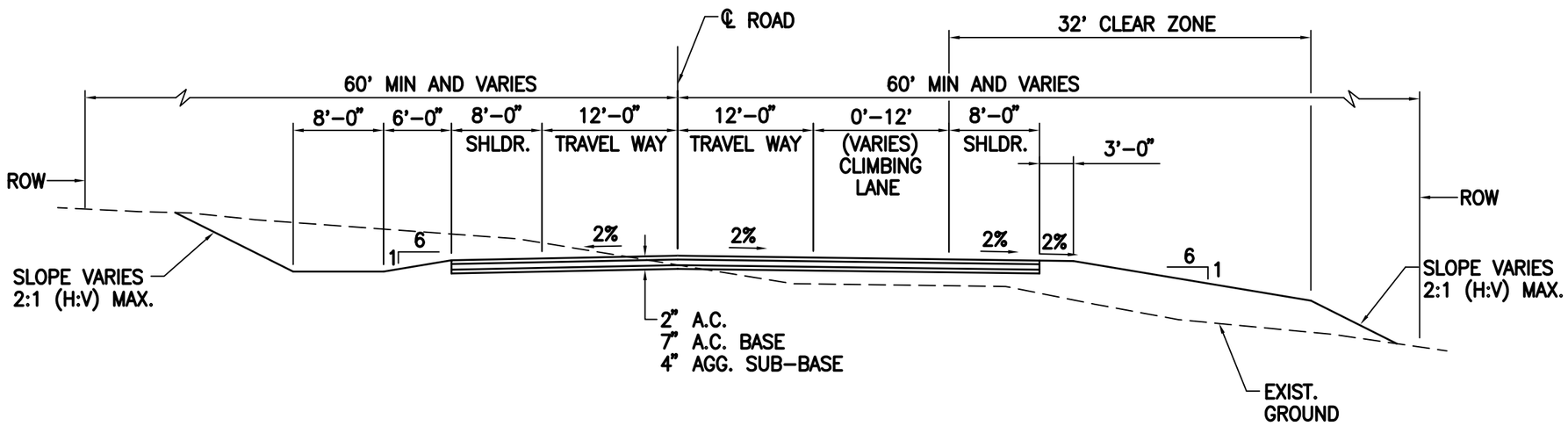
To reduce the threat of wildfires between the eastern boundary of the Keʻāmuku parcel and approximately MP 41, which passes adjacent to *Palila* critical habitat, Typical Section B has additional features to both reduce the likelihood of accidental ignition from unintentional road sources (car fires, catalytic converters, cigarettes, etc.) and assist in creating a firebreak and fuelbreak on the north side of the highway (Figure 2.2.1.b, Section B). The Typical Section in this area would have:

- Two 12-foot travel lanes with 8-foot paved shoulders.
- An 8-foot strip of pavement on the north side of the highway, which would serve as a firebreak, with a four-inch high curb on the outside.
- At the outside edge of the firebreak, a wire fence with metal posts would be constructed to a height of four feet on the edge of the pavement.

Further east, as W-7 crosses the Keʻāmuku and descends into lower elevations, the primary concern is to prevent fires from Saddle Road spreading southwards, towards the western boundary of the Keʻāmuku Endangered Species Management Unit containing *Haplostachys haplostachya*. The Typical Section is illustrated in Figure 2.2.1.b, Section C, and is modified from Typical Section A as follows:

- Three 12-foot travel lanes with 8-foot paved shoulders, with a four-inch high extruded asphalt curb at the outside of the shoulder.

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(W7)		



TYPICAL SECTION INSTALLED FROM HWY 190 TO STATION 340+00.
AUXILIARY LANES FOR THE INTERSECTION ARE NOT SHOWN.

TYPICAL SECTION A

NOT TO SCALE

U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

FIGURE 2.2.1a
ROAD TYPICAL SECTION A

Scale: N.T.S. Date: Sept. 2009

SHEET No. 1 OF 1

O:\Oproj\Joel\99011A-Saddle West Side SEIS\BA\Figure 3.dwg

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
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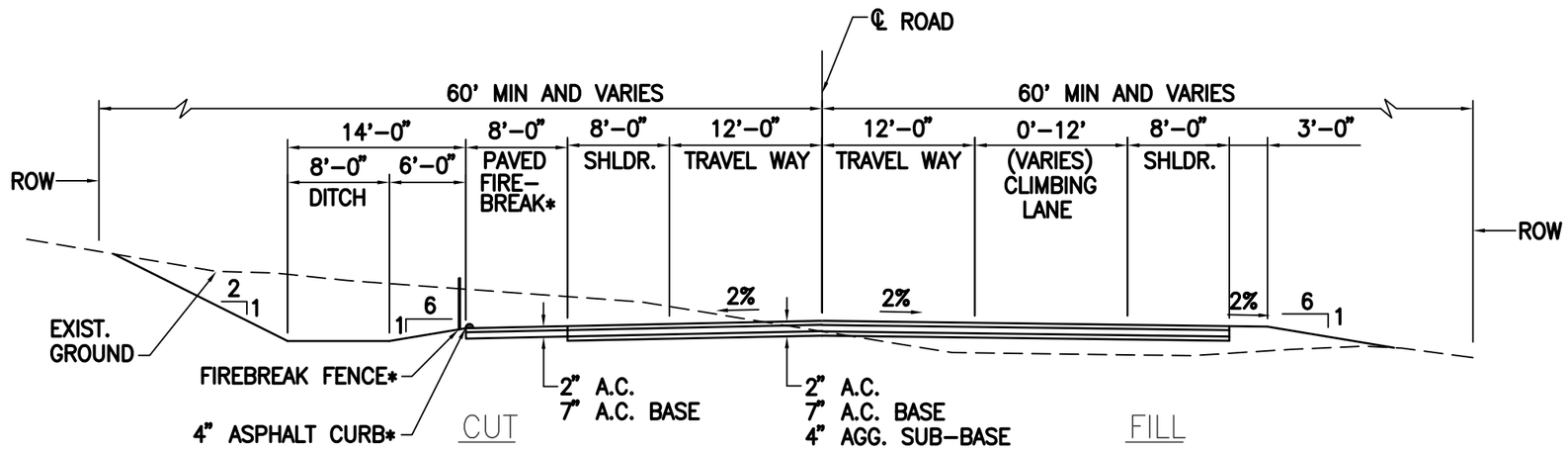
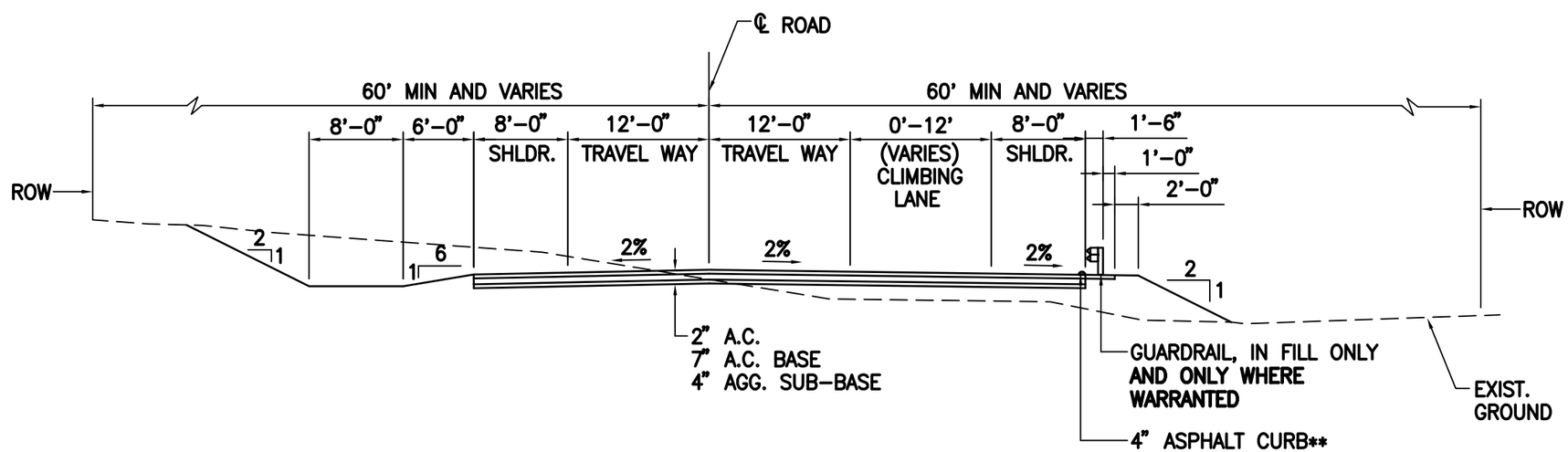


*PAVED FIREBREAK, ASPHALT CURB, AND FIREBREAK FENCE INSTALLED ON NORTH SIDE FROM STATION 466+00 TO THE NEW SADDLE ROAD NEAR MP 41 (STATION 544+37).

TYPICAL SECTION B

NOT TO SCALE



**ASPHALT CURB INSTALLED ON SOUTH SIDE FROM STATION 340+00 TO 466+00 IN CUT AND FILL CONDITIONS.

TYPICAL SECTION C

NOT TO SCALE

U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

FIGURE 2.2.1b
ROAD TYPICAL SECTIONS
STATIONS 340+00 TO 544+37

Scale: N.T.S. Date: Sept. 2009

SHEET No. 1 OF 1

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STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
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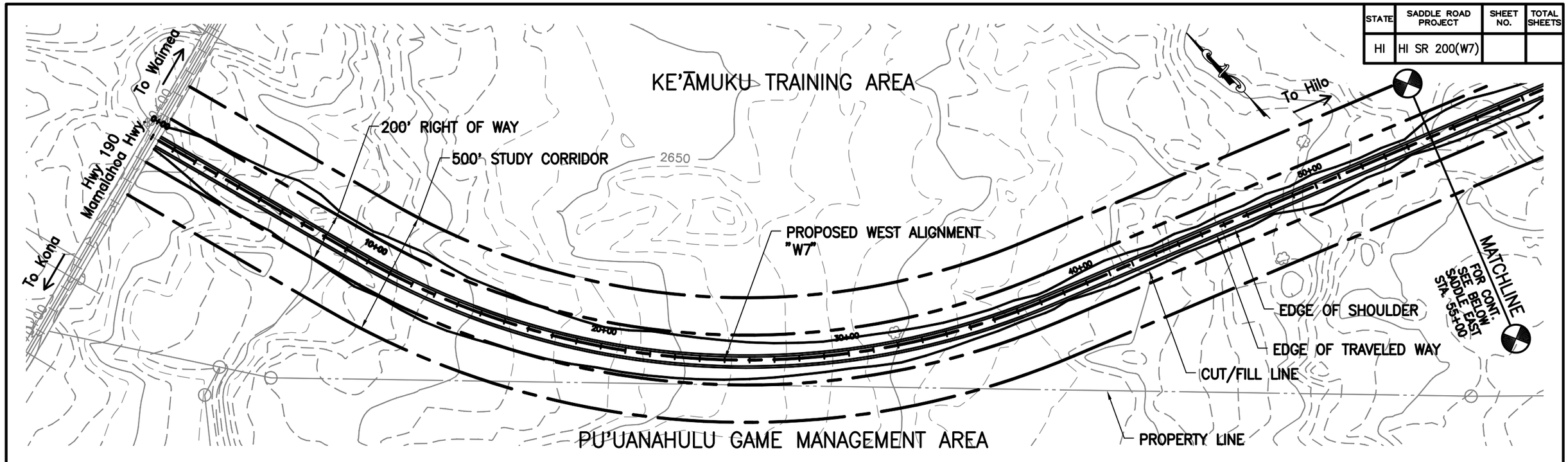

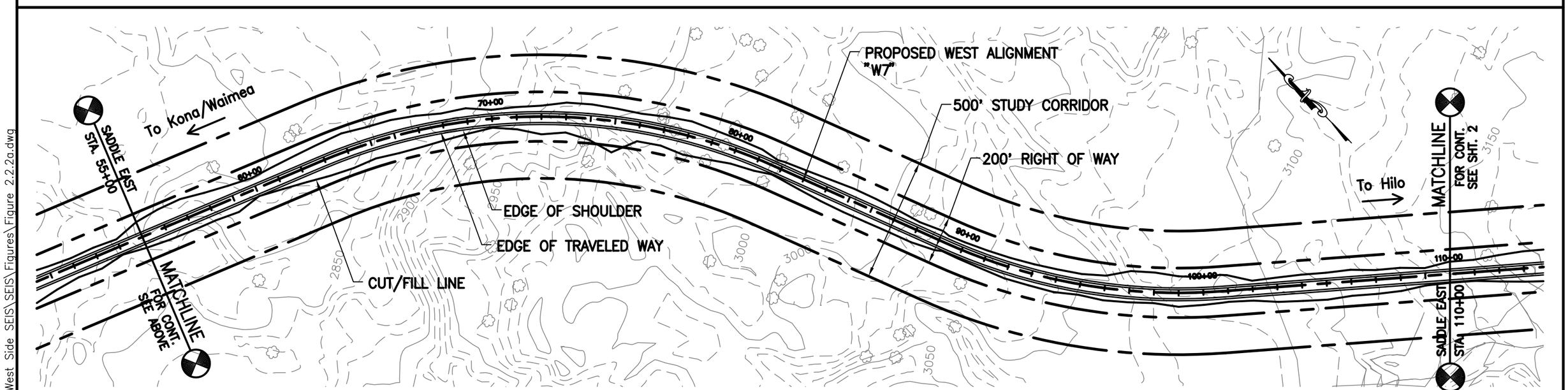

SCALE:
1" = 400'

400' 200' 0 400' 800'

U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

FIGURE 2.2.2a

PLAN SHEET – PART 1
STATION 0+00 TO 110+00

Scale: 1"=400' Date: Sept. 2009

SHEET No. 1 OF 5

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STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
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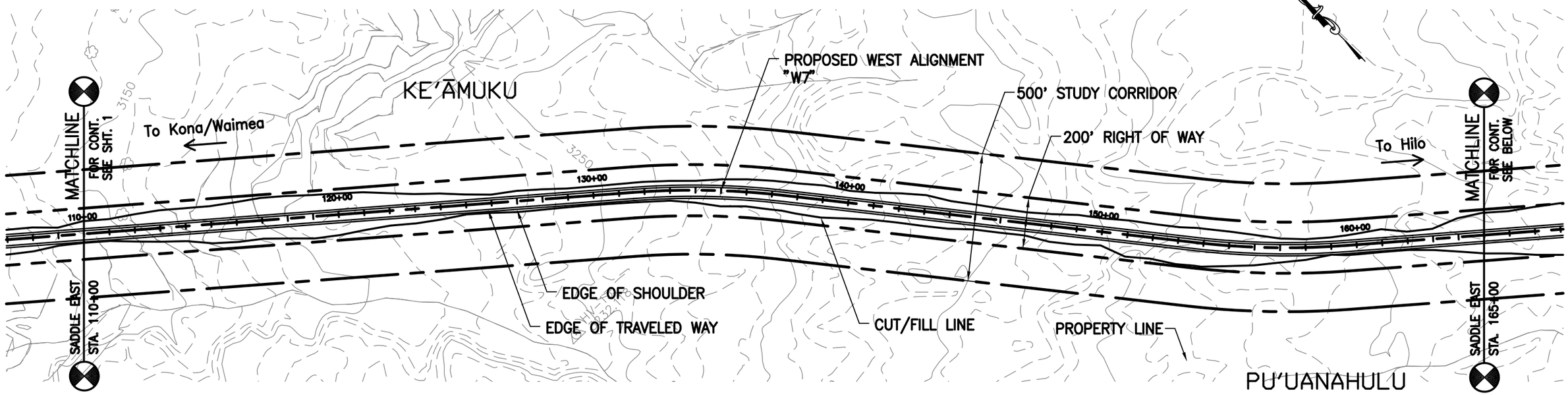

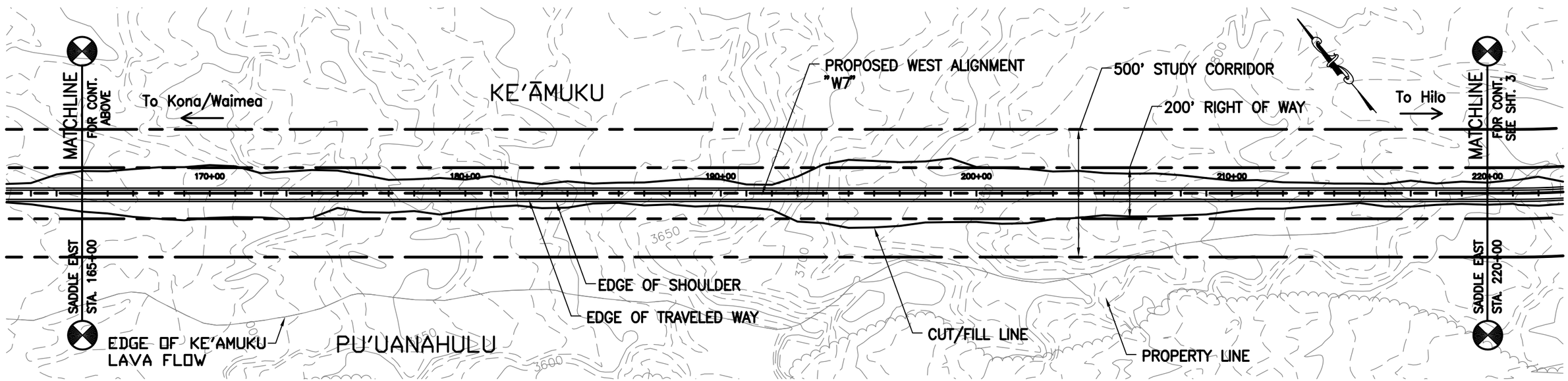

SCALE:
1" = 400'

400' 200' 0 400' 800'

U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

FIGURE 2.2.2b
PLAN SHEET – PART 2
STATION 110+00 TO 220+00

Scale: 1"=400' Date: Sept. 2009

SHEET No. 2 OF 5

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STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
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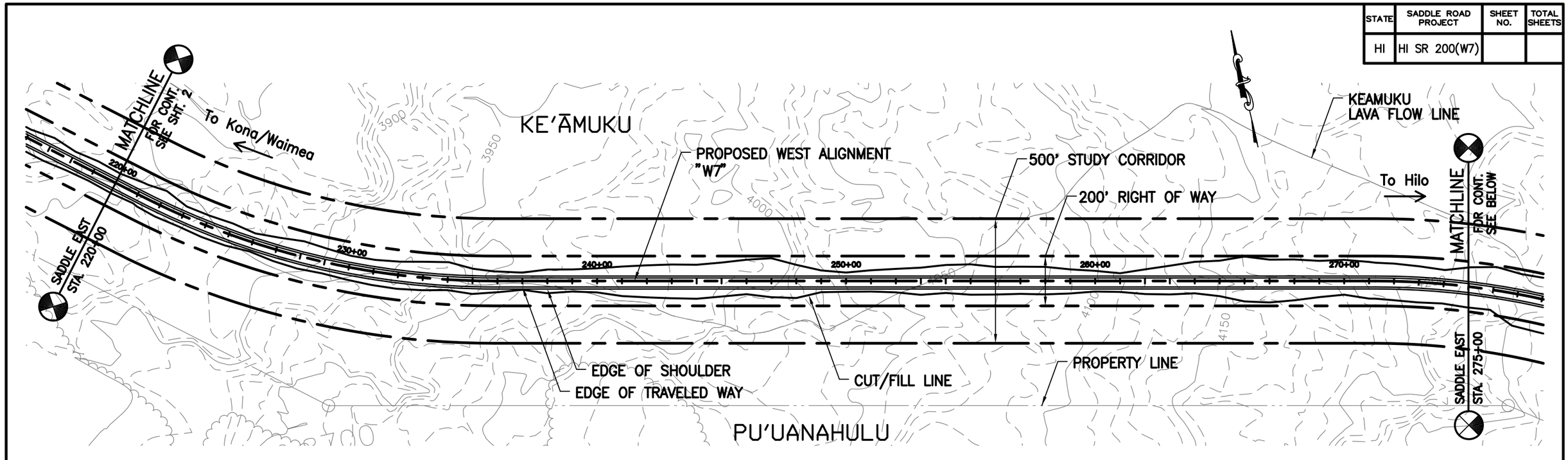

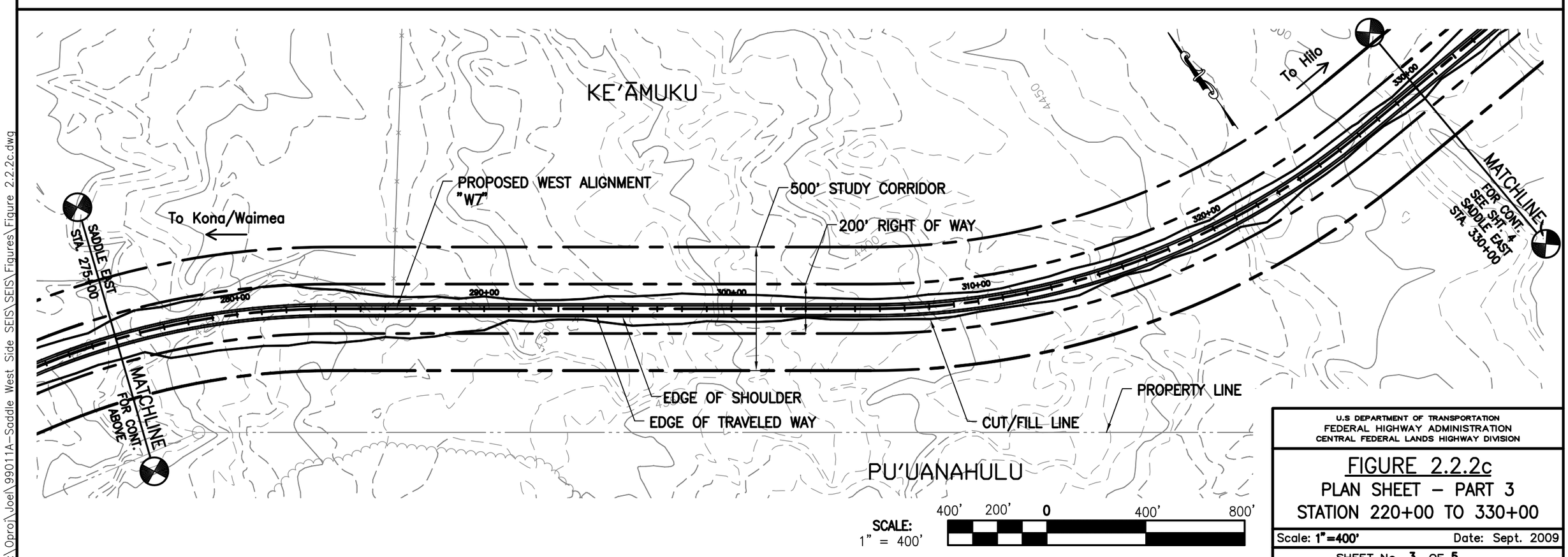

U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

FIGURE 2.2.2c
PLAN SHEET – PART 3
STATION 220+00 TO 330+00

Scale: 1"=400' Date: Sept. 2009

SHEET No. 3 OF 5

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STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
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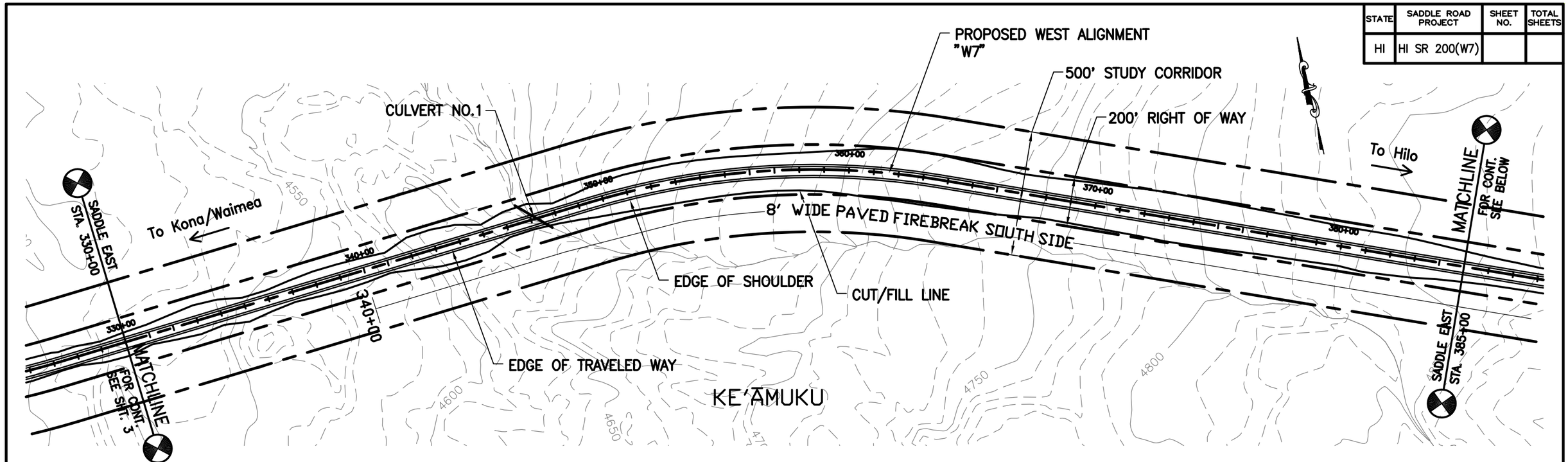

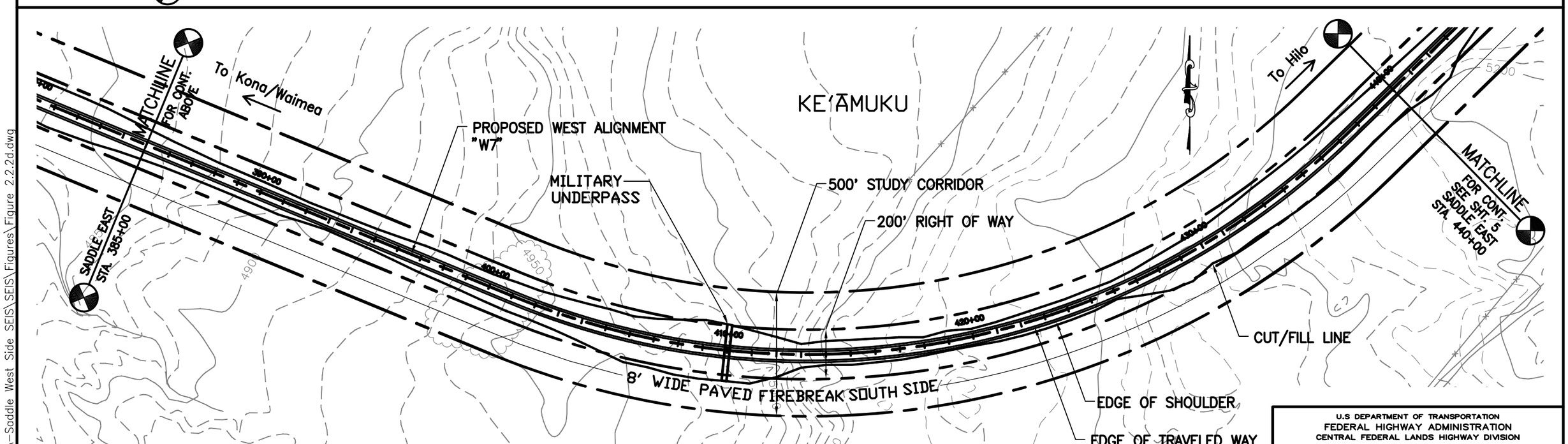

SCALE:
1" = 400'

400' 200' 0 400' 800'

U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

FIGURE 2.2.2d

PLAN SHEET – PART 4
STATION 330+00 TO 440+00

Scale: 1"=400' Date: Sept. 2009

SHEET No. 4 OF 5

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STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
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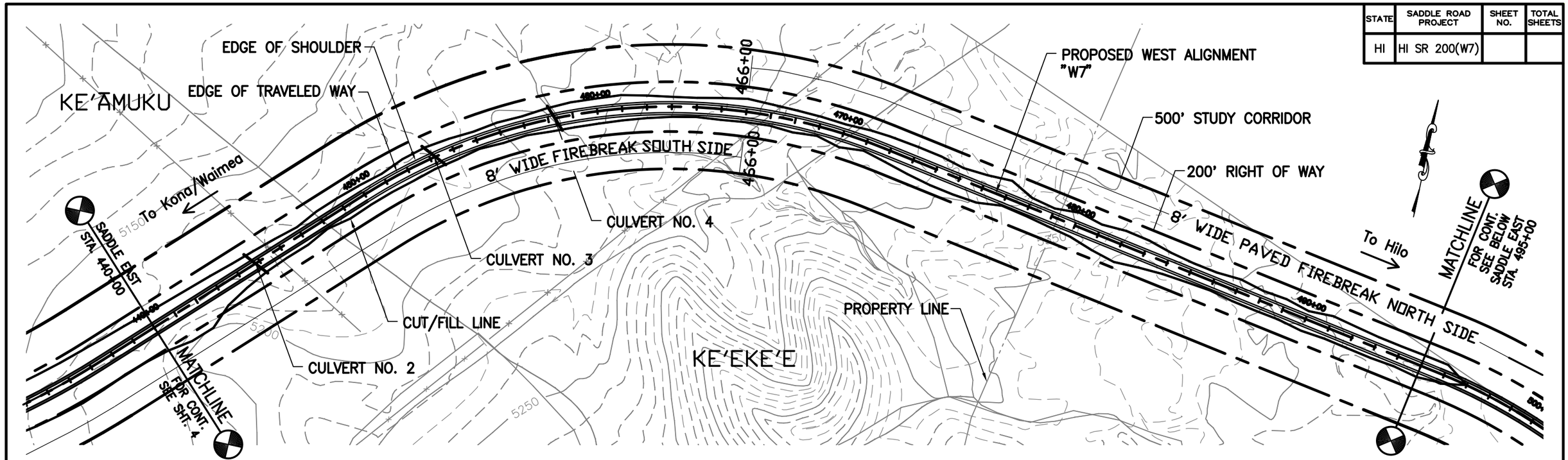

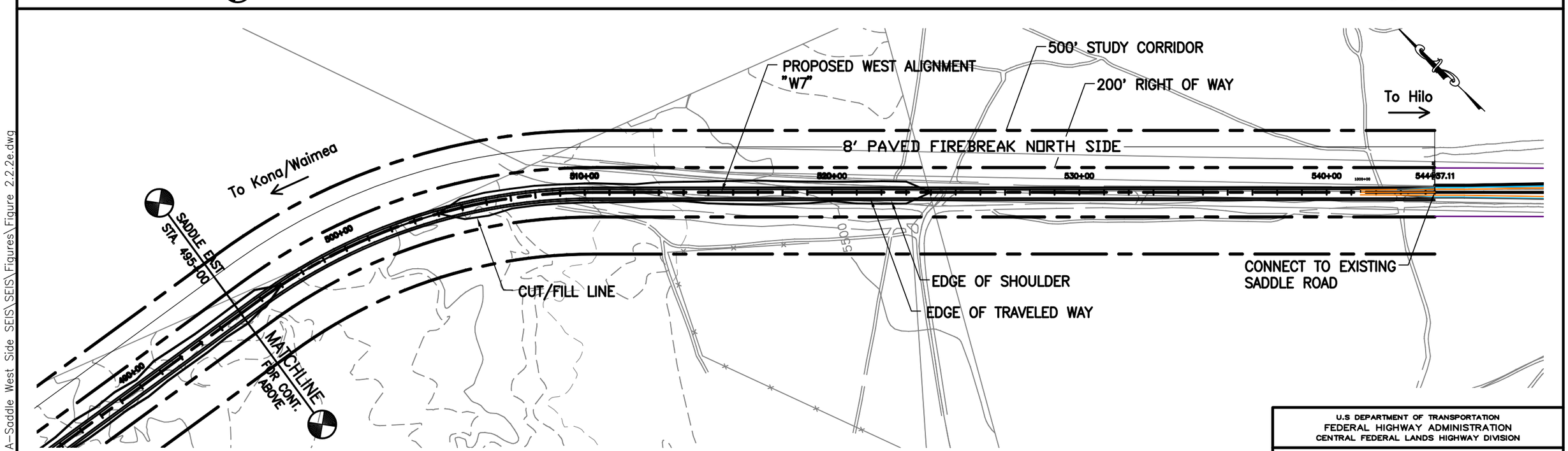

SCALE:
1" = 400'

400' 200' 0 400' 800'

U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

FIGURE 2.2.2e
PLAN SHEET – PART 5
STATION 440+00 TO 544+37.11

Scale: 1"=400' Date: Sept. 2009

SHEET No. 5 OF 5

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Military traffic passing between Keʻāmuku and the main sections of PTA would be required to cross W-7. This would occur at one point, the location of which is not yet specified, which would be a grade-separated crossing. It is likely that military traffic would pass *under* Saddle Road.

2.2.2 Engineering Characteristics of W-7

Table 2.2.4, below, provides a summary of the key characteristics of W-7.

Table 2.2.4
Basic Engineering Characteristics

Total Length	10.31 miles
Max. Grade	8.0 %
Grade ≥ 6%	4.8 miles
Traffic Maintenance and Constructability	Maintenance of traffic would be possible for all of alignment except intersections at MP 41 and Mamalahoa Highway, where there would be restrictions or closures for limited periods.
ROW Needed	250 acres: Note: all ROW land would still be owned by the Army and a perpetual easement to the State would be issued.
Utility Conflicts	Power transmission and communication poles.
Horizontal Alignment	Ties to SR 190 near Mile Post 14 four miles south of Waikoloa Rd. Satisfies design parameters. Separates traveling public from PTA maneuvers.
Construction Cost	[1]$58 M
Mitigation Cost	Not yet known

[1] 2007 construction costs and dollars

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CHAPTER 3 AFFECTED ENVIRONMENT, ENVIRONMENTAL CONSEQUENCES, AND MITIGATION MEASURES

This section reviews the direct and indirect environmental effects of building Section I of Saddle Road on the W-7 alignment. In order to provide for design flexibility for minor alignment shifts for placing the 200-foot wide ROW, the team of resource scientists/specialists studying W-7 for this SEIS surveyed along a 500-foot corridor along the W-7 centerline. The term "W-7 alignment" is used in this SEIS to denote the route of the road, and the term "W-7 corridor" or study corridor is used to indicate the actual area studied for the alignment, which is larger than the area to be occupied by the highway.

In general, this SEIS does not repeat the analysis of the effects of the completion of Saddle Road as a whole that was conducted in the 1999 FEIS. Impacts from acquisition and use of the Keʻāmuku parcel by the Army were analyzed in the Army's EIS for the transformation of the 2nd Brigade, 25th Infantry Division (Light) to a Stryker Brigade Combat Team. However, Chapter 6 is a separate analysis of cumulative impacts from all past, present and foreseeable future actions in order to provide a holistic, integrated view.

3.1 LAND USE AND RELATED GOVERNMENTAL PLANS AND POLICIES

3.1.1 LAND USE AND LAND OWNERSHIP

3.1.1.1 Affected Environment

Discussion in this section includes uses within W-7 corridor and the broader area within and adjacent to Section I of Saddle Road (Figure 3.1.1). Broadly considered, existing land uses along Section I of Saddle Road involve military training, ranching, and public hunting, with limited residential uses. However, all land in and around the W-7 corridor is now controlled by the Army and planned for military training. To the north, Parker Ranch and various landowners also control large and small holdings within or adjacent to the existing Saddle Road, and the State of Hawaiʻi's Puʻuanahulu Game Management Area is located directly to the south.

3.1.1.1.1 Ranching

Ranching activities in the broader area include grazing in the private lands along Saddle Road near and below Waikiʻi and in the lands *makai* (Hawaiian for towards the sea, in this case, west) of Mamalahoa Highway. These vary from large operations at Parker Ranch to smaller operations such as the Waikiʻi Ranch, which manages cattle over a number of lots within a gated residential/agricultural community.

W-7 traverses the Keʻāmuku parcel, which prior to the Army's purchase was part of Parker Ranch's operations. Grazing has continued since the Army's purchase as part of efforts to reduce fuel buildup. To the degree consistent with training, grazing may continue to occur as part of an integrated vegetation management system that is being developed by the PTA, or it may be discontinued.

3.1.1.1.2 Military

Military land use within the project area occurs within the PTA, a multi-service training complex operated by the U.S. Army Garrison, Hawai‘i (USAG-HI) (Figure 3.1.1). PTA consists of approximately 132,950 acres of land, including the Ke‘āmuku parcel, situated in the plateau between Mauna Kea and Mauna Loa. Saddle Road currently extends through much of the northern portion of PTA, for a length of approximately 13 miles, from MP 30 to MP 43.

PTA provides a safe, modernized, major training area for the U.S. Army Pacific (USARPAC) and other Pacific Command Units. All branches of the armed services located in the Pacific theater utilize PTA, including the Army, Army Reserves, Marines, Air Force, Navy, and the National Guard, as well as local law enforcement agencies and foreign allied forces. PTA provides space for field training exercise and annual service practice. PTA is capable of supporting coordinated live firing of all assigned crew-served weapons of the infantry company and battalion and artillery in conjunction with live air support. The ranges and firing points at PTA accommodate employment of all the conventional weapons in the Pacific Region. PTA is the only training area in the Pacific that affords training units the opportunity to employ their weapon systems at their maximum standoff range. More than 15,000 military personnel receive training at PTA each year.

A summary of notable PTA facilities follows, including reference to associated future plans.

Live-Fire Ranges and Maneuver Areas. PTA contains 14 operational fixed live-fire ranges, two rotary wing forward arming and/or refueling ranges, unlimited artillery firing points, 24 motor points, six drop zones, a helicopter and fighter/bomber gunnery range, strategic aircraft bombing range, and almost 23,000 contiguous acres for maneuver training (not counting Ke‘āmuku).

Bradshaw Army Airfield. Bradshaw Army Airfield is located at PTA and is used primarily by Army and Marine helicopters, though it also supports limited fixed wing operations (Figure 3.1.1). A project to lengthen the runway from its existing length of 3,700 to 6,000 feet is currently under review by the Army. The longer runway would allow fully loaded C-130 aircraft and C-17 aircraft operating at 80 percent capacity to utilize the airfield.

Cantonment Area. PTA can support a training deployment of up to 2,400 personnel. The base camp includes 154 buildings, including three fully equipped with dining facilities, two motor pools, 2.1 million gallons of water storage, a rations warehouse, a bulk fuel facility, a chapel, a theater, a recreation club including game courts, and a medical facility.

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
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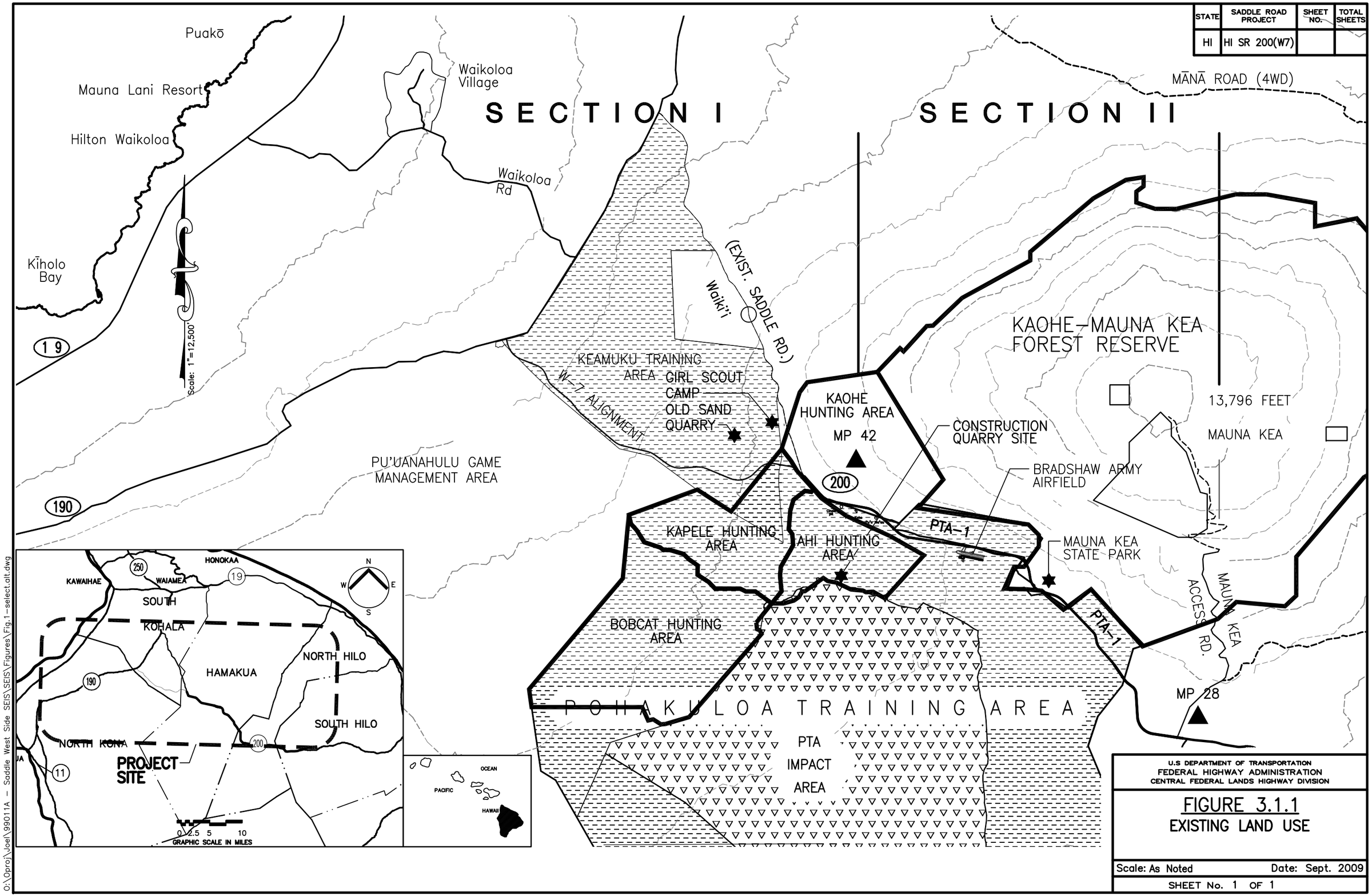

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FIGURE 3.1.1
EXISTING LAND USE

Scale: As Noted | Date: Sept. 2009

SHEET No. 1 OF 1

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Infrastructure. PTA is in the process of upgrading its water system. A water filtration system to purify water from Pohakuloa Spring has been completed and is now providing approximately 14,000 gallons/day. Based on demand, the spring water is augmented by water hauled to PTA by truck. Research on establishing a water well is under way, and as soon as funding is available a test well will be drilled.

Training in Keʻāmuku. The Army has incorporated Keʻāmuku within PTA and is preparing to use it for military training involving all maneuver elements of Army, Marine, and Reserve Component units. Training resources used by these elements include non-live-fire maneuver training facilities and rudimentary bivouac areas. Live-fire exercises will not be undertaken on the Keʻāmuku parcel.

3.1.1.1.3 Residential, Commercial and Industrial Uses

There is a mix of ranching and residential uses within Waikiʻi Ranch on the existing Saddle Road between MP 49 and MP 46. W-7 does not pass closer than three miles to these homes and ranches. Lands *makai* (west) of Mamalahoa Highway near the proposed W-7 intersection have been subdivided into the Waikoloa Ranch Lots, which include about a dozen properties that front the highway and range in size from roughly 700 to 1,000 acres. These will be used for agricultural purposes and may include a single-family residence as a farm dwelling and additional farm housing as appropriate.

There are no existing commercial or industrial uses within the Section I project area, and given the zoning and State and County plans, little opportunity for such development.

3.1.1.1.4 Public Lands

State Forest Reserve lands designated as a Game Management Area are found along the north side of Saddle Road between MP 41 and about MP 43 (Figure 3.1.1). These lands are hunted on and used to access the west side of Mauna Kea for bird and mammal hunting, hiking, resource gathering and other recreational and cultural uses. On the south side of Keʻāmuku is the Puʻuanahulu Game Management Area (Figure 3.1.1), an area of rugged terrain used primarily for mammal hunting.

3.1.1.1.5 Mining

A rock quarry within PTA used for construction projects at PTA and for Saddle Road is located approximately about three miles southeast of the eastern terminus of Section 1 (Figure 3.1.1). In addition, an approximately 15-acre sand quarry, now closed, was located on the south side of Saddle Road, west of the Kilohana Girl Scout Camp, within a half-mile of W-3.

3.1.1.2 Environmental Consequences

Land use impacts that would result from continuing implementation of the Saddle Road Improvement Project include temporary construction-related impacts, direct impacts associated with use of military land, and indirect impacts resulting from changes in the character and use of the road. Construction and use of the highway would also insert a civilian transportation project within an area where land use is currently dedicated to military training.

Construction activities would be expected to result in short-term impacts on land uses adjacent to Saddle Road. These impacts include traffic delays and congestion, construction noise and dust, and community disruption. Most of the construction work would be completed outside of the existing Saddle Road corridor, allowing use of the existing highway during most of the construction period.

Following the construction period, the proposed project would improve the safety and efficiency of Saddle Road, but also increase cross-island traffic between East and West Hawai‘i. The W-7 alignment (just as with the 1999 ROD-selected route of W-3) would route Saddle Road cross-island traffic off the existing Saddle Road, notably reducing traffic levels through Waiki‘i Ranch. The existing Saddle Road serving Waiki‘i, Parker Ranch and other local access needs (e.g., State hunting lands at Ka‘ohe) would continue to be the responsibility of the County of Hawai‘i to maintain. HDOT is currently examining funding or cooperative mechanisms to provide assistance to local governments in the maintenance of local roads.

The project would improve access to lands directly adjacent to the corridor, in particular land *makai* (west) of Mamalahoa Highway. There may be some increased opportunities for development of a convenience commercial facility at the Saddle Road-Mamalahoa Highway intersection. However, any such development would be severely limited by the lack of infrastructure, especially potable water service. As no land use approvals are in place, any such request would require review by the State Land Use Commission and County Council and Planning Commission, and would likely entail a State Land Use Boundary Amendment, a General Plan amendment, and a change of zone. This would ensure that the full range of impacts was considered as part of the review process. Furthermore, this potential already exists at the Saddle Road and Waikoloa Road intersections with Mamalahoa Highway.

W-7 versus W-3

W-7 would provide an even greater buffer to Waiki‘i than W-3 and would impose no notable construction-related impacts on this or any other community. Some of the large parcels at the developing Waikoloa Ranch Lots may experience impacts at the W-7-Mamalahoa Highway intersection point (which is the same area that was planned for the W-3 intersection point), depending on when they are developed or occupied.

W-7 would minimize the disruption to military training by keeping the highway near the southern edge of the training area. In contrast, the 1999 ROD-selected route of W-3 essentially splits the Keʻāmuku training area in two and may hamper training. In order to effectively train, the military would need a number of underpass or overpass crossings, instead of the single one planned for W-7. As discussed in Section 1.2, the difference between these two potential routes is the reason that in 2006, the U.S. Army Garrison, Hawaiʻi, requested that HDOT and FHWA consider relocating the highway about a mile southwest towards the southern boundary of Keʻāmuku.

3.1.1.3 Mitigation Measures

- Construction contract conditions will require access to public use and recreation areas, ranching operations, residences, and the PTA to be maintained at all times during construction.

3.1.2 Governmental Plans, Policies, and Land Use Regulations

3.1.2.1 Hawaiʻi State Plan

The Hawaiʻi State Plan (State Plan) was adopted in 1978 and revised in 1986 and again in 1991 as Chapter 226, Hawaiʻi Revised Statutes (HRS). The plan establishes a set of goals, objectives and polices that are meant to guide the State's long-term growth and development.

Relevant sections of the Hawaiʻi State Plan include the following from Section 226-17, HRS, relating to Transportation:

Objective a.1: An integrated multi-modal transportation system that serves statewide needs and promotes the efficient, economical, safe and convenient movement of people and goods.

Objective a.2: A statewide transportation system consistent with planned growth objectives throughout the State.

Policy b.1: Design, program, and develop a multi-modal system in conformance with the desired growth and physical development as stated in this chapter.

Policy b.6: Encourage transportation systems that serve to accommodate present and future development needs of communities.

Policy b.9: Encourage the development of transportation systems and programs which would assist statewide economic growth and diversification.

Policy b.10: Encourage the design and development of transportation systems sensitive to the needs of affected communities and the quality of Hawai‘i’s natural environment.

The proposed project is consistent with the transportation policies and objectives of the State Plan. The highway will accommodate both existing and future cross-island traffic in a safe and efficient manner. It would improve the link between existing residential, governmental and service centers in East Hawai‘i and major job centers and economic development opportunities of West Hawai‘i.

3.1.2.2 Hawai‘i State Functional Plans

The State Plan contains twelve separate Functional Plans addressing specific areas of concern. The 1991 revision of the Functional Plan for Transportation has several objectives, policies and implementing actions that are relevant to this project including the following:

Objective IA: Expansion of the Transportation System.

Policy I.A.2: Improve regional mobility in areas of the State experiencing rapid urban growth and road congestion.

Objective I.E: Planning and designing State highways to enhance inter-regional mobility.

Policy I.E.1: Design highways with controlled accesses, grade separated crossings, and minimum four-lane divided standards where applicable. Encourage counties to develop local road networks for local travel and access.

Objective II.A: Development of a transportation infrastructure that supports economic development initiatives.

Policy II.A.1: Support State economic development initiatives.

Policy II.A.2: Support tourism and economic development.

The proposed project is consistent with the Objectives and Policies of the Transportation Functional Plan. The realigned and improved highway would accommodate both existing and future cross-island traffic in a safe and efficient manner. It would link the existing residential, governmental and service centers in East Hawai‘i with the major job centers and economic development opportunities in West Hawai‘i.

3.1.2.3 Island of Hawai‘i Long Range Land Transportation Plan

The Hawai‘i Long Range Land Transportation Plan (HLRLTP) for the Island was adopted by HDOT in May 1998. This plan updated the Island of Hawai‘i Long Range Highway Plan, which was originally developed in 1991. The HLRLTP is intended to identify needed land transportation improvements to accommodate traffic demand projections for the year 2020 and to prioritize those improvements for funding. This plan serves as the guide to State and County highway planning for the Island of Hawai‘i.

The HLRLTP identified the Saddle Road Improvement Project, extending from Kaumana to Mamalahoa Highway (SR 190), as a Tier 1 project. Tier 1 projects comprise those projects considered higher priority. This was based on the fact that the project: 1) linked Hilo with West Hawai‘i; 2) addressed safety concerns along Saddle Road; 3) provided a more efficient route to West Hawai‘i; 4) relieved congestion along other routes (Highway 19); 5) had Federal Funds through the Department of Defense available; and 6) connected Mamalahoa Highway (SR 190) with PTA.

The proposed project, including both of its alignment alternatives, is consistent with the project development description for Saddle Road Project as contained in the HLRLTP. Projects will be added to the State Transportation Improvement Program in segments as they are programmed. It should be noted that the HLRLTP is currently in the early stages of an update.

3.1.2.4 County of Hawai‘i General Plan

The *General Plan* for the County of Hawai‘i is a policy document expressing the broad goals and policies for the long-range development of the Island of Hawai‘i. The plan was adopted by ordinance in 1989 and revised in 2005 (Hawai‘i County Planning Department). The *General Plan* itself is organized into thirteen elements, with policies, objectives, standards, and principles for each. There are also discussions of the specific applicability of each element to the nine judicial districts comprising the County of Hawai‘i. Most relevant to the proposed project are the following Goals, Policies, and Standards:

TRANSPORTATION – GOALS

- Provide a transportation system whereby people and goods can move efficiently, safely, comfortably and economically.
- Make available a variety of modes of transportation that best meets the needs of the County.

TRANSPORTATION – POLICIES

- A framework of transportation facilities that will promote and influence desired land use shall be established by concerned agencies.
- The agencies concerned with transportation systems shall provide for present traffic and future demands, including the programmed development of mass transit programs for high growth areas by both the private and public sectors.
- The improvement of transportation service shall be encouraged.
- Consider the provision of adequate transportation systems to enhance the economic viability of a given area.
- Develop a comprehensive, islandwide multi-modal transportation plan that identifies the location and operation of automobile, mass transit, bicycle and pedestrian systems, in coordination with appropriate Federal and State agencies.

TRANSPORTATION – STANDARDS

- Transportation systems shall meet the requirements of the U.S. Department of Transportation, State Department of Transportation and the County of Hawai‘i.
- Transportation systems shall conform with design guidelines established by the American Association of State Highway and Transportation Officials (AASHTO).

ROADWAYS – GOALS

- Provide a system of roadways for the safe, efficient and comfortable movement of people and goods.
- Provide an integrated State and County transportation system so that new major routes will complement and encourage proposed land policies.

ROADWAYS – POLICIES

- Encourage the programmed improvement of existing roadways by both public and private sectors.
- Investigate various methods of funding road improvements, including private sector participation, to meet the growing transportation needs of the island.
- Encourage the State to establish a continuous State highway system connecting the County’s major airports and harbors.
- Support the development of programs to identify and improve hazardous and substandard sections of roadway and drainage problems.
- Coordinate with appropriate Federal and State agencies for the funding of transportation projects for areas of anticipated growth.
- There shall be coordinated planning of Federal, State, and County street systems to meet program goals of the other elements such as historic, recreational, environmental quality, and land use.
- Encourage the State Department of Transportation to establish special scenic routes within and between communities.

- Support the development of an efficient transit route between east and west Hawaii.
- Develop short and long range capital improvement programs and plans for transportation that are consistent with the General Plan.

ROADWAYS – STANDARD

- Primary Arterial: Includes major highways, parkways, and primary arterials that move vehicles in large volumes and at higher speeds from one geographic area to another; highest traffic volume corridor. Designed as a limited access roadway. Primary arterials shall have a minimum right-of-way of 120 feet.

PUBLIC LANDS – GOALS

- Utilize publicly owned lands in the best public interest and to the maximum benefit.
- Acquire lands for public use to implement policies and programs contained in the General Plan.

PUBLIC LANDS – POLICY

- State and County Capital Improvement Programs should continue to be coordinated.

PUBLIC LANDS – STANDARD

- Public lands with unique recreational and natural resources shall be maintained for public use.

The project is completely consistent with these goals, objectives, and standards, because it provides a modern, safe, efficient and scenic highway that fulfills County land use, access and circulation objectives while maintaining environmental quality.

3.1.2.5 General Plan Land Use Pattern Allocation Guide Map and Facilities Map

The *Hawai‘i County General Plan Land Use Pattern Allocation Guide* (LUPAG) is the map component of the General Plan and a graphic representation of the Plan’s goals, policies, and standards as well as of the physical relationship between land uses. It also establishes the basic urban and non-urban form for areas within the planned public and cultural facilities, public utilities and safety features, and transportation corridors. The Ke‘āmuku property is classified as Extensive Agriculture and Other Important Agricultural Lands in the LUPAG; a 0.8-mile portion of the segment from MP 41 towards Ke‘āmuku is classified as Conservation. Since adoption of the General Plan in 2005 the Ke‘āmuku property was purchased by the Army and consistency with LUPAG classifications is no longer relevant, as the property has been entirely dedicated to military uses and is under Army control.

The General Plan Facilities Map of the Hawai‘i County General Plan shows the existing Saddle Road as a Primary Arterial Roadway that requires improvement. The Facilities Map also shows a proposed new road that intersects with Saddle Road at MP 44 and runs in a southerly direction to the Pu‘uanahulu/Pu‘u Wa‘awa‘a area. This alternative alignment was considered during the scoping phase of Saddle Road project and rejected because of environmental concerns (ref: FEIS - Part I, 2.3).

3.1.2.6 Land Use Regulations for State Land Use Districts

All land within the State of Hawai‘i is classified into one of four state land use districts (SLU); Urban, Rural, Agricultural, or Conservation. Chapter 205, HRS, establishes the criteria and objectives for the land use and assigns responsibility for the regulation of these districts. According to Chapter 205, HRS and Chapter 15-15, Hawai‘i Administrative Rules (HAR) provides for the classification and regulation of the districts as follows:

> *Urban District*. This district shall include land characterized by “city-like” concentrations of people, structures, streets, urban level of services, and other related land uses. Urban districts shall include activities or uses as provided by ordinances or regulations of the County within which the urban district is situated.
>
> *Rural District*. This district shall include areas of land composed primarily of small farms mixed with very low density residential lots, which may be shown by a minimum density of no more than one house per half-acre and a minimum lot size. Rural districts shall include activities or uses as characterized by low density residential lots of not more than one dwelling house per half-acre.
>
> *Agricultural District*. This district shall include areas of land with a high capacity for agriculture production. It may also include lands surrounded by or contiguous to agricultural lands which are not suited for agricultural production by reason of topography, soils and other related characteristics. Agricultural districts shall include activities or uses as characterized by the cultivation of crops, orchards, forage and forests, farming activities, open area recreational uses, and related activities.
>
> *Conservation District*. This district shall include areas necessary for protecting watersheds and water sources; preserving scenic and historic areas; providing park lands, wilderness, and beach reserves; conserving indigenous or endemic plants, fish, and wildlife, including those which are threatened or endangered; preventing floods and soil erosion; forestry; open space areas where existing openness, natural condition, or present state of use, if retained, would enhance the present or potential value of abutting or surrounding communities, or would maintain or enhance the conservation of natural or scenic resources; areas of value for recreation purposes; and other related activities. Activities within the Conservation district shall be established by the State of Hawai‘i Board of Land and Natural Resources.

The W-7 alignment extends through areas that are mostly within the State Land Use Agricultural District, with a 0.8-mile stretch from MP 41 towards Keʻāmuku classified within the Conservation District. There are no Rural or Urban designated lands within or adjacent to W-7 or the broader project corridor.

The project would be consistent with State Land Use District regulations. Transportation systems are allowable uses in all State Land Use Districts. Chapter 13-5, HAR, related to the Conservation District, stipulates that transportation systems undertaken by the State or counties for public benefit may be allowed within the Conservation District, provided a permit from the Board of Land and Natural Resources is first received. Accordingly, a permit must be approved by the Board of Land and Natural Resources prior to the commencement of construction of any portion of Saddle Road project within the SLU Conservation District. The 0.8-mile segment adjacent to MP 41 has already received a Conservation District Use Permit as part of adjacent construction activity in Section II.

3.1.2.7 Hawaiʻi County Zoning Code

The Hawaiʻi County Zoning Code, as contained in Chapter 25 of the Hawaiʻi County Code, is the legal instrument that regulates the use of land within the SLU Urban, Agricultural and Rural Districts. The land within the W-7 alignment consist of entirely A-40a (Agricultural, minimum lot size 40 acres) zoning. However, since the purchase of the Keʻāmuku property by the Army in 2006, County zoning is no longer relevant, as the property has been entirely dedicated to military uses and is under Army control.

3.1.2.8 Kona and South Kohala Community Development Plans

The South Kohala and Kona community development plans (CDP) encompass the judicial districts of South Kohala, and North and South Kona, respectively. They were developed under the framework of the February 2005 County of Hawaiʻi General Plan. Community Development Plans are intended to translate broad General Plan Goals, Policies, and Standards into implementation actions as they apply to specific geographical regions around the County. They are also intended to serve as a forum for community input into land-use, delivery of government services and any other matters relating to the planning area. The General Plan now requires that a Community Development Plan shall be adopted by the County Council as an “ordinance,” giving the CDP the force of law. This is in contrast to former CDPs that were adopted by “resolution” and served only as guidelines or reference documents for decision-makers.

The Hawai‘i County Council adopted the Kona CDP in September 2008, and the version referenced is this Environmental Assessment is available at:

http://www.hcrc.info/community-planning/community-development-plans/kona/cdp-final-drafts/KCDP_Final_Draft_Vol1_May2008_rev1.pdf.

The South Kohala CDP was approved in November 2008 and is available at:

http://www.hcrc.info/community-planning/community-development-plans/south-kohala/skcdpfinaldraft11.18.08.pdf.

The plans have many elements and wide-ranging implications, but there are several major strategies that embody the guiding principles related to land use, housing, public facilities, infrastructure and services, and transportation.

The Saddle Road project is consistent with plans related to road improvements in the two CDPs. Specifically, Section 4.1.2, “Overall Strategy,” of the Kona CDP notes that “Widening, improving and extending major arterials, as well as increasing connectivity between and within existing and future development are necessary to enhance mobility in Kona.”

The project is also consistent and/or not inconsistent with other goals, objectives and policies of the CDPs, and in particular with the policies or principles that seek to guide planning for the districts.

3.1.2.9 Summary of Consistency of Alternatives with Existing Plans and Policies

The proposed Saddle Road project complies with appropriate State and County land use policies, plans, goals, objectives and controls. It would facilitate implementation of the State Plan, the Transportation Functional Plan, the Island of Hawai‘i Long Range Highway Plan, the County of Hawai‘i General Plan, the Kona and South Kohala Community Development Plans, and the land use controls and regulations established pursuant to the State Land Use Law and the Hawai‘i County Zoning Code.

Table 3.1.1, *Conformance with Land Use Plans and Policies*, summarizes the project’s conformance with previously described land use plans and policies.

Table 3.1.1
Conformance with Land Use Plans and Policies

Agency	Name	Year Adopted/ Revised	Plan Purpose or Description	Plan or Policy Conformance
State of Hawai‘i	Hawai‘i State Plan	1991	Establishes broad goals, objectives and policies to guide the overall development of the State.	Consistent with State goals on economy/transportation.
State of Hawai‘i	Hawai‘i Long Range Land Transportation Plan	1998	Identifies and prioritizes major highway system improvements necessary to accommodate future traffic demands.	Consistent with recommendation for realignment and/or reconstruction of Saddle Road.
State of Hawai‘i	Hawai‘i State Transportation Functional Plan	1991	Establishes guidelines for implementation of the State Plan with respect to transportation.	Consistent with Plan on regional mobility, land use, economic development.
State of Hawai‘i	Coastal Zone Management (CZM) Program	1977	Establishes objectives and policies to protect coastal resources and areas.	Project conforms with objectives, policies in all seven CZM resource areas.
State of Hawai‘i	Hawai‘i State Land Use Law	1962	Establishes the legal uses within the State Land Use Urban, Rural, Agricultural, and Conservation Districts.	Consistent with State Land Use District regulations.
County of Hawai‘i	County of Hawai‘i General Plan	2005	Long-Range Comprehensive Plan guiding the overall development of the County.	Consistent with Transportation Goals of the General Plan.
County of Hawai‘i	General Plan LUPAG and Facilities Map	2005, 2007	Maps show general location of land uses and roadway networks in relationship to each other.	Project is consistent with maps which call for improvement of Saddle Road. LUPAG designation within/along W-7 no longer relevant, as land is under military control.
County of Hawai‘i	County of Hawai‘i Zoning	No date	Establishes zoning districts.	Zoning of property within/along W-7 no longer relevant, as it is under military control.
County of Hawai‘i	Kona and South Kohala Community Development Plans	2008	Long-Range Comprehensive Plan guiding the overall development of the Kohala.	Project is consistent with Maps which call for improvement of Saddle Road.

W-7 versus W-3

There are no differences in consistency with government plans between W-3 and W-7.

3.2 FARMLAND

3.2.1 Affected Environment, Environmental Consequences and Mitigation

In the 1990s, the U.S. Natural Resources Conservation Service (NRCS), formerly known as the Soil Conservation Service, was consulted to determine the soil and agricultural resources present in the project corridor and vicinity. In coordination with the NRCS, a Farmland Conversion Impact Rating assessment was completed pursuant to FHWA regulations related to the Federal Farmland Protection Policy Act process (Form AD 1006, located in Appendix A of the 1999 FEIS). The assessment evaluated potential impacts to farmland from implementation of project alternatives. The farmland ratings for Saddle Road alternatives W-2 and W-3 ranged from 106 to 145 points, below the 160-point threshold requiring consideration of alternatives less harmful to farming activities.

Since that time, as discussed above, the Keʻāmuku parcel was acquired by the Army. As the property is now entirely dedicated to military training, the issue of conversion of farmland to non-farming uses is no longer relevant. No adverse effect of conversion of farmland would occur under development of the W-7 alignment. More efficient highway connections would promote better markets for intra-island agricultural product sales. No mitigation is required.

3.3 SOCIAL

Saddle Road serves a variety of purposes for the residents of the island of Hawaiʻi including access to PTA, Mauna Kea and Mauna Loa, and a connection between East and West Hawaiʻi. The purposes of travel include recreation, shopping, business, and limited commuting. Astronomers, support staff, and suppliers with bases in Hilo or Waimea use the road as access to Mauna Kea. Thirteen observatories are currently present, and two more are under consideration (although several existing observatories may be decommissioned before any new observatories are built). Depending on the schedule of activity, between dozens and hundreds of trips per day are associated with astronomy. Hunters, hikers, and recreationalists also use Saddle Road. The 1999 Final EIS included information from four community surveys of road users, government and commercial entities, tourists, and the general public. Many survey respondents in 1999 stated that they chose to use Saddle Road because it saves time, and many stated a concern with the safety of this route. Safety continues to be a concern.

Saddle Road provides the only access to Waikiʻi Ranch, which is the only community in or near Section I of Saddle Road. The 1999 EIS reported residents dissatisfaction with the current state of road maintenance, speed limit enforcement, vehicle mix and traffic volumes. Waikiʻi residents asked about walking or bicycling stated that Saddle Road was

too dangerous. Better alternate pedestrian, bicycle and equestrian pathways within the ranch and allow for safe recreation, but using Saddle Road remains a problem.

3.3.1 Population and Settlement Patterns

3.3.1.1 Affected Environment

As the 1999 FEIS noted, Hawai‘i County has experienced continuing population growth over the last half-century. Table 3.3.1 shows population totals for the County and selected districts. From 1960 to 2006 the average annual growth rate for the County as a whole was 2.3 percent. Population growth has not been evenly distributed. The districts of Puna (southeast of Hilo), North Kona and South Kohala have had far more population growth, and a much higher rate of growth, than the South Hilo district. Outlying areas in East Hawai‘i – Hamakua and North Hilo – have seen little or no population growth.

Table 3.3.1. Population Trends, 1960 to 2006, Hawai‘i County

	1960	1970	1980	1990	2000	2006
Resident Population						
County	61,333	63,468	92,053	120,317	148,677	171,191
South Hilo District	31,553	33,915	42,278	44,639	47,386	NA
North Kona District	4,451	4,832	13,748	22,284	28,543	NA
South Kohala District	1,538	2,310	4,607	9,140	13,131	NA
Average Annual Change		**1960-1970**	**1970-1980**	**1980-1990**	**1990-2000**	**2000-2006**
County		0.3%	3.8%	2.7%	2.1%	2.4%
South Hilo District		0.7%	2.2%	0.5%	0.6%	NA
North Kona District		0.8%	11.0%	4.9%	2.5%	NA
South Kohala District		4.2%	7.1%	7.1%	3.7%	NA

Note: NA = not available.
Sources: 1999 FEIS; State of Hawai‘i Data Book 2006; American Community Survey (for 2006), reported at http://hawaii.gov/dbedt/info/census/population-estimate.

Table 3.3.1 shows that the North Kona district’s population growth was strongest in the 1970s, while South Kohala’s growth continued high through 2000. Table 3.3.2 shows the same pattern for Census Designated Places (CDPs) in these districts. The South Kohala coastal CDPs grew significantly in the 1990s. In that time, both Hilo and Kailua-Kona had little population increase within their CDP boundaries.

Table 3.3.2. Population of Major Towns in Study Area

	1990	2000	Average Annual Growth Rate
Hilo CDP	37,728	40,759	0.8%
Kailua-Kona CDP	9,224	9,870	0.7%
Waikoloa/Puako CDPs	2,683	5,235	6.9%
Waimea CDP	5,934	7,028	1.7%

Source: U.S. Census. Data available at http://hawaii.gov/dbedt/info/census/Folder.2005-10-13.2927/sf-profile-hawaii-county.

Two local areas along the existing Saddle Road, Kaumana at the Hilo end, and Waikiʻi near the West Hawaiʻi end, are of note. Kaumana is an outlying residential district of Hilo, largely within the urban area. Waikiʻi was once an isolated ranch village. In recent decades, it was subdivided as a community with luxury homes on large lots. Although it includes some 130 lots, the small resident population numbers indicate that most of the homes are held for vacation use.

Table 3.3.3
Population of Communities near Saddle Road

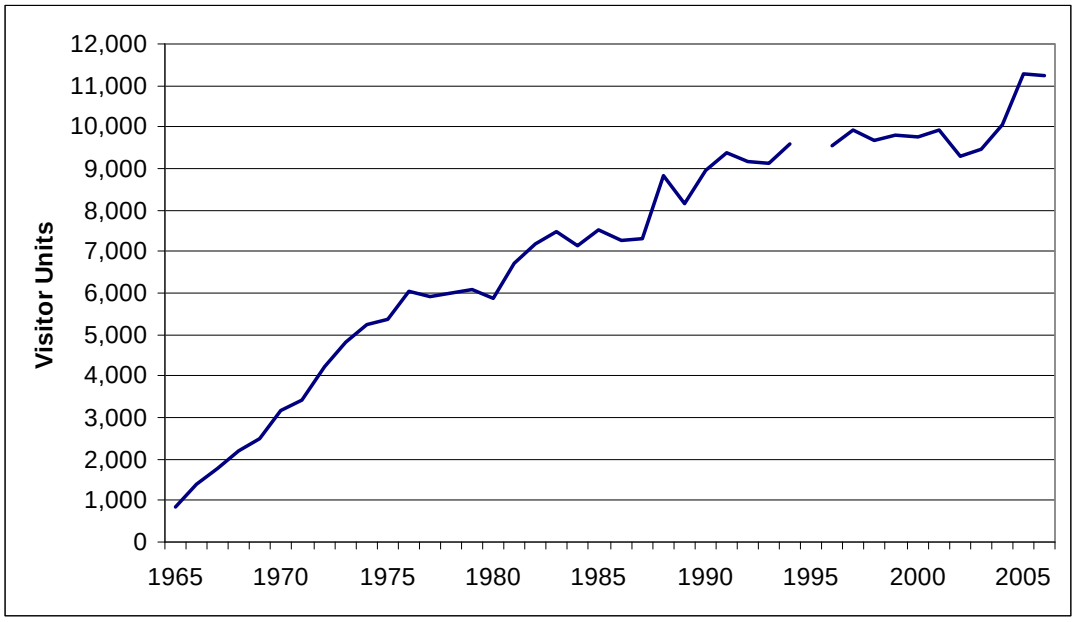
	1990	2000	Average Annual Growth Rate
Upper Kaumana	**935**	**2,215**	**9.0**
Waikiʻi	**50**	**89**	**5.8**

Notes: Upper Kaumana is defined as Census Tract 208.01, block group 2, for both 1990 and 2000. Waikiʻi's 1990 population is estimated in the FEIS based on interviews. The 2000 figure is for Census Tract 217.02, blocks 3065, 3070, 3072, 3073, 3075, 2076, 3106.

Over the last half-century, Hawaiʻi County has seen major changes in its economic base. Plantation agriculture has ended, leaving communities in North Kohala, Hamakua, North Hilo and Kaʻū with few local jobs, while visitor units, and hence resort jobs, grew through the mid-1990s. Since then, visitor arrivals and expenditures have continued to increase.

Figure 3.3.1 shows the long-term growth in the visitor plant, while Table 3.3.4 shows that such growth has been concentrated in West Hawaiʻi.

FIGURE 3.3.1
Visitor Units, Hawaiʻi County, 1965 to 2006



Notes: The Visitor Plant Inventory survey was not conducted in 1995. Visitor units include hotels, condos for visitor use, bed and breakfasts, hostels, and other units. Source: Visitor Research Report, 2006, of the Hawaiʻi Department of Business, Economic Development, and Tourism.

TABLE 3.3.4
Visitor Units, 1990 to 2006

	1990	2000	2006
Hawaii County	8,952	9,774	11,247
Hilo	1,411	1,204	1,297
Kona	4,096	4,295	4,968
Kohala	3,327	3,983	4,694

Note: Regions in this table roughly correspond to County districts as follows:
Hilo: South Hilo, North Hilo, Hamakua
Kona: North Kona, South Kona
Kohala: South Kohala, North Kohala
Puna and Ka‘u are not included in these regional counts.
Source: *Visitor Plant Inventory* for 2000, 2006.

Until late 2008, the visitor population had been increasing steadily even when there was little growth in visitor units. In part this is because resort housing – both single- and multi-family projects – has been developed in South Kohala and North Kona. While some of these units are owner-occupied, many are timeshare or fractional ownership units, or are second homes used only part-time by the owners and their friends.

Hawai‘i County is expected to see continuing growth in resident and visitor populations. Prior to the late 2008 economic slowdown, the State Department of Business, Economic Development and Tourism released a new series of long-range projections. These projections recognize that Hawai‘i County is experiencing the fastest population growth in the state. They anticipate population and job growth continuing at higher rates than the visitor count. They accordingly suggest two economic trends: successful targeting of high-income visitors and diversification of the local economy. The former trend supports high employment in the visitor industry. As the local economy grows, it can support a larger share of its own commercial infrastructure, lessening dependence on O‘ahu.

TABLE 3.3.5
Hawai‘i State 2035 Series Population Projections, for Hawai‘i County

	Residents	Total Job Count	Visitor Units	Average Visitor Census
2010	185,850	103,370	12,460	28,869
2015	205,820	113,120	12,930	30,851
2020	225,000	122,030	13,680	32,644
2025	243,420	131,680	14,410	34,370
2030	261,340	141,610	15,070	35,964
2035	279,150	151,790	15,840	37,801

Source: Population and Economic Projections for the State of Hawai‘i to 2035: DBEDT 2035 Series. Honolulu, 2008a.

The County of Hawai‘i issued projections for the General Plan revision in 2000. These extend to 2020. Table 3.3.7 shows the 2020 resident population estimates for the districts most immediately affected by Saddle Road. The State projections are roughly aligned with the more aggressive projections developed by the County (Series “B” and “C”).

The State projections are not issued for areas smaller than the county. If the economy rebounds and future growth is in line with past trends, the anticipated population increase by 2030 can be estimated at the district level, as shown in Table 3.3.6.

3.3.1.2 Environmental Consequences

Construction of Section I of Saddle Road on W-7 would involve many workers. Hawai‘i County’s construction workforce has contracted, then grown, and then contracted again in recent years. The annual average construction job count in 1998 was 2,300 persons. By 2007, the total had grown to 5,750. The economic recession of 2008 has caused high unemployment among this workforce. Figure 3.3.2 shows annual average construction job counts and year-to-year variation. The variability evident in the chart suggests that large changes in local demand for construction workers are normal.

Table 3.3.6
Allocation of 2035 Series Population Estimates by District

	Historical			*Projected*		
	1980	**1990**	**2000**	**2010**	**2020**	**2030**
Puna	11,751	20,781	31,335	43,092	57,495	72,190
South Hilo	42,278	44,639	47,386	52,583	59,498	65,654
North Hilo	1,679	1,541	1,720	1,779	1,938	2,064
Hamakua	5,128	5,545	6,108	6,931	8,016	9,020
North Kohala	3,249	4,291	6,038	7,712	9,884	12,065
South Kohala	4,607	9,140	13,131	18,432	24,677	31,054
North Kona	13,748	22,284	28,543	38,292	49,611	61,035
South Kona	5,914	7,658	8,589	10,608	12,936	15,209
Ka'u	3,699	4,438	5,827	7,151	8,904	10,640
Hawaii County	92,053	120,317	148,677	186,580	232,960	278,930
Average Annual Rate of Change		**1980s**	**1990s**	**2000s**	**2010s**	**2020s**
Puna		5.9%	4.2%	3.2%	2.9%	2.3%
South Hilo		0.5%	0.6%	1.0%	1.2%	1.0%
North Hilo		-0.9%	1.1%	0.3%	0.9%	0.6%
Hamakua		0.8%	1.0%	1.3%	1.5%	1.2%
North Kohala		2.8%	3.5%	2.5%	2.5%	2.0%
South Kohala		7.1%	3.7%	3.4%	3.0%	2.3%
North Kona		4.9%	2.5%	3.0%	2.6%	2.1%
South Kona		2.6%	1.2%	2.1%	2.0%	1.6%
Ka'u		1.8%	2.8%	2.1%	2.2%	1.8%
Hawaii County		2.7%	2.1%	2.3%	2.2%	1.8%

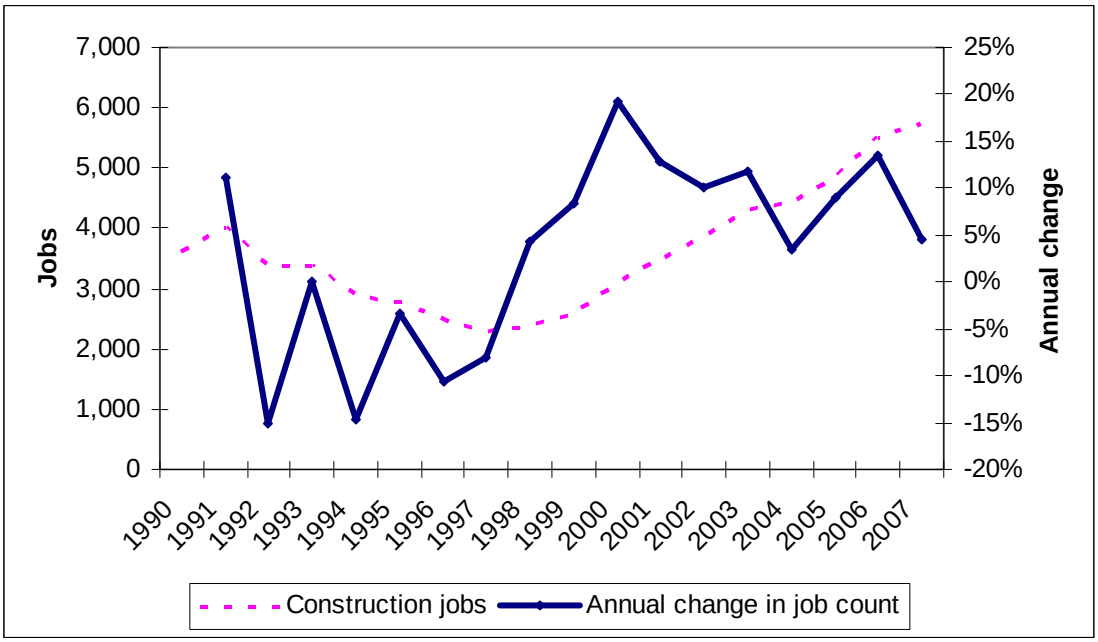
Source: 2035 Series Projections for Resident Population, allocated to districts by Belt Collins. District populations projected by extending historical trends, and adjusting all districts equally so that the sum of districts equals the current projection for 2030. By 2030, the state projection is nearly 120% of the historical extrapolation, so this allocation should be seen as no more than heuristic.

Table 3.3.7
County of Hawai‘i General Plan Population Projections, to 2020

	Hawaii County	**South Hilo**	**South Kohala**	**North Kona**
Series A	213,452	48,815	23,947	41,447
Series B	217,718	49,791	24,426	42,275
Series C	237,323	54,274	26,625	46,082

Source: County of Hawai‘i General Plan, passed as Ordinance 05-25, February 2005.

Figure 3.3.2
Construction Jobs, Hawai‘i County, 1990-2007



Source: Hawai‘i State Department of Labor and Industrial Relations website, http://www.hiwi.org/cgi/dataanalysis/cesSelection.asp?menuchoice=ces

One conclusion that can be drawn from the table is that the local workforce is large enough to build Section I of Saddle Road. Since work is progressing on other segments, an experienced workforce is at hand. If those workers are committed to other jobs, construction workers could be brought to the Big Island from elsewhere in Hawai‘i or even the U.S. mainland. The result would be in increase in the local construction workforce by less than 5 percent. That increase is well within the historical range of variation. Accordingly, while construction of new Saddle Road segments could attract workers other than current Hawai‘i County residents if unemployment dips significantly from its current high level before construction, the short-term increase does not amount to a significant change.

Improvement and realignment of Saddle Road would affect travel choices of both residents and visitors. It could affect residential distribution patterns slightly (as discussed in Section 3.3.2.2). However, completing Saddle Road by building Section I is not likely to attract people to the island, affecting the total resident and visitor populations, once construction is finished. Nor would changes in the location of visitor spending, possible with a new roadway, lead to increased visitor spending, supporting island jobs and households. After construction, then, no impact on population is anticipated.

W-7 versus W-3

There are no differences in impacts to population and settlement patterns between W-3 and W-7.

3.3.1.3 Mitigation Measures

No mitigation measures are needed.

3.3.2 Socioeconomic

3.3.2.1 Affected Environment

In the late 1990s, Hawai‘i island was weathering an economic slump after the closure of the last sugar plantations and a slowdown in visitor industry growth. Since that time, visitor counts and expenditures have grown again, especially in West Hawai‘i. Economic expansion has involved some diversification:

- In the tourism sector, development of time-share properties and second homes has been ongoing.
- On-island retailing has expanded greatly, with “big box” stores now located in both Hilo and Kona. Currently, new retail areas target both resident and visitor populations.
- At the Natural Energy Laboratory of Hawai‘i in North Kona, aquaculture has expanded and a new export, bottled water, has been developed.
- Astronomical observatories on Mauna Kea have expanded, supporting both work on the mountain and at headquarters in Hilo and Waimea. Two new observatories, the Thirty Meter Telescope and the Pan-Starrs Observatory, are in planning.
- The University of Hawai‘i has expanded programs in both Hilo and Kona.
- While West Hawai‘i remains the focus of the visitor industry, East Hawai‘i depends on a mixed economy, with agriculture, government and astronomy prominent sources of income. Also, many East Hawai’i residents commute to the west to work in visitor industry jobs.
- Workers commute by automobile or bus. Currently, about 400 workers travel by bus from East Hawai‘i to South Kohala, and about 100 to North Kona (pers. communication, Tom Brown, Administrator, Hawai‘i County Mass Transit Agency to Ron Terry, August 2009).

In the last year, the island economy has slowed substantially, following global trends.

Tables 3.3.8 through 3.3.10 show socioeconomic patterns at the district level, as of the 2000 census. Continuing east/west differences are visible:

- Most residents of South Hilo had been in their homes for five years or more, and less than 20 percent had moved from outside Hawai‘i County, while about 30 percent of the residents of North Kona and South Kohala had moved from outside the county in the last five years.
- Caucasians were the largest racial group in the West Hawai‘i districts, while Asians were most numerous in South Hilo.

- Unemployment was over 10 percent in South Hilo in 2000, and less than 4 percent in the West Hawai‘i districts.
- Incomes were higher, on average, in North Kona and South Kohala. Some 17.1% of the population in South Hilo was below the poverty line. This rate was about twice that found in the two West Hawai‘i districts.
- Labor force participation was appreciably higher in North Kona and South Kohala than in South Hilo. This is a common pattern near visitor destination areas.
- While a much larger share of the workforce in West Hawai‘i is in the visitor industry (as indicated by “accommodations and food services”), this industry still accounts for about 9 percent of South Hilo residents’ jobs. In South Hilo, government, education, and health service industries employ a larger share of the workforce than in North Kona and South Kohala.

Table 3.3.8
Selected Demographic Characteristics, by District, 2000 Census

	Hawaii County	South Hilo District	North Kona District	South Kohala District
POPULATION				
Total Population (1)	148,677	42,425	28,543	13,131
Male	74,499	20,776	14,349	6,545
Female	74,178	21,649	14,194	6,586
Age Groups (1)				
Under 5 years	6.1%	5.6%	6.4%	6.8%
5 to 14 years	15.2%	14.3%	13.8%	17.5%
15 to 19 years	7.5%	8.1%	6.4%	6.9%
20 to 64 years	57.7%	55.1%	61.6%	59.7%
65 to 74 years	7.3%	8.6%	6.7%	5.5%
75 and over	6.2%	8.3%	5.1%	3.6%
Median Age	38.6	38.7	39.4	36.2
Race (Federal classification)				
White alone	31.5%	17.3%	47.1%	38.8%
Black or African American alone	0.5%	0.4%	0.4%	0.4%
American Indian and Alaska Native alone	0.4%	0.3%	0.5%	0.2%
Asian alone	26.7%	38.5%	16.3%	18.1%
Native Hawaiian and Other Pacific Islander alone	11.2%	12.9%	10.7%	12.8%
Some other race alone	1.1%	0.9%	1.4%	1.0%
Two or more races	28.4%	29.7%	23.5%	28.8%
Residence in 1995 for Persons 5 and Older (2)				
Same house	53.2%	57.6%	43.6%	41.6%
Different house, same county	24.4%	26.0%	25.2%	28.0%
Different county in HI	12.3%	9.3%	15.7%	16.9%
Different state	7.9%	4.8%	12.7%	9.9%
Outside the US	2.3%	2.2%	2.9%	3.6%

Source: Census 2000.

Table 3.3.9
Selected Economic Characteristics, by District, 2000 Census

	Hawaii County	South Hilo District	North Kona District	South Kohala District
LABOR FORCE (2)				
Persons 16 and older				
In civilian labor force	70,592	19,414	15,484	6,862
Unemployment % (of CLF)	8.0%	10.3%	3.9%	3.3%
Labor Force Participation % (of population 16 and older)	61.7%	58.7%	69.2%	70.7%
Workers by Industry (Selected Industries)				
Agriculture, forestry, fishing and hunting	7.0%	3.9%	3.7%	4.9%
Construction	7.8%	6.5%	8.7%	6.9%
Retail trade	12.0%	12.6%	13.3%	8.2%
Finance, insurance, real estate	5.1%	4.5%	7.8%	4.7%
Educational services	9.9%	13.8%	5.0%	8.9%
Health care and social assistance	9.0%	11.9%	6.8%	8.2%
Accommodation and food services	14.9%	8.8%	18.7%	32.3%
Public administration	5.7%	8.9%	3.5%	2.3%
INCOME AND POVERTY				
Household income in 1999				
Under $25,000	30.9%	32.6%	22.2%	17.5%
$25,000 to $49,999	29.8%	27.9%	30.8%	30.7%
$50,000 to $74,999	18.4%	18.3%	20.0%	22.7%
$75,000 to $99,999	10.4%	11.2%	11.6%	15.1%
$100,000 to $199,999	8.7%	8.7%	12.2%	10.8%
$200,000 and above	1.8%	1.3%	3.3%	3.2%
Median Household Income	$39,805	$39,213	$47,610	$51,379
Poverty Status				
Share of total population below poverty line	15.7%	17.1%	9.7%	8.5%
Age distribution, persons below poverty line				
0 to 17 years	35.9%	35.3%	32.7%	41.9%
18 to 64 years	58.0%	58.2%	60.9%	53.5%
65 to 74 years	3.2%	3.1%	3.6%	3.1%
75 years and over	2.9%	3.4%	2.9%	1.5%

Source: Census 2000.

Table 3.3.10
Selected Housing Characteristics, by District, 2000 Census

	Hawaii County	South Hilo District	North Kona District	South Kohala District
HOUSING				
Housing Units (1)				
Total	62,674	16,640	13,960	5,794
Occupied	52,985	15,141	10,522	4,648
Vacant	9,689	1,499	3,438	1,146
Vacant for seasonal use	5,101	230	2,753	847
Vacant share of all units	15.5%	9.0%	24.6%	19.8%
Tenure of occupied housing units	52,985	15,141	10,522	4,648
Owner occupied	64.5%	61.3%	58.5%	58.9%
Renter occupied	35.5%	38.7%	41.5%	41.1%
Households (1)				
Number	52,985	15,141	10,522	4,648
Average household size	2.75	2.71	2.70	2.81
Median contract rent	$553	$491	$683	$724
Median gross rent	$645	$545	$745	$811
Owner-occupant housing costs				
Median, for owners with a mortgage	$1,133	$1,147	$1,423	$1,385
Share of households with high housing costs				
Renters, paying 30% to 39% of income	12.7%	14.0%	13.9%	11.3%
Renters, paying > 40% of income	30.3%	32.1%	27.9%	19.0%
Owners, paying 30% to 39% of income	15.9%	14.4%	17.3%	16.2%
Owners, paying 40% + of income	21.3%	16.3%	24.9%	27.1%

Source: Census 2000.

The vacancy figures in Table 3.3.10 point to a major difference between South Hilo and the West Hawai‘i districts: dedication of much of the local housing stock to vacation use (whether vacation rentals or second homes). Counts of housing units and visitor units overlap, since vacation rentals are likely to be included in both. To complicate matters, second homes are not housing units available for residents, but are counted in housing inventories. Housing costs are higher in West Hawai‘i. While many renters in all districts paid a disproportionate share of their income for housing, housing costs used up more than 30 percent of gross income for about 30 percent of homeowners in South Hilo, as compared to more than 40 percent in North Kona and South Kohala.

The next three tables deal with 2000 Census data for towns near the ends of Saddle Road: Hilo in the east, Waimea in the uplands of South Kohala, and Waikoloa and Puakō, the two other major South Kohala towns. They show much the same patterns identified at the district level. An important difference emerges in Table 3.3.13. Vacation units account for a small share of the housing inventory in Waimea as in Hilo, as compared to about 25 percent of the coastal housing inventory.

Table 3.3.11
Selected Demographic Characteristics, by Census Designated Places, 2000 Census

	Hawaii County	Hilo CDP	Waimea CDP	Waikoloa & Puako CDPs
POPULATION				
Total Population (1)	148,677	40,759	7,028	5,235
Male	74,499	19,950	3,467	2,678
Female	74,178	20,809	3,561	2,557
Age Groups (1)				
Under 5 years	6.1%	5.6%	6.3%	7.4%
5 to 14 years	15.2%	14.3%	18.0%	17.1%
15 to 19 years	7.5%	8.1%	8.1%	5.5%
20 to 64 years	57.7%	55.2%	57.6%	62.6%
65 to 74 years	7.3%	8.5%	6.0%	4.5%
75 and over	6.2%	8.2%	4.1%	2.8%
Median Age	38.6	38.6	36.5	41.4
Race (Federal classification)				
White alone	31.5%	17.1%	30.6%	48.0%
Black or African American alone	0.5%	0.4%	0.3%	0.4%
American Indian and Alaska Native alone	0.4%	0.3%	0.2%	0.2%
Asian alone	26.7%	38.3%	20.3%	16.2%
Native Hawaiian and Other Pacific Islander alone	11.2%	13.1%	15.6%	8.8%
Some other race alone	1.1%	0.9%	0.7%	8.8%
Two or more races	28.4%	29.7%	32.2%	25.0%
Residence in 1995 for				
Same house	53.2%	57.3%	53.5%	31.1%
Different house, same county	24.4%	26.2%	24.8%	31.8%
Different county in HI	12.3%	9.4%	13.7%	19.1%
Different state	7.9%	4.8%	5.5%	13.3%
Outside the US	2.3%	2.2%	2.5%	4.7%

Source: Census 2000.

Table 3.3.12
Selected Economic Characteristics, by Census Designated Places, 2000 Census

	Hawaii County	Hilo CDP	Waimea CDP	Waikoloa & Puako CDPs
LABOR FORCE (2)				
Persons 16 and older				
In civilian labor force	70,592	18,681	3,528	2,911
Unemployment % (of CLF)	8.0%	10.3%	2.9%	3.3%
Labor Force Participation % (of population 16 and older)	61.7%	58.8%	68.5%	74.4%
Workers by Industry (Selected Industries)				
Agriculture, forestry, fishing and hunting	7.0%	3.8%	7.9%	1.6%
Construction	7.8%	6.6%	7.6%	5.0%
Retail trade	12.0%	12.7%	8.3%	8.4%
Finance, insurance, real estate	5.1%	4.6%	2.8%	6.8%
Educational services	9.9%	14.0%	12.9%	4.3%
Health care and social assistance	9.0%	11.7%	10.4%	4.6%
Accommodation and food services	14.9%	8.8%	26.5%	40.4%
Public administration	5.7%	9.1%	2.6%	2.0%
INCOME AND POVERTY				
Household income in 1999				
Under $25,000	30.9%	32.7%	17.8%	16.9%
$25,000 to $49,999	29.8%	27.9%	30.8%	32.2%
$50,000 to $74,999	18.4%	18.2%	24.1%	21.5%
$75,000 to $99,999	10.4%	11.3%	14.9%	15.6%
$100,000 to $199,999	8.7%	8.6%	9.1%	11.2%
$200,000 and above	1.8%	1.2%	3.3%	2.6%
Median Household Income	$39,805	$39,139	$51,150	$55,145
Poverty Status				
Share of total population below poverty line	15.7%	17.1%	6.0%	9.8%
Age distribution, persons below poverty line				
0 to 17 years	35.9%	35.0%	40.9%	42.9%
18 to 64 years	58.0%	58.7%	50.0%	55.4%
65 to 74 years	3.2%	2.9%	6.0%	1.2%
75 years and over	2.9%	3.4%	3.1%	0.6%

Source: Census 2000.

Table 3.3.13
Selected Housing Characteristics by Census Designated Place, 2000 Census

	Hilo CDP	Waimea CDP	Waikoloa & Puako CDPs
HOUSING			
Housing Units (1)			
Total	16,026	2,589	2,759
Occupied	14,577	2,371	1,965
Vacant	1,449	218	794
Vacant for seasonal use	216	79	650
Vacant share of all units	9.0%	8.4%	28.8%
Owner occupied	60.9%	64.2%	51.7%
Renter occupied	39.1%	35.8%	48.3%
Households (1)			
1990 to March 2000	15.7%	21.2%	45.8%
1980 to 1989	15.3%	33.6%	36.7%
1970 to 1979	26.2%	21.0%	12.9%
1960 to 1969	16.4%	8.2%	1.2%
Before 1960	26.3%	16.0%	3.4%
Median contract rent	$489	$737	$766
Median gross rent	$542	$860	$850
Owner-occupant housing costs			
Median, for owners with a mortgage	$1,147	$1,337	$1,798
Share of households with high housing costs			
Renters, paying 30% to 39% of income	14.1%	5.1%	15.9%
Renters, paying > 40% of income	31.9%	14.4%	20.5%
Owners, paying 30% to 39% of income	14.4%	13.6%	17.1%
Owners, paying 40% + of income	16.4%	30.6%	21.4%

Source: Census 2000.

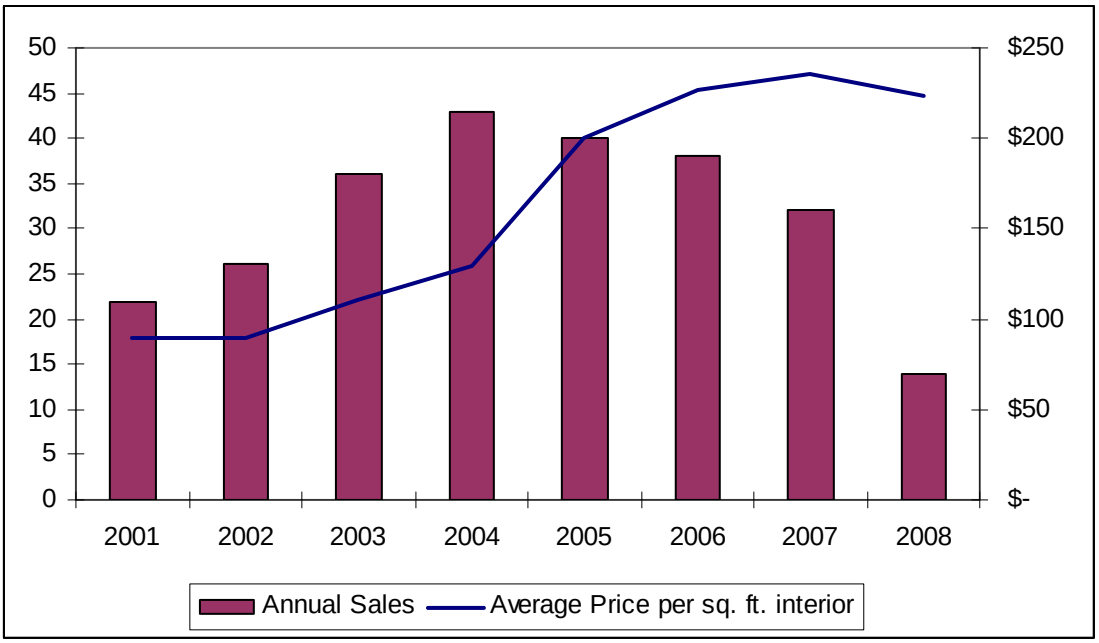
Table 3.3.14 provides more recent data on the housing market. It shows that the three districts studied here account for more than two-thirds of single-family housing sales. In the areas with many sales, South Hilo and Puna housing prices are much lower, both in terms of total price and price per square foot of housing, than North Kona and South Kohala prices. The sales data in Figure 3.3.3 show that an active housing market has existed in the Kaumana area since 2000, accounting for about 10 percent to 20 percent of South Hilo District sales. The average price for homes in this area has climbed, but it remains below the average for the district as a whole. Too few housing sales have occurred in Waiki‘i to allow comparison of local and district trends.

Table 3.3.14
Single Family Housing Sales by District, 2006 to Q1, 2008

District	Volume	Average Price	Average Price per sq.ft.
Puna	491	$258,093	$212
South Hilo	560	$356,063	$252
North Hilo	24	$303,576	$260
Hamakua	42	$382,274	$322
North Kohala	37	$466,367	$349
South Kohala	373	$593,879	$377
North Kona	638	$690,015	$403
South Kona	43	$486,423	$320
Ka'u	92	$258,500	$217

Source: Real Property Tax data for the period from January 1, 2006 through February 29, 2008, compiled by Hawaii Information Service and analyzed by Belt Collins Hawaii.

Figure 3.3.3
Residential Sales in Kaumana Area



Notes: Download for sales in Kaumana subdivisions. 2008 data are through 10/31/2008.
Source: Hawaii Information Service data, analyzed by Belt Collins Hawaii.

The share of commuters traveling an hour or more to work is smaller in the districts adjoining Saddle Road, because the longest commutes are now from districts with dispersed housing but few jobs – Puna, Ka‘ū, North Kohala and Hamakua (Tables 3.3.15 and 3.3.16).

Table 3.3.15
Commute Travel Time, by Districts, 2000 Census

	South Hilo	Puna	Kau	South Kona	North Kona	South Kohala	North Kohala	Hamakua	North Hilo
Working at home	883	1,034	136	419	782	316	141	149	19
Commuters	18,105	10,815	1,813	3,725	13,646	6,152	2,168	2,361	737
45 to 59 minutes	352	444	77	369	499	595	413	433	116
% of commuters	1.9%	4.1%	4.2%	9.9%	3.7%	9.7%	19.0%	18.3%	15.7%
1 hour or more	1,004	893	177	379	556	417	204	507	114
% of commuters	5.5%	8.3%	9.8%	10.2%	4.1%	6.8%	9.4%	21.5%	15.5%

Table 3.3.16
Commute Travel Time, by Census Designated Place, 2000 Census

	Hilo CDP	Waimea CDP	Waikoloa & Puako CDPs
COMMUTING			
Travel time for workers			
Worked at home	729	170	113
Commute less than 15 minutes	8,170	1,241	542
Commute 15 to 29 minutes	5,821	657	1,283
Commute 30 to 44 minutes	731	635	486
Commute 45 to 59 minutes	275	363	207
Commute 1 hour or more	852	270	123
% of commuters, 1 hr or more	5.4%	8.5%	4.7%

Source: Census 2000.

3.3.2.2 Environmental Consequences

Just as with the 1999 ROD-selected alignment W-3, W-7 would shorten the travel distance between Hilo and coastal West Hawai‘i by approximately 30 minutes, or more during peak travel. For travel between Hilo and Waimea, SR 19 and Saddle Road would have approximately equal travel times. The improved Saddle Road would be safer and easier to drive than the existing road, and less likely to be congested than the other circum-island routes. At peak drive times, the difference could be much greater. The impact on the social environment depends on the drivers and routes affected, notably:

- Visitors traveling between West Hawai‘i and the Kilauea Volcano area;
- East Hawai’i residents commuting to and from work in West Hawai‘i;
- Residents of either side of the island, making occasional cross-island trips;
- Residents of Waiki‘i, whose subdivision is adjacent to the existing Saddle Road;
- Visitors and residents traveling between West Hawai‘i and the Mauna Kea Access Road; and
- Workers at Pohakuloa Training Area and the Mauna Kea and Mauna Loa observatories.

More details by group are provided below:

Visitors. Currently, vacationers in West Hawai‘i who visit Hawai‘i Volcanoes National Park can take either SR 11 around South Point, or SR 19 to Hilo and then SR 11 to Volcano. The former route is more direct and shorter, to and from Kona, while the latter may take less time to and from South Kohala. If a day trip is planned, either route involves a lengthy drive. If these are combined in a circle-island drive of approximately 220 miles, visitors may have little time for sightseeing and may be slowed by congestion in Waimea, Hilo, and/or South Kona.

Use of Saddle Road allows visitors to make a shorter circular tour. With the new route, Hilo is likely to see more tourists, i.e., some of those who would now travel only by SR 11 may choose to return by way of Saddle Road, passing through Hilo on their way. Visitor attendance at Hilo area museums and attractions and visitor spending in the Hilo area could thus increase slightly.

Commuters. Commuting by way of Saddle Road already occurs. For Puna and South Hilo residents who work in West Hawai‘i, or residents from either side who work at Pohakuloa Training Area or Mauna Kea, the Saddle Road improvements would bring increased safety and shorter travel times. Few residents of other districts are likely to take this route now. Shorter travel times could make Saddle Road a preferable route for North Hilo commuters, but this is a small group.

With the new route, some residents of Kaumana may take work in West Hawai‘i. Others may become interested in moving into the Kaumana area as it may be more convenient to their commute. Housing is available in the area, and recent prices are slightly lower than in South Hilo district as a whole. However, the Kaumana prices are higher than average prices in Puna, so cross-island commuters might have to weigh higher housing costs against lower travel time and cost. The additional demand for housing in the area could be in the range of 15 to 30 sales per year. Table 3.3.17 estimates the eventual impact of Saddle Road improvements on the Kaumana area. Some of the impact could be dispersed over a larger share of the Hilo urban area, lowering the impact on neighborhoods directly below Saddle Road.

Table 3.3.17
Estimate of Increase in Housing Demand in Kaumana from Section I Construction

Commuters from South Hilo (1 hour or more):	1,000				
Share likely to seek new home (over five or more years)		37%			
Share of movers likely interested in Kaumana as closer to work site		30%			
Potential new Kaumana households				112	
Possible new buyers/renters (over five to ten years)			11	to	22
Commuters from Puna (1 hour or more)	900				
Share likely to seek new home (over five or more years)		37%			
Share of movers likely interested in Kaumana as closer to work site		10%			
Potential new Kaumana households				33	
Possible new buyers/renters (over five to ten years)			3	to	7
Total estimated new annual housing demand			15	to	29

Notes: Number of commuters from 2000 Census. Share of households interested in moving on island from 2006 *Hawai'i Housing Policy Study*. Share likely interested in Kaumana based on survey respondents' interest in "moving to the other side of Hawai'i island" for the right home at the right price (22% of potential movers). The move from other areas in South Hilo to Kaumana is viewed here as a short one; the move from Puna is viewed as long, separating a moving household from friends and family in their home district. (Still, the longer move would also yield a much shorter commute.) It is assumed here that home prices for movers are similar in Kaumana and other South Hilo areas, but higher than the home areas of Puna commuters.

The additional demand could increase Kaumana sales by 50 percent or more, creating pressure to raise local sales prices, which have recently fallen steeply. With new demand largely from South Hilo residents and based on workers' convenience, little change in the character of the local community is anticipated.

The preceding discussion focuses on automobile travel. The County of Hawai'i is working to expand bus travel by residents, and hence reducing use of fossil fuels. With bus travel from Downtown Hilo as an alternative for commuters to West Hawai'i, the share of commuters likely to be attracted to the Kaumana area could be smaller than estimated above.

A second factor that could lessen the impact of the project on the housing market is the development of workforce housing in South Kohala, notably at the County's Kamakoa project. For those who have few roots in East Hawai'i, Waikoloa Village offers a convenient place to live, at reasonable cost. However, the analysis of project impacts dealt with the share of commuters who retain strong ties to East Hawai'i but would be motivated to move within the area by a shorter commute time.

Other Residents. Residents travel cross-island for work, recreation, and other reasons. Improved cross-island transport would help to slow increasing congestion in urban areas along SR 11 and SR 19. Shorter cross-island travel times would allow residents more time to enjoy at their homes and destinations.

Waiki‘i. Under either the 1999 ROD-selected W-3 or the W-7 alignment, Waiki‘i would no longer lie next to a major roadway. The existing Saddle Road in this area would become a less-improved alternative route to Waiki‘i and PTA. For Waiki‘i residents, the impacts would be a gain in isolation – part of the appeal of this area – and improved safety.

Mauna Kea. For parties traveling between West Hawai‘i and Mauna Kea, the W-7 alignment, as with the 1999 ROD-selected W-3 alignment, would bring smoother and safer travel. While this improvement would likely be appreciated by the few who travel the route often, it is not expected to have any discernible impact on travel decisions, e.g., on the popularity of Mauna Kea summit tours.

W-7 versus W-3

There are no differences in socioeconomic impacts between W-3 and W-7.

3.3.2.3 Mitigation Measures

- HDOT will install signage to remind visitors that there are no services on Saddle Road.

No further mitigation measures are needed. The largest impact noted here – increased housing demand in Kaumana – would lessen as local prices rise.

3.3.3 Community Identity and Cohesion

3.3.3.1 Affected Environment

Vitally important to an accurate characterization of the social fabric of an area are the following concepts which portray social well-being and community cohesion.

- Community decision-making processes and local power structures.
- Relocation of locals away from the community.
- Socioeconomic harmony or polarization.
- Community and regional character or spirit.
- Codes of conduct among and between various social and ethnic groups.
- Relationship with visitors and tourist industry.

The Island of Hawai‘i has a rich, multi-ethnic history that has helped to create a strong sense of community identity evidenced in both the people and the landscape. Many native Hawaiian traditions, including cuisine, *luau* and *pa‘ina* (ceremonial feasts), and music and dance have been enthusiastically embraced by later arrivals. Native Hawaiian culture is strong and growing in influence. In addition, many traditions of the Japanese, Chinese, Filipino, Portuguese, and Korean immigrant plantation workers have also been perpetuated.

Most long-time Hawai‘i (*kama‘aina*) families trace their roots to such beginnings and share many deep and wide-ranging bonds. Newer residents, particularly those from the mainland, do not share such links. Nevertheless, celebrations of this heritage in such events as hula festivals, plantation days, and rodeos are enthusiastically supported by long-term residents and newcomers alike.

At the same time, however, the sense of community is evolving as new residents (and their values) from outside the island are gradually incorporated. *Kama‘aina* residents often express a longing for the old days and a fear of being disenfranchised. Many towns and villages (particularly Kailua-Kona) have been transformed from charming local settlements into bustling visitor and residential communities with numerous wealthy, transplanted mainlanders whose influence in community affairs is not related to their family connection to the land.

A few of those who participated in surveys, meetings and workshops for the 1999 EIS expressed the sentiment that Hawai‘i County should be two counties instead of one; that the two sides of the island have very distinct destinies. The majority, however, felt that the Island of Hawai‘i makes up one large community, despite the divisive forces of distance, and unequal economies, and that better transportation would enhance mutual community support, and balanced economic growth. In the view of most, steady improvement of an island-wide highway system over the decades has solidified the community. A strong theme of the Saddle Road Task Force has been the unifying effect of an improved Saddle Road.

Individual areas affected by the Saddle Road project have very distinct histories, social makeup and identities. Community workshops and surveys for this project were intended to allow residents to express what they valued about their community and what impacts they expected as a result of improving Saddle Road. The following area characterizations were formed from opinions presented in these surveys.

Waimea. Headquarters for Parker Ranch for over a century and a half, Waimea has a rich history and a dramatic setting in the misty uplands. A substantial area of Hawaiian Home Lands, supporting farms and ranches, is also present. The last twenty years have produced rapid growth. The charming cattle town is now also an enclave for wealthy transplanted mainlanders and a bedroom community for workers at South Kohala resorts. Waimea participants tended to emphasize the rural character and heritage of their region, pointing with pride to the "...unique ranching/farming community" but worrying that it is "twice daily assaulted by a long string of traffic."

Waikoloa. Development of Waikoloa, a planned community, started in the 1960s. This windy and dry village has developed an identity of its own, and is distinctly different from the Waikoloa resort area on the coast. Today, working families are more abundant than retirees, and the community continues to expand and diversify. Non-residential land uses are limited but expanding. Waikoloa has the potential to grow as large or larger than Waimea. Waikoloa has a strong community association and a tradition of "self-help."

Waiki‘i. Waiki‘i’s rich ranching tradition and dramatic scenery presented the opportunity for a unique subdivision in the 1980s. All 130 lots have grazing easements and share large common areas. Currently, homes have been built on several dozen lots, and several additional homes are present in the area but outside Waiki‘i Ranch proper. The arrangement has allowed continuation of ranching activities under the supervision of the lot owner association. In addition to cattle, many residents raise horses and are involved in equestrian activity. Among the valued traits of Waiki‘i most commonly mentioned by its residents are the spectacular scenery, cool weather, and seclusion.

Hilo and Kaumana. Hilo’s tradition as a major population center is unbroken from pre-Cook Hawai‘i to modern times. Hilo is often described as quaint and traditional. Formerly centered on the sugar cane industry, agriculture around Hilo became more diversified with the growth of macadamia, papaya, orchid and foliage industries. The economy is now more dependent on business and government functions headquartered in Hilo, including the University of Hawai‘i at Hilo. It is the major commercial center on the Island of Hawai‘i and also supports several industrial and commercial districts. Hilo International Airport and a deep draft harbor anchor the island’s major shipping center.

Kaumana is a former sugar cane camp that has been annexed as a quiet suburb of Hilo. Upper Kaumana, which would be most directly affected by Saddle Road, contains a mixture of old camp housing and modern subdivisions. One school and a small general store are present. Kaumana residents feel a strong stake in Saddle Road and have been active participants in meetings, surveys and workshops. As one resident stated, the community is in a “state of transition” from an isolated relic of the plantation era to a growing suburb of Hilo. The integration with Hilo is convenient: a “location close to the mountains and [not too far from] the shoreline...cleanliness, relatively rural lifestyle...with access to modern day conveniences.” Another noted “[We are] separate from downtown Hilo, yet close enough and affordable, especially to owner builders.” Preserving Kaumana’s “serenity, privacy, low traffic, good neighbors, natural backyard” and “active community associations” is seen as important.

Kailua-Kona. Kona was an important and powerful district in Hawai‘i prior to Western contact, the seat of ruling chiefs and the site of productive upland agriculture and teeming shoreline and offshore fisheries. For most of the years since 1850, however, Kona was an isolated, sleepy rural district where scattered coffee farms and cattle ranches were the economic mainstay. The growth of tourism in West Hawai‘i since the 1960s has steadily attracted new residents lured by the physical beauty of Kona and the growing employment and entrepreneurial opportunities. Following Hilo, Kailua is now the second largest population and business center on the island. In surveys and public meetings, North Kona residents noted the value of climate, scenery and history of this area. Most prominent, however, were statements about the vital economy of West Hawai‘i, powered by tourism.

3.3.3.2 Environmental Consequences

Construction and operation of the W-7 alignment, just as with the 1999 ROD-selected W-3 alignment, would not create any temporary or permanent adverse impacts on any local community. The most important effects would be beneficial: to connect all these communities together with a safe and modern highway system. The physical safety of the road would be substantially enhanced by widening travel lanes, providing passing lanes, Typical Sections s, improving pavement, straightening horizontal curves, and leveling vertical alignment. Traffic on the narrow, winding existing Saddle Road through Waikiʻi would be reduced and military and truck traffic would be minimized, in keeping with isolated feel valued by residents. As Section I is entirely within a military base, no community barriers would be created by the widened road profile.

Because the W-7 alignment is distant from existing communities (as well as existing roads, except the endpoints), construction activities, which can cause speed limit reductions within the construction zone, inconvenience in accessing driveways and side streets, periodic closures of one or more travel lanes, and resultant delays to "pass-through" traffic, would not occur within individual communities. No temporary impacts to community identity and cohesion would result. For construction near MP 41 and where Section I connects to Section II, and near Mamalahoa Highway, disturbance to the existing road would occur, resulting in minor delays during construction.

After construction, the majority of traffic using Saddle Road would be diverted away from the existing segment through Waikiʻi and onto the W-7 alignment. The reduction in traffic on the existing Saddle Road through Waikiʻi would make pedestrian, bicycle and equestrian travel safer and improve the Waikiʻi community.

Based on results of analysis of driving time with proposed improvements on W-7, motorists traveling between East Hawaiʻi and most locations in West Hawaiʻi would generally find the trip considerably safer and approximately 15 minutes shorter one way, in addition to the 15 minute time savings achieved through improvements in Sections II, III and IV [ref: FEIS, Part I, 3.4.3.1].

The implications of this are far-ranging. With a safer and faster Saddle Road, social interchange would be expected to increase. Families separated by the distances between East and West Hawaiʻi would find it substantially easier to travel across the island. Social events occurring either in East or West Hawaiʻi would draw more participants from both sides of the islands. In addition, potential employees (particularly of the job-rich West Hawaiʻi resorts) would find the commuting time across island more acceptable. University of Hawaiʻi students also stand to benefit by a shorter commute between the Kona and Hilo campuses and field station visits. All of these factors would tend to increase the community cohesion of the island as a whole. This potential benefit of improving Saddle Road was supported by a majority of survey participants.

Some residents are concerned that improvements to Saddle Road would encourage or facilitate expansion of the observatories on Mauna Kea and increase visitation of Mauna Kea, stressing its natural and cultural resources. Improvements to Saddle Road would benefit observatories and visitors by providing a safer faster transportation route to and from the observatory complex; however, the expansion of these facilities is not dependent on the improvement of Saddle Road, but rather on the management oversight of the University of Hawai‘i, particularly the Office of Mauna Kea Management, which has recently formalized a comprehensive management plan.

W-7 versus W-3

There are no differences in impacts to community identity and cohesion between W-3 and W-7.

3.3.3.3 Mitigation Measures

- A traffic control plan will be developed to outline the steps needed to minimize congestion and maintain access to adjacent properties at all times during construction.
- As feasible, construction-related delays will be minimized during normal rush hours for commuters.
- Since construction work on W-7 would avoid the existing Saddle Road alignment, construction impacts are expected to be minimal on cross-island traffic. However, if delays or closures are anticipated at the project corridor’s intersections with Mamalahoa Highway or Saddle Road, information will be publicized on a regular, ongoing basis through posted advertisements, radio and newspaper bulletins, and road signs at each end of Saddle Road and along Mamalahoa Highway (SR 190) and Kaumana Drive in Hilo.

3.3.4 Outdoor Recreation Resources and Hunting

3.3.4.1 Affected Environment

Saddle Road provides access to a number of outdoor recreational resources and opportunities, notably Mauna Kea State Park, several hunting areas and hiking trails, and the attractions of the astronomical observatories on Mauna Kea and the visitor center at Hale Pohaku. However, the W-7 alignment itself would be wholly enclosed within a military base and provide very little access to recreational resources.

Saddle Road itself is used by recreational motorists, including motorcyclists, as well as bicyclists and occasional runners. Pedestrians and bicyclists are discussed in Section 3.8 of this SEIS.

Hunting is a long-standing tradition in Hawai‘i. For two centuries, Hawai‘i’s forests and ranges have been hunted for sport and food. Hunting connects people to the natural environment and provides an occasion to enjoy and learn from the forests. Hunting is also an important source of food for many families. The game resources currently hunted legally in Hawai‘i are unique in the United States in that all species were introduced and none are native to the state. The 3,000-plus licensed hunters on the island of Hawai‘i hunt pigs, sheep, goats, turkey, pheasants, quails, chukars, francolins and a variety of other gamebirds by rifle or archery. Some three dozen units largely concentrated in the central portion of the island enclose almost 700,000 acres (ref: FEIS, Part I, 3.3.4.1). In the vicinity of Section I of Saddle Road, State hunting areas include the Mauna Kea Forest Reserve, the Pu‘uanahulu Game Management Area, Ka’ohe, and PTA hunting units. PTA allows hunting when and where it does not conflict with training. Hunting rules on PTA are the same as the State’s except only mammal archery and shotgun bird hunting are allowed (no rifle hunting). Figure 3.1.1, above, includes hunting areas in the vicinity of Section I of Saddle Road, which are described in Table 3.3.18.

Table 3.3.18
Hunting Units Near Saddle Road Section I Area

Unit	Location/Remarks	Resource/Arms Permitted	Access
A	Mauna Kea Forest Reserve Elevations > 6,700’	Pigs, Goats, Sheep[1], Birds; Archery and Firearms	North of Saddle Road
E	Pu‘uanahulu Game Management Area (GMA)	Pigs, Goats, Sheep, Birds; Archery and Firearms	East of Mamalahoa Highway
E	Kapele Section of PTA GMA	Pigs, Goats, Sheep (Archery); Birds (Shotgun)	South of Saddle Road
F	Bobcat Section of PTA Cooperative GMA	Pigs, Goats, Sheep (Archery); Birds (Shotgun)	South of Saddle Road
G	Ka’ohe (SW corner of Mauna Kea)	Pigs, Goats, Sheep[1]; Archery and Firearms (muzzle loader)	North of Saddle Road

Source: State of Hawai‘i Division of Forestry and Wildlife (DOFAW); Chapter §13-123, HAR, *Rules Regulating Game Mammal Hunting*, and §13-122, HAR, *Rules Regulating Game Bird Hunting, Field Trials and Commercial Shooting Preserves* (2003 Unofficial Versions);
[1] DLNR is under court order to eliminate sheep from this area. No bag limit, extended hunting periods.

3.3.4.2 Environmental Consequences

Minor temporary impacts to outdoor recreation associated with construction of the project would occur. Construction activities often cause traffic congestion and delays, potentially making access to recreational areas and hunting units less convenient. Motor-touring, bicycling, and running would be temporarily disrupted at the connection points of W-7 and the existing Saddle Road and Mamalahoa Highway. In addition, construction activities could spook game from some areas within the Kapele Unit of the PTA Game Management Area.

With regard to direct, long-term impacts, improvements to Saddle Road would provide better general accessibility to recreational areas along Saddle Road, including Mauna Kea State Park, the hunting areas throughout Saddle Road, and Mauna Kea. PTA expects to open Keʻāmuku to hunting under the same State of Hawaiʻi State hunting regulations as other areas within PTA, once infrastructure in the form of trails, parking areas, and fire prevention facilities are in place.

The 1999 EIS noted that increasing use of Saddle Road could somewhat degrade the quality of the experience of wild areas, cause overcrowding, and contribute to the usage of off-road vehicles and mountain bikes within the study corridor. Improvement of Saddle Road within Sections II and III has already been a factor in the increase in traffic and use of the Saddle area, and completing the critical Section I link would likely continue this trend. Increased accessibility and use of formerly isolated recreational areas does bring with it increased management responsibilities, but overall it is a substantial recreational benefit.

W-7 versus W-3

There are no differences in impacts to outdoor recreation resources and hunting between W-3 and W-7.

3.3.4.3 Mitigation Measures

- The traffic control plan will specify that during construction, access will be maintained at all times to areas of Saddle Road that serve recreational areas, including hunting units.

3.3.5 Public Services and Community Facilities

3.3.5.1 Affected Environment

3.3.5.1.1 Fire, Police, and Emergency Services

Fire and emergency service for the County of Hawai‘i is provided by the Hawai‘i Fire Department. Full stations are present in Waimea and North Kona, with a smaller station at Waikoloa. The South Kohala Fire Station is located near the intersection of Puakō Beach Road and Queen Ka‘ahumanu Highway (SR19). Each station operates round-the-clock with a crew of firefighters and Mobile Intensive Care Technicians. The 1999 EIS reported that about 80 percent of calls are related to emergency medical services, and 20 percent or less for building, brush, and vehicle fires (FEIS: Sec. 3.3.5.1.1).

The Pohakuloa Training Area maintains 24-hour emergency services with 25 firefighters, two ambulances, and 14 Army Police. PTA has a Mutual and Automatic Aid Agreement with the County of Hawai‘i and provides first response to 911 calls for all fires, traffic accidents and other emergencies in its vicinity, including at a minimum, the area from MP 17 to 46 and the summits of Mauna Kea and Mauna Loa.

The Hawai‘i Police Department provides all police services for the island, including round-the-clock police stations in Waimea and Hilo. Plans are underway for a police substation in Waikoloa. Police have begun patrols and speed enforcement on Saddle Road as portions of the highway have been improved and traffic is increasing. Emergency telephones are located at Mauna Kea State Park, PTA and in emergency call boxes within Section II. Current plans for expansion of the HDOT call box system do not include the project corridor.

3.3.5.1.2 Schools

The closest school to the W-7 alignment is Waikoloa Elementary. This school is located outside of the project limits, about six miles west of the site where Saddle Road would connect with the Highway 190.

3.3.5.1.3 Community Facilities

No churches, community centers, or similar facilities are located on Saddle Road, either within the greater MP 6 to MP 53 limits or within the Section I area.

3.3.5.2 Environmental Consequences

Construction activities for W-7 would result in slight traffic delays and traffic congestion during limited times on Saddle Road and Mamalahoa Highway. Access would be maintained and no substantial impact on the ability to provide emergency services should occur during construction. Impacts to public services and community facilities would not occur during construction.

After construction, a portion of Saddle Road would be completely within PTA, and primary responsibility for responding to fires and other emergencies on this part of the road would rest with PTA. The Mutual and Automatic Aid Agreement with the County of Hawaiʻi would be modified to include all or a portion of the new Saddle Road in Section I. As a result of increased use of Saddle Road in the future, the demand for certain types of public services is expected to grow. The expected increase in traffic volumes would create a corresponding growth in the need for fire, emergency and police response in the project corridor. The incidence of stranded motorists would be expected to increase. The military, as the entity with the first opportunity to respond in many cases, would be burdened with additional responsibility. The demand for fuel and mechanical assistance would increase.

Direct, long-term, adverse impacts to public services, community centers, and local businesses from the proposed action are not anticipated. With improvements to Saddle Road, long-term impacts are expected to be beneficial in nature.

The increase in traffic and the presence of a new highway also increases the potential for wildfires in the project corridor, mainly through arson, as discussed in Section 3.9 of this SEIS.

Beneficial impacts are also anticipated. Proposed improvements to Saddle Road would generally result in a decrease in response time for emergency vehicles responding to Saddle Road incidents. The improved road would substantially improve the ability of PTA, the Hawaiʻi Fire Department and the Hawaiʻi County Police Department to respond to road, fire and medical emergencies because of shorter distances as well as straighter, better-paved and wider roadways. The project would also provide a superior alternate route or evacuation route in case accidents, floods or landslides block SR 19 along the Hamakua Coast. Likewise, if lava flows from Kilauea or the southwest or northeast rift zones of Mauna Loa cuts off SR 11 in Puna, Kaʻu or South Kona, an improved Saddle Road would be an invaluable alternate route. With the proposed project, Saddle Road would become a safer and faster route across the island. With the proposed improvements, and future growth in traffic volumes and use, the maintenance of an express bus between Hilo and Kona may prove feasible.

W-7 versus W-3

There are no differences in impacts to public services and community facilities between W-3 and W-7.

3.3.5.3 Mitigation Measures

- Emergency service providers, including the Hawai‘i County Fire Department, the Hawai‘i Police Department, and the PTA, will be kept informed of the location and schedule of construction along the length of the project.
- Traffic control plans prepared for construction of Saddle Road will include provisions for allowing emergency vehicles to pass through construction zones without delays and to have unimpeded access to roadside facilities at all times.
- Fire prevention and suppression measures are discussed in detail in this SEIS in Section 3.9, Fire Hazard.

3.3.6 Environmental Justice

Consistent with Title VI of the 1964 Civil Rights Act and Executive Order 12898 on Environmental Justice, all program and project actions and decisions must ensure that minority and low-income populations do not experience disproportionately high and adverse human health or environmental effects and activities. Environmental justice is a term that refers to social inequity in bearing the burdens of adverse environmental impacts. Certain socioeconomic groups in the United States, including ethnic minorities, the elderly, rural residents and others, have historically experienced a disproportionate share of undesirable side-effects from locally undesirable land uses such as toxic waste dumps, landfills, and freeway projects.

The policy of the FHWA with regard to environmental justice is to address whether any minority or low-income group is disproportionately impacted by a proposed project and identify mitigation measures to avoid or minimize any adverse social impacts. This policy is in keeping with Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low Income Populations*.

In the State of Hawai‘i, the Office of Assistant Secretary for Planning and Evaluation at the Department of Health and Human Services (DHHS), suggested that the Census Bureau’s poverty threshold be used in an analysis of environmental justice rather than DHHS poverty guidelines. Accordingly, the poverty threshold of $14,279 per year (the 2005 average poverty threshold preliminary estimate of $15,577 for a three-person family multiplied by the 2.75 persons/household as shown in the 2000 U.S. Census of Population for Hawai‘i County) was used.

Although the census data are currently nine years old, they remain a reasonably reliable source of information for ethnic affiliation in most areas of Hawai‘i. In terms of major categories recognized by the U.S. Census, the majority of residents in the State of Hawai‘i are Asians/Pacific Islanders (61.8 percent), with the remainder mostly white (33.3 percent). African-Americans comprise 2.5 percent of the population. This breakdown, however, inadequately describes the ethnic makeup as perceived by Hawai‘i residents, who distinguish among Native Hawaiians, Samoans, Japanese, Chinese, Koreans, and Filipinos. In addition, more than half of all births in Hawai‘i since 1970

involve parents of different or mixed ethnic backgrounds. Consequently, the conventional definition of ethnic affiliation is problematic in Hawai‘i. Discussions of environmental justice in Hawai‘i generally involve the Native Hawaiian population, which is usually recognized as disadvantaged in terms of income, health, home ownership, and many other measures of socioeconomic well-being.

The only community within five miles of the W-7 alignment is Waiki‘i. Census data on income and poverty are not available for Waiki‘i, but it is predominately a high-income ranching subdivision with very few or perhaps no families below the poverty level. Analysis of race reported by residents in the 2000 U.S. Census of Population for the census blocks making up Waiki‘i indicate that the residents are 53 percent white, 6 percent Asian, 8 percent Native Hawaiian, and 19 percent of two or more races, somewhat similar to the County and State as a whole. Waiki‘i would be affected positively by a reduction in traffic, and no adverse effects would occur.

In summary, there are no concentrations of minority or low-income groups in the project area that would experience disproportionately high and adverse impacts from construction, ROW-acquisition, noise and air quality, or other direct, indirect or cumulative impacts from the implementation of the project.

The public involvement process has included intensive efforts to outreach into the minority and low-income populations of the island, and especially West Hawai‘i. These efforts have involved not only conventional newspaper and email announcements but also outreach to community leaders and posting of flyers at non-traditional locations such as laundromats, community centers, day care facilities, union halls, Hawaiian Homes centers, and senior care facilities. Throughout project development, project representatives have also spoken before neighborhood organizations, union membership meetings, small business groups, and environmental groups to encourage participation among low-income and minority populations.

W-7 versus W-3

There are no differences in environmental justice impacts between W-3 and W-7.

3.3.7 Native Hawaiian Culture and Values

The reader is referred to Section 3.3.8 of the 1999 EIS for a full discussion of the relationship of the entire project to Native Hawaiian culture and values. The discussion in this SEIS is greatly abbreviated and mainly emphasizes the features of Section I. However, some background is necessary on the historical and cultural foundations for the intricate relationships among elements of the natural and cultural worlds, which were, and still are, seen as one whole.

Native Hawaiians are people whose daily lives and culture are rooted in and integrated with the surrounding natural and biological world. They have recognized and practiced respect for hierarchy for man and land alike. The mountain is the sacred child of Wakea, and it is the source for the land. The mountains and land were genealogically connected to native Hawaiians through the original ancestor, Wakea and Papa. The mountains or land, water, and sky were a necessary part of the life cycle. The taro was regarded as an older brother of the land and provided sustenance. The coral was also an older brother (of the sea) and was the means through which other food could be acquired. The hierarchical system assigns rank to man, god, and the elements of the environment. Within the hierarchical food system another set of rules apply. The older or larger trees are primary and most important. The other animals that use these trees as their residence or food source are secondary. The *lokahi* or harmony system complements and maintains the well being of the whole entity. Everything is important because each has a function.

Water was and is necessary for all life forms. Laws for water and the use of water were formulated so all had exposure to water. Water that did not touch ground was highly prized, such as the water in the lake on Mauna Kea and the water in the *piko* (navel) of the taro leaf. Water that moved underground or over land from the mountain to the sea was sometimes funneled into irrigation channels and fed the older brother kalo and was also treasured. The mountain and the *waomaʻukele* (rainforests) attracted the atmospheric water.

The W-7 alignment traverses the *moku* (district) of Hamakua, within the *ahupuaʻa* (subunit) of Kaʻohe, and the *moku* of Kohala, within the *ahupuaʻa* of Waikoloa (which is sometimes termed an *ʻili kūpono* rather than an *ahupuaʻa*). Although the highway alignment involves minimal land space from within these land sections, it travels through the upper region of this island, an area which is considered to have religious importance to Native Hawaiians. Mauna Kea is known around the world, and it is regarded by many as the highest island mountain, the highest mountain in the world from below sea level, and the best mountain from which to make astronomical observations. To the Native Hawaiian, Mauna Kea is a *kupuna*, a grandparent or ancestor, and an *one hanau*, birthplace or home.

Based on native Hawaiian cultural background and philosophy, the following cultural features and sites were identified within the larger Saddle Road project corridor, from MP 6 to MP 53: *mamane* forest (ref: FEIS - Part I, 3.13.1.2.4), *kipuka* (ref: FEIS - Part I, 3.13.1.3), prehistoric trails (ref: FEIS - Part I, 3.19.1.1), and historic trails (ref: FEIS - Part I, 3.19.1.2).

The cultural value of *mamane*/*naio* forest and *kipuka* is associated with the age and size of the trees (ref: FEIS - Part I, 3.3.8.1.3.6). Prehistoric trails were developed and used by Hawaiians long before Western contact of the 1800s. Historic trails were developed following Western contact, as ranching and tourism increased traffic to and through the Saddle. Two trails intersecting the project area were identified by the archaeological survey (ref: FEIS - Part I, 3.19.2). The Hilo-Puʻu ʻOʻo Trail is historic, but it probably

follows the general route of an earlier prehistoric trail. The Pu‘u ‘O‘o-Volcano Trail is prehistoric. None of these features were located within the Section I area, and none are affected by the W-7 alignment.

3.3.7.2 Environmental Consequences

No *mamane* forest, *kipuka*, trails, *heiau* (temple) sites, burial sites, water sources, or sensitive landforms such as cinder cones are present or would be affected.

Some native Hawaiian groups may have concerns that negative cultural impacts would result from project implementation due to the belief that within the Saddle area there exist detrimental residual forces. Another belief is that human intrusion in areas not previously despoiled or developed would result in the release of negative energy, without the proper protocol (ritual) of “release” or “sanctification.”

W-7 versus W-3

The change in alignment from W-3 to W-7 would not increase or change the nature of impacts to Native Hawaiian culture and values.

3.3.7.3 Mitigation Measures

- As has occurred previously when newly-constructed segments of Saddle Road are opened for public use, proper cultural protocol will be completed by a native Hawaiian who follows the ways of the old culture to release and sanctify or bless the construction project.

3.4 ECONOMIC

Historically, East Hawai‘i has been the seat of government and higher education. Hilo was the economic and administrative center of the island. In recent years, many government functions have become available in West Hawai‘i, but Hilo remains the site of most government decision-making.

East Hawai‘i jobs declined with the end of plantation agriculture. New economic endeavors – diversified agriculture and astronomy on Mauna Kea – have not created jobs for island residents in comparable numbers. East Hawai‘i residents have been working in the resorts of West Hawai‘i in large numbers since about 1990.

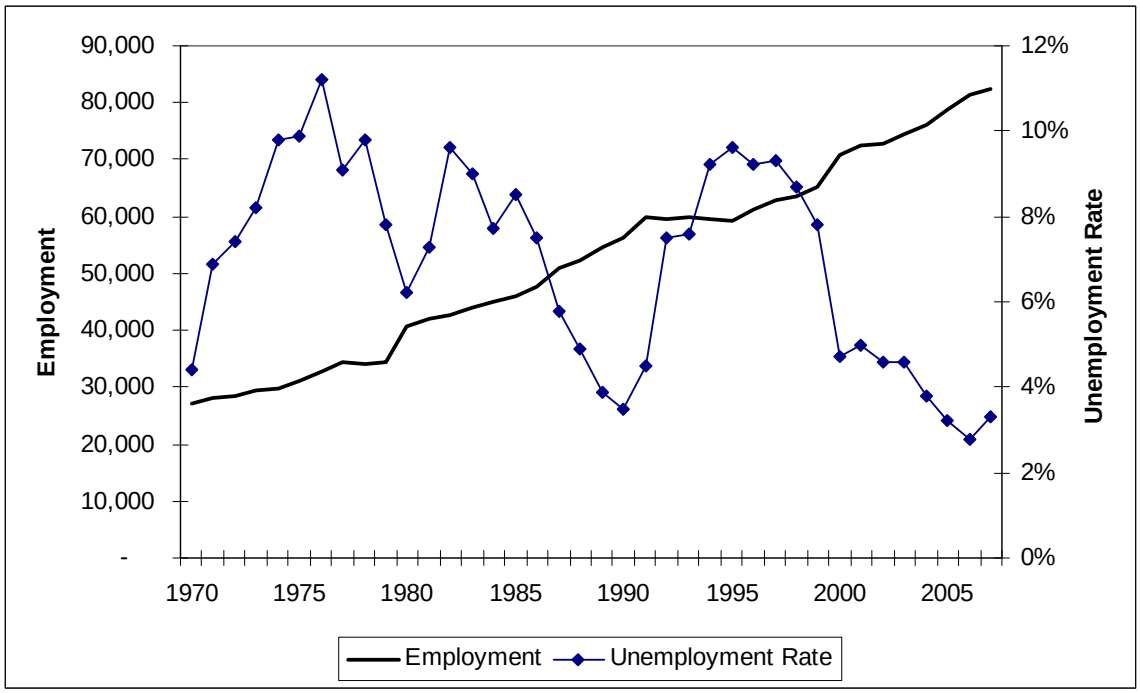
3.4.1 Employment and Income

3.4.1.1 Affected Environment

Hawai‘i County has seen steady growth in the number of jobs over recent decades, but unemployment rates have fluctuated from 3 percent nearly to 12 percent in that time (Figure 3.4.1). As of May 2009, the county unemployment rate was 10.4 percent

(Hawai‘i State Department of Labor and Industrial Relations: http://www.hiwi.org/admin/uploadedPublications/754_PR_current.pdf).

Figure 3.4.1
Employment and Unemployment Rate, Hawaii County, 1970-2007



Source: Hawai‘i State Department of Labor and Industrial Relations website.

As shown in Table 3.3.9, household incomes reported in 2000 in North Kona and South Kohala averaged about 20 to 30 percent higher than South Hilo incomes.

3.4.1.2 Environmental Consequences

Construction of the realigned highway would involve construction labor over a period of about two years and would cost approximately $58 million in 2007 dollars. The average size of the workforce can be estimated, as shown in Table 3.4.1. Direct jobs are created in the firms tasked with construction. Some may be located in offices and baseyards, not at the work site. The indirect and induced jobs shown in the table are created by the expenditure of capital in the regional economy. That spending would occur over a longer period than the anticipated two-year construction schedule, and over a wider area, not just in Hawai‘i County. Construction costs could increase due to changes in route or additional improvements. Notably, construction of a grade-separated intersection at Mamalahoa Highway would add up to $10 million to the costs cited here. Construction jobs and wages would increase in proportion to construction spending.

Although maintenance of the highway would require labor, no new continuing jobs are anticipated as a result of the construction of W-7.

Table 3.4.1
Construction Employment and Wages, for Action Alternatives

Construction cost (1)		58.4 million (2008)
	Total Jobs	Annual Jobs (3)
Direct construction jobs (2)	281	140
Direct construction wages (4)	$20.1 million	$10.0 million (2008
Indirect and induced jobs (5)	382	Person years
Indirect and induced wages (6)	$15.8 million	

Notes:
(1) Construction cost based on project estimate of $58 million (2007 dollars).
(2) Job count based on 2007 ratio of construction jobs to construction spending (4.8 jobs/million $). The number of workers on the job site would vary from time to time, and specialist contractors may only work for a short time. The calculation is of full-time equivalent jobs.
(3) Construction is expected to last for two years, so the annual job count is half the total.
(4) Wages are estimated from 2007 average wages in Hawai‘i County for highway, street and bridge construction, adjusted to 2008 dollars in line with increase in the Consumer Price Index.
(5) Indirect and induced jobs are estimated from the Input-Output model developed and refined by the State. For every construction job in Hawai‘i, some 1.36 additional jobs are created. Indirect jobs are due to firms' purchase of goods and services for use in the direct activity. Induced jobs are due to spending in the local economy by workers in direct and indirect jobs. Since these jobs are created through cash flows over time, it is not appropriate to estimate annual jobs and wages.
(6) Since indirect and induced jobs occur throughout the economy, these wages are estimated from the average wage for 2007, adjusted to 2008 in line with the Consumer Price Index.

Sources: State Department of Business, Economic Development and Tourism (DBEDT), 2006, 2008b, 2008c. State Department of Labor and Industrial Relations, 2008

3.4.1.3 Mitigation Measures

No mitigation measures related to employment and incomes are needed, as impacts would be beneficial.

3.4.2 Fiscal Impacts

3.4.2.1 Affected Environment

The County and State of Hawai‘i depend on several types of taxes for revenue to support public programs and facilities. Major sources of government income are real property tax for the County and income and excise taxes for the State. Revenues for State highway construction and maintenance come from the State Highways Fund and Federal sources.

3.4.2.2 Environmental Consequences

The State's share of construction costs for Saddle Road could be limited to planning and preliminary design costs, or they could amount to as much as 20 percent of construction costs, depending on agreements to be reached with federal agencies. While this is clearly a key fiscal impact for the State of Hawai‘i, it cannot be estimated at this time.

Completion of Section I would shorten travel time and congestion. These results are likely to result in lower fuel consumption, and hence in lower fuel taxes. The size of this reduction is uncertain, since it depends on the volume of traffic, vehicle fuel economy, and the fuels used by travelers on Saddle Road. Table 3.4.2 provides a rough estimate of the impact of the project for State and County fuel tax collections, assuming that the current tax structure remains in place.

These impacts on State funds would be offset by State revenues associated with construction of the project, shown in Table 3.4.3.

For the State of Hawai‘i, the net impact of building W-7 from the cash flows estimated here would be positive – although it could be less than the State's share of Saddle Road construction costs, depending on how the project is funded.

For the County of Hawai‘i, reduced fuel consumption could result in lower fuel tax revenues totaling at least $1.3 million (2008 dollars) over a twenty-year period.

3.4.2.4 Mitigation Measures

No mitigation measure is necessary. The analysis shows that State tax collections associated with construction would more than offset reduced revenues from fuel taxes. While no new revenues have been identified to offset County fuel tax revenues lost, Saddle Road improvements would offer Hawai‘i Island residents greater mobility, and hence contribute to the quality of life and economic activities that can generate County tax revenues.

Table 3.4.2
Estimated Fuel Tax Reduction

A. Impact of Saddle Road Alternatives on Fuel Consumption			
Number of parties affected			
Early years (1)		2,830	vehicles/day
Later years (2)		4,990	vehicles/day
Average time saved per trip (3)		25	minutes
Average speed		50	miles per hour
Reduced fuel consumption per trip			
@ 15 miles per gallon		1.39	
@ 30 miles per gallon		0.69	
@ 50 miles per gallon		0.42	
Reduced annual fuel consumption			
Early scenario (early volume, @ 15 mpg)		1,434,653	gallons
Low later scenario (later volume, @ 50 mpg)		758,896	gallons
High later scenario (later volume, @ 30 mpg)		1,264,826	gallons
B. Fuel Taxes (as of 2008)			
	State	County of Hawai'i	
Gasoline	$0.17	$0.09	per gallon
Ethanol	$0.02	$0.01	per gallon
Biodiesel (4)	$0.04	$0.00	per gallon
Diesel (4)	$0.17	$0.09	per gallon
Tax Impacts of scenarios			
Early, with 90% gasoline, 10% ethanol	$222,945	$115,490	per year
Late, low, with 15% gasoline, 85% ethanol	$34,833	$18,403	per year
Estimated average annual impact over 20 years, with gradual change from highest to low tax impact	$128,889	$66,946	per year
Estimated impact over 20 years	$2.6	$1.3	million (2008)

Notes: Figures in this table are based on estimates of ADT on Saddle Road from Julian Ng, Inc. *South Kohala Regional Traffic Forecasts*. 2002, which are about 40% lower than current ADT estimates.

(1) Daily parties added to Saddle Road travel, for "2005" in traffic study.

(2) Daily parties added to Saddle Road travel, for "2025" in traffic study.

(3) Time saved would vary greatly depending on destination and time of travel. The figure used here could be high, but represents a large enough saving to motivate drivers to switch to Saddle Road from other routes.

(4) Taxes on biodiesel and diesel are not used in computations, but are included to illustrate the range of alternatives being modeled. Conversion from gasoline to diesel would have no impact. Conversion to biodiesel, instead of ethanol, would increase State tax collections but decrease County collections.

Table 3.4.3
State Revenues Associated with Construction

Construction cost	$58.4 million (2008)
Construction-related wages	$35.9 million (2208)
Excise taxes on construction on workers' spending	 $2.3 million (2008) $1.4 million (2008)
Personal income tax	$1.7 million (2008)
Corporate income tax	$51 thousand (2008)
Total State revenues	$5.5 million (2008)

Notes:
(1) Estimated as 4% of construction cost.
(2) Estimated as 4% of the share of workforce income subject to taxation. That share (61.6%) calculated from average spending data for 2004-2005 by Honolulu consumers.
(3) Estimated at 4.8% of wages, based on State data incomes and income taxes gathered in 2005.
(4) Estimated as 0.1% of corporate revenues (in this case, construction cost), from State data on corporate revenues and income taxes gathered for 2002.
Sources: DBEDT, 2008b, State Department of Taxation, 2005, 2008.

3.4.3 Tourism

3.4.3.1 Affected Environment

The importance of tourism to the island economy is reflected in the services and retail sectors. As depicted in Table 3.3.9, above, data from the 2000 Census show that the accommodation and food services sector accounted for 14.9 percent of all island employment followed by the retail sales sector with 12 percent. On the district level, however, almost 19 percent of the jobs in North Kona and 32 percent of the jobs in South Kohala are within the accommodation and food services sector, indicating the great reliance on the visitor industry.

Statistics from the Hawaii State Department of Economic Development and Tourism (http://hawaii.gov/dbedt/info/visitor-stats/ni-stats/BigIsland.xls) show that in 2007, 1,324,302 total visitors came to the Island of Hawai‘i, with the large majority staying on the west side, although almost half ended up visiting the east side. Most stayed in hotel rooms at least part of the time, and many stayed in visitor condominiums, time-shares, and bed and breakfasts. Tourism on the west side of the island began in earnest in the early 1970s with the development of resorts along the Kona Coast. As of 2008, there were 6,665 hotel rooms on the west side compared to about 1,085 rooms on the east side. In addition, there were over 4,000 condominiums, time-shares and individual vacation units, most of which were located on the west side (Hawai‘i State DBEDT 2008).

Despite the recent economic slowdown, the visitor count of the west side is expected to increase over the long-term, following the same trend of the past three decades, albeit at a slower rate.

Historically, rental car contracts have prohibited travel on Saddle Road. Tourists are thus often obliged to take the northern or southern routes for cross-island travel, which requires additional time. Some tourists do not include cross-island trips in their itineraries because of the extra time, while a small portion violate the rental agreement and use Saddle Road. Twenty-five percent of visitors surveyed in 1999 reported having used Saddle Road, mostly in order to save time. Many who travel the road, however, also take advantage of its attractions. A large number reported visiting Mauna Kea, Mauna Loa, and Mauna Kea State Park. The main reason cited in the survey for not using Saddle Road was the car rental contract prohibition. Few cited safety as a restricting factor. When asked if they would have traveled on Saddle Road if it had been safer and more accessible (and presumably permitted under their rental contract), a large majority indicated that they would do so. A recent informal phone survey of rental car companies in Hilo indicates that many now allow travel on the Saddle, but not to the Mauna Kea summit or other off-road Saddle destinations. Completion of the remaining segments of the Saddle Road Improvement Project would further encourage removal of this prohibition.

3.4.3.2 Environmental Consequences

Completion of this segment of the project, combined with the already improved Sections II and III, would likely induce more rental car companies to remove driving restrictions on Saddle Road. Improvements would decrease the travel time for tourists traveling between the east and west sides of the island, as discussed below in Section 3.4.4. An improved Saddle Road would thus probably increase the number of tourists visiting the east side of the island since, at present, only about one-third include the Hilo area in their itineraries. Visitation to attractions accessed by Saddle Road would also increase. Tourist expenditures would be expected to increase on the east side of the island with increased visitation.

A concern expressed at public meetings for the project in the 1990s that continues to be occasionally heard relates to potential reduction of drive-by traffic on the Hamakua Coast and Waimea. This issue is important because of the job losses triggered by the closure of sugar plantations in the 1990s, which have never fully been replaced, especially in Hamakua. A number of gas stations, general/convenience stores, and snack shop/restaurants rely on drive-by traffic for a substantial part of their total business. With improvements to Saddle Road, some commuters that currently use SR 19 would be expected to use Saddle Road instead and would thus not contribute to drive-by business.

In assessing the magnitude of such an impact, consideration must be given to the overall increase in traffic expected for SR 19 despite the expected absolute and relative increase in the share of cross-island traffic using Saddle Road. In the 1999 FEIS, it was estimated

that Average Daily Traffic would increase from 1992 levels of between 5,000 and 9,000 (depending on location) to between 14,000 and 20,000 by the year 2020 (REF: FEIS - Part I, 3.4). In the long run, the customer base for roadside businesses will grow substantially rather than decline. The *Plantation Heritage Corridor Cultural Trail*, an outgrowth of the 1995 Hamakua Strategic Plan, has gradually expanded the visitor industry in Hamakua. Waimea continues to grow in importance as a visitor destination. The Saddle Road will likely become part of a "loop" that includes SR 19 or SR 11, rather than the only highway used by residents or visitors as they travel across the island. This should more than offset any loss in drive-by traffic. With the projections in growth in traffic on SR 19, no decrease in drive-by business would be anticipated as a result of completing the Saddle Road Improvements in Section I.

W-7 versus W-3

There are no differences in economic impacts between W-3 and W-7.

3.4.3.3 Mitigation Measures

No mitigation measures related to tourism are merited. Impacts would be beneficial.

3.4.4 Time Savings

3.4.4.1 Affected Environment

Important routes used by frequent cross-island travelers are Hilo-Waimea, Hilo-Waikoloa, and Hilo-Kailua-Kona. Three routes can be used for travel to cross-island destinations: SR 19, SR 11 and Saddle Road. However, SR 11 is from 30 to 100 miles longer than the other two routes, and is generally not used by frequent travelers (Table 3.4.4).

Table 3.4.4
Estimated Travel Time in Minutes

	Estimated Travel Time (Minutes)	
Route/Action Alternative	**Hilo - Waimea**	**Hilo - Waikoloa**
SR 19	73	97
Saddle Road in 2003, previous to any improvements	82	95
Existing Saddle Road (only Sections II and III improved)	78	91
With addition of W-7*	67 - 71	64 - 67

*Same as W-3

Prior to improvements on Sections II and III of Saddle Road, most travelers preferred SR 19 because the road was safer and higher average speeds could be attained and this route is comparable in distance to Saddle Road. In addition, SR 19 offers more roadside amenities and improved driving conditions. According to traffic studies conducted for the 1999 EIS (ref: FEIS, Part III), average speeds of 50 to 55 MPH were common on SR 19 compared to average speeds of about 45 MPH on Saddle Road. The combination of average speed and distances led to slightly to substantially longer times to travel between Hilo and various West Hawai‘i destinations prior to improvement of Saddle Road.

3.4.4.2 Environmental Consequences

Completion of Section I using the W-7 alignment would decrease travel times and, for some destinations, distances for cross-island travelers. The distance between Hilo and Kailua-Kona would be shortened by about nine miles, and between Hilo and Waikoloa by about one mile. The travel distance between Hilo and Waimea using Saddle Road would not change, if travelers used the existing route through Waiki‘i, and would be five miles longer, but safer, if using W-7.

Decreased distances coupled with higher average speeds from improved road conditions would result in reduced travel time between these destinations, as shown in Table 3.4.4. Travel time under existing conditions along Saddle Road is estimated to be 91 minutes for Hilo to Waikoloa. Using W-7, the time between Hilo and Waikoloa would be reduced by approximately 30 minutes.

Time savings has an economic value for both business and non-business travelers. Less time spent driving may be used to increase productivity in the work place, increase leisure activities, etc. An exact value is difficult to determine because of the large number of possible activities and associated values. Nevertheless, an estimate has been made of the value of saving approximately 30 minutes (considering the project altogether, with improvements completed in Sections II, III and IV of Saddle Road) on a one-way trip for travelers using Saddle Road based on available information.

W-7 versus W-3

There is no appreciable differences in time savings between W-3 and W-7.

3.4.4.3 Mitigation Measures

No mitigation measures related to time savings are merited. Impacts would be beneficial.

3.4.5 Safety

Although the economic benefits of increasing the safety of a highway are difficult to quantify, the 1999 Final EIS used a formula of accident data per million vehicle miles traveled and estimates of the monetary value of accidents to calculate then-current losses

to property, health, and lives. Interested readers may refer to Section 3.4.4 of the 1999 Final EIS. The conclusion was that the planned improvements to Saddle Road would raise the LOS from E to B (in the year 2014), and that the value of reducing the accident rate from present levels to the State average is estimated to have a present value of $43.1 million over a 20-year period. These savings would be shared by individuals, families, the County, and the State. This SEIS has not updated these figures, but the general conclusion that improving safety not only saves lives but also dollars remains valid. There are no differences in the improvements to safety between W-3 and W-7.

3.5 RIGHT-OF-WAY AND RELOCATION

3.5.1 Affected Environment

The right-of-way (ROW) along the existing Saddle Road Section I corridor is 100 feet wide. In a number of places, the existing ROW is not centered on the existing roadway. W-7 is contained entirely on military land, and there are no structures within the entire study corridor.

3.5.2 Environmental Consequences

Construction of Section I of Saddle Road using the W-7 alignment would not require any relocations, but it would require acquisition of a limited area of private property within currently unoccupied ranch lots in association with intersection improvements west of Mamalahoa Highway. Right-of-way within the Keʻāmuku parcel, which is owned by the Army, would be acquired through perpetual easement. In the Keʻekeʻe section of PTA, which the Army leases from the State, the State DOT would acquire ROW from DLNR, which would be subdivided out of the parent parcel. There are no differences in ROW or relocation impacts between W-3 and W-7.

3.5.3 Mitigation Measures

The acquisition of property necessitated by the project would be completed in accordance with Federal Uniform Relocation and Real Property Acquisition Policies Act of 1970 (P.L. 91-646), as amended, and applicable State regulations.

Since 1971, the acquisition of private land for government programs and projects has been subject to the Uniform Relocation Assistance and Real Property Acquisition Policies Act (URARPAPA) of 1970 (amended and updated by Congress in 1987). The URARPAPA provides for fair and equitable treatment of persons whose property would be acquired, or persons who would be displaced because of federally funded programs or projects.

The URARPAPA has three parts or Titles. Title I contains general provisions and definitions. Title II has provisions for relocation assistance for persons displaced because of Federal and federally assisted programs. Title III, the Uniform Real Property

Acquisition Policy, contains the provisions for consistent treatment of owners whose private property is acquired by the government. All Federal, state and local public agencies, in addition to others receiving Federal financial assistance for public programs and projects requiring the acquisition of real property, must comply with the policies and provisions set forth in the URARPAPA and its amendments.

The acquisition of private property does not need to be directly Federally funded for the rules of URARPAPA to apply. If Federal funds are used in any phase of the program or project, the URARPAPA applies. Its rules encourage acquiring agencies to negotiate with property owners in a prompt and amicable manner so that litigation can be avoided.

3.6 PEDESTRIAN AND BICYCLE FACILITIES AND USE

3.6.1 Affected Environment

Saddle Road has not been used extensively by bicyclists, pedestrians, or for other non-motorized modes of transportation. A motorist on a typical trip across the Saddle will observe very few, if any, pedestrians, bicyclists, or equestrians above Kaumana City. There are no developed bike or pedestrian trails within the Saddle Road or W-7 corridor. Substantial change in elevation along the length of the road, foggy and rainy weather (especially on the eastern side), and the lack of adequate shoulders produce difficult conditions. Prior to completion of the project between MP 19 and 41, the only substantial stretch with improved shoulders was between MP 11 and 19, where shoulders consisted of five feet of pavement. The construction has improved conditions, but more use by non-motorized traffic probably awaits completion of the entire project.

Saddle Road currently provides access to two identified mountain bike trails. One trail is the access road to Ahumoa/Puʻu Laʻau which intersects existing Saddle Road at MP 43. The other trail is the Keanakolu Road which intersects with the Mauna Kea Access Road near its terminus at MP 28. Neither trail traverses the existing road or the W-7 alignment.

Saddle Road is occasionally used by some bicycle road racers for training purposes, including those training for the Ironman Triathlon, held annually in Kona in October. Usage of this type is on a non-regular basis, and is generally more concentrated in the months leading up to the Triathlon. The Mauna Kea Relay, a 100-kilometer road race from Hilo to Waimea formerly held annually in April, traversed Saddle Road. The event attracted between a few dozen and a few hundred runners during its existence from the 1970s to the 1990s. This event appears to have terminated, at least in a formal sense, and no organized road races using Saddle Road are known.

Pedestrian use of the shoulders of Saddle Road occurs during gathering of traditional plant material. This is especially frequent before hula festivals between approximately MP 22 and 8, and does not occur in the W-7 corridor, which is within a military base. Horses and equestrian trails are common in many parts of the Big Island, which has an extensive ranching and rodeo tradition. Horses are occasionally seen in side-trails in the Saddle Area. The existing road within Section I completely lacks shoulders and is

dangerous for equestrian activities, although horses are in use for work and recreation in Parker Ranch and lots within the Waiki‘i Ranch subdivision.

3.6.1.1 Government Plans and Policies Related to Bicycle and Pedestrian Facilities

There are several State and County plans that discuss bicycling and pedestrian facilities. HDOT’s bicycle masterplan, *Bike Plan Hawaii* (HDOT 1994) (updated in 2003 on a web publication at http://hawaii.gov/dot/highways/Bike/bikeplan/index.htm) identifies Saddle Road as a future “Shared, Signed Proposed Bike Route.” A signed shared roadway is a street or highway that is specifically designated by signs as a preferred route for bicycle use. Signed facilities generally should meet or exceed widths of 14 feet for curb lanes or 4 feet for paved shoulders. This route is identified as a *Priority III*, which is expected to be implemented beyond a ten-year planning horizon. It is identified as a *Class A* facility, which indicates that once the Saddle Road Improvement Project is completed, only minor work would be necessary to upgrade the existing facility to appropriate standards.

The County of Hawai‘i General Plan is a policy document expressing the broad goals and polices for the long-range development of the Island of Hawai‘i. The plan was originally adopted by ordinance in 1967, and was most recently amended in 2005. The General Plan is organized into thirteen elements, with goals, policies, standards and recommended courses of action for each. The Transportation Element of the General Plan establishes the following policy with regard to pedestrian and bicycle facilities:

> “Explore means and opportunities to enhance the shared use of the island’s roadways by pedestrians and bicyclists, in coordination with appropriate government agencies and organizations.”

3.6.2 Environmental Consequences

Construction activities often present obstacles to pedestrians and bicyclists crossing the highway, and can temporarily prevent use of the road for walking or biking in the immediate vicinity of construction work. Because of the location of the construction on new alignment within a military base, very little interference is expected, except briefly at the termini on the existing Saddle Road and Mamalahoa Highway. Construction-related impacts would be short-term and temporary in nature.

The design parameters and controls that would be implemented with the proposed project would markedly improve safety characteristics of Saddle Road. Even though traffic volumes would increase in the future, widened, paved shoulders proposed for the project would minimize the hazards to pedestrians and bicyclists using Saddle Road, and would enhance safety. As shown in Figures 2.2.1a-b, all Typical Sections include, from inside to outside, a travel lane, a travel line edge stripe, a 4-inch gap, and then rumble strip millings 12 inches wide spaced 12 inches apart. These extend for 47 feet with a 13-foot gap, and then resume again. After construction, HDOT would provide standard signage denoting a shared, signed bike path. With the proposed construction of wider travelways and paved shoulders along the entire corridor, use of Saddle Road by bicyclists and

pedestrians would be expected to increase. While recreational ridership may increase, the steep grades and inclement weather are daunting, and much of the increased ridership would likely be from expert riders training for races and competitions.

The one sector where more than occasional use would possibly occur is commercial bike tours, which could transport bicyclists to the higher elevations of Saddle Road. This is already an important recreation/visitor activity on other islands in Hawai‘i. Although there were formerly operators who conducted downhill tours from Mauna Kea, these have not operated for many years (pers. comm., Stephanie Nagata, Office of Mauna Kea Management, to Ron Terry, August 2009). Upon improvement of the road, it is possible that such usage could increase, including use of the Mauna Kea Access Road as well. Riders would then coast downhill to a pick-up point at either end of Saddle Road.

The construction of Saddle Road on the W-7 alignment would be result in a long-term decrease in traffic volumes within Waiki‘i, since through-traffic would use the new alignment, enhancing the opportunity for rural bicycling on this stretch of Saddle Road.

In a January 22, 2008 letter responding to the EISPN, the organization People’s Advocacy for Trails Hawai‘i (PATH) and another commenter (see Appendix A2) urged FHWA to develop Saddle Road as a “complete street…designed for all users, including motorists, transit, pedestrians and bicyclists.” They specified shoulder bikeways, and, where necessary because of steep grades, a separate curvilinear “Shared Use Path System” that would be parallel to the existing road and could accommodate bikes and pedestrians and meet AASHTO standards for bikeways. These paths would closely follow the route of the highway but could more closely follow the natural terrain. Optional “green drainage” sections would provide equestrian opportunities. They also asked for consideration of motorized off-road users by lightly grading the area to the north of the highway and removing collision hazards. PATH noted that this could become a dedicated travel route for “off-road vehicles.”

The Saddle Road improvements would have a signed, shared route on the shoulder for bicycles and pedestrians, a great improvement from existing conditions. However, land on both sides of W-7 is off limits to the general public, used for military training and wildfire-sensitive, and thus inappropriate for off-road vehicles or equestrian paths.

W-7 versus W-3

There are no differences in pedestrian and bicycle impacts, which are beneficial, between W-3 and W-7.

3.6.3 Mitigation Measures

- The project will accommodate bicycles and pedestrians through a signed, shared route on the shoulder.
- Project construction will include provisions for pedestrian and bicycle crossings of Saddle Road during construction periods.

3.7 AIR QUALITY

3.7.1 Affected Environment

3.7.1.1 Criteria Pollutants

The 1999 Final EIS contained a discussion of the Federal Clean Air Act of 1970, including National Ambient Air Quality Standards (NAAQS) for six criteria pollutants: carbon monoxide (CO), nitrogen dioxide, ozone, particulate matter, sulfur dioxide (SO_2), and lead. Some of these standards have since been modified. That discussion is not repeated in this SEIS. It is important to note that the Clean Air Act Amendments of 1990 authorized the EPA to designate those areas that had not met the NAAQS as *"non-attainment"* and to classify them according to their degree of severity. States that fail to attain the NAAQS for any of the criteria pollutants are required to submit State Implementation Plans (SIPs) which outline those actions which would be taken to attain compliance. There are no non-attainment areas in the State of Hawai‘i.

In the project area, volcanic emissions of sulfur dioxide convert into particulate sulfate, which causes a volcanic haze (vog) to blanket the area, primarily during occasional episodes when trade winds are not present. The major industrial source for air pollution is oil-fired power plants, which emit SO_2, nitrogen oxides, and particulate matter. Motor vehicles emit CO, nitrogen oxides and hydrocarbons (an ozone precursor), and smaller amounts of other pollutants. Except for periodic vog and possibly occasional localized impacts from traffic congestion, local industrial sources, and dust from farms and ranches during very windy periods, the present air quality of the project area is believed to be relatively good. There are no air quality monitoring data from DOH for the Waimea or Saddle area, but the limited air quality data that are available for other locations on Hawai‘i Island suggest that (despite the vog) pollutant concentrations are generally well within State and national air quality standards.

3.7.1.2 Mobile Source Air Toxics

Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the U.S. Environmental Protection Agency (EPA) regulate 188 air toxics, also known as hazardous air pollutants. Toxics originate from on-road mobile sources, non-road mobile sources (e.g., airplanes), area sources (e.g., dry cleaners) and stationary sources (e.g., factories or refineries). The EPA has assessed this expansive list in their latest rule on the Control of Hazardous Air Pollutants from Mobile Sources (Federal Register, Vol. 72, No. 37, page 8430, February 26, 2007) and identified a group of 93 compounds emitted from mobile sources that are listed in their Integrated Risk Information System (IRIS) (http://www.epa.gov/ncea/iris/index.html). Mobile Source Air Toxics (MSATs) are compounds emitted from highway vehicles and non-road equipment. Some toxic compounds are present in fuel and are emitted to the air when the fuel evaporates or passes through the engine unburned. Other toxics are emitted from the incomplete

combustion of fuels or as secondary combustion products. Metal air toxics also result from engine wear or from impurities in oil or gasoline.

The 2007 EPA Rule also identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers from their 1999 National Air Toxics Assessment (NATA) (http://www.epa.gov/ttn/atw/nata1999/). These are acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter. While FHWA considers these the priority MSATs, the list is subject to change and may be adjusted in consideration of future EPA rules.

The 2007 EPA rule mentioned above requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines. According to an FHWA analysis using EPA's MOBILE6.2 model, even if national vehicle activity (vehicle-miles traveled, VMT) increases by 145 percent as assumed, a combined reduction of 72 percent in the total annual emission rate for the priority MSAT is projected from 1999 to 2050 (FHWA 2009).

3.7.1.3 Depleted Uranium

Another air quality issue that emerged subsequent to the 1999 Final EIS was the potential presence of depleted uranium (DU). The Army conducted training at PTA during the mid-1960s using the M101 spotting round of the Davy Crockett Weapon System. The training missions used depleted uranium to simulate the trajectory of real nuclear rounds. The M101 spotting round was a small (20mm) low speed projectile that was about seven inches long and weighed approximately one pound. Each round contained approximately one half-pound of D38 U Alloy (92 percent DU and 8 percent molybdenum) (Rubin 2008). This spotting round was designed to mirror the flight characteristics of larger caliber rounds and was fired to identify the correct range and bearing for those larger caliber rounds. This round was not an armor piercing penetrator and was not designed to burn. These rounds typically broke into large fragments after use. In August 2007, Army contractors discovered one intact M101 spotting round during a screening survey of the remote Impact Area at PTA. The recovered fragment consisting of depleted uranium (DU) was nearly completely unoxidized and found lying on a bare rock lava surface. Subsequent surveys uncovered aluminum firing tubes for the spotting round, but no additional spotting rounds themselves. Only three pieces of the radioactive material have been found at PTA, although others may have fallen into lava cracks. Ten soil samples were collected by the US Army from sites where sediment had collected from past runoff/erosion events around the perimeter of PTA. Radiometric analysis of those samples found only natural U abundances and $^{234}U/^{238}U$ isotopic composition (Rubin 2008).

The Army has no record or estimate of how many of the rounds were fired or how much depleted uranium may be on the surface. According to a newspaper account of the discovery (Bret Yager, *Hawai'i Tribune Herald*, 8/26/07):

> "The material's hazard level is a point of contention. The Army maintains that the DU at Pohakuloa presents no public health threat and that exposure to airborne DU or contaminated soil has not been shown to cause observable effects on health or reproduction. Clean-up contractors say that intact chunks of depleted uranium have such a low radioactive reading they can be safely handled without protective gear. The World Health Organization states that grams of DU dust would have to be breathed to present a lung cancer risk. But the Army acknowledges that the material is considered a chemical hazard. Big Island activists and others say the material may not present a radiation hazard when handled, but that bits of DU dust lodged in the lungs can present real health problems, constantly bombarding cells with alpha radiation."

Although the Army acknowledges that DU material is considered a chemical hazard, it maintains that DU at Pohakuloa does not pose a risk to public health and that insufficient quantities have been detected to pose a risk to human health. Prior to the effort conducted for this SEIS, sampling and analytical data for DU were not available in areas where W-7 is to be constructed.

Because of the controversy and uncertainty regarding DU that existed as SEIS research began in 2008, the highway agencies responsible for this SEIS contracted for a study to address the public's concern that depleted uranium originating from military operations at PTA may impact the health of workers building Saddle Road as well as future motorists. The study consisted of surface soil sampling in the general vicinity of W-7, a source determination and background evaluation, and a Baseline Human Health Risk Assessment (BHHRA) for uranium (U) isotopes. The study is contained in full in Appendix E and is summarized below. The risk assessment considered both chemical and radiological toxicity from uranium. This document was prepared in accordance with the provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

Methods and Results

Natural uranium is a mixture of three types (or isotopes) of U, written as ^{234}U, ^{235}U, and ^{238}U. Although these isotopes are different radioactive materials with differing radioactive properties, they are the same chemically. Because U normally occurs at very low concentrations in natural materials at Earth's surface, (less than 5 parts per million by weight, ppm), geochemists refer to it as a "trace element." Uranium is a naturally occurring heavy metal. Rocks, soil, coral, water, air, plants and animals all contain varying amounts of U. Uranium ores and U-rich minerals do not occur in Hawai'i, but U is dispersed at low abundance in normal rock-forming minerals. Uranium occurs naturally in trace amounts in Hawaiian rocks, soils and waters at or below concentrations of 1 to 3 ppm by weight (Rubin 2008). Uranium may also occur in soils due to anthropogenic action, such as from military use or as a byproduct of nuclear energy generation. Determining the source of U isotopes detected along the proposed Saddle Road alignment was one objective of this study.

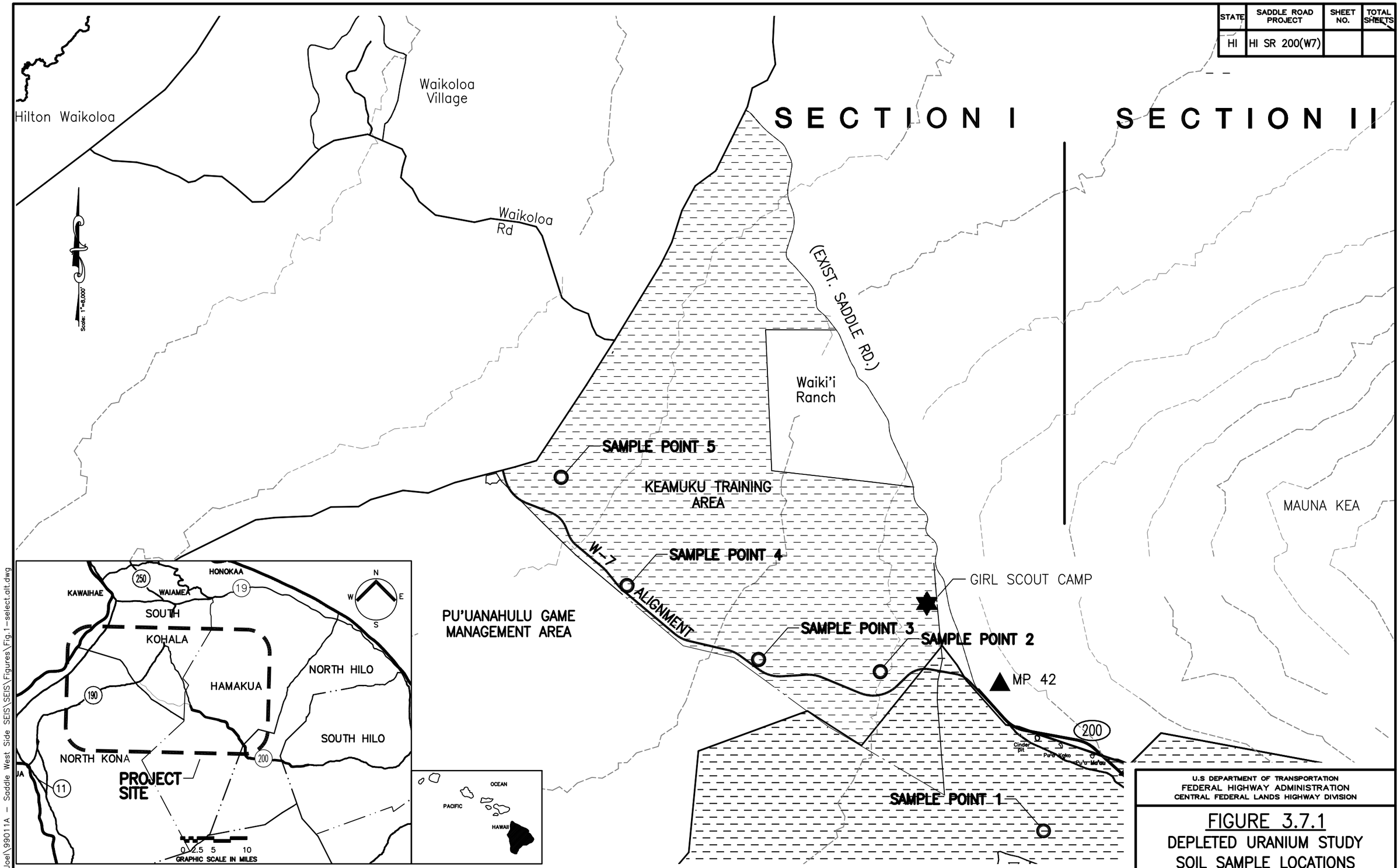
The U sample locations included four sites along the length of the W-7 alignment and one near the rock quarry that lies between the W-7 alignment and the Impact Area of PTA where the DU was found (Figure 3.7.1). Two methods can be utilized to determine whether detected U originates from natural or DU or enriched U (EU) sources. The SEIS study utilized both methods of evaluation. The first method involves a simple comparison of site U concentrations to U concentrations found in typical unimpacted environmental media. The second method compares isotopic abundance (isotope ratios) from site-specific media to the isotope abundance in typical unimpacted environmental media. An industrial process called enrichment is used to concentrate ^{234}U and ^{235}U, producing enriched uranium (EU) used for nuclear fuel. The material left over from the enrichment process is called DU because it has lower concentrations of these two isotopes than natural uranium. DU is thus a modified form of U from which these lighter and more radioactive isotopes have been partially removed, creating a substance that has more ^{238}U than natural U. The resulting change in the isotopic composition makes it possible to distinguish naturally occurring U from enriched and depleted forms.

In June 2008, concentrations of ^{234}U, ^{235}U and ^{238}U isotopes in surface soil were collected and analyzed. The first method to evaluate uranium isotope concentrations, inductively coupled plasma mass spectrometry (ICP-MS), was utilized to provide precision and low detection limits for the ^{235}U and ^{238}U isotopes. Results for the ICP-MS method verify the presence of ^{238}U, but resulted in non-detects for the ^{234}U and ^{235}U isotopes, indicating that they were either not present or below their respective minimum detection limits. These data were considered but not used in the background analysis and risk assessment because the assessments require data input by activity and/or mass concentration. The second analytical method utilized in the study was alpha spectrometry. The alpha spectrometry results were expected to provide the greatest precision and lowest detection limit for the ^{234}U isotope. Results of the alpha spectrometry analysis indicate the presence of all three isotopes in site soils. ^{235}Uranium was detected in only one of the five locations sampled. Given that data for all three isotopes was available for the alpha spectrometry method, data obtained from this method were utilized for both the background analyses and human health risk assessment.

Two methods were employed to evaluate uranium isotope source. The first method compared site-specific total U mass concentrations to naturally occurring U mass concentrations in Hawai‘i. Total U was determined by summing the isotopic concentrations of ^{234}U, ^{235}U and ^{238}U detected at each of the five independent sample sites. Results of this analysis indicated that total U in the vicinity of the W-7 alignment *is at or below the level of 1 to 3 ppm by weight* occurring naturally in Hawaiian soils. Total U based on alpha spectrometry analyses ranged from 0.428 parts per million (ppm) at location DU003 to 1.32 ppm at DU001. The average at all five locations was 0.798 ppm.

The second method used to determine whether detected U originates from natural or DU sources was the evaluation of isotope abundance. Except in extremely rare circumstances (not found in Hawai‘i), natural U dispersed in rocks and soils has a comparatively greater ^{234}U/^{238}U and ^{235}U/^{238}U ratio than those originating from DU. Although use of the ^{235}U/^{238}U ratio is considered a more precise measurement than the ^{234}U/^{238}U ratio in

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(W7)		



U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

FIGURE 3.7.1
DEPLETED URANIUM STUDY SOIL SAMPLE LOCATIONS

Scale: As Noted | Date: Sept. 2009

SHEET No. 1 OF 1

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isotopic fingerprinting of U contamination, the $^{234}U/^{238}U$ ratio utility is significant when ^{235}U data is not available or when concentrations of the ^{235}U isotope are too low to detect. That is the case here and as such, the $^{234}U/^{238}U$ ratio was used as the second method to fingerprint U source. Naturally occurring $^{234}U/^{238}U$ ratio in soil has been determined to $^{235}U/^{238}U$ is considered a more precise measurement than the $^{234}U/^{238}U$ ratio in isotopic fingerprinting of U contamination, the $^{234}U/^{238}U$ ratio utility is significant when ^{235}U data is not available or when concentrations of the ^{235}U isotope are too low to detect. This is be in the range of 0.5 to 1.2 (Sansone et al. 2001). $^{234}U/^{238}U$ ratios on W-7 ranged from 0.74 to 1.79, with an average ratio across all five sample locations of 1.16. Assuming the average ratio across the five sites is representative of the proposed alignment, these results indicate that the $^{234}U/^{238}U$ isotopic ratio is within the background range. Analysis based on the surface soil samples has determined that uranium detected at the site originates from natural sources.

3.7.2 Environmental Consequences

3.7.2.1 Criteria Pollutants

The air quality analysis performed in the 1999 Final EIS for assessing impacts from the proposed Saddle Road improvements focused on vehicle emissions of carbon monoxide (ref: FEIS, Part I, 3.7.2). Other pollutants, such as particulate matter (PM_{10}) and oxides of nitrogen are also components of vehicular emissions; however, the impacts of carbon monoxide are most easily assessed and provide a convenient measure of air quality impact. Ozone, nitrogen oxides, and hydrocarbons are pollutants that are regional in nature, and as such, meaningful evaluation at the project level is not possible. At the time of the 1999 FEIS, the EPA was developing procedures for analyzing microscale particulate pollution impacts, but since guidance was not available at this time, an analysis for PM_{10} was not performed. The analysis concentrated on the local impact of carbon monoxide emissions estimated for the existing conditions, and for the No Action and Action Alternatives in 2014.

The details of the analysis are contained in the 1999 Final EIS and are not repeated here. To summarize, the predicted maximum 1-hour concentrations for 2014 associated with the proposed improvements to Saddle Road was predicted to increase slightly over the No Action Alternative due to the increase in the predicted traffic volume; however, predicted concentrations were extremely low and did not exceed either the Federal or State standards. Furthermore, as projected traffic volumes for the 2034 are now substantially lower than those estimated in the 1999 FEIS, emission of criteria pollutants would likely be substantially less than estimated in the FEIS.

Short-term impacts to CO could also occur during construction due to the interruption of normal traffic flow. Temporary, localized impacts to air quality would be anticipated during construction, associated with the generation of fugitive dust and the emissions generated by construction equipment and vehicles. Short-term impacts to PM_{10} could also occur during the construction phase, but these would normally be reduced through the standard Best Management Practice of watering for dust-control measures.

3.7.2.2 Mobile Source Air Toxics

A qualitative analysis provides a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various alternatives. The qualitative assessment presented below is derived in part from a study conducted by the FHWA entitled A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives, found at: www.fhwa.dot.gov/environment/airtoxic/msatcompare/msatemissions.htm.

The amount of MSATs emitted (as compared to the No Action Alternative) by vehicles on Saddle Road would be proportional to the vehicle miles traveled, or VMT, assuming that other variables such as fleet mix are the same. The overall ADT (average daily traffic) for W-7 would be 80 percent higher than ADT if W-7 is not built (see Section 1.4.3, above). VMT would not rise in exact proportion, however, because the ultimate travel distances for most motorists, who are bound between Hilo and Waikoloa or Kona, would be reduced. The higher VMT with the project would also be accompanied by somewhat higher average travel speeds due to the improved traffic flow. MSAT research has not yet established the relationship between travel speed and MSAT emission rates. If it is assumed that the average travel speed is not a factor, then the increase in MSATs relative to No Action would probably be just slightly less than the 80 percent increase in ADT.

It is also important to note that much of the increase in traffic would be vehicles withdrawn from SR 19, leading to little net increase in VMT. Public exposure would be mitigated by the isolation of Saddle Road from residences and commercial areas, especially compared to SR 19, which passes through a number of populated areas with residences and commercial activities directly adjacent to the highway, notably Waimea. Furthermore, regardless of whether the project is built, emissions would likely be lower than present levels in the design year (2034) as a result of EPA's national control programs that are projected to reduce MSAT emissions by 57 to 87 percent from 2000 to 2020. Local conditions may differ from these national projections in terms of fleet mix and turnover, VMT growth rates, and local control measures. The magnitude of the EPA-projected reductions is so great (even after accounting for VMT growth) that MSAT emissions in the study area are likely to be lower in the future in virtually all locations.

Incomplete Or Unavailable Information For Project-Specific MSAT Health Impacts Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in MSAT emissions associated with a proposed set of highway alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The U.S. Environmental Protection Agency (EPA) is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. It is the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The EPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. It maintains the Integrated Risk Information System (IRIS), which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (EPA, http://www.epa.gov/ncea/iris/index.html). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). Two HEI studies are summarized in Appendix D of FHWA's Interim Guidance Update on Mobile Source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are cancer in humans in occupational settings, cancer in animals, and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious are adverse human health effects of MSAT compounds at current environmental concentrations (http://pubs.healtheffects.org/view.php?id=282) or in the future as vehicle emissions substantially decrease (http://pubs.healtheffects.org/view.php?id=306).

The methodologies for forecasting health impacts include emissions modeling, dispersion modeling, exposure modeling, and then final determination of health impacts, with each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. These difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable. The results produced by the EPA's MOBILE6.2 model, the California EPA's Emfac2007 model, and the EPA's DraftMOVES2009 model in forecasting MSAT emissions are highly inconsistent. Indications from the development of the MOVES model are that MOBILE6.2 significantly underestimates diesel particulate matter (PM) emissions and significantly overestimates benzene emissions.

Regarding air dispersion modeling, an extensive evaluation of EPA's guideline CAL3QHC model was conducted in an NCHRP study that documented poor model performance at ten sites across the country - three where intensive monitoring was conducted plus an additional seven with less intensive monitoring (http://www.epa.gov/scram001/dispersion_alt.htm#hyroad). The study indicates a bias of the CAL3QHC model to overestimate concentrations near highly congested

intersections and underestimate concentrations near uncongested intersections. The consequence of this is a tendency to overstate the air quality benefits of mitigating congestion at intersections. Such poor model performance is less difficult to manage for demonstrating compliance with National Ambient Air Quality Standards for relatively short time frames than it is for forecasting individual exposure over an entire lifetime, especially given that some information needed for estimating 70-year lifetime exposure is unavailable. It is particularly difficult to reliably forecast MSAT exposure near roadways, and to determine the portion of time that people are actually exposed at a specific location.

There are considerable uncertainties associated with the existing estimates of toxicity of the various MSAT, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population, a concern expressed by HEI (http://pubs.healtheffects.org/view.php?id=282). As a result, there is no national consensus on air dose-response values assumed to protect the public health and welfare for MSAT compounds, and in particular for diesel PM. The EPA (http://www.epa.gov/risk/basicinformation.htm#g) and the HEI (http://pubs.healtheffects.org/getfile.php?u=395) have not established a basis for quantitative risk assessment of diesel PM in ambient settings.

There is also the lack of a national consensus on an acceptable level of risk. The current context is the process used by the EPA as provided by the Clean Air Act to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires EPA to determine a “safe” or “acceptable” level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld EPA’s approach to addressing risk in its two-step decision framework. Information is incomplete or unavailable to establish that even the largest of highway projects would result in levels of risk greater than safe or acceptable.

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

3.7.2.3 Depleted Uranium

Although, as discussed in Section 3.7.1.3 above, the level of uranium detected in the general vicinity of the W-7 alignment appears to be consistent with background levels, a baseline human health risk assessment (BHHRA) was performed to evaluate the potential risk posed by the uranium isotopes detected. The alignment was evaluated as a single decision unit represented by five distinct sampling locations. Receptors were assumed to be exposed to the lesser of the maximum concentration of each isotope detected or the 95 percent UCL of the mean. Risks were evaluated for the following receptors:

- A construction worker scenario assumed to be on site for 8 hours a day for 250 days in 1 year and assumed to contact surface and subsurface soil.
- A recreational user of the road assumed to frequent the Site 350 days a year for 2 hours a day, as a child for 6 years and as an adult for 24 years, totaling a 30-year recreational tenure.

Recreational receptors were assumed to contact just the surface soil. Potential estimated lifetime cancer risks were calculated using the RESidual RADioactivity (RESRAD) computer code, Version 6.4, developed by Argonne National Laboratory (ANL 2007). Carcinogenic risks were compared to the USEPA regulatory level of concern of one in one million and one in ten thousand. Estimated noncarcinogenic risks posed from the chemical toxicity of uranium are presented as total site Hazard Indices and were calculated by summing the pathway-specific Hazard Quotients. A total Hazard Index of 1 was considered to be the regulatory level of concern.

The results for each receptor are presented below. Neither was found to exceed the most conservative USEPA lifetime cancer risk regulatory level of concern of one in one million or the noncarcinogenic Hazard Index regulatory level of concern of 1.

Construction worker. The Construction Worker scenario is assumed to be on site for 8 hours a day for 250 days in one year and contact surface and subsurface soil. The construction worker was found to have a carcinogenic risk of one in ten million, and a noncarcinogenic risk of four in one thousand.

Recreational/Commuter. This receptor is a user of the road on a daily basis. The recreational receptor is assumed to frequent the Site 350 days a year for 2 hours a day, as child for 6 years and as an adult for 24 years, totaling a 30-year recreational tenure. Recreational receptors were assumed to contact just the surface soil. The carcinogenic risk associated with this receptor was found to be four in one hundred million for the Child Receptor and one in ten million for the Adult Receptor. These carcinogenic risks can be summed for a total carcinogenic risk of two in ten million for the full 30-year tenure. The noncarcinogenic risk was calculated to be three in one thousand for the Child Receptor and one in one thousand for the Adult Receptor.

Potential noncancer health risks from the ingestion, inhalation and dermal contact of soil along the proposed alignment are below the EPA's acceptable risk level of concern. Potential cancer risks from radiological activity of the detected U isotopes are below the most conservative regulatory criteria.

In terms of risk from future use of DU in training, the Army reports that it prohibited all training with DU in 1996. Resuming such training would require a site license from the Nuclear Regulatory Commission to do so, which the Army does not possess or intend to obtain. Any abatement of the DU hazard at PTA that might be conducted in the future would be required to utilize safeguards to ensure that DU would not leave the site.

3.7.2.4 Conformity

Since 1977, Federal agencies and Metropolitan Planning Organizations (MPO) have been required by Section 176c of the Clean Air Act to ensure that all transportation projects conform to the approved air quality State Implementation Plans. The Clean Air Act Amendments enacted in 1990 defined conformity to a SIP as meaning "conformity to a SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS" (Federal Register, November 30, 1993). The conformity determinations for Federal actions related to transportation projects must meet the requirements of 40 CFR Part 51, subpart T. There are no non-attainment areas in Hawai‘i and resulting SIP.

W-7 versus W-3

There are no substantial differences in any aspect of air quality between W-3 and W-7, although there are marginally more dust-generating soils in the W-3 corridor.

3.7.3 Mitigation Measures

- Standard dust control and construction equipment emission control measures will be implemented as necessary to reduce temporary impacts to air quality during construction activities. Water or a dust palliative will be applied as necessary to minimize particulate pollution. Areas to receive such treatment will include unpaved access roads, staging sites, and construction areas where the movement and operation of construction equipment produces airborne dust.
- Construction equipment will be required to meet all applicable emission standards.
- FHWA and HDOT will keep apprised of the results of monitoring for depleted uranium by the Hawai‘i State Department of Health and the Army and take any necessary precautionary measures.

3.8 NOISE

3.8.1 Affected Environment

Ambient noise levels along Saddle Road within most of the existing Section I corridor are generally low, reflecting the light traffic volumes on Saddle Road and the undeveloped and unpopulated nature of much of the landscape. Noise levels in the vicinity of PTA can be periodically high in association with military training activities (e.g., live firing of artillery) and low-flying aircraft, including helicopters and jet fighters.

The 1999 Final EIS contained an extensive discussion of noise measurement fundamentals, modeling of noise impacts, and the requirements for study set forth in 23 CFR 772 and implemented in Hawai‘i’s Noise Analysis and Abatement Policy (HDOT 1996) (ref: FEIS, Part I, 3.8). That discussion is not repeated in this SEIS, but some concepts are reiterated.

Noise levels are described by a logarithmic scale in units of decibels (dB). The human ear perceives noises of different frequency in different ways. The A-weighted decibel scale (dBA) approximates human perception of the overall noise spectrum and is therefore used in most noise studies. Small changes in noise levels (3 dBA or less) are not noticeable by the average person. Because human hearing approximates a logarithmic scale, a 10 dBA increase in noise level is generally perceived as a doubling of the sound. To quantify a noise level, an average noise level over a specified interval of time can be used. This average over a 1-hour period is referred to as the $L_{eq(h)}$. All noise levels in the 1999 Final EIS were reported in terms of peak hour dBA L_{eq}.

The FHWA has adopted Noise Abatement Criteria (NAC) that establish acceptable hourly, A-weighted dBA for various land use activity categories (Table 3.8.1). For the purposes of the 1999 Final EIS study, noise levels were considered to have an impact when they approached (came within 1 dBA L_{eq}) or exceeded the NAC, or when the predicted noise levels substantially exceeded the existing noise levels. Noise abatement measures were considered for receptors with noise levels expected to approach or exceed the NAC or with expected substantial (15 dBA L_{eq} or more) increases in noise.

However, within the project area in Section I that would be affected by noise on alignment W-7, there is no developed land, as all land is devoted to military use except for a small area of highway and unoccupied ranching lands at the western terminus. Nor are there any Category A lands, for which serenity and quiet are of extraordinary significance and serve an important public need. Therefore, there are no areas for which noise impacts require study.

Table 3.8.1
Noise Abatement Criteria, Hourly A-Weighted Sound Level - Decibels (dBA)

Activity Category	$L_{eq(h)}$[1]	Description of Activity Category
A	57 (Exterior)	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities is essential if the area is to continue to serve its intended purpose.
B	67 (Exterior)	Picnic areas, recreation areas, playgrounds, active sports areas, parks, residences, motels, hotels, schools, churches, libraries, and hospitals.
C	72 (Exterior)	Developed lands, properties or activities not included in Categories A or B above.
D	---	Undeveloped lands.
E	52 (Interior)	Residences, motels, hotels, public meeting rooms, schools, churches, libraries, hospitals, and auditoriums.

Source: 23 CFR 772. [1] ($L_{eq(h)}$) = Average noise level over a one-hour period.

3.8.2 Environmental Consequences

As there are no noise sensitive lands near the W-7 corridor, no adverse impacts are expected. There are no differences in noise impacts between W-3 and W-7.

3.8.3 Mitigation Measures

As there are no impacts, no noise mitigation is required.

3.9 FIRE HAZARD

3.9.1 Affected Environment

Wildfire in Hawai‘i

In addition to the damage wildfire can inflict on urban areas and ranches in dry parts of Hawai‘i, it poses a grave threat to Hawaiian ecosystems by converting native habitats into grasslands dominated by nonnative species. As in many other tropical areas, fires in Hawai‘i are usually caused by human activity. Because few native Hawaiian animals or plants are adapted to wildfires, they generally perish when exposed to fire. Native shrubs and trees may recover from fire to some degree, but native plant communities are often subsequently overwhelmed by more aggressive alien species. Many nonnative species, such as fountain grass, are pyrophytic (fire adapted) and thrive in the aftermath of fires. Unlike native shrubs and trees, many alien grasses recover quickly, increasing in ground cover and biomass after a fire. Fires encourage fountain grass by stimulating growth from the base of clumps and encouraging seed production. The establishment of pyrophytic grasses increases the threat of additional fires. Fire represents a major disturbance, which encourages conversion of native-dominated communities into alien-dominated plant communities.

The entire west side of the Big Island between the Ka‘upulehu area of Kona in the south and Waimea in South Kohala in the north is subject to extensive wildfires. A map entitled *Draft Kona Fire History* (which also included the southern part of South Kohala) produced by the U.S. Fish and Wildlife Service in 2002 illustrated the boundaries of known fires by decade from the 1950s through the 1990s. Pu‘uanahulu was “ground zero” for many of the fires, which also affected the southern portion of Ke‘āmuku. Since 2002, several other fires have burned parts of Pu‘uanahulu and Waikoloa. An arsonist set fires on Waikoloa Road, Mamalahoa Highway, and Saddle Road, charring limited portions of Ke‘āmuku. The fire history map shows that sometimes the highways here act as barriers to fire movement, but at other times the fires cross highways.

Primary responsibility for fighting fires outside PTA rests with the Hawai‘i Department of Land and Natural Resources. PTA assists on fires that affect adjacent State and private lands as well.

Wildfire Threat at Ke‘āmuku

As with nearby areas, W-7 traverses very dry habitat. Most of it has undergone transition into alien-dominated plant communities, although areas above 4,800 feet in elevation may support communities largely dominated by natives. The entire project corridor is subject to wildfire.

Before 2006, the property belonged to Parker Ranch and was grazed by cattle stocked at various densities. Although fuel loads were reduced by grazing, areas with fountain grass

would become dense after periods of adequate rain and Keʻāmuku was highly subject to fire, especially in the southern and westernmost parts.

The PTA Fire Department has primary responsibility for responding to and fighting fire within PTA. Current capabilities include:

- A fire station with a 25-personnel firefighting detail, six to eight of whom are on duty at any given time, with specialties including wildland fire, EMS, structural fire, and airfield.
- Two 1,000-gallon Engines, two 300-gallon Brush Trucks, and one 3,000-gallon Tank Truck. No helicopters are permanently assigned, but when troops are training one helicopter is available for initial firefighting attack and local helicopter operators are on contract to provide additional support.
- Eleven 80,000-gallon dip tanks are located on PTA, three of which are under construction to support the Keʻāmuku Training Area (see Figure 3.9.1).

Since its purchase by the Army in 2006, Keʻāmuku has been added to the area for which PTA is primarily responsible. In the last five years, the Army has committed to and begun implementation of various actions called for in the *Integrated Wildland Fire Management Plan, Oahu and Pohakuloa Training Areas* (IWFMP) (U.S. Army 2003). The Army recognizes that wildfire poses a significant threat to the sensitive ecosystems, cultural sites, and training lands of the U.S. Army, Hawaiʻi, and that the munitions and weapons systems that are necessary for effective training often increase the chance of wildfire ignition. The actions outlined in the IWFMP are intended to minimize the occurrence and size of training-related fires within PTA, including the Keʻāmuku Maneuver Area. They are also intended to prevent such fires from escaping beyond the PTA boundary, and to ensure that fires do not move onto the installation from outside and threaten operations and resources at PTA. These measures will include fire suppression, resource staffing procedures, training restrictions based on calculated fire danger rating, installation and maintenance of dip sites, fuel modifications, and weather stations.

A portion of the IWFMP studied fire history at PTA, including the Keʻāmuku area. The wildland fire fuel types found at PTA were mapped by Castillo et al. (1997) into six classes with different fuel and fire behavior characteristics. Two of the three types are common on the W-7 alignment:

> *Type b. Perennial Grassland*. Land dominated by perennial alien (*Pennisetum setaceum*) and native (predominately *Eragrostis atropioides*) grasses averaging about three feet high. Found primarily on older substrates having relatively developed soils (~10,000 years old). However, some *P. setaceum*-dominated lands are found on younger lava. These grasslands extend downslope from PTA in the North Kona and South Kohala districts below 6,200 feet in elevation. Fine fuel loads are usually continuous and 0-3 inches. Grass litter accumulation is usually high.

Type c. Lowland Montane Shrubland. Land dominated by low-structure shrubs or a mixture of low-structure shrubs and annual and perennial grasses. Includes *Dodonaea* shrubland (as found in Keʻāmuku), *Myoporum* shrubland and *Chenopodium* shrubland. Found primarily on Mauna Kea substrate with relatively developed soils. Grass and shrub litter accumulates to form continuous fine fuel loads, which carry flame lengths of 7-10 feet on average. These shrublands occupy portions of the Pohakuloa plain along Saddle Road (6,000-foot elevation) and parts of Kipuka Kalawamauna downslope into the lowland regions of Puʻuanahulu and Puʻu Nohonaohae (2,500 feet). These shrublands burn as often as every 1-4 years.

Prior to human use of the area, fire in the PTA area was probably rare, limited to occasional volcanically started fires and lightning ignitions. Military use for live-fire exercises and target practice as well as roadside arson and accidental fires from catalytic converters has significantly increased ignition frequency, resulting in many small fires. The IWFMP researched fire history from existing fire records and documentation provided by various agency sources, although data for many fires was incomplete.

A detailed analysis of fires at PTA between 1987 and 1999 indicated that there were between 16 and 98 fires every year. March and June were the most frequent months for fires to begin, and most fires ignited in the afternoon. The ignition source was generally unknown or associated with tracer firing. Most of the fires were extremely small in area, with only 10 percent becoming larger than an acre. Only a handful of fires burned more than 100 acres. The larger fires were generally associated with non-military ignition sources. More than 7,700 acres, or 91 percent of all acres burned, were burned by fires caused by lightning, arson, or carelessly discarded cigarettes, and the largest of these started off of Army lands and later burned into PTA (U.S. Army 2003: p. 7-51). The west and north of PTA were determined to be the areas of greatest wildfire threat. Keʻāmuku will have a fairly high level of training activity, and grazing will be discontinued, increasing fuel load. As the area also contains scattered populations of listed endangered plant species, Keʻāmuku was assigned a high pre-suppression priority (only Mauna Kea and Kipuka Kalawamauna were considered to have a greater priority).

Army Wildfire Mitigation at Keʻāmuku

The IWFMP laid out specific guidance, procedures, and protocols in the prevention and suppression of wildfires on all U.S. Army Hawaiʻi training lands with wildland fuels. Its goal was to convey the methods and protocols necessary to minimize fire frequency, severity, and size. The document defined the responsibilities of all offices, departments, and agencies involved, and described fire pre-suppression and suppression actions to be taken on Army bases. Pursuant to the plan, the Army has implemented improvements to its land and firefighting resources that have enhanced the response and capabilities of firefighters. Firebreaks are defined as cleared-to-mineral-soil fire control lines. Fuelbreaks are strategically located blocks or strips within which vegetation has been manipulated to reduce fuel volume or flammability as an aid to fire control. Fuelbreaks are most effective if they are linked to other natural or man-made fire containment barriers. Many firebreaks, fuelbreaks, and other fire management improvements that will

aid firefighters in containing and suppressing fires have been or will be constructed. Some of these will also serve to help keep non-military ignited fires off Army lands.

An important part of the IWFMP involves organization. A Pohakuloa Training Area (PTA) Wildland Fire Coordinator has been hired to manage the numerous fire related projects and regular maintenance requirements there. The Range Control Office at PTA has implemented a Fire Danger Rating System (FDRS). This system restricts weapons fire and training depending on weather and vegetation conditions.

As weather, topography, and fuel conditions make fire suppression at PTA difficult, adequate pre-suppression measures are vital for minimizing fire loss. Accordingly, access roads and firebreaks with appropriate planning and maintenance are priority measures. Pre-constructed firebreaks need to be negotiable by 4WD vehicles to facilitate fire and management access, and they need to meet with standards for firebreaks and fuelbreaks. At PTA, most firebreaks (which are generally narrow, 25-40 feet) are being combined with a fuelbreak (80-150 feet wide) to increase their effectiveness.

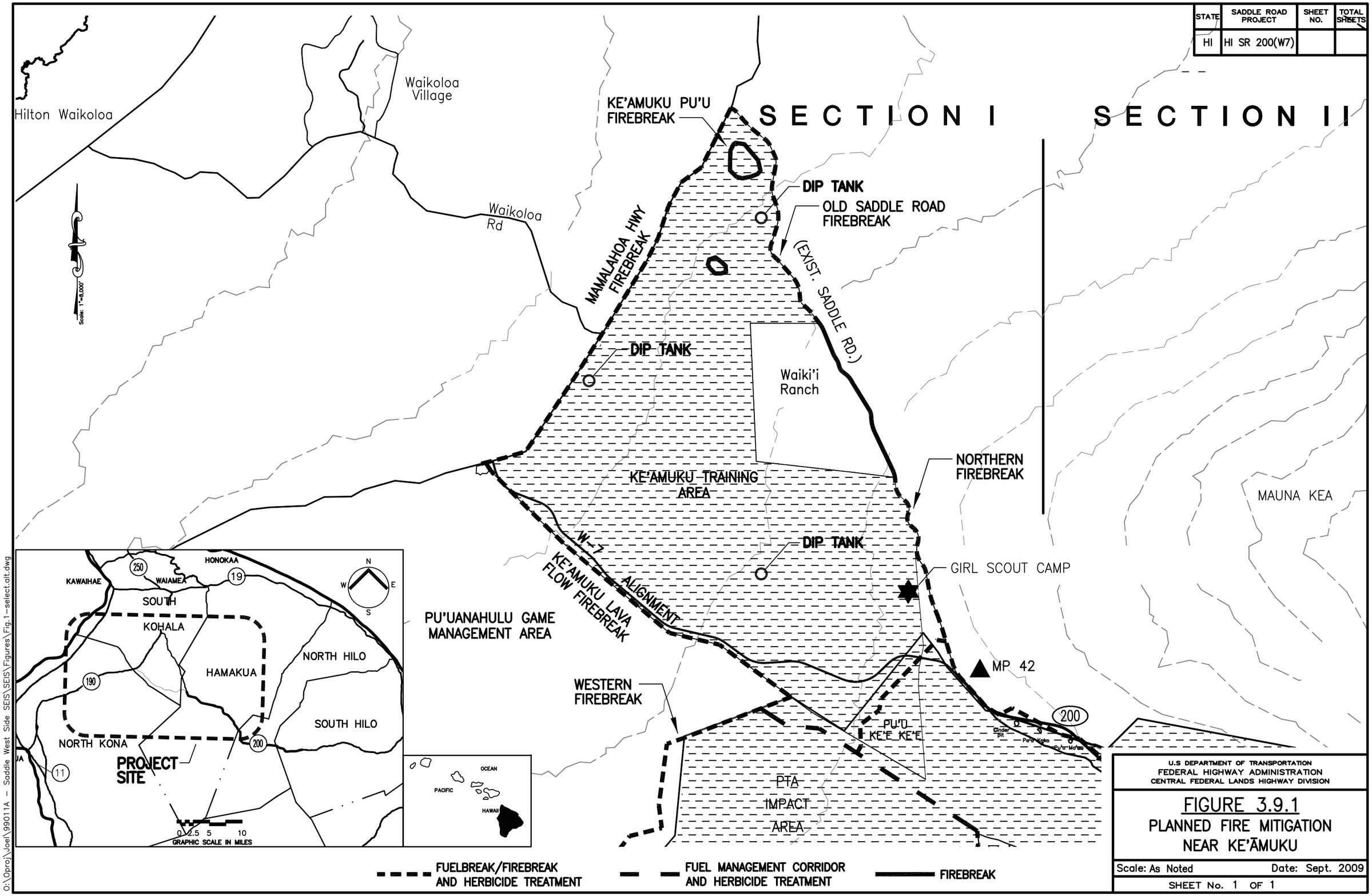
In all, a total of six firebreaks are being built or will be built at PTA (Figure 3.9.1). Within or near Keʻāmuku are the following:

Western Firebreak. This break starts at the Keʻāmuku lava flow and proceeds south along the western boundary of PTA, between Kipuka Kalawamauna and Puʻu Anahulu, to the 1859 lava flow. It consists of a firebreak combined with a fuelbreak. The firebreak will vary in width, but will never be less than about 25 feet across. The associated fuelbreak will vary in width depending on the fuel type through which it is passing. In grassy areas it will be about 80 feet wide, while in shrub or forest areas it will be about 150 feet wide. Fuels within the fuelbreak will be maintained at less than 20 percent crown cover. Fuels will be kept discontinuous and pockets of fuels will be removed. The fuelbreak will be monitored annually via calibrated ocular estimation.

Northern Firebreak. This break starts on the northern side of the Keʻāmuku flow and travels north along Keʻekeʻe road to an existing powerline road that runs along the northern side of the installation. It follows this to the eastern boundary of PTA where it turns south and follows the PTA boundary to Saddle Road. This firebreak will also be combined with a fuelbreak. The firebreak will be no less than about 15 feet wide, and the fuelbreak will vary from about 80 to 150 feet, as with the Western Firebreak. The function of this break will largely be replaced by the realigned Saddle Road in the future. The roadbed including shoulders will be greater than 15 feet wide. The fuelbreak will continue to be maintained along the south side of the road.

Keʻāmuku Lava Flow Firebreak. This will extend from the end of the Keʻāmuku flow to Mamalahoa Highway. The firebreak will be no less than about 15 feet wide, and the fuelbreak will vary from about 80 to 150 feet, as with the Western Firebreak, and will be maintained and monitored as described above. The firebreak will be extended

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(W7)		



U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

FIGURE 3.9.1
PLANNED FIRE MITIGATION NEAR KE'ĀMUKU

Scale: As Noted | Date: Sept. 2009

SHEET No. 1 OF 1

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as necessary to account for the encroachment of *Pennisetum setaceum* onto the Keʻāmuku lava flow. Extensions will be added wherever crown cover of vegetation exceeds 20 percent. The flow will be monitored annually as described above.

Keʻāmuku Puʻu Firebreaks. These two already constructed firebreaks will protect Nohonaohae cinder cone and Puʻu Papapa, which harbor a number of listed endangered plant species, from fires in the Keʻāmuku Parcel. They are 15 feet wide and are maintained annually. These firebreaks have already demonstrated their effectiveness in protecting Nohonaohae from a fire that originated in the lands to the west.

In addition, two fuelbreaks will be established within Keʻāmuku itself:

Mamalahoa Highway Fuelbreak. A fuelbreak of about 80 to 150 feet wide will be established on the east side of Mamalahoa Highway within Keʻāmuku. The width will vary depending on the vegetation as described above. Mamalahoa Highway will serve as the firebreak.

Old Saddle Road Fuelbreak. A fuelbreak of the same dimensions will be established along the south side of the existing Saddle Road near Keʻāmuku. It will be maintained annually. The fuelbreak will not be established within Waikiʻi ranch property. The fuelbreak will be monitored annually and maintained as necessary to remain within specifications. The existing Saddle Road will serve as the firebreak.

Another fire hazard mitigation program at PTA involves fuels modification. In Keʻāmuku, grasses are the main fuel-related concern and their spread and accumulation increase ignition potential and provide contiguous fine fuel beds. Implementation of road/firebreak improvement and other recommendations of the IWFMP serve to reduce flashy fuels along high ignition risk roads and breakup contiguous fuel beds.

Six fuel management corridors are being established and maintained to provide areas through which fire will not carry. These corridors will be aligned so as to provide several distinct areas of PTA within which fire may be contained. Each corridor will be approximately 325 to 775 feet wide, though terrain, safety concerns, or protected resources may constrain the width in some areas. Fuel specifications within the corridor require that canopy cover not exceed 20 percent. All corridors are located in areas with little or no existing fuel. These corridors are monitored biannually and treated whenever necessary to remain within specifications. Although not currently planned, grazing will also be open for consideration as an option to control fuels within fuelbreaks and perhaps other areas within Keʻāmuku.

The IWFMP continues to be reviewed and updated to ensure the latest information is consistently incorporated into Army wildfire prevention and suppression procedures.

3.9.2 Environmental Consequences

It is first important to emphasize the context of any alignment (other than the existing Saddle Road) within Section I, which is an area that is under intensive wildfire management by the Army. The property adjacent to the road on all sides, including the community of Waikiʻi, Parker Ranch, and lands across Mamalahoa Highway, will effectively be surrounded by one or multiple firebreaks and fuelbreaks. Nevertheless, there is a risk for fires associated with Saddle Road that may potentially affect military training land and spread into adjacent State and private lands.

The proposed Saddle Road within Section I could increase the likelihood of wildfire caused by human activity. Construction equipment used during grading and paving as well as careless construction workers can cause fires. After construction, there would be a permanently heightened risk of wildfire ignition. Improvement of the road would substantially increase the number of vehicles traversing the area. Fires in dry areas of Hawaiʻi have been ignited by construction activities, cigarettes thrown from car windows, by hot catalytic converters of vehicles pulling off of the pavement, and by arsonists. Construction fires can largely be controlled by proper management, and the chief fire risk is the increase in ignition potential from arson or accidental fires within an area that is currently not highly subject to fire starts.

The presence of a modern highway within Keʻāmuku would also bring fire-fighting benefits, including the following:

- Provide a highway firebreak and fuelbreak that would help impede the spread of fires from the north, where military activities occur, to the south, where the Puʻuanahulu GMA is located. The highway would help block fires from spreading from the Puʻuanahulu GMA to the main portion of Keʻāmuku.
- Provide adequate and rapid access for firefighting equipment and personnel not only to Keʻāmuku but also to the Puʻuanahulu GMA. Currently, both areas are inaccessible by paved road except at the far northern and western margins. With the PTA Fire Station less than 15 minutes away, firefighting crews could mobilize adjacent to Puʻuanahulu very quickly and more effectively deal with fires. The wide Typical Sections would facilitate staging of firefighting vehicles, equipment and personnel.

W-7 versus W-3

The shift in alignment from W-3 to W-7 would bring the highway between 1,000 and 4,000 feet closer to the extremely fire-prone State lands in Puʻuanahulu, as noted by Hawaiʻi Division of Forestry and Wildlife personnel during meetings with FHWA and HDOT. This poses a greater hazard to Puʻuanahulu, but also provides better access and a highway firebreak/fuelbreak that is more effectively located for stopping fires from crossing back and forth between Puʻuanahulu and Keʻāmuku.

Note that the indirect effects of wildfire and other aspects of the road to threatened and endangered species and critical habitat are covered in Section 3.18 of the SEIS.

3.9.3 Mitigation Measures

In addition to the extensive actions called for in the *Integrated Wildland Fire Management Plan Oahu and Pohakuloa Training Areas* discussed in the above section, design measures being incorporated into the project's Typical Sections will mitigate for wildfire. The expanded and modified Typical Sections for the roadway would both reduce the likelihood of accidental ignition from unintentional road sources (car fires, catalytic converters, cigarettes, etc.) and assist in creating a firebreak and fuelbreak. The Typical Sections have been specially designed to reduce wildfire impacts, in ways specific to the segments of Section I through which they pass. All share the base characteristics of Typical Section A (Figure 2.2.1.a), which extends east from Mamalahoa Highway. It incorporates two 12-foot travel lanes, two 8-foot paved shoulders, and a passing lane for most of the length.

To reduce the threat of wildfires between the eastern boundary of the Keʻāmuku parcel and approximately MP 41, which passes adjacent to *Palila* critical habitat, B has additional features (Figure 2.2.1.b, Section B):

- Two 12-foot travel lanes with 8-foot paved shoulders.
- An 8-foot strip of pavement on the north side of the highway, which would serve as a firebreak, with a four-inch high curb on the outside.
- At the outside edge of the firebreak, a wire fence with metal posts would be constructed to a height of four feet on the edge of the pavement.

Further east, as W-7 crosses the Keʻāmuku and descends into lower elevations, the primary concern is to prevent fires from Saddle Road spreading southwards, towards the western boundary of the Keʻāmuku Endangered Species Management Unit containing *Haplostachys haplostachya*. Typical Section C is illustrated in Figure 2.2.1.b, Section C, and is modified from Typical Section A as follows:

- Three 12-foot travel lanes with 8-foot paved shoulders, with a four-inch high extruded asphalt curb at the outside of the shoulder.

In addition, the following mitigation measures are planned:

- The PTA Fire Department will install additional fire risk signs along Saddle Road at the western boundary of PTA (one is currently present at the eastern end). Sign information will be based upon the National Fire Danger Rating.
- To minimize the risk of wildfire during construction, the Special Contract Requirements will mandate that all construction activity shall be restricted to within the clearly delineated ROW and that entry and exit into the ROW by all construction personnel and equipment shall be at previously identified and marked non-sensitive areas.

3.10 WATER RESOURCES

3.10.1 Affected Environment

The receiving ocean waters for runoff in the South Kohala area are classified as "AA," or highest level of water quality. These coastal waters are important for fishing, recreation, visual quality, and traditional practices. The oceanic waters of Hawai‘i also support a number of endangered and threatened animals. Water pollution in certain streams and coastal waters of the State of Hawai‘i is an ongoing problem. The primary sources nowadays are polluted urban and agricultural runoff and groundwater. These coastal waters are a minimum of nine miles from the project area and there are no surface waterways that connect the W-7 corridor to the ocean.

Water resources and drainage characteristics occurring along the length of the entire Saddle Road project are diverse. One contributing factor to this variation from one end of the project to the other is the amount of rainfall received. Average annual rainfall ranges within the Saddle Road corridor from less than 20 inches in Sections I and II, to a high of more than 180 inches in Section III (UH Hilo 1998:57)

On the Island of Hawai‘i, infiltration of the substrate is generally high, especially in the areas of recent lava flows. The high rate of infiltration of surface water serves to recharge the island's basal groundwater aquifers. In general, streams develop slowly on such surfaces because of high permeability of the surface materials. There are no perennial streams in the Section I project corridor, and the area traversed by W-7 has no continuous ephemeral streams. This area's drainages are essentially draws between lava flow hummocks that carry water in very heavy rains. None of the drainages in Ke‘āmuku flow more than a few days a year. These short drainages have accomplished only limited downcutting, and they all outlet onto flats where the water percolates rapidly into the ground, sinking thousands of feet to the basal groundwater lens that underlies the island. Any polluted runoff undergoes extensive natural filtration through percolation of water through soil and rock before reaching the basal (near sea-level) water table.

Further north, between a half-mile and three miles from W-7, are several large ephemeral drainages including Waiki‘i, ‘Auwaiakeakua, Popo‘o, Pohakuloa, and Waikahalulu Gulches, some of which have carved long, continuous channels that almost reach the sea. These latter drainages originate on the steep slopes of Mauna Kea and cross the existing Saddle Road at a number of bridges, culverts, and dips in the road. No intermediate lakes or ponds are present within the region.

Since there are no perennial stream channels within the Saddle Road study corridor, no baseline data on surface water quality are available. There are baseline water quality data from the required sampling of drinking water wells. An existing private well at the Waiki‘i Ranch subdivision is more than 2,700 feet deep. This well, located within 200

feet of the existing Saddle Road, meets all of the Federal standards for safe drinking water. There is no recorded contamination associated with this well despite its vicinity to Saddle Road.

According to the EPA, there are no principal or sole source aquifers designated under Section 1424(e) of the Safe Drinking Water Act on the island of Hawai‘i (http://www.epa.gov/safewater/sourcewater/pubs/qrg_ssamap_reg9.pdf).

3.10.2 Environmental Consequences

Construction of the proposed roadway improvements might have limited, short-term effects on surface water quality, particularly an increase in suspended sediments during and shortly after precipitation events during the construction phase. Construction of cuts and fills would remove vegetation, disturb soils, and change overland flow characteristics, intensifying the effects of natural erosion until soils stabilize.

Water would be consumed in the construction process, much of it for dust control. The specific source of water to be used for construction would be the responsibility of the contractor, but contractors to date on Saddle Road have purchased and trucked water mostly from County Department of Water Supply standpipes in Kaumana, above Hilo. As the W-7 alignment is closer to Waimea, and the construction would involve an outlet on the Mamalahoa Highway, Waimea may prove to be the best source.

Regarding long-term effects, use of the W-7 alignment (or any alignment in the interior of Ke‘āmuku) relative to the existing Saddle Road would increase the extent of impermeable road surface due to a widened road and paved shoulders. An enlarged area of impermeable surfaces would increase surface water runoff during precipitation events. In addition, due to the geometry of roadways, an improved road would be expected to collect and concentrate stormwater runoff, potentially changing overland flow to a series of more concentrated sources.

Stormwater discharges to intermittent stream channels are regulated by the EPA through the Clean Water Act (CWA) and the National Pollutant Discharge Elimination System (NPDES) program. Stormwater runoff from the roadway would be tributary to stream channels during construction of the road as well as after construction is complete. During construction of the roadway, there is potential for degradation of stormwater quality from sediment as well as from construction materials mixing with stormwater.

Potential sources of pollution from the roadway after construction include solids, heavy metals, and organics from fuels and motor oils. With an increase in the number of vehicles using Saddle Road, automobile accidents and vehicle breakdowns are expected to increase, which raises the potential for chemicals and petroleum residues to be deposited on the roadway. Stormwater flowing over impermeable surfaces may pick up petroleum residues, and, if not controlled, transport them off-site. Contaminated stormwater could degrade the quality of surface waters or filter through soils and degrade groundwater resources.

Although there is no empirical data regarding the effects of pollutants from the highway on the groundwater, according to the U.S. Department of Transportation publication *Retention, Detention, and Overland Flow for Pollutant Removal from Highway Storm Water Runoff: Interim Guidelines for Management Measures*, all highway runoff contains pollutants, but pollutant loading does not always cause a problem for receiving waters. The document cites studies that monitored highway pollutant impacts to receiving waters at sites with ADT volumes from 7,400 to 135,000 vehicles per day (vpd). Results showed that runoff from lower ADT rural highways did not cause discernable toxic stress to aquatic biota. Few significant impacts were detected for roadways with less than 30,000 ADT. The ADT on the realigned Section I of Saddle Road is estimated to reach 6,500 by the year 2034.

As discussed above, W-7 would require construction of four culverts across minor ephemeral drainages; however, it deserves emphasis that there are no receiving surface waters in the area traversed by W-7.

To determine the likelihood that runoff from Saddle Road would impact groundwater quality, the 1999 Final EIS reviewed other existing wells and shafts on the island. Wells or well shafts located adjacent to major highways that have been in existence for more than 20 years have experienced no known detrimental effects from surface runoff contamination. For example, the Kahalu‘u well shaft located adjacent to Kamehameha III Road and Kuakini Highway in Kona, with a depth to groundwater of between 600 and 800 feet, has no record of groundwater quality contamination. Groundwater testing of all of the deep wells of the County of Hawai‘i’s Department of Water Supply has not indicated any signs of groundwater contamination. Because similar wells positioned near highways have shown no signs of groundwater contamination and because best management practices (BMPs) will be employed to control runoff, impacts to groundwater quality from the proposed project are not expected to be significant. Although the analysis is over ten years old, there do not appear to be any new data or concerns on highway-related pollution in similar environments.

Without the improvement of Saddle Road, although no construction-related impacts to water quality would result, the inadequacy of existing drainage structures under Saddle Road would continue to allow stormwater to overtop the road, resulting in erosion and increased risk to motorists during flooding.

W-7 versus W-3

There are no substantial differences between impacts to water resources between W-3 and W-7, although the few ephemeral drainages crossed by W-7 tend to be shallower have shorter distances to natural percolation basins than those of the W-3 corridor.

3.10.3 Mitigation Measures

In order to comply with the Clean Water Act, measures must be provided both during and after construction to prevent pollutants, including sediment and hazardous chemicals, from degrading the quality of stormwater runoff. As required by EPA and State DOH regulations on stormwater discharges, stormwater pollution prevention measures called Best Management Practices (BMPs) would be required for the Saddle Road project both during and after construction. Unlike construction activity BMPs, the stormwater permanent BMPs are designed to remain part of the project features after the site grading operation is completed. The permanent BMPs are intended to reduce stormwater pollution typically associated with the increase in impervious surfaces. (Hawai‘i State DOT 2007).

The Stormwater Pollution Prevention Plan (SWPPP) will include the following types of BMPs:

- Practices that prevent erosion, including the stabilization of cut and fill slopes by vegetative as well as non-vegetative means.
- Practices that trap pollutants before they can be discharged, such as silt fences and sedimentation basins.
- Practices that prevent the mixing of pollutants from construction materials and stormwater, such as providing protected storage for chemicals, paints solvents, and other toxic materials.
- During construction, erosion will be minimized by applying temporary measures that will reduce the velocity of the runoff and retain sediment on-site. Examples of these measures include but are not limited to: silt fences, check dams, mulching, culvert outlet protection, and sedimentation basins. Construction materials will be stored in a protected area with measures in place to contain and clean-up spills.
- Permanent pollution control measures will be applied to minimize degradation of stormwater quality after construction of the road has been completed. These measures include but are not limited to, the following examples: providing velocity reducers and/or settlement basins at culvert outlets, vegetating slopes, minimizing the steepness of slopes where possible, providing stream bank stabilization where required, and managing the use of chemicals for roadway maintenance.
- Cut slopes will be revegetated to reduce highway runoff pollution.
- If a major hazardous spill occurs, cleanup efforts will be coordinated through both the County of Hawai‘i Civil Defense Agency and the State of Hawai‘i DOH.

Permitting requirements are provided in Section 1.7. During final design of individual project segments, the SWPPP would be prepared as part of Section 401 permitting and submitted to DOH in accordance with USACE Section 404 permit procedures.

3.11 WATERS OF THE U.S./WETLANDS

A report describing the hydrology of the area with respect to regulations and policies implementing Section 404 of the Clean Water Act (CWA) was prepared in February 2009. This report is attached as a portion of Appendix B and is summarized below.

3.11.1 Affected Environment

Waters of the United States (U.S.) is a regulatory term referring to surface waters that are under the jurisdiction of the U.S. Army Corps of Engineers (USACE). Surface waters may include streams, streambeds, rivers, lakes, reservoirs, arroyos, washes, and other ephemeral watercourses and wetlands that have certain connections or relations to navigable waters of the U.S. Any actions that result in fill to waters of the U.S. require compliance with the CWA Section 404. Wetlands, as defined by the USACE, are areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support vegetation adapted for life in water-saturated soils. Wetlands are classified as "Special Aquatic Sites" and are considered waters of the U.S. under most circumstances.

For background, it should be noted that surveys conducted for the 1999 Final EIS determined that no waters of the U.S. were present in Section I or Section II of the project area. This was concurred with by the USACE, the Environmental Protection Agency, and the U.S. Fish and Wildlife Service (ref: USACE letter dated August 22, 1997, FEIS - Part II, 1.4.4, and EPA letter dated August 12, 1998, FEIS - Part II, 1.4.5). Part. III, Tech. App.). However, such determinations are only valid for a period of five (5) years. Since 1999, furthermore, regulations regarding waters of the U.S. have changed substantially and therefore additional fieldwork and analysis were required.

Ephemeral drainages are present on the W-7 corridor, and as under some circumstances these may be considered waters of the U.S., they required investigation. Since 1999, when the original Saddle Road EIS was being developed, the USACE has substantially revised its practical definition of waters of the U.S. and also its methods for assessing them. The latest guidance is contained in *JD Form Instructional Guidebook* and the *Approved Jurisdictional Determination Form*; these digital files are available on the Honolulu District website (http://www.poh.usace.army.mil/EC-R/EC-R.htm) (Rev. 5/23/07). In this guidance, the USACE has reaffirmed that all traditional navigable waters (TNW) are jurisdictional, and that any stream that generally flows three continuous months of the year or more – called a relatively permanent water (RPW) – is also jurisdictional. It is understood that any wetlands adjacent to RPW, as well as non-RPW streams and wetlands adjacent to them, need to be evaluated to see if they have a significant nexus to a TNW. The USACE, interpreting a ruling by the U.S. Supreme Court, defines this as follows:

> "A significant nexus exists if the tributary, in combination with all of its adjacent wetlands, has more than a speculative or an insubstantial effect on the chemical, physical, and/or biological, integrity of a TNW. Principal considerations when

> evaluating significant nexus include the volume, duration, and frequency of the flow of water in the tributary and the proximity of the tributary to a TNW, plus the hydrologic, ecologic, and other functions performed by the tributary and all of its adjacent wetlands."

Therefore, the first task was to identify within the W-7 corridor any TNWs, tributary RPWs, and tributary non-RPW streams, along with any wetlands or other special aquatic sites. After these are identified and mapped, certain waters will be by definition jurisdictional, and for others, the issue of a significant nexus must then be examined. After this, a jurisdictional determination can be made.

No "blue-line" permanent or ephemeral streams are mapped on U.S. Geological Survey topographic maps along the route of the W-7 corridor (see Appendix B, Figure 3). There is a distinct geomorphological difference between the central and northern parts of the Keʻāmuku property, which contain deep, blue-line gulches, and the southern part, which lacks them. This roughly corresponds to a geological difference between older and younger Mauna Kea flows. The very youngest flows – where there are no blue-line streams whatsoever – are found on the southern margin of the Keʻāmuku property, where W-7 is mostly located. The Keʻekeʻe section consists of rough lava flows as well as cinder cone and Holocene surficial deposits.

The topography of the area strongly reflects the geology. The area of the saddle at the base of Mauna Kea near Puʻu Keʻekeʻe is fairly flat, with alluvial Pleistocene and later deposits over old lava flow and ash deposits from cones such as Puu Keʻekeʻe, which exhibits typical cinder cone topography. The far southern portion of the Keʻāmuku property, which contains most of W-7, has a surface in which the lobes of the lava flows that flowed downslope are clearly visible, with little erosion or sediment build-up. Soil is not strongly developed and few erosional or alluvial features are evident. In the middle southern part of Keʻāmuku, which contains the eastern (mauka) portion of W-7, the topography generally has a smoother appearance, reflecting a cover of ash, cinders and sand of variable thickness on top of the bedrock lava flows.

Field investigations of a 500-foot width within the W-7 corridor were undertaken on five days during August and September of 2008 by a team of two to four scientists and technicians. For all sites within the W-7 corridor where a drainage crossing appeared to have any potential to be considered as a water of the U.S., the site was first located using a handheld global positioning system (GPS) device, then photographed and evaluated using the criteria in the USACE data sheets per the guidance referenced above. Three crossings were located (note that one of the four planned culverts discussed in Section 3.15 drains a small area that did not contain any recognizable channel). They are detailed in Table 3.11.1, mapped on Figure 3.15.1, and described below. The full records and photographs for each site are contained in Appendix B.

Table 3.11.1
Drainage Crossing Details

Name of crossing	Lat/Long (Decimal Degrees)*	Average width/depth (feet)	Substrate/Geometry
W-7-1	19.7940 155.6401	28/6	Shrub vegetation and grass, meandering
W-7-2	19.7935 155.6413	20/3	Grass, meandering
W-7-3	19.7935 155.6691	20/4	Grass and bedrock, meandering

Crossing W-7-1 has a bed that is a combination of bedrock and kikuyu grass (*Pennisetum clandestinum*) exhibiting no obvious signs of systematic erosion or deposition or high-water marks, although water clearly flows through on rare occasions. The sideslopes have kikuyu grass (*Pennisetum clandestinum*), fountain grass (*Pennisetum setaceum*), the common native shrub *ʻaʻaliʻi* (*Dodonaea viscosa*), and the herb fireweed (*Senecio madagascarensis*). Although only one of these plants is classified in the *National List of Plant Species That Occur in Wetlands (Region H),* (kikuyu grass, listed as FACU – a plant species that are likely to occur in uplands, but may occasionally be found in wetlands), none of the plants are associated with wetlands. All but *ʻaʻaliʻi* are alien introductions. The drainage outlets into a flat area dominated by kikuyu grass and disappears. Crossing W-7-2 is similar to W-7-1 but in an adjacent crease between lava flow hummocks.

Crossing W-7-3 intersects the one drainage that had a length of more than about 600 feet. Vegetation is similar to above, with more fountain grass and *ʻaʻaliʻi*. This drainage runs more than a mile along the clear contact between a young, rocky lava flow (the most northern lobe of the younger flows on the southern end of Keʻāmuku) that runs parallel to and about ten to twenty feet higher than an adjacent older lava flow mantled with ash. As the slope tilts slightly sideways towards the younger lava flow, runoff from occasional storms is channeled down and along this contact zone, where it has eroded some areas as deep as 15 feet. When the cross-slope topography no longer favors sheet flow in extreme rainfall events in the direction of the contact zone, the drainage disappears.

None of the three crossings appears to meet the definition of a water of the U.S. All are extremely ephemeral and their channels essentially disappear into basins between hills. Thus, none are tributary in any way to any relatively permanent waters (RPWs), such as an intermittent stream, and thereby to potential traditional navigable waters (TNWs). Rather than intermittent streams, these drainage features are essentially the V-shaped contacts between hummocky lava flows. Almost all rainwater immediately sinks in youthful lava flows, but where ash has mantled the lava flows, a soil forms that is a little less permeable and some runoff occurs in heavy rains. This naturally gets funneled into these Vs, slightly eroding out the soil and ash and in places exposing the bedrock that lies

one to four feet beneath the surface. Where the Vs are naturally steep, the erosion is more intense, and where the Vs are gentle, deposition occurs rather than erosion, and the V tends to fill in. At some point along the contact the V will flatten out and disappear, and finally no channel at all is evident, as this runoff simply spreads and percolates. Typically, in between the sets of hummocky lava flows are plains or basins with minor quantities of alluvium, colluvium, and aeolian deposits. The basins generally have no real outlet channel.

Even if these drainages were tributary to RPWs, it would be doubtful that they would have a significant nexus to a TNW. The amount and frequency of flows in such features is minor, and it is doubtful that sediment or water generated in these areas makes its way overland for any significant distance. The ground surface is highly permeable, and where overland runoff is generated, it percolates in natural basins. No habitat for native reptiles or amphibians (none of which exist in Hawai‘i), waterbirds, fish, or invertebrates is present. No wetlands or riparian plants or vegetation are present. In sum, there would appear to be insubstantial effect on the chemical, physical, and/or biological, integrity of the Pacific Ocean, the nearest TNW, which lies a minimum of ten miles from the drainages.

Botanical investigations of W-7 (see Appendix C) determined that no wetlands of any type were present within or near the W-7 corridor. The area was found to completely lack the wetlands indicators of hydrophytic vegetation, areas that are inundated for any substantial period, and hydric soils. Moreover, no springs or other special aquatic sites were observed within the W-7 corridor covered during these field investigations, and none are known to exist in the general area.

In summary, no jurisdictional waters of the U.S. appear to be present, as no wetlands or special aquatic sites are present, and none of the highly ephemeral and poorly developed drainage features meets the criteria of a water of the U.S. for streams. Specifically, there are no traditional navigable waters (TNWs), relatively permanent waters (RPWs), or non-RPW streams that are tributary to RPWs and/or have a significant nexus to a TNW. This finding was concurred with by the U.S. Army Corps of Engineers in a jurisdictional determination of September 8, 2009 (see Appendix B).

3.11.2 Environmental Consequences

No waters of the U.S. are located in or near the W-7 corridor, and therefore no impacts to waters of the U.S. would result from project implementation.

W-7 versus W-3

As discussed in Appendix B, W-3 has a greater number of crossings than W-7, although they are identical in nature to those in W-7. HDOT and FHWA did not request jurisdictional determinations on any of the W-3 crossings.

3.11.3 Mitigation Measures

No impacts to waters of the U.S. would occur and no mitigation measures are required.

3.12 CLIMATE, GEOLOGY, AND SOILS

3.12.1 Affected Environment

3.12.1.1 Climate

The climate of Hawai‘i is generally characterized by mild and fairly uniform seasonal temperatures; cloudy, humid conditions along the eastern coast and clear, dry conditions in the west; and a general dominance of trade-wind flow from the northeast. The rugged configuration of the island, however, produces large variations in climatic conditions. Precipitation amounts vary widely and both precipitation and temperature are affected by elevation, distance from the ocean and exposure to the trade winds.

Section I of Saddle Road is on the west-facing slope of Mauna Kea, which is the leeward, dry slope. The annual rainfall on the W-7 corridor averages around 20 inches, and is somewhat dryer at the upper elevation and wetter at the lower. The range of elevation between about 2,600 feet and 5,800 feet above sea level in turn leads to variation in average daily high temperatures from the low 80s to the mid-70s Fahrenheit, and average nightly lows between the high and low 60s. The tropical location leads to only slight seasonal changes of about five degrees.

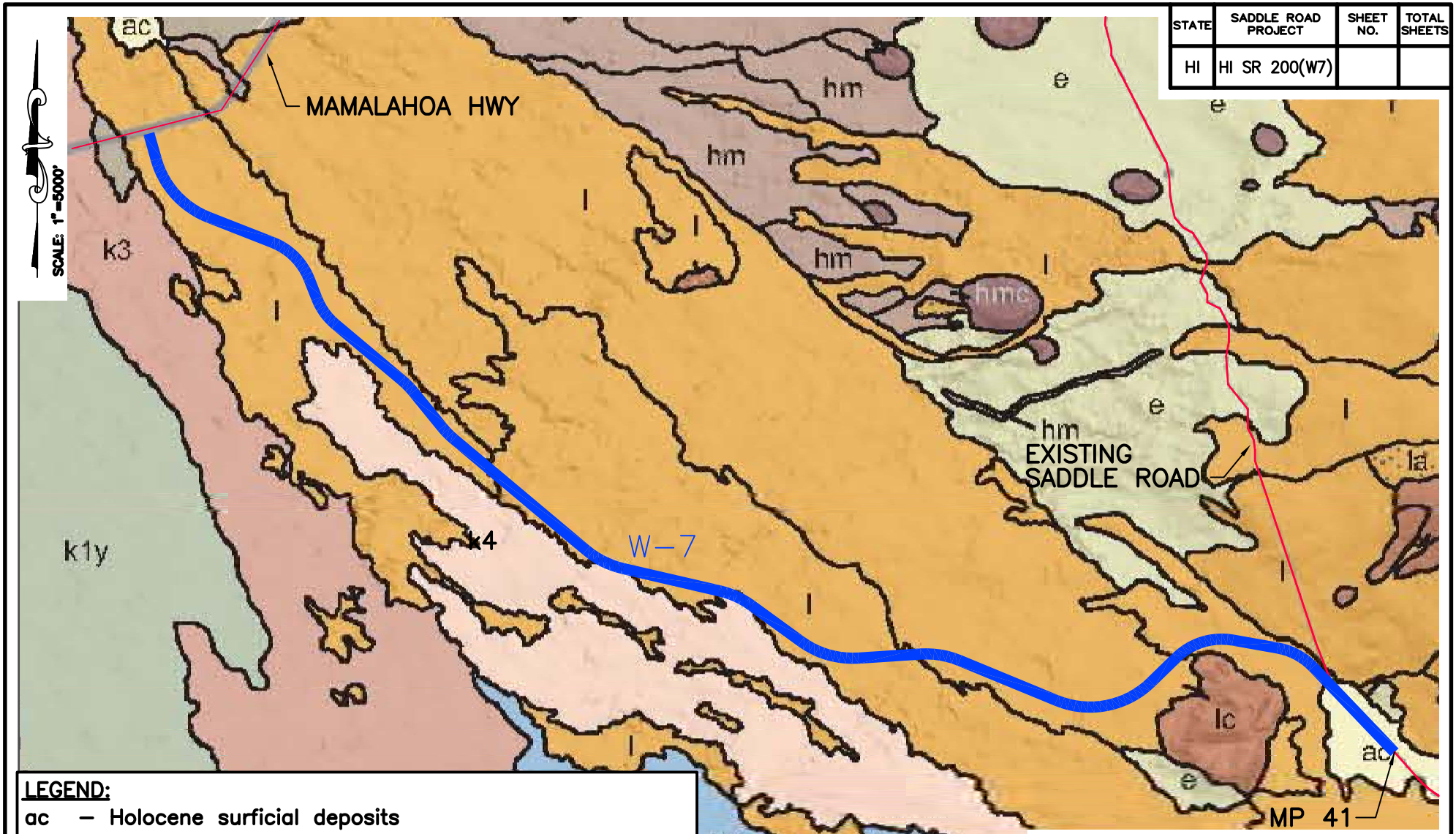
Fog is essentially absent at sea level in Hawai‘i because of the radiative properties of the ocean and the abundant wind mixing, which combine to prevent surface temperature inversions. The natural cooling that takes place as air is forced to higher elevations promotes fog development, and many locations over 800 feet in elevation in Hawai‘i experience some fog. Driving conditions at high elevations on the Saddle Road can be dangerous due to frequent fog.

The wind patterns on the island are also complex due to the mountainous terrain. Although the general trade winds are fairly constant, this flow is disrupted by the terrain and often replaced by winds from passing storms. In Section I, the wind tends to blow from the east (downslope) at night and in the early morning and from the west (upslope) for most of the day into the evening. Surface winds are generally fairly light but high winds over 20 miles per hour may occur because of storms, strong trade wind episodes, or during the peak of daytime upslope wind flow.

3.12.1.2 Geologic Formations

Hawai‘i, the largest island of the Hawaiian Archipelago, covers an area of approximately 4,000 square miles. The island was formed by the activity of five shield volcanoes: Kohala (long extinct); Mauna Kea (active during recent geologic times); Hualālai (last erupted in 1801); and Mauna Loa and Kilauea (both still active).

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(W7)		



LEGEND:

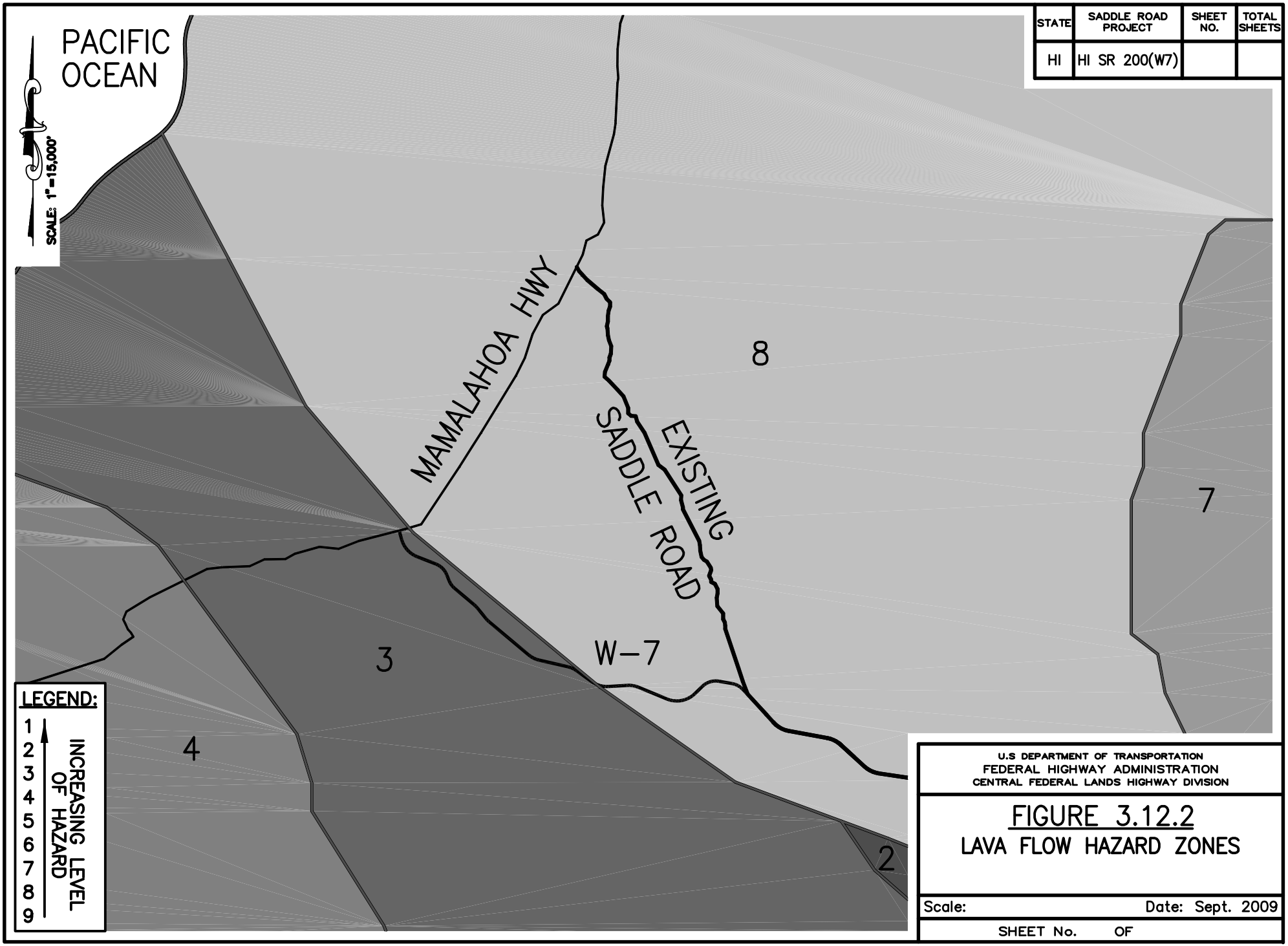
- ac – Holocene surficial deposits
- e – Pleistocene surficial deposits
- l – Later Pleistocene Mauna Kea lava flows
- lc – Later Pleistocene Mauna Kea cinder cones
- hm – Earlier Pleistocene Mauna Kea lava flows
- hmc – Earlier Pleistocene Mauna Kea cinder cones
- k2 – 1500–3000 year old Mauna Loa lava flows
- k3 – 750–1500 year old Mauna Loa lava flows
- k4 – (Keamuku) 400–750 year old Mauna Loa lava flows

U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

FIGURE 3.12.1
GEOLOGY

Scale: Date: Sept. 2009

SHEET No. OF


PACIFIC OCEAN
SCALE: 1" = 15,000'
MAMALAHOA HWY
EXISTING SADDLE ROAD
W-7
8
7
3
4
2
LEGEND:
1
2
3
4
5
6
7
8
9
INCREASING LEVEL OF HAZARD
STATE
SADDLE ROAD PROJECT
SHEET NO.
TOTAL SHEETS
HI
HI SR 200(W7)
U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION
FIGURE 3.12.2
LAVA FLOW HAZARD ZONES
Scale:
Date: Sept. 2009
SHEET No. OF

Section I is located mainly along the southwestern flank of Mauna Kea. The western end of W-7 skirts the boundary between Mauna Loa and Mauna Kea lavas (Figure 3.12.1). The majority of the surficial soil and rock of the W-7 corridor is derived from ‘a‘a (the Hawaiian word that has become the scientific term for clinkery) lava flows of the Hamakua and Laupahoehoe Volcanic Series of Mauna Kea Volcano, all older than 10,000 years. Recent historic eruptions from Mauna Loa have flowed north toward Mauna Kea, where they were diverted downslope to the south. They typically consist of pahoehoe (ropy or smooth) lava. A very small extent of these lavas is contained on the southern end of the W-7 corridor.

The W-7 corridor is generally underlain by four types of geologic materials, including Volcanic Ash Deposits, Cinder Sand Deposits, ‘A‘a Lava Flows, and very limited amounts of Pahoehoe Lava Flows.

Volcanic ash deposits generally consist of near-surface brown to light brown silty fine sand and sandy silt soils intermixed with some ‘a‘a basalt rock. In general, volcanic ash deposits were observed as a dry and powdery soil cover, deposited in layers primarily as volcanic air-fall deposits generated from pyroclastic vents associated with Mauna Kea Volcano. Volcanic ash material is easily erodible.

Cinder sand deposits generally consist of poorly-graded to well-graded coarse sand and gravels, pumice cobbles, and volcanic ash, underlain by basalt rock formation. The surface is typically barren and fairly level, rainfall is high, and surface runoff is low, as evidenced by a general lack of erosional drainage features in these materials.

‘A‘a lava flows generally consist of light gray to grayish brown basalt with clinker material and occasional dense basalt layers. The material forms a rough and broken ground surface with high relief consisting of mounds or piles of very spiny plates and blocks of rock piled in tumbled heaps. Lava tubes and void spaces may occur within the interior of ‘a‘a flows, although less commonly than in pahoehoe lava. ‘A‘a rock is generally easier to excavate except where the core of the flow is encountered. The core of the flow often requires greater effort to excavate, including blasting and intensive chipping and ripping. Pahoehoe flows generally consist of more fluid lavas of dense basalt interbedded with relatively small clinker seams. The rock varies from highly vesicular to massive, and the flows may contain lava tubes, blisters, and other void spaces. Voids are commonly encountered in pahoehoe flows during excavation work. The pahoehoe rock is typically devoid of soil cover except in the forested areas of the eastern project area.

There is a distinct geomorphological difference between the central and northern parts of the Ke‘āmuku parcel, which contain deep gulches, and the southern part, where the W-7 corridor is, that lacks these gulches. This roughly corresponds to a geological difference between older and younger Mauna Kea flows. The far southern portion of the W-7 corridor has a surface in which the lobes of the lava flows that flowed downslope are clearly visible, with almost no erosion or sediment build-up. The Ke‘eke‘e section of the corridor east of Ke‘āmuku consists of rough lava flows as well as cinder cone and

Holocene surficial deposits. This area is fairly flat, reflecting alluvial Pleistocene and later deposits over old lava flow and ash deposits from cones such as Pu‘u Ke‘eke‘e, which exhibits typical cinder cone topography.

3.12.1.3 Geologic and Volcanic Hazards

The Island of Hawai‘i is geologically the most active of the Hawaiian Archipelago. Many volcanic eruptions and earthquakes have been recorded on this island in historic times. Faults, rift zones, lava flows, lava tubes, and vents are present. Historical records of lava flows and seismic events provide some indication of the relative risk in various geographic areas of the island (Heliker 1990). While the entire island is considered a geologic hazard area, degrees of risk have been established in zones across the island. The USGS has classified the island into Lava Hazard Zones 1 through 9, in order of decreasing risk (Figure 3.12.2). The Lava Hazard Zone of highest volcanic risk, Zone 1, includes those areas where more than 25 percent of the land has been covered by lava since 1800. Zone 1 areas are immediately adjacent to the calderas and major rift zones of the active volcanoes Mauna Loa and Kilauea. Zone 2 areas represent lava flow inundations of 15 to 25 percent since 1800, and Zone 3 represents inundations of 1 to 15 percent. Zone 2 and 3 generally characterize areas of increasing distance downslope of active volcanoes. The W-7 project corridor crosses geologically older slopes of the dormant volcano Mauna Kea, within the relatively low risk Lava Hazard Zone 8. The western portion of W-7 is directly adjacent to Mauna Loa flows and is thus also directly adjacent to Lava Hazard Zone 3.

Lava tubes are characteristic of relatively young pahoehoe lava flows and are important landforms on young volcanoes such as Mauna Loa. The W-7 corridor is mainly on ash-covered ‘a‘a flows from Mauna Kea, and no significant lava tube caves (or any other types of caves) have been observed during field surveys.

According to the USGS (see letter in Appendix A2), maximum shaking in the project area has a 10 percent chance of exceeding accelerations of 0.4g within 50 years (Klein et al 2001; http:/pubs.ugs.gov.impa/i-274i/).

3.12.1.4 Soils

The following general information on soils is based on a U.S. Department of Agriculture (USDA) Soil Survey of the Island of Hawai‘i (USDA 1973).

KZD - Kilohana Loamy Fine Sand, 12 to 20 Percent Slopes. The Kilohana series consists of somewhat excessively drained loamy fine sands that formed in volcanic ash, sand, and cinders. These soils are moderately steep, and are found on uplands at elevations ranging from 5,000 to 6,500 feet. They receive from 20 to 40 inches of rainfall annually and their soil temperature is between 50° and 53° F. The Kilohana loamy fine sand type is used for pasture, wildlife habitat, and recreation areas. There are cemented layers of sand in the lower part of the profile in some places. The soil is alkaline. Permeability is rapid, runoff is slow, and erosion hazard is slight.

PVD - Puu Pa Extremely Stony Very Fine Sandy Loam, 6 to 20 Percent Slopes. The Puu Pa series consists of well-drained stony very fine sandy loams that formed in volcanic ash. These soils are gently sloping to extremely steep, and most areas are extremely stony. They are on uplands at elevations ranging from 1,000 to 2,500 feet and receive from 20 to 35 inches of rainfall annually. Their mean annual soil temperature is between 69° and 71° F. The Puu Pa extremely stony very fine sand loam type is moderately deep to fragmental ‘a‘a lava. The soil is moderately acid to slightly acid in the surface layer and neutral in the subsoil. The surface layer is silt loam in places. Permeability is moderately rapid, runoff is medium, and erosion hazard is moderate.

rKED - Kaimu Extremely Stony Peat, 7 to 25 Percent Slopes. The Kaimu series consists of well-drained, thin organic soils over ‘a‘a lava. These are gently sloping to moderately steep soils on uplands at elevations ranging from near sea level to over 1,000 feet. They receive from 40 to 60 inches of rainfall annually, and their mean annual soil temperature is between 72° and 74° F. The Kaimu extremely stony peat type is shallow to fragmental ‘a‘a lava, but deep to underling bedrock. It occurs on moderately sloping to moderately steep uplands. The soil is neutral in reaction. Permeability is rapid, runoff is slow, and erosion hazard is slight.

rVS - Very Stony Land. This unit consists of ‘a‘a lava that has a thin covering of volcanic ash that locally extends deep into cracks and depressions. From 50 to 90 percent of the surface area is covered with stones and boulders. ‘A‘a lava outcrops are common. The slope is between 10 and 15 percent. Between the lava outcrops and in the cracks of the lava, the soil material extends to a depth of 3 to 6 inches. Erosion hazard is slight.

WLC - Waikaloa Very Fine Sandy Loam, 6 to 12 Percent Slopes. The Waikaloa series consists of well-drained very fine sandy loams that formed in volcanic ash. These soils are gently sloping to moderately sloping and found on uplands at elevations ranging from 1,500 to 4,500 feet, where precipitation is 20 to 30 inches annually. Their mean annual soil temperature is between 61° and 64° F. The Waikoloa very fine sand loam type occurs on moderately sloping uplands. The surface layer is neutral, and the subsoil is mildly alkaline. Permeability is moderate, runoff is medium, and erosion hazard is moderate.

3.12.2 Environmental Consequences

The proposed project would have no impact on weather or climate along the W-7 corridor or within the region. Other than the issue of dust, discussed above in Section 3.7 in the context of air quality, the only climatic condition that requires special consideration is fog. The proposed realignment will lead to greater traffic levels and more driving in foggy conditions (although the cross-island alternative, SR 19, also experiences frequent fog between Honoka‘a and Waimea). However, the project would also eliminate the sharp curves that make driving in the fog here such a special hazard, and would realign the road away from the “Seven Steps” area near the Kilohana Girl Scout Camp, thus

reducing the elevation of summit of the western part of the Saddle Road by about 200 feet, which will reduce the incidence of fog.

Geologic hazards within the W-7 corridor include some steep slopes with a modest potential for instability and minor landslides. Based on the site reconnaissance and literature research conducted for the project, no significant geologic hazards were observed or identified along the proposed segments.

Due to the presence of volcanic and seismic hazards in various locations along Saddle Road, the improved Saddle Road could be directly damaged in the future by lava flows and earthquake activity, temporarily resulting in road closures to repair damage or rebuild affected sections. This risk exists with or without implementation of the proposed action, since Saddle Road is an existing transportation corridor through this region. However, because Section I is not highly subject to lava hazard, additional costs would likely be no greater than if W-7 were not constructed.

The volcanic ash soils, when wetted, have relatively low strength characteristics and are highly susceptible to erosion in a dry state. If in-situ moisture contents are high enough, these soils become fluid and lose strength temporarily when remolded or disturbed (thixotropic soils). PVD and WLC soils present a moderate erosion hazard, and KTB soil presents a moderate to severe soil-blowing hazard.

During construction activities, grubbing and earthwork would expose the soil and increase erosion potential. Soil erosion impacts would be localized and short-term, related to precipitation events during the construction phase.

Construction of the road would involve paving the road surface and shoulders. No notable, long-term increase in soil erosion is anticipated with implementation of the action alternatives.

Although the ash-covered ‘a‘a that makes up most of the W-7 corridor generally does not support extensive lava tubes or lava tube caves, they are potentially present. No caves were observed during the extensive fieldwork by botanists, ornithologists, engineers, surveyors, and others. However, most lava tubes have no entrance or may have an entrance far from the survey area; accordingly, they cannot be surveyed before construction begins. Accidentally breaking through the roof of hidden caves would be hazardous to workers and detrimental to the cave and its resources. Breaks into caves would change the airflow patterns in the cave, usually making them less suitable for cave animals. Clearing vegetation for staging areas and other uses related to the road construction would reduce the amount and quality of food entering the cave ecosystem, especially in those areas of the W-7 corridor where native vegetation is present. Many Hawaiian cave animals are dependent on native plant species on the surface above their cave habitats. Changing water flow patterns and infiltration rates may desiccate some caves or flood others. Chemical spills and runoff may enter caves and have devastating effects on the fauna. The road may seal caves making them no longer available for study or enjoyment.

W-7 versus W-3

There are no substantial differences between the climate, soils or geologic hazard between W-3 and W-7. The W-7 alignment is slightly closer to areas of higher lava flow hazard.

3.12.3 Mitigation Measures

- Prior to construction, a final review will be conducted to determine the probability of caves or lava tubes in the construction corridor. Should significant caves be present, final design and/or construction techniques will be developed to avoid or minimize impacts.
- If a significant cave or lava tube is inadvertently encountered during construction, all construction activity will cease immediately at the location in question and the Project Engineer will be notified. Consultation will be conducted with appropriate resource or regulatory personnel to ensure that unique biological, cultural, or geological resources associated with these features are investigated and documented, and, if warranted, protected.
- Construction specifications would be incorporated to minimize potential hazards of caves to construction workers.
- During the rainy season, following completion of construction, slopes and denuded areas will be allowed to revegetate with natural seed sources, such as kikuyu grass and *‘a‘ali‘i,* to minimize soil erosion.
- FHWA will coordinate with HDOT regarding fog warning signs or systems during final design.

3.13 BOTANICAL RESOURCES

A survey of the 500-foot wide W-7 corridor was done in 2008 and 2009 by a team of professional botanists. The purposes of the study were to provide a baseline description of the plants and vegetation of the corridor and to locate and identify endangered plant species (if any), other rare species, and other valuable botanical resources within the corridor. The survey report is contained in full in Appendix C and is summarized below.

The initial botanical survey of the entire alignment was conducted on four days in September 2008. The botanical surveys consisted of a 100 percent visual, walking survey. This means that the botanists walked along the entire alignment in an orderly manner that ensured visual observation of all parts of the study corridor. Surveys were conducted with three or four team members evenly spaced within one-half the width of the study corridor. The team then covered the rest of the corridor by reversing direction and spacing themselves between the centerline and the other outer limit. An additional survey was conducted on May 9, 2009. This survey was concentrated in one particular zone of the corridor and timed to follow the seasonal winter and spring rains to increase the probability that if any rare plants were present they would be actively growing and more readily found.

3.13.1 Affected Environment

3.13.1.1 Flora and Vegetation Types

A total of 91 species of vascular plants was recorded within the study corridor during the field survey (see Appendix C for full list). Of these, 15 are endemic to the Hawaiian Islands and 15 are indigenous, meaning they are native to Hawai‘i but occur naturally in other places as well. Sixty-one species are introduced, meaning they were brought to Hawai‘i by people. The introduced species include one of Polynesian origin.

Only two of the endemic species, *‘aweoweo* (*Chenopodium oahuense*) and hard-stemmed lovegrass (*Eragrostis atropioides*), are common or dominant anywhere in the corridor. These two are dominant only between Ke‘āmuku and the existing Saddle Road. Seven of the 15 endemic species were recorded as uncommon within the corridor, meaning only one or very few individuals were observed. These findings show that endemic plants have been nearly extirpated from Ke‘āmuku during years of cattle-grazing.

No plants listed as endangered or threatened by the State of Hawai‘i or the U.S. Fish and Wildlife Service were found during surveys within the W-7 corridor. (NOTE: Section 3.18 of this SEIS deals specifically with the subject of direct and indirect impacts to threatened and endangered biological species.) A small population of a plant that appears to be *Chamaesyce olowaluana* was found in the corridor at 3,600 feet above sea level. The U.S. Fish and Wildlife Service unofficially named this as a “species of concern,” meaning that it is somewhat rare and its numbers may be declining. The population consisted of four small individuals that have been grazed and one large, near-dead specimen. The large individual was six feet high and approximately five inches in diameter at the base, with only a few living leaves present. The poor condition of these plants precludes positive identification; the plants could also possibly be *C. multiformis*, a native species that is somewhat more common and not a species of concern. In any case, many individuals of *C. olowaluana* are present in other areas of PTA.

3.13.1.2 Vegetation Types

Nearly all of the Ke‘āmuku parcel has been used for cattle production for many years. Thus, the vegetation of most of the area is pasture, made up of introduced grasses with varying numbers of scattered native shrubs, many introduced forbs (weeds) and a few introduced shrubs and trees. The general appearance is of rolling grasslands on the rugged slope of Mauna Kea with some extensive stands of the indigenous shrub *‘a‘ali‘i* (*Dodonaea viscosa*). From Mamalahoa Highway up to about 4,600 feet above sea level, fountain grass (*Pennisetum setaceum*) is the single dominant pasture grass. Above this elevation, kikuyu grass (*P. clandestinum*) becomes the dominant pasture species.

Seven different vegetation zones were recognized (Table 3.13.1), which are similar to vegetation zones previously reported by Arnett (2002). The zones generally correspond primarily to differences in human land-use patterns and secondarily to differences in the substrate. Four of the five zones within Keʻāmuku (Fountain Grass with *ʻAʻaliʻi*, Native Shrubs Amidst Fountain Grass, Rangeland and *ʻAʻaliʻi*, and Moderate to Dense *ʻAʻaliʻi*) differ mainly in the balance between the two introduced pasture grasses (fountain grass and kikuyu grass) and the abundance of native shrubs. In general, native shrubs are more numerous and diverse where grazing has been less intense. Often, these areas are those with very rocky surface and rugged terrain that may impede access by cattle. The fifth vegetation zone within Keʻāmuku is the Keʻāmuku Lava Flow, a young, near-barren *ʻaʻa* flow.

Table 3.13.1
Vegetation Zones Along W-7 Corridor

Community	Location	Extent (linear feet)	Acreage	Elevation (feet above sea level)	% Native Species	% Native Importance Index
Fountain Grass with *Aʻaliʻi*	Keʻāmuku	0-27,400 (27,400)	4.8	2,600-4,200	34	22
Keʻāmuku Flow	Keʻāmuku	27,400-28,700 (1,300)	100.8	4,200-4,300	70	62
Native Shrubs Amidst Fountain Grass	Keʻāmuku	28,700– 34,600 (5,900)	21.7	4,300-4,600	28	25
Rangeland and *ʻAʻaliʻi*	Keʻāmuku	34,600– 44,700 (10,100)	37.2	4,600-5,100	39	26
Moderate to Dense *ʻAʻaliʻi*	Keʻāmuku	44,700– 46,800 (2,100)	7.2	5,100-5,200	37	30
Eragrostis Grassland	Keʻekeʻe	46,800 – 51,000 (4,200)	15.5	5,200-5,600	37	38
ʻAheahea Shrubland	Keʻekeʻe	51,000– 54,400 (3,300)	12.1	5,600-5,800	21	27

ʻAʻaliʻi, an indigenous shrub, is common in much of the study area and is a dominant species in several vegetation zones in Keʻāmuku. It is probable that this abundance is actually in response to disturbance of the natural vegetation by human actions and does not represent the foundation of a healthy native plant community. *ʻAʻaliʻi* is tolerant of the wildfires that are frequent in this environment and it is relatively unpalatable to cattle. Overgrazing may increase the abundance of this native shrub. In contrast, nearly all other native plants in this region decline in response to wildfire and cattle grazing.

The two vegetation zones outside of the Keʻāmuku parcel in the Keʻekeʻe area near Saddle Road (*Eragrostis* Grassland and *ʻAheahea* Shrubland) are somewhat different, having a native grass and native shrubs among the dominant plants. Even here, however, introduced plant species outnumber the natives.

3.13.1.2 Detailed Vegetation Description Along W-7 Corridor

The following describes vegetation by elevational zones.

2,600-4,200 Ft. Elevation: Fountain Grass with ʻAʻaliʻi and Sparse Native Shrubs. This grassland with a small and inconspicuous component of shrubs and small trees prevails over the lower half of the proposed alignment, extending from the origin at Mamalahoa Highway for 27,400 linear feet. At the time of the survey it was being used for cattle pasture and had been for many decades. The vegetation is introduced grasses and forbs, with widely scattered native shrubs and a few introduced shrubs and trees. The substrate is very stony land partially covered by shallow, fine textured soil. At lower elevations, this covering soil is a fine sandy, mineral soil (Puu Pa soil series) but at higher elevation it is derived mostly from organic matter (Kaimu soil series) (U.S. Department of Agricultural 1973).

The most common shrubs are the indigenous *ʻaʻaliʻi* and, somewhat less common, *ʻilima* (*Sida fallax*). *ʻAʻaliʻi* is variable in cover, ranging from widely scattered to approaching 50 percent cover in a few places at higher elevation in this zone. Other native shrubs or trees include *pukiawe* (*Leptecophylla tameiameiae*), *naio* (*Myoporum sandwicense*),*ʻulei* (*Osteomeles anthyllidifolia*) , and *naʻenaʻe* (*Dubautia cilliolata*), all of which are very widely scattered. One individual, or one small population, was found of *ʻakia* (*Wikstroemia pulcherrima*) and *ʻakoko* (*Chamaesyce olowaluana* or *multiformis*), both endemic large shrubs.

The conspicuous introduced European olive (*Olea europaea*) is common in the middle reaches of this zone. Introduced *haole koa* (*Leucaena leucocephala*), although less visible, is frequent at least in some areas, as is indigo (*Indigofera suffruticosa*), a much smaller shrub.

Nineteen of the 56 plant species (34 percent) recorded in this zone are native species; the rest are introduced, including one of Polynesian introduction. However, the "index of importance," calculated using the estimated frequency values, is only 22 percent for native species (Table 3.13.1). This indicates that the 19 native species have disproportionately low cover and play a minor role in the vegetation ecology of this zone.

4,200-4,300 Ft. Elevation: Keʻamuku Lava Flow. A 1,300-foot section of the centerline of the corridor traverses the sparsely vegetated Keʻāmuku Lava Flow. Somewhat more of the southern edge of the corridor is also on this flow. This is the only part of the corridor that is situated on lava from Mauna Loa. The Keʻāmuku Flow is very rugged *ʻaʻa* lava dated to between 200 and 750 years before the present time (Wolfe and Morris 1996). The Keʻāmuku Flow is very visible because the brown and nearly barren lava contrasts with the surrounding pastures and grasslands.

The most conspicuous plant species on the Keʻāmuku Flow is *ʻohiʻa lehua* (*Metrosideros polymorpha*); however, only one individual of this native tree actually falls within the corridor. Other native trees and shrubs include *naio* and *pukiawe*, both of which are common. Many of the introduced plants that are dominant in the surroundings, especially fountain grass, fireweed (*Senecio madagascarensis*) and barbwire grass, are also found on the Keʻāmuku Flow, in much lower densities.

Seven of the ten plant species (70 percent) within the study corridor on the Keʻāmuku Flow are native species. This is the highest percentage of native species of all the vegetation zones along the proposed alignment. Similarly, the index of importance for native species is the highest here, at 62 percent (Table 3.13.1). These high values for native plants point out that this young lava flow is not easily invaded by introduced plants and the native plants may be more tolerant of the harsh conditions of the barren lava.

4,300-4,600 Ft. Elevation: Native Shrubs Amidst Fountain Grass. The vegetation of this zone differs from the fountain grass pastures below the Keʻāmuku Flow in that the native shrubs and trees are more dominant and conspicuous here. In places, the *ʻaʻaliʻi* forms about 50 percent cover and is up to five feet high. The other native shrubs, especially *ʻilima*, *pukiawe*, and *naʻenaʻe*, are much more common than at lower elevations. In certain locations, especially silt-laden swales, the ground cover of fountain grass is replaced by kikuyu grass, fireweed, black medick, and scarlet sage (*Salvia coccinea*), all introduced plants.

The surface in this zone is much more rocky and rugged than in the fountain grass grasslands at lower elevation and is mapped in the soil survey as Very Stony Land (Sato et al. 1973). This ruggedness probably accounts for the presence of more species of native plants here. This is the habitat type that supports two endangered native species, *Haplostachys haplostachya* and *Stenogyne angustifolia*, located as close as 500 feet south of the proposed alignment. About 5,900 feet of the W-7 corridor is within this vegetation type.

Although native shrubs are an important component of the vegetation in this zone, there are many introduced plants, including fountain grass, kikuyu grass and fireweed, that rank among the dominants. Thirteen of the 46 plant species (28 percent) in this zone are native. The index of importance of native species is even lower, at 25 percent.

Thirteen of the 29 plant species (45 percent) found in this vegetation zone are native. The index of importance of native species is somewhat lower at 33 percent (Table 3.13.1). The difference between these two indices reflects the findings that even though there are many native species, more introduced plants are among the dominants.

4,600-5,100 Ft. Elevation: Rangeland and ‘A‘ali‘i. An extent of 10,100 linear feet of the corridor passes through this heavily degraded rangeland. This zone has the potential for good pasture because the soil here, mapped as Kilohana Loamy Fine Sand (Sato et al. 1973), is much less stony than at lower elevations along the corridor. This zone includes two subtypes with very different appearances: heavily grazed kikuyu grass pasture and dense stands of *‘a‘ali‘i* that are four to five feet high and difficult to pass through. These two subtypes are included together because both appear to be the product of heavy cattle grazing over a period of time. *‘A‘ali‘i* is one of the few native plant species that is relatively tolerant of both cattle grazing and fire. In this zone, the grass is currently cropped very short and appears overgrazed. Even in the grassy areas, shrubs of *‘a‘ali‘i* are present, indicating that it is at least as tolerant of heavy grazing and the fires that occur in this zone as the introduced grasses. In fact, it appears that the dense stands of *‘a‘ali‘i* are the product of years of overgrazing and probably frequent fire. These extensive areas are no longer of any value for grazing. If intensive grazing continues in the grassy areas, they may be converted to dense *‘a‘ali‘i* stands. In these areas, the indigenous *‘a‘ali‘i* behaves as a successional species and this vegetation type should not be considered a remnant of the original vegetation.

Seven of the 18 (39 percent) plant species found in this zone are native. However, only one of these, *‘a‘ali‘i*, has a high importance value. The trend noted above of native plant species having disproportionately low cover, and therefore importance values, is strongest in this vegetation zone, resulting in an index of importance for native plants of just 26 percent (Table 3.13.1).

5,100-5,200 Ft. Elevation: Moderate to Dense ‘A‘ali‘i. At this elevation, the vegetation is somewhat less degraded in that a few other species of native trees and shrubs are sparsely represented. These native plants include *mamane* (*Sophora chrysophylla*), *ilima* (*Sida fallax*), *naio* and a single specimen of *pilo* (*Coprosma montana*). These appear to be remnants of the original vegetation rather than reinvasion following degradation, as in the previous vegetation type.

‘A‘ali‘i is the dominant species in much of this zone, which also includes extensive areas of heavily gazed kikuyu grass with many introduced weeds, including fireweed, black mustard (*Brassica nigra*), stinkweed (*Tagetes minuta*) and crown-beard (*Verbesina encelioides*). Thirty-seven percent of the plant species recorded are native species; the index of importance for native species is somewhat lower at 30 percent (Table 3.13.1). An extent of 2,100 linear feet of the W-7 corridor passes through this vegetation type. The underlying soil is mapped as Kilohana Loamy Fine Sand (Sato et al. 1973).

5,200-5,600 Ft. Elevation: Eragrostis Grassland. At 46,800 linear feet from the origin on Mamalahoa Highway, the W-7 alignment crosses *Ke'eke'e* Road and leaves the Ke'amuku parcel. This zone east of *Ke'eke'e* Road has not been grazed, at least in recent years. Here, the dominant grass is the endemic hard-stemmed lovegrass (*Eragrostis atropioides*) which forms a near-complete cover in most areas. The terrain is very rugged in the lower half of this zone and native shrubs are common, as are some introduced weedy species. *'A'ali'i* is common and *mamane*, *naio*, and *'ilima* are frequent. Kikuyu grass is the most common of the introduced plants, but orchard grass (*Dactylis glomerata)*, stinkweed and fireweed are also abundant. The upper part of the zone, nearing the existing Saddle Road, is a more level and smoother surface and also more disturbed and degraded by human activities. Here, the native shrubs are less frequent and the weedy introduced species become more prevalent.

In this zone, 37 percent of the 38 species recorded are native, and the index of importance for native species is 38 percent (Table 3.13.1). The soil in this zone is mapped as Keekee Loamy Sand, derived from cinder material erupted from nearby Puu Ke'eke'e and other nearby cinder cones (Sato et al. 1973).

5,600-5,800 Ft. Elevation: 'Aheahea Shrublands. At the top of this zone, the corridor rejoins the existing Saddle Road and is superimposed over it for an extent of 3,300 linear feet before terminating. This zone has an unusual substrate and a unique set of forces of disturbance that support a unique combination of native and introduced plant species. The surface is mapped as a deposit of alluvial and colluvial sand and gravel deposited by gravity and running water (Wolfe and Morris 1996).

The dominant plant is the endemic shrub *'aweoweo* forming a stand about five feet high. The native hard-stemmed lovegrass is also common. Research shows that both of these endemic species are tolerant of disturbance and resprout after fire (Lamb 1981, Sherry et al. 1999). It is probable that this community does not represent the original indigenous plant community but is itself a product of disturbance. Other than those two hardy native species, the vegetation contains a large collection of introduced grasses and weeds, probably associated with continuing human disturbance near Saddle Road. One of the more conspicuous is Russian thistle (or tumbleweed) (*Salsola kali*). Between the shrubs and other plants, much of the surface is barren and dusty and there is much evidence of human activity. Twenty-one percent of the 24 species present are native and the index of importance for native species is only slightly higher at 27 percent (Table 3.13.1).

Roughly half of this area is heavily dominated by introduced species, including the invasive species fountain grass. The native communities that would be disturbed include shrublands dominated by *'a'ali'i* and *aheahea* and *Eragrostis* grassland.

Biodiversity refers to the value that individual species have because of their rarity, uniqueness or important role in supporting the ecosystem. A community with a unique combination of plant species or which is habitat for valuable animal species also has biodiversity value. For the purposes of this assessment, only native plant species are

considered to have biodiversity value. Introduced plants may have economic, soil conservation or scenic values, but they lack biodiversity value because they are abundant elsewhere in the world in their native ranges and their presence in Hawai‘i often displaces native plants and communities.

Vegetation attributes with biodiversity value are: 1) rare or endangered native plants; 2) other native, especially endemic, plant species; 3) plant communities dominated by native plants, especially if the community is a combination of plant species found only in that area; and 4) plant communities, including those dominated by introduced plants, that support native animal species.

3.13.2 Environmental Consequences

Direct Impacts

No plants listed as endangered or threatened by the State of Hawai‘i or the U.S. Fish and Wildlife Service were found within the study area. There are also a few individual plants that were in poor condition and thus could not be definitively identified, but which may be specimens of the rare species plant *Chamaesyce olowaluana*. This species is found in modest numbers further east in PTA, and even if these specimens are *C. olowaluana*, loss of a few plants in the W-7 corridor would not harm the species.

Construction of the project would involve about 250 acres of ROW but less than 200 acres of actual vegetation disturbance.

In general, the biodiversity value of the vegetation found in the corridor is low, although it increases with increasing elevation, as native plants become more common and vegetation has more integrity. The plant communities present, however, are not unique or high-diversity native plant communities, and none are restricted to the corridor. They are in fact common in the Saddle region and protected in a number of locations. Construction of this project would not eliminate any species or plant community type from the region. Therefore, it is concluded that the impact on biodiversity is minor.

Indirect Impacts

Secondary or indirect impacts to vegetation in the broader region beyond the corridor could occur through the spread of alien species, wildfire, and impacts to offsite endangered plant species. Wildfire is discussed in Section 3.9 of the SEIS, and threatened and endangered species are dealt with in Section 3.18.

Construction and operation of highway projects have at least some potential to spread various alien species already present on the island to areas in which they are not now present. In some cases, where equipment, supplies or workers are brought in from other islands or the mainland, highway projects can introduce alien species new to the

Hawaiian Islands. Alien species are partly responsible for the catastrophic decline of the native Hawaiian flora and fauna, and the cumulative impact of ongoing development in all areas of Hawai‘i is likely to exacerbate the problem.

Construction and operation of Saddle Road on W-7 are unlikely to lead to the severe spread of alien plant species in the region, because the area is already heavily invaded by those alien plants that thrive in the region. Furthermore, the general area is already subject to land uses such as highways, grazing, military use, and hunting, which contribute in various degrees to the spread of alien species. As the area is a military base, motorists would not generally be stopping along the corridor. However, the general increase in traffic through the Saddle region would inevitably bring with it more opportunities for transport of alien species seeds, spores, and plant parts.

W-7 versus W-3

There are no substantial differences between the botanical communities or flora present along the W-3 corridor and documented in the 1999 FEIS and those determined to be present in the W-7 corridor.

3.13.3 Mitigation Measures

- All equipment, material, and support structures will be stored and maintained within the ROW or in designated staging areas that have been approved as being areas where the storing, servicing, and staging of equipment and material will not adversely impact native species. These areas will be clearly demarcated and fenced prior to construction.
- All construction activity will be restricted to the clearly delineated ROW.
- A Project Engineer or representative will be on site at all times during construction to ensure implementation and compliance with environmental mitigation requirements as stated in the contract documents.
- Contractors will be required to participate in an environmental quality control program similar to required safety programs contained in Contract Specifications.
- Immediately after construction in this Section I is completed, in conformance with conditions of the NPDES permit, some areas in the margins of the roadway will be covered with stockpiled grubbed material to allow natural regeneration of vegetation. These areas will be irrigated for 30 days. In some areas of the Saddle Road Improvement project, native species such as *‘a‘ali‘i* have taken hold in cut slopes with soil.
- After construction, HDOT will maintain the area to keep the unpaved road edges vegetation-free or closely mowed, which will help reduce the spread of weeds.
- The following standard management requirements will be implemented to prevent introduction of noxious weeds:
    - All heavy equipment will be cleaned prior to entering the project area;
    - All equipment entering the project area will be covered when loaded; and
    - All plant material used for erosion control and road maintenance will be certified weed-free.

Additional mitigation measures pertaining to the reduction of impacts to biological resources are detailed in the sections of this chapter that deal with mitigation related to wildfire (Section 3.9.3) and threatened and endangered species (Section 3.18.3).

3.14 WILDLIFE AND OTHER FAUNAL RESOURCES

3.14.1 Birds

A wildlife study including a survey for birds was conducted for the W-7 corridor in August 2009. The primary purpose of this survey was to document which species occur (or are likely to occur given the type of habitat available), provide some baseline data on the relative abundance of the species found, determine the presence of any native or listed threatened or endangered species, and identify and address potential conflicts between the proposed action and listed species. The survey report is contained in full in Appendix D and is summarized below. Note that scholarly references have been mostly removed in this summary; interested readers may consult the appendix.

3.14.1.1 Affected Environment

Background

Both the isolation of the Hawaiian Islands from continental land masses and their volcanic origin fosters a high degree of adaptive radiation and endemism. The adaptation and specialization displayed by many of Hawai‘i’s endemic avian species have contributed to their vulnerability in a rapidly changing world. To date, more than 60 percent of Hawai‘i’s endemic avifauna has become extinct. Within historical times, a total of 69 endemic avian species and sub-species have been described from Hawai‘i. Of these, 23 have gone extinct. Of the remaining 46, a total of 32 are currently listed as endangered or threatened by the USFWS. Thirteen of these are critically endangered or may in fact have already become extinct. Of the 32 currently listed endangered avian species and sub-species found in Hawai‘i, 13 are found on the Island of Hawai‘i.

Migratory waterbirds and shorebirds make up a large part of the winter avian population of Hawai’i. These annual visitors are found throughout the islands from August through May. Eighty-two separate migratory and extralimital waterbird and shorebird species have been documented from the Islands. Most of these species are generally associated with wetland habitat; however, two of them, Pacific Golden-Plover (*Pluvialis fulva*) and Ruddy Turnstone (*Arenaria interpres*), are common winter migrants and are regularly found in open, grassy areas.

During the last century more than 160 species of alien birds have been introduced to the Hawaiian Islands. Many of these species were game birds introduced by a combination of private landowners, the Territorial Board of Agriculture and Forestry, and, following

statehood, by the State of Hawai'i DLNR Division of Forestry and Wildlife. These birds were introduced in the hope that they would become established and provide a recreational hunting resource which, in turn, would generate Federal funding through the Pittman Robinson Act for the maintenance of game bird hunting. Less than a quarter of these introductions have been successful. On the Island of Hawai‘i more than 60 species of game birds have been introduced. Currently, 14 of these alien introductions have survived and are considered to be established on the Island. Little is known of the effect that these species have on Hawai‘i's native bird populations. Many of these alien birds out-compete Hawai‘i's native species for food, cover, and nesting resources. They have been implicated in the spread of alien plant species, which has had a severely negative effect on native ecosystems in Hawai‘i. Some of these species are thought to impact Hawai‘i's endemic avifauna by spreading disease.

Survey Methods and Findings

Forty-five avian count stations were sited along the W-7 corridor. Count stations were placed at approximately 350-meter intervals equally spaced along the proposed right-of-way. Six-minute point counts were made at each of the 45 count stations. Each station was counted once. Field observations were made with the aid of Leitz 10 X 42 binoculars and by listening for vocalizations. Counts were concentrated between 6:30 a.m. and 10:00 a.m., the peak of daily bird activity.

A total of 749 individual birds of 27 different species, representing 18 separate families, were recorded during station counts (Table 3.14.1). Avian diversity and densities were low, though in keeping with the habitat present within the project area. No birds were at one of the 45 count stations. Two species, Sky Lark (*Alauda arvensis*), and House Finch (*Carpodacus mexicanus*), accounted for slightly less than 54 percent of the total number of birds recorded during station counts.

Three of the species recorded, Pacific Golden-Plover, Ruddy Turnstone, and Short-eared Owl (*Asio flammeus sandwichensis*), are native species. The Pacific Golden-Plover and Ruddy Turnstone are indigenous migratory shorebird species that nest in the high Arctic during the late spring and summer months, returning to Hawai‘i and the tropical Pacific to spend the fall and winter months each year. They usually leave Hawai‘i for their trip back to the Arctic in late April or the very early part of May each year, though small numbers of both of these species over-summer in Hawai‘i. The Hawaiian endemic sub-species of the Short-eared Owl, or *Pueo*, is a diurnal bird of prey, regularly seen within the grasslands of North and South Kohala. The remaining 24 avian species detected are all considered to be alien to the Hawaiian Islands.

Table 3.14.1
Avian Species Detected on Saddle Road W-7 Corridor

Common Name	Scientific Name	ST	RA
	GALLIFORMES		
	PHASIANIDAE - Pheasants & Partridges		
	Phasianinae - Pheasants & Allies		
Gray Francolin	*Francolinus pondicerianus*	A	0.31
Black Francolin	*Francolinus francolinus*	A	0.51
Erckel's Francolin	*Francolinus erckelii*	A	1.20
Japanese Quail	*Coturnix japonica*	A	0.11
Ring-necked Pheasant	*Phasianus colchicus*	A	0.20
	Meleagridinae - Turkeys		
Wild Turkey	*Meleagris gallopavo*	A	0.42
	ODONTOPHORIDAE - New World Quail		
California Quail	*Callipepla californica*	A	0.22
	CHARADRIIFORMES		
	CHARADRIIDAE - Lapwings & Plovers		
	Charadriinae - Plovers		
Pacific Golden-Plover	*Pluvialis fulva*	IM	0.11
	SCOLOPACIDAE - Sandpipers, Phalaropes & Allies		
	Scolopacinae - Sandpipers & Allies		
Ruddy Turnstone	*Arenaria interpres*	IM	0.24
	PTEROCLIDIDAE - Sandgrouse		
Chestnut-bellied Sandgrouse	*Pterocles exustus*	A	0.31
	COLUMBIFORMES		
	COLUMBIDAE - Pigeons & Doves		
Rock Pigeon	*Columba livia*	A	0.71
Spotted Dove	*Streptopelia chinensis*	A	0.11
Zebra Dove	*Geopelia striata*	A	0.38
	STRIGIFORMES		
	TYTONIDAE - Barn Owls		
Barn Owl	*Tyto alba*	A	0.04
Common Name	**Scientific Name**	**ST**	**RA**
	STRIGIDAE - Typical Owls		
Short-eared Owl	*Asio flammeus sandwichensis*	ES	0.09
	PASSERIFORMES		
	ALAUDIDAE - Larks		
Sky Lark	*Alauda arvensis*	A	6.58
	ZOSTEROPIDAE - White-Eyes		
Japanese White-eye	*Zosterops japonicus*	A	0.16

Table 3.14.1, continued			
	MIMIDAE -Mockingbirds & Thrushes		
Northern Mockingbird	*Mimus polyglottos*	A	0.18
	STURNIDAE - Starlings		
Common Myna	*Acridotheres tristis*	A	0.29
	EMBERIZIDAE - Emberizids		
Saffron Finch	*Sicalis flaveola*	A	0.27
	CARDINALIDAE - Cardinals Saltators & Allies		
Northern Cardinal	*Cardinalis cardinalis*	A	0.20
	FRINGILLIDAE - Fringilline And Cardueline Finches & Allies		
	Carduelinae - Carduline Finches		
House Finch	*Carpodacus mexicanus*	A	2.36
Yellow-fronted Canary	*Serinus mozambicus*	A	0.27
	PASSERIDAE - Old World Sparrows		
House Sparrow	*Passer domesticus*	A	0.04
	ESTRILDIDAE - Estrildid Finches		
	Estrildinae - Estrildine Finches		
Red Avadavat	*Amandava amandava*	A	0.16
African Silverbill	*Lonchura cantans*	A	0.87
Nutmeg Mannikin	*Lonchura punctulata*	A	0.31

Notes: ST = Status; A = Alien Species; IM = Indigenous Migratory Species; ES = Endemic Sub-species; RA = Relative Abundance – number of individual birds detected divided by the number of stations (45)

No species currently listed, or proposed for listing under either Federal or State of Hawai‘i endangered species programs, were detected during the course of this survey.

3.14.1.2 Environmental Consequences

The relatively poor habitat and relative lack of native bird species within the W-7 corridor indicates that it is unlikely that any negative impacts on native bird species would result from the construction and operation of the roadway. Impacts to threatened and endangered bird species that were not detected but could potentially approach or overfly the corridor are contained in Section 3.18. Use of the W-7 alignment would not affect the ability of birds to spread the seeds of introduced plant species.

There are no substantial differences between the bird fauna present along the W-3 corridor and documented in the 1999 FEIS and those determined to be present in the W-7 corridor.

3.14.1.3 Mitigation Measures

Mitigation measures pertaining to the reduction of impacts to threatened and endangered birds that were not detected but could potentially approach or overfly the corridor are contained in Section 3.18.

3.14.2 Mammals

A wildlife study including a survey for mammals was conducted for the W-7 corridor in August 2009. Because Hawai‘i has only one endemic terrestrial mammal, the endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*), the primary purpose of this survey was to determine the extent to which the species inhabits the project area. The survey of feral mammals was limited to visual and auditory detection, as well as observation of scat, tracks, and road kills. No trapping study was conducted to determine their relative abundance. The survey report is contained in full in Appendix D and is summarized below. Note that scholarly references have been mostly removed in this summary; interested readers may consult the appendix.

3.14.2.1 Affected Environment

A total of nine mammalian species were detected during the course of this survey. Several European house mice (*Mus musculus domesticus*) were seen at various locations within the site. Small Indian mongooses (*Herpestes a. auropunctatus*) were seen at several locations, predominantly on the western third of the alignment. Several horses (*Equus c. caballus*) were seen within the Ke‘āmuku parcel. Pigs (*Sus s. scrofa*), domestic cattle (*Bos taurus*), feral goats (*Capra h. hirca*), and feral sheep (*Ovis aries*) were seen in numbers along the whole length of the Ke‘āmuku parcel. Additionally, tracks, scat and sign of dog (*Canis f. familiaris*), small Indian mongoose, cat (*Felis c. catus*), horse, pig, cattle, goat and sheep were encountered throughout the Ke‘āmuku parcel. Of particular note were the numerous very large herd of goats seen in the mid-to-upper elevation areas of the W-7 corridor; over 400 animals were seen each day.

All of these mammalian species were introduced to the Hawaiian Islands by man. This process started when the first aboriginal settlers landed in the Islands some 1,500 years ago, bringing with them pigs, dogs, chickens, and Polynesian rats, along with non-native plants and insects of many kinds. Many of Hawai‘i’s endemic birds, especially the flightless and ground-nesting ones, were easy prey for the introduced dogs and hungry humans. Both the aboriginal people and their pigs proceeded to markedly alter the endemic ecosystems. Humans cleared and burned the lowlands for agricultural purposes and the pigs moved into the wet forests, where they found abundant food in the myriad of endemic understory plants. The European arrival in the Hawaiian Islands in the late 1700s heralded another wave of introductions that included European rabbits, roof rats, Norway rats, European house mice, small Indian mongooses, cats, horses, cattle, goats, pigs, and sheep, as well as countless insect and plant species.

Although not detected in the survey, it is likely that Hawaiian hoary bats overfly portions of the alignment on a seasonal basis. They may also forage for flying insects over portions of the project area on a seasonal basis, though the dry habitat lacking dense vegetation provides few food resources for bats.

3.14.2.2 Environmental Consequences

No adverse impacts to the introduced mammals detected in the survey are anticipated. Currently there is no suitable Hawaiian hoary bat roosting habitat along the entire length of the project corridor, so it is unlikely that the clearing, grubbing construction and operation of a roadway through the area would result in deleterious impacts to this listed species. There are no anticipated effects on the introduction or spread of alien mammals. There are no substantial differences between the mammalian fauna present along the W-3 corridor and documented in the 1999 FEIS and those determined to be present in the W-7 corridor.

3.14.2.3 Mitigation Measures

No mitigation is proposed for impacts to mammals.

3.14.3 Invertebrates

Surveys for invertebrates were conducted as part of the 1999 Final EIS in August, September, and October 1996 (Hawai'i Biological Survey 1996). The surveys involved spot sampling of the fauna along the length of the existing Saddle Road and along the alternative new alignments. A total of 80 sites were investigated, 57 for land snails and slugs and 73 for insects and other arthropods. These sites were located in all sections of the corridor and on all alternative segments. Over 3,000 specimens of snails, insects, and related arthropods were collected. In addition, previous work in the area was reviewed through literature and collections of Bishop Museum. The 1999 FEIS also involved a survey of cave habitats to investigate subsurface geological features that extend into the project area. Many rare and sensitive species are obligate cave species and restricted to *deep zone habitats*. Deep zone habitats are moist still-air passages beyond direct environmental effects of climatic events on the surface. It is noteworthy that no caves were detected in or near the W-7 corridor; archaeologists have found only one significant cave in Keʻāmuku (Robins et al 2007).

3.14.3.1 Affected Environment

In general, all alternative alignment corridors studied as part of the 1999 FEIS in Section I, where the W-7 corridor is located, had low diversity of native invertebrates and no rare, threatened or endangered species (Table 3.14.2).

Snails and Slugs

Section I harbored low diversity of land snails and slugs, except at its eastern end in Keʻekeʻe, where the study corridors for all alternative alignments overlapped that of W-7. A relatively diverse assemblage of snails was found around rocky outcrops, including *Leptachatina* sp. In Keʻāmuku, which has more degraded habitats, only the two most common snails were found. No tree snails were seen. In general, the heavily grazed areas along this segment are extremely poor snail habitat.

Table 3.14.2
Invertebrate Native Species Recorded in Section I

Snail and Slugs	*Succinea konaensis* "tornatellinid" A "tornatellinid" C	?*Striatura* sp.* "tornatellinid" B *Leptachatina* sp. A
Rare Native Insect and Related Arthropods	*Coleotichus blackburniae* [1] *Trupanea* sp. [1]	

Table Key: * Unclear Status or Origin; [1] Rare.

Insects and Related Arthropods

Over 3,000 specimens of insects and related arthropods were collected during the 1996 survey of the entire Saddle Road. These comprised 215 species in 88 families and 14 orders. Due to the large number of insects and related arthropods collected and identified, the discussion in this SEIS and the list in Table 3.14.2 is limited to rare native species within Section I. While these species are not afforded legal protection under the Endangered Species Act, the list reflects endemic arthropods of note. Two somewhat rare insects were detected. The koa bug, *Coleotichus blackburniae*, was collected at several sites, in association with *'a'ali'i* shrubs. An undetermined species of the flower-head breeding fly *Trupanea* was collected at other sites.

3.14.3.2 Environmental Consequences

For Saddle Road in general, invertebrate specialists determined that direct impacts of construction, especially on sedentary species including snails and non-volant insects, are likely. Populations of individual species may be highly localized. Road construction would impact the habitat and the animals associated with it. However, the habitat types of particular value for invertebrates are caves, lava tubes, *kipuka*, and *mamane/naio* forest, none of which is contained within Section I.

Section I does not harbor many sensitive insect species and there are few concerns. Populations of two relatively common snails, *Succinea konaensis* and a specimen tentatively identified within the genus *Striatura*, might be impacted by construction, but they are widely distributed, so these impacts would not be notable. These species were found in highly localized rocky outcrops. However, it is expected that rock outcrops in similar locations outside the corridor would likely contain similar populations.

Road construction in the W-7 route alignment could generate a corridor along which introduced species, both plant and animal, might be able more readily to gain access to native habitat. Numerous species of alien wasps and alien ants (including Argentine ants) exist along portions of the existing Saddle Road. However, the most valuable such habitat currently lies within a disturbed setting adjacent near Pu'u Ke'eke'e, crossed by Saddle Road and various Army roads, and thus already subject to invasion.

W-7 versus W-3

There are no substantial differences between the invertebrate fauna present along the W-3 corridor and documented in the 1999 FEIS and those determined to be present in the W-7 corridor.

3.14.3.3 Mitigation Measures

Mitigation measures in the 1999 Final EIS included avoidance or reduction of impacts to sensitive environments including *kipuka* and significant caves, measures which have been implemented during construction of the project. No such resources are present in Section I, and no further mitigation measures for invertebrates are recommended.

3.15 FLOODPLAINS AND DRAINAGE

The following information on floodplains is based on a preliminary hydrologic research of the W-7 corridor performed by the project engineers. This work reviewed and assessed aerial photographs and mapping to determine floodplains, flow patterns, major drainages, and potential hydraulic concerns. The work determined preliminary hydrology and hydraulics computations (50-year storm) for all drainages with watersheds larger than 25 acres. It defined storm frequency, delineated and measured major drainage areas, calculated discharges, proposed tentative structure types/sizes, and identified other notable drainage requirements.

3.15.1 Affected Environment

The W-7 alignment traverses an uninhabited and undeveloped area formerly used for pasture and planned for military training. Because of this, the area has not been studied for floodplain determination by the Federal Emergency Management Agency (FEMA), the County, or the State, and is within Zone X, outside of the designated 500-year floodplain.

The W-7 corridor crosses several ephemeral drainages (Figure 3.15.1). The peak discharges for all major ephemeral drainages along the study corridor were initially calculated using the regression equations for the 50- and 100-year storms (FEMA n.d.). However, during the design phases, these flows were found to be too high and the Soil Conservation Service (SCS) method was used instead (Table 3.15.1). Tributary 1 is the largest of four tributaries, with 796 acres and a 100-year flow of 223 cubic feet per second (cfs). The other three tributaries are significantly smaller in drainage area with lower flows. All other sections of W-7 would likely need only relief culverts spaced at intervals to be determined during the design phase.

Table 3.15.1
Drainage Flows

Tributary Number	50 Year Flow (cfs)	Possible Culvert for 50-year Flow	100-year Flow(cfs)	Possible Culvert for 100-year Flow
1	135	60” dia. Plastic Pipe	223	2-6’x4’ Concrete Box
2	7	24” dia. Plastic Pipe	13	24” dia. Plastic Pipe
3	6	24” dia. Plastic Pipe	11	24” dia. Plastic Pipe
4	32	36” dia. Plastic Pipe	56	2-36” dia. Plastic Pipes

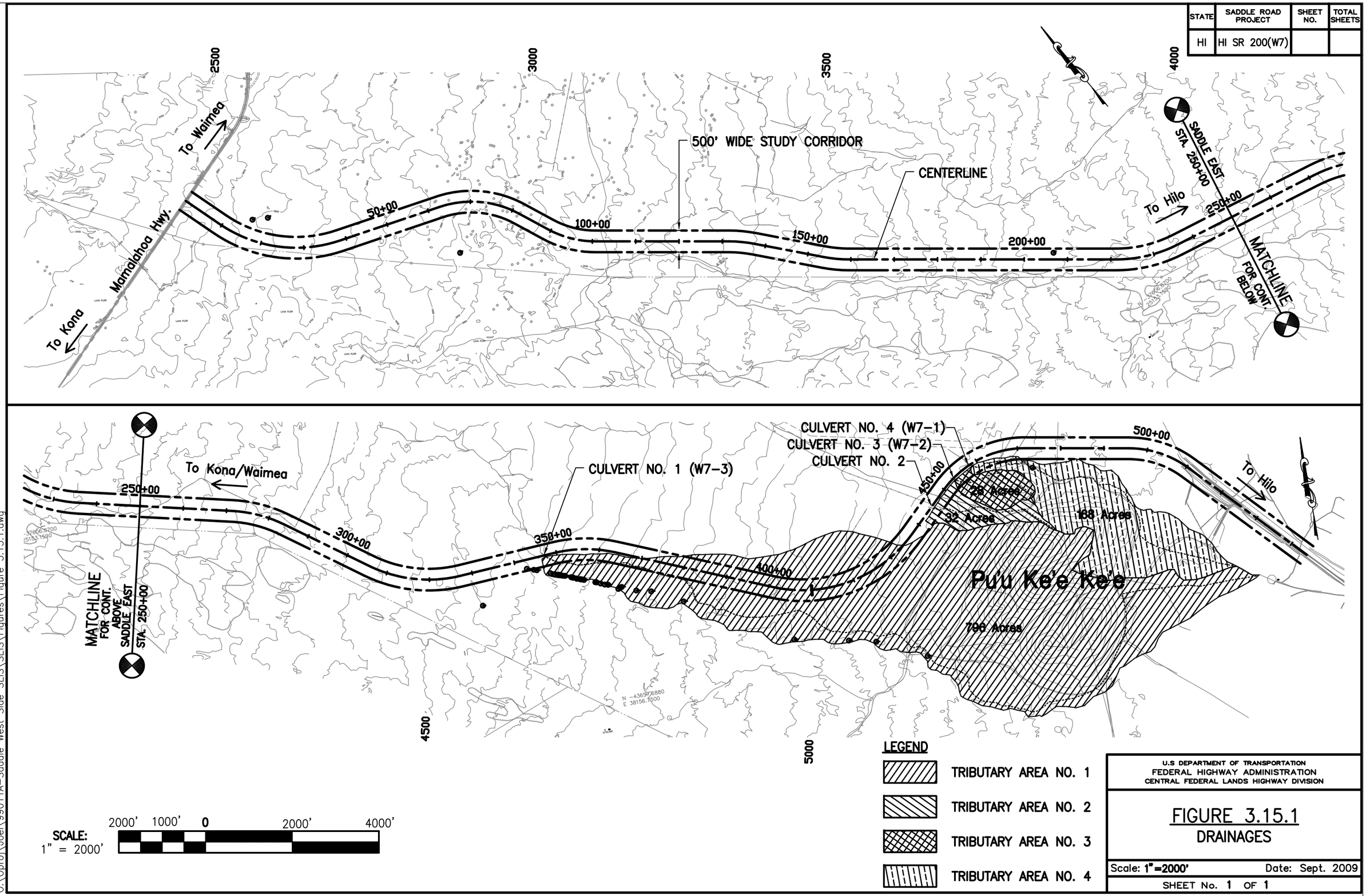
As discussed in Section 3.10, all drainages are unnamed and undepicted on USGS maps. Rather than intermittent streams, these drainage features are essentially the V-shaped contacts between hummocky lava flows. Almost all rainwater immediately sinks into the recent lava flows, but where ash has mantled the lava flows, a soil forms that is a little less permeable and some runoff occurs in heavy rains. This naturally gets funneled into these Vs, slightly eroding the soil and ash over time, and in places exposing the bedrock that lies one to four feet beneath the surface. Where the Vs are naturally steep, the erosion is more intense, and where the Vs are gentle, deposition occurs rather than erosion, and the V tends to fill in. At some point along the contact the V tends to flatten out and disappear, and finally no channel at all is evident, as this runoff simply spreads and percolates. Typically, in between the sets of hummocky lava flows are plains or basins with minor quantities of alluvium, colluvium and aeolian deposits. The basins generally have no real outlet channel.

In contrast, it should be noted that the drainages on the existing Saddle Road as it traverses Waikiʻi originate on the steep slopes of Mauna Kea and cross the existing Saddle Road at a number of bridges, culverts, and dips in the road. These drainages form typical networks in which the main branch may incise deeply and extend many miles downslope. Although they are normally dry, they fill up rapidly during periods of high rainfall which sometimes result in flash floods. Continuing use of the existing Saddle Road exposes motorists to periodic drainage hazards, and widening of the existing route would entail numerous bridges and culverts. The expense and hazards associated with these drainages figured into the rationale for rejecting the No Action Alternative and the EX-1 Alternative in the 1999 Final EIS.

3.15.2 Environmental Consequences

23 CFR 650 states that is the policy of FHWA to encourage a broad and unified effort to prevent uneconomic, hazardous, and incompatible use and development of the nation’s floodplains by avoiding significant encroachments on floodplains where applicable. An encroachment is any action within the limits of the base floodplain. A “significant” encroachment is defined as a highway encroachment and any direct support of likely base floodplain development that would involve construction or flood-related impacts after encroachment. Although W-7 crosses minor intermittent drainages, no FEMA designated floodplains or other significant drainages are involved.

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(W7)		



U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

FIGURE 3.15.1
DRAINAGES

Scale: 1"=2000' Date: Sept. 2009

SHEET No. 1 OF 1

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The 50-year design storm would be used for culvert design for the improved Saddle Road. Although bridges are currently not anticipated to be needed, the 100-year design storm would be used for bridge design, in accordance with the HDOT's *Design Criteria for Highway Drainage*, if bridges are required. Drainage structures would be provided at all drainage crossings to prevent water from flowing over the roadway during major storm events. The structures would be designed to accommodate the drainage without increasing existing flood elevations or altering existing drainage patterns. No floodplain map revisions are anticipated. The design improvements proposed would serve to better protect the road base and surface from flood drainage and associated damage, and would decrease the likelihood that flood waters would inundate the roadway in the future.

The installation of culverts and bridges would not result in the temporary or permanent loss of riparian vegetation associated with drainageways, as no such riparian vegetation exists within the W-7 corridor. There are no perennial streams within the W-7 corridor, therefore, aquatic wildlife is not sustained. No impacts to aquatic wildlife are anticipated.

W-7 versus W-3

No designated floodplains are present within either the W-3 or W-7 corridors. The W-3 corridor would have crossed three major ephemeral drainages (as well as other minor drainages requiring culverts (ref: FEIS Volume I, 3.15.2), as compared to the one medium-sized and three minor ephemeral drainages for W-7.

3.15.3 Mitigation Measures

No mitigation measures are necessary for impacts to designated floodplains, which are not present.

- Saddle Road will be designed as an all-weather facility, with new drainage structures designed to handle the minimum 50-year design storm in accordance with existing State requirements.

3.16 WILD AND SCENIC RIVERS

No Wild and Scenic Rivers are located within the project corridor or its vicinity. No impacts to Wild and Scenic Rivers are anticipated from construction and use of the W-7 alignment.

3.17 COASTAL BARRIERS/COASTAL ZONES

3.17.1 Affected Environment

No Coastal Barriers are present in the State of Hawai‘i. The Hawai’i Coastal Zone Management (CZM) Program was established in 1977 through the adoption of the Coastal Zone Management Act, incorporated in Chapter 205A HRS. Under the CZM program, Federal projects must conform with objectives and polices related to ten areas: recreation resources, historic resources, scenic and open space resources, coastal ecosystems, economic uses, coastal hazards, managing development, public participation, beach protection and marine resources. The CZM objectives are outlined as follows.

- Recreational Resources. Provide coastal recreational opportunities accessible to the public.
- Historic Resources. Protect, preserve, and, where desirable, restore those natural, man-made historic, and pre-historic resources in the CZM area that are significant in Hawaiian and American history and culture.
- Scenic and Open Space Resources. Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.
- Coastal Ecosystems. Protect valuable coastal ecosystems from disruption and minimize adverse impacts on all coastal ecosystems.
- Economic Use. Provide public or private facilities and improvements important to the State’s economy in suitable locations.
- Coastal Hazards. Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, and subsidence.
- Managing Development. Improve the development review process, communication, and public participation in the management of coastal resources and hazards.
- Public Participation. Stimulate public awareness, education, and participation in coastal management, and maintain a public advisory body to identify coastal management problems and provide policy advice and assistance to the CZM program.
- Beach Protection. Protect beaches for public use and recreation; locate new structures inland from the shoreline setback to conserve open space and minimize loss of improvements due to erosion.
- Marine Resources: Implement the state’s ocean resources management plan.

Chapter 205A also established the *Special Management Area* (SMA), which is an area of particular concern that requires a higher level of management to ensure the coastal resources are appropriately protected and managed. Accordingly, any development proposed within the SMA requires the approval of a minor or major use permit, dependent on the cost and impact of the proposed activity. No portion of the project area is within the SMA, which does not include any areas of the island of Hawai‘i farther than one mile from the coast.

3.17.2 Environmental Consequences

All Federal projects require a determination to ensure that the proposed project is consistent with the objectives and polices of the CZM Program. With implementation of the project mitigation measures, the project has been determined to be consistent with the objectives and polices of the CZM Program. The formal determination has been made by the CZM agency based on submittal of the required CZM assessment form, which was documented in the 1999 Final EIS, in Part II, 1.4.6. Because the entire project area is outside of the established SMA, no review under the SMA Use Permit provisions is required for the project. The following relationships to the individual criteria are noted:

- Recreational Resources. The proposed improvements to Saddle Road would not directly impact existing or potential future coastal recreational opportunities accessible to the public, but would indirectly improve accessibility of these opportunities through a safer and more efficient cross-island route.
- Historic Resources. One historic site partially within the W-7 corridor will be impacted by the proposed improvements to Saddle Road. An adverse effect would result, but the effect can be mitigated (see Section 3.19.2.2). Mitigation may include the construction of a vehicle Typical Sections and installation of interpretive signage for these features.
- Scenic and Open Space Resources. The proposed improvements will affect the visual character and visual quality of the road corridor, but would allow improved access to the center of the island. With the road improvements, people in rental cars would be allowed to travel Saddle Road and enjoy the open space and scenic quality of Mauna Kea and Mauna Loa, forested vegetation, open grasslands, varying terrain, and distant views of the ocean.
- Coastal Ecosystems. No direct impacts to coastal ecosystems would be anticipated with the proposed project.
- Economic Use. The proposed improvements to Saddle Road would result in a notable, positive economic benefit to the island in employment and income, tourism, time-savings for cross-island travel, and safety (see Section 3.4.4).
- Coastal Hazards. During natural disasters (tsunami, storm waves, stream flooding, lava flows, erosion, and subsidence), other key roads on the island (e.g. SR 19 and SR 11) may be blocked or partially destroyed. The improvement of Saddle Road will provide a safe and efficient alternative route to these roadways. In addition, improvements to Saddle Road and its drainage structures would minimize the risk of flooding and flood damage to the road base and surface.
- Public Participation. The proposed highway is not inconsistent with the objective of stimulating public awareness, education, and participation in coastal management.
- Beach Protection. No beaches are present or would be affected by the proposed project.
- Marine Resources. The improved highway will not affect marine resources in any adverse way, will not adversely affect implementation of the state's ocean resources management plan, and is not inconsistent with this objective.

W-7 versus W-3

FHWA has determined that there are no differences between the use of W-3 and W-7 with respect to consistency with the Coastal Zone Management Act. This will be confirmed through review of the new corridor by the Hawai‘i CZM program, which has been supplied a copy of this SEIS.

3.17.3 Mitigation Measures

The key mitigation measures related to the objectives and policies of the CZM program are listed in several sections of this SEIS: Section 3.19.3 relating to archaeological, historic, and traditional cultural properties; Section 3.21.3 relating to visual resources, Section 3.10.3 relating to water quality, Section 3.23.3 relating to construction impacts, Section 3.15.3 relating to floodplains, and Section 3.18.3 relating to threatened and endangered species.

3.18 THREATENED AND ENDANGERED SPECIES

During the course of the biological surveys conducted along the 500-foot wide W-7 corridor, no botanical, avian or mammalian species currently listed as endangered, threatened or proposed for listing under either the federal or state of Hawai‘i’s endangered species statutes were recorded within or near the corridor itself (see Appendices C and D). These findings are not unexpected given the highly degraded nature of the habitat present within the corridor.

A Biological Assessment (BA) was prepared for the project in association with the 1999 Final EIS project to address species afforded legal protection by the USFWS (ref: 1999 FEIS, Tech. App. Vol. III). The BA was based on the information provided by floral and faunal surveys prepared for this project (ref: 1999 FEIS Tech. App. Vol. II). The U.S. Fish and Wildlife Service reviewed the BA and issued a final Biological Opinion (BO) in July 1998 (ref: 1999 FEIS, Part III, BO). A supplemental BA was prepared in 2009 to address additional species and Critical Habitat that were listed and designated in Sections II, III and IV of the Saddle Road project area between the issuance of the original BO in 1998 and the present. A BO was issued concluding the reinitiation of the second consultation in September 2009. A third BA has been prepared addressing this new alignment (Appendix G). A concurrence letter from the USFWS is expected to be issued within the next two months, and will be contained in the Final SEIS.

3.18.1 Affected Environment

Several endangered species are known from the general project area. A contiguous system of Endangered Species Management Units has been established within Pohakuloa Training Area (PTA) at Kipuka Kalawamauna and Puʻu Ka Pele to protect habitat. These are the primary sites where *honohono* (*Haplostachys haplostachya*) survives within the Hawaiian Islands today. Puʻu Ka Pele is about 6,770 feet southeast, and Kipuka Kalawamauna is about 4,700 feet south of the proposed W-7 corridor. A third Endangered Species Management Unit has been designated within Keʻāmuku itself to protect and manage both *Haplostachys haplostachya* and *Stenogyne angustifolia*, another endangered plant. At closest, this area is approximately 500 feet south of the proposed W-7 corridor (see Figure 1.3.1). These sites are managed by the U.S. Army to protect and stabilize endangered plant species. All three sites have been fenced to exclude feral ungulates.

Although not detected during the course of the biological surveys conducted as part of the SEIS, the endangered *Nēnē* (*Branta sandwichensis*) has been recorded in low numbers within the Keʻāmuku parcel. During the 1996 survey of two alignments (W-3 and W-4) that were located parallel to the W-7 corridor, one to the north and the other to the south, one *Nēnē* was seen in an area close to the W-7 corridor. Since the Army purchased the Ke'āmuku parcel in 2006, their biologists have reported seeing two or fewer *Nēnē* on several occasions close to the western terminus of this corridor, including one apparent nesting attempt north of the W-7 corridor in 2008. The repeated sightings of *Nēnē* within the general area have apparently involved three separate individual birds (Lena Schnell, PTA biologist, pers. comm. to Reggie David, 2009). Additionally, it is possible that small numbers of the endangered endemic Hawaiian Petrel (*Pterodroma sandwichensis*) and the threatened Newell's Shearwater (*Puffinus auricularis newelli*) over-fly the project area between the months of May and November.

Hawaiian Petrels were formerly common on the Island of Hawaiʻi. This pelagic seabird reportedly nested in large numbers on the slopes of Mauna Loa and in the saddle area between Mauna Loa and Mauna Kea, as well as at the mid-to-high elevations of Hualālai. It has within recent historic times been reduced to relict breeding colonies located at high elevations on Mauna Loa and, possibly, Hualālai. Hawaiian Petrels were first listed as an endangered species by the USFWS in 1967 and by the State of Hawaiʻi in 1973.

Newell's Shearwaters were also once common on the Island of Hawaiʻi. This species breeds on Kauaʻi, Hawaiʻi, and Molokaʻi. Newell's Shearwater populations have dropped precipitously since the 1880s (Banko 1980b, Day et al., 2003). This pelagic species nests high in the mountains in burrows excavated under thick vegetation, especially *uluhe* (*Dicranopteris linearis*) fern. Newell's Shearwater was listed as a threatened species by the USFWS in 1975 and by the State of Hawaiʻi in 1973.

The primary cause of mortality in both Hawaiian Petrels and Newell's Shearwaters is thought to be predation by alien mammalian species at the nesting colonies. Collision with man-made structures is considered to be the second most significant cause of mortality of these seabird species in Hawai‘i. Nocturnally flying seabirds, especially fledglings on their way to sea in the summer and fall, can become disoriented by exterior lighting. When disoriented, seabirds often collide with manmade structures, and if they are not killed outright, the dazed or injured birds are easy targets of opportunity for feral mammals. There is no suitable nesting habitat within or close to the W-7 corridor for either of these pelagic seabird species.

The listed endangered Hawaiian Hawk (*Buteo solitarius*) and Blackburn's sphinx moth (*Manduca blackburni*) were also investigated for this project. There was no suitable habitat found for Hawaiian Hawks. Hawaiian Hawks are not known from the Ke‘āmuku area, and furthermore there are no suitable nest trees within, or close to the W-7 corridor. During the course of the biological surveys conducted for the project, project biologists observed neither the native host plants used by the sphinx moth nor the alien host plant, tree tobacco (*Nicotiana glauca*). These species will not be further discussed in this analysis.

3.18.2 Environmental Consequences

It is not expected that the construction and operation of Saddle Road along the W-7 alignment would result in direct impacts to any species currently listed as endangered, threatened or proposed for listing under either the federal or State of Hawai‘i endangered species statutes.

Wildfire could spread to the Endangered Species Management Units within Ke‘āmuku and other parts of PTA from sources within Ke‘āmuku, other parts of PTA, or the Pu‘uanahulu Game Management area, potentially threatening endangered plants. The extensive wildfire mitigation being undertaken by the Army and augmented by project mitigation measures, along with the benefits the new highway would provide in terms of fighting fires, is discussed in Section 3.9.

It should be borne in mind that the proposed road will be located within the PTA training facility, which has an extensive fire minimization and mitigation program in place in accordance with the Biological Opinions that have been issued at the conclusion of the two Section 7 consultations that the US Army has recently completed. The proposed W-7 alignment will create an additional firebreak within PTA, which will be between 40 and 52 feet wide. This road will also allow very rapid response by PTA and County of Hawai‘i firefighting personnel in the event that a fire does occur within the general

project area. To put that statement into perspective of fire responsiveness, the center of the W-7 alignment is approximately 10 miles from the PTA fire station, and approximately the same distance from the Waikoloa fire station. As the new highway will be designed to accommodate 60 MPH traffic, both fire stations could respond very quickly to any wildfire that might occur within the general project area. These areas would otherwise be extremely difficult to access from the existing Saddle Road, thus result in extremely long response times. Additionally, the Army is currently constructing three firefighting dip tanks within the Keʻāmuku parcel to provide onsite water to be used to fight any wildfires that may ignite within the general area.

Given the above considerations and the proposed mitigation measures, the FHWA has determined that the project may affect, but is not likely to adversely affect, any listed species. The FHWA is currently in informal consultation with the USFWS. A concurrence letter is expected prior to the release of the Final SEIS and will be included in that document.

If nighttime activity, whether actual construction or equipment maintenance, is proposed during the construction phase of the project, lighting that may be required as part of those activities has the potential to attract Hawaiian Petrels and Newell's Shearwaters, which may become disoriented by the lighting, resulting in birds being downed.

If streetlights are installed in conjunction with the new road they too pose a potential threat to Hawaiian Petrels and Newell's Shearwaters if they are not adequately shielded.

W-7 versus W-3

From a biological perspective, there is no significant difference between alignments W-3 and W-7. Potential impacts to threatened or endangered species within the project area would be essentially the same no matter which alignment is actually constructed.

3.18.3 Mitigation Measures

The following minimization measures will be implemented to ensure that the construction and operation of the proposed highway within Section I does not result in deleterious impacts to threatened and endangered species that are present within the greater project area.

- To avoid the potential downing of Hawaiian Petrels and Newell's Shearwaters by their interaction with external construction lighting, no construction or unshielded equipment maintenance lighting will be permitted after dark between the months of April and October. This prohibition will be one of the Special Contract Requirements, which will be incorporated in the construction contract documents.

- No nighttime construction will occur during the peak seabird fallout period, from September 15 to December 15 annually.
- Any streetlights that may be installed as part of this action will be shielded to reduce the potential for interactions of nocturnally flying Hawaiian Petrels and Newell's Shearwaters with external lights and man-made structures. This minimization measure would both minimize the threat of disorientation and downing of Hawaiian Petrels and Newell's Shearwaters and fully comply with Hawai‘i County Code § 14 – 50 et seq., which requires the shielding of exterior lights so as to lower the ambient glare to the astronomical observatories located on Mauna Kea.
- To minimize collateral damage to areas outside of the ROW and the risk of wildfire during construction, the Special Contract Requirements will mandate that all construction activity shall be restricted to within the clearly delineated ROW and that entry and exit into the ROW by all construction personnel and equipment shall be at previously identified and marked non-sensitive areas.
- Special Contract Requirements will be incorporated into the construction documents directing the contractor's work consistent with specific minimization commitments that are outlined in this section and in the BO for the project. The Contracting Officer will have the authority to shut down construction should violations of Special Contract Requirements be detected; furthermore, the project engineer will be responsible for ensuring compliance with all environmental restrictions and minimization measures.

Additional construction mitigation measures that, among other effects, would reduce the possibility of wildfire, are listed in Section 3.23.

The Typical Sections for the project are discussed and depicted in Section 2.2.1, above. The expanded and modified Typical Sections for the roadway would both reduce the likelihood of accidental ignition from unintentional road sources (car fires, catalytic converters, cigarettes, etc.) and assist in creating a firebreak and fuelbreak. The Typical Sections have been specially designed to reduce wildfire impacts, in ways specific to the segments of Section I through which they pass. All share the base characteristics of Typical Section A (Figure 2.2.1.a), which extends east from Mamalahoa Highway. It incorporates two 12-foot travel lanes, two 8-foot paved shoulders, and a passing lane for most of the length.

To reduce the threat of wildfires between the eastern boundary of the Ke‘āmuku parcel and approximately MP 41, which passes adjacent to *Palila* critical habitat, B has additional features (Figure 2.2.1.b, Section B):

- Two 12-foot travel lanes with 8-foot paved shoulders.
- An 8-foot strip of pavement on the north side of the highway, which would serve as a firebreak, with a four-inch high curb on the outside.
- At the outside edge of the firebreak, a wire fence with metal posts would be constructed to a height of four feet on the edge of the pavement.

Further east, as W-7 crosses the Keʻāmuku and descends into lower elevations, the primary concern is to prevent fires from Saddle Road spreading southwards, towards the western boundary of the Keʻāmuku Endangered Species Management Unit containing *Haplostachys haplostachya*. Typical Section C is illustrated in Figure 2.2.1.b, Section C, and is modified from Typical Section A as follows:

- Three 12-foot travel lanes with 8-foot paved shoulders, with a four-inch high extruded asphalt curb at the outside of the shoulder.

At the current time there is no known conflict between Nēnē and the proposed W-7 alignment. If such a conflict arises, FHWA will address the issue with a multi-pronged approach utilizing measures detailed in the September 11, 2009 BO for activities in the recently constructed Section II of Saddle Road designed to minimize vehicle-Nēnē interactions. Field trials are being implemented between approximately MP 29 and MP 30.2, which may modify the measures, but as currently formulated, these include:

- The erection of a permanent fence along both the north and south sides of the roadway within any section that appears to attract Nēnē on a regular basis. The fence will be placed as close to the roadside as permissible under ASHTO federal safety guidelines.
- Vegetation will be removed between the aforementioned fence and the edge of the roadway by the use of herbicides or by paving the area.
- The loose gravel along the roadside in any such identified area will be secured with a tacking agent, or asphalt paving, so that Nēnē are unable to gather gravel for use in their crops.
- FHWA will install enhanced Nēnē crossing and traffic advisory signs to warn motorists of the potential danger they pose to Nēnē along any such identified roadway section.

3.19 ARCHAEOLOGICAL, HISTORIC, AND TRADITIONAL CULTURAL RESOURCES

An Archaeological Inventory Survey and Traditional Cultural Study designed to meet applicable State and Federal requirements was prepared for the entire Saddle Road project. This study, the fieldwork for which was performed in 1996, was contained in Part III of the 1999 Final EIS. Although much of the background research remains valid, the shift of route to the W-7 alignment required a new inventory survey. The inventory survey report is contained in Appendix F and is summarized in the sections below, which also contain relevant information from the 1999 Final EIS; most scholarly references, which can be consulted in the appendix, have been removed from this summary. Furthermore, as part of Army efforts, archaeological studies were conducted on the entire Keʻāmuku property (Robins et al. 2004 and 2007), which were consulted during the preparation of the current inventory survey.

The fieldwork consisted of a 100-percent pedestrian survey of the W-7 corridor in order to locate and evaluate all cultural resources for eligibility for listing on the National Register of Historic Places (NRHP), as outlined in 36 CFR 800.4 . The fieldwork was conducted by archaeologists in 2009. Previous studies addressing the prehistoric use of the project area by native Hawaiians were reviewed.

3.19.1 Background

3.19.1.1 Prehistoric Background

Archaeological evidence suggests Hawaiʻi was first settled between A.D. 0 and 700 by people sailing from the Marquesas (Cordy 2000). Early settlements on the Island of Hawaiʻi were founded on the windward shores in likely places such as Waipiʻo, Waimanu, and Hilo Bay. The windward or *koʻolau* shores receive abundant rainfall and have numerous streams that facilitated agricultural and fishpond production. The windward shores also provide rich benthic and pelagic marine resources. The dry leeward shores of Hawaiʻi Island presented a very different environment requiring a modified set of subsistence strategies. Archaeologists and historians are uncertain about the circumstances that led to the establishment and spread of settlements on the leeward side of Hawaiʻi, but archaeological evidence suggests the process was underway between the A.D. 900s and 1100s (Cordy 2000).

The lands of Keʻāmuku were traditionally used as *pili* (a native grass used for thatch) lands by the people of Waikōloa and Waimea. Prehistoric trails crossed the general area of the project, running west to east and south to north. The trails enabled travel between districts and access to interior resources. Keʻāmuku was probably too dry to have been exploited by Hawaiians for agriculture. The dry upland forest was mainly used by birdcatchers who sought the *ʻUaʻu* (Dark-rumped Petrel), *Nēnē* (Hawaiian Goose) and

Koloa (Hawaiian Duck) for meat, and various smaller birds for their feathers. The Keʻāmuku area would have provided access to these and other interior resources, such as the adze quarry at the summit of Mauna Kea to the north. Adzes made from Mauna Kea basalt were distributed throughout the Island of Hawaiʻi and beyond.

3.19.1.2 Historic Background

The arrival of Europeans and the Hawaiian people's introduction to world markets drastically altered the distribution of population centers, agriculture, and cultural practices in Hawaiʻi. In the Waimea-Waikōloa region, maritime trade and ranching slowly replaced traditional fishing, aquaculture and farming practices as chief economic activities. During the nineteenth century, traditional Hawaiian use of interior resources gave way to Western-inspired exploitation. Herds of wild cattle, sheep, and goats flourished on grasslands of West Hawai'i and the interior of the island. Much of Waikōloa was overrun by wild cattle. John Parker was granted permission to hunt wild bullock for the crown in 1822. Wild cattle were captured in bullock pits seven to eight feet long by four feet wide covered with braches and a thin layer of dirt. They were also hunted with guns and were lassoed after the arrival in Hawaiʻi of *vaqueros*, later known as *paniolo*. Large portions of the Kohala and Hamakua districts eventually came under the control of Parker Ranch, centered at Waimea.

Kamehameha I gave a large portion of the good grazing lands of Waikōloa, including Keʻāmuku, to his trusted advisor Isaac Davis, as an *ʻili kūpono* for services rendered during the conquest of the Hawaiian Islands. His son, George Davis Huʻeu, made a Land Commission Claim for this land, and in 1865 Royal Patent Grant 5671 was granted to him as an unsurveyed Land Commission Award (8521B). Keʻāmuku, as recorded on the first survey map and all since, translates as "cut-off lava" and refers to the lava flow and low prominence west of the Keʻāmuku Sheep Station (Pukui et al. 1974: 102). This portion of Huʻeu's property eventually became the lands of the Keʻāmuku Sheep and Cattle Station, which were developed and used by various individuals, partnerships and companies through the last half of the 19th century. Parker Ranch acquired the land in 1904. Ranching played a major role in shaping the historic landscape of the Saddle. Pasture lands were demarcated with barrier walls made of stone.

In addition to ranching, transportation also has left its mark on the historic landscape. During prehistory, foot travel took place over unmodified pahoehoe, grassland, and on stepping stones over rough ʻaʻa flows. Trails were modified and/or built with basalt cobbles in thin, meandering pathways during historic times, to facilitate the movement of horses, mules, and cattle. Carts and wagons required different paths. New trails and existing trails facilitated the movement of cowboys and stock across the island, from pasture to market and between pastures. The old wagon road between Waimea and Humuʻula was built to carry wool from the Humuʻula Sheep Station to the harbor at

Kawaihae west of Waimea. Once automobiles were brought to the island, the wagon road was used by tourists.

Road development was further stimulated by World War II. Since a Japanese attack could have hindered travel along the coast, there was a need to develop alternative routes through the interior. Roads capable of carrying cars, trucks, and tanks were created by bulldozing. The path chosen for the World War II-era Saddle Road included portions of the old wagon road to the west, some previously unmodified areas in the Saddle, and portions of the Hilo-Pu‘u ‘O‘o trail on the east. Historic walls associated with earlier ranching activities were breached. Later on, maintenance and upgrades of Saddle Road resulted in some deviation from the original World War II route.

The primary World War II military headquarters on the island of Hawai‘i were located at Camp Tarawa in Waimea, about 10 miles north of the W-7 corridor. Tank training maneuvers and artillery practice took place at Camp Pohakuloa, located in the same area as the present cantonment area of the PTA. Structures associated with this war training include tents, a few Quonset huts, and the Civilian Conservation Corps (CCC) camp house located east of the PTA, at the site of the current Mauna Kea State Park. The current airfield and cantonment were built during the early and mid 1950s. Structures used in field training are located within and beyond the limits of the PTA. These include walls of various shapes (C-shaped, L-shaped, linear), low enclosures, refuse disposal, and filled excavations (foxholes).

3.19.2 Archaeological Sites

3.19.2.1 Affected Environment

The *area of potential effect* (APE) for the project was defined in consultation with the Hawai’i State Historic Preservation Office (SHPO) for the 1996 survey effort (consultation with the SHPO may be reviewed in the 1999 Final EIS, particularly Part II, 1.4.4). Because several different types of sites were encountered, it was decided to define the APE according to the type of site. The APE for archaeological sites was defined as the staked roadway corridor (200 feet in width along the existing alignment and 350 to 400 feet in width along proposed new alignments). For the 2009 inventory survey of the W-7 corridor, a 500-foot wide APE was uniformly used for archaeological sites. The actual area of disturbance of the proposed project would be limited to the proposed ROW, which averages approximately 150 feet in width within the staked roadway corridor. Not all portions of a site within the defined APE would necessarily be impacted by the proposed project. The APE for burial and ritual sites is discussed in Section 3.19.3.2.1, below. No burials or ritual sites were discovered in either the 1996 or 2009 surveys.

During the 1996 survey, a total of 19 archaeological sites were observed and recorded within the APE of the Selected Alternative from Hilo to Kona; two of these were present in the Section I portion of this Selected Alternative, which utilized the W-3 alignment. Both sites on W-3 were considered eligible for listing on the National Register of Historic

Places (NRHP). The two sites within the APE of W-3 were the Old Waimea-Kona Belt Road (State Inventory of Historic Places [SIHP] Site 50-10-21-20855) and a historic habitation/animal enclosure (50-10-21-20854) (hereinafter in this document, SIHP Site is omitted before site numbers). The former is a historic-era linear site that runs parallel to the Mamalahoa Highway more or less continuously for many miles between Waimea and Kona. The 2009 inventory survey determined that W-7 corridor also crosses this site. This old roadway is a two-track, unpaved pathway on pahoehoe, built at grade within the W-3 corridor. The roadway has been used for access to ranching operations since its abandonment. There is a hand-built stone causeway culvert along this site within the APE of the W-3 corridor. One bridge and eight culverts similar in architecture and varying in size were observed along the roadway within a one-mile sample of the road near W-3.

Significance assessments for these sites were made in consultation with the Hawai'i SHPO. As with many of the sites that were to be impacted by the Saddle Road undertaking, the Old Waimea-Kona Belt Road (50-10-21-20855) is long and linear with a relatively small width. Only short portions of the long sites are within the APE. Consequently, identification, assessment of site integrity, and significance evaluation efforts was confined to those portions of the site that were within and adjacent to the APE. Other criteria of significance may apply to these sites beyond the APE. Like the other 18 archaeological sites, Site 20855 was considered eligible under Criterion d only; it contained important information pertaining to prehistory or history.

An additional six sites were found in the 2009 survey of the W-7 corridor, including five rock mounds, and remnants of a ranching-era fence (Table 3.19.1). Four of the rock mounds correspond very roughly to the boundary between the Keʻāmuku cattle station lands and ranch lands to the southwest. This area is also the boundary between Waikōloa and Puʻuanahulu *ahupuaʻa*. Site 26875 contained a Kalopa Soda Works bottle and a roll of galvanized fence wire in its construction. A fifth rock mound (Site 26876) marks the intersection of two ranch roads along the southeast side of the Keʻāmuku cattle station lands. The ranching-era fence (Site 23452) appears to have been used early in the history of sheep and cattle ranching at Keʻāmuku. The original fence wire has been removed and it passes through the middle of several more recently fenced paddocks.

Table 3.19.1
Sites Found in the 2009 Inventory Survey

Site	Type	Function	Age
20855	Road	Transportation	Historic
23452	Fence Line	Boundary	Historic
23528	Rock Mound	Boundary	Historic
26875	Rock Mound	Boundary	Historic
26876	Rock Mound	Boundary	Historic
26877	Rock Mound	Boundary	Historic
26878	Rock Mound	Boundary	Historic

3.19.2.2 Environmental Consequences

FHWA, in consultation with the SHPO in 1997, determined that the effects to the Old Waimea-Kona Belt Road (50-10-21-20855) in W-3 were adverse but could be mitigated. The Hawai'i SHPO concurred with the FHWA's determination and signed a Memorandum of Agreement (MOA) with the FHWA and the Office of Hawaiian Affairs (OHA) to mitigate adverse effects to Site 50-10-21-20855. Mitigation consists of preparation of a mitigation plan which provides for a pull-off and interpretive sign to be constructed adjacent to the site. Similarly, it is the finding of the FHWA, as lead agency, for the purpose of Section 106 of the National Historic Preservation Act, that the W-7 Alternative will adversely affect the Old Waimea-Kona Belt Road. The Old Waimea-Kona Belt Road (Site 50-10-21-20855) was previously determined eligible for the National Register of Historic Places under criterion "d" by the FHWA following the cultural resource survey of the W-3 Alternative. The five rock mounds and historic fence line are within the study corridor, but are located outside of the APE, and will be avoided with the current preliminary highway design. For the six sites that are outside of the APE, FHWA has issued a finding "no historic properties affected."

3.19.2.3 Mitigation Measures

The archaeological report discussing historic properties is being provided to various agencies and groups, including the State Historic Preservation Division, the Office of Hawaiian Affairs, Hawaiian Civic Clubs, the Royal Order of Kamehameha, and others, for their comment, as part of consultation under Section 106 of the National Historic Preservation Act (see Appendix F2 for list of groups and letter). The Final SEIS will present the results of this coordination.

For reference concerning the larger Saddle Road project, it should be noted that an MOA was executed among the FHWA, SHPO, Advisory Council on Historic Preservation (ACHP), HDOT, and OHA agreeing upon mitigation treatment procedures for the historic sites contained in various portions of the Recommended Alternative (which included W-3 in Section I). The MOA stipulated how each archaeological site will be treated and provided a schedule for plan development and review procedures in the mitigation process. Subsequent construction of the improvements to Saddle Road has fulfilled all the requirements of the MOA prior to construction of applicable segments. For the W-7 Alternative, the remaining task is to amend the existing MOA to mitigate the adverse effect of the W-7 Alternative to the Old Waimea-Kona Belt road (Site 50-10-33-20855). The mitigation plan includes construction of a Typical Sections adjacent to the Old Waimea-Kona Belt Road and fabrication of an interpretative sign, which provides a history of the road, for the general public.

3.19.2.4 Section 4(f)

The purpose of 49 U.S.C. Section 103, generally known as Section 4(f), is to ensure that the U.S. DOT makes special efforts to protect public parks and recreation lands, wildlife and waterfowl refuges, and historic properties. The law states that the Secretary of Transportation shall approve a project which requires the use of publicly owned land from a public park, recreation area, wildlife or waterfowl refuge, or from an historic property of significance only if; (1) there is no prudent and feasible alternative to such use, and (2) the project includes all possible planning to minimize harm to the resource being affected by use. It is the responsibility of the FHWA to determine whether any potential Section 4(f) properties are present and will be used by a highway project. This determination is made through thorough examination of the resources and consultation with agencies that have jurisdiction over potential Section 4(f) properties. It should be noted that there are no public parks, recreation areas, or wildlife or waterfowl refuges in or near Section I of the project area. Of potential Section 4(f) resources, only archaeological sites are present.

One historic property, the Old Waimea-Kona Belt Road (Site 50-10-21-20855), is located partially within the W-7 Alternative and would be subject to Section 4(f) use. The remaining six boundary sites would be avoided, as part of final design of the actual 200-foot ROW corridor within the 500-foot study corridor in which the sites are located. A full Section 4(f) analysis is contained in Chapter 7 of this document.

3.19.3 Traditional Hawaiian Cultural Sites

3.19.3.1 Consultation

The traditional Hawaiian cultural sites known to occur in the very broad saddle region include native Hawaiian burials and native Hawaiian ritual sites of several kinds.
As part of the research effort for the 1999 Final EIS, 24 individuals were contacted who provided information about the potential for such sites. Information provided was used to determine the broad historical patterns of land ownership, settlement, and land use in the project area. This effort was designed to provide the historical context and to gain information about specific historic sites within the project area. The oral history research was started by initiating consultation with native Hawaiian organizations and by networking to find knowledgeable informants.

Initial consultation with native Hawaiian organizations is mandated by the 1992 amendment to the NHPA, Sect. 301. The amendment requires that the project investigator notify native Hawaiian organizations at the start of the project and ask for their advice on finding expert informants. The Office of Hawaiian Affairs (OHA) and Hui Malama i Na Kupuna O Hawai'i Nei were notified by letter at the start. Hui Malama recommended that Mr. Henry Auwae be interviewed regarding the project. Other organizations including the Waimea Hawaiian Civic Club, Waimea Homesteaders Association, Kona-Hawaiian Civic Club, Hilo Hawaiian Civic Club, Prince David

Kawananakoa Hawaiian Civic Club [of Hilo], and Ka Lahui Hawai'i were consulted. None of these other organizations responded with the names of additional Hawaiian *kupuna* (elders) who had knowledge of traditional native Hawaiian sites in the project area. Consultation with native Hawaiian organizations is included in the 1999 Final EIS (ref: FEIS, Vol. IV).

The late Mr. Henry Auwae was interviewed on five occasions for this project, and two helicopter trips were made to attempt to locate the sites. Mr. Auwae's knowledge of these sites may be unique. He was the only informant recommended through contact and coordination with native Hawaiian organizations. Mr. Auwae attained his knowledge about ritual sites and burials from his great-grandparents, who adopted him and imparted their knowledge to him.

At the time of interviews in the 1990s, Mr. Auwae believed he was the only individual who still had knowledge of either the burials or the ritual sites. Subsequent to speaking with Mr. Auwae, however, attempts were made to locate additional informants with knowledge of native Hawaiian sites in the project area, without success. Older Hawaiians in Waimea and Hilo and native Hawaiian organizations in both areas were asked if they knew of any individuals who might have such knowledge. Surviving relatives of Hawaiian cowboys who had worked at Parker Ranch or Pu'u 'O'o Ranch were contacted, but no knowledge of cultural sites had been passed down to them.

As discussed in Section 3.19.2.3, the archaeological report for the new W-7 alignment was provided to various agencies and groups, including the State Historic Preservation Division, the Office of Hawaiian Affairs, Hawaiian Civic Clubs, the Royal Order of Kamehameha, and others, for their comment (see Appendix F2 for list of groups and letter). The Final SEIS will present the results of this coordination.

3.19.3.2 Affected Environment

3.19.3.2.1 Burials

Native Hawaiian burial sites over 50 years old are protected under the Hawai'i State historic preservation law, Chapter 6(E), Sect. 43. Under that law, decisions on the treatment of native burials are made by an island-level burial council. Any burial located within the project area would have to be removed and relocated, or the road be rerouted. Burials outside the project area might be left in place, but there still would be some potential for disturbance of any burial located adjacent to the road corridor. As part of the work conducted for the 1999 Final EIS, the APE (area of potential effect) for burials was 200 feet from the proposed centerline in order to provide for a buffer between the burials and the potential project impacts.

In addition to extensive archaeological work, Mr. Auwae was consulted regarding potential locations of burials. Mr. Auwae knew of two areas where people used to live and where there were Hawaiian burials, one on the west side and one in the central Saddle. Mr. Auwae said there were Hawaiian graves in the area near the west side of

alternative routes W-2 and W-3. In the Saddle, Mr. Auwae said there once were "villages" north of the present Saddle Road on the lower slopes of Mauna Kea, at an elevation where several springs existed, and he knew of Hawaiian burials in that area. He said there had also been many Hawaiian burials in the area of Bradshaw Army Airfield in the PTA, and to the southeast of Mauna Kea State Park in the PTA. Both areas were heavily bulldozed by the DOA after World War II and he believed nothing would be left of the graves.

Attempts were made to determine the relationship of the alternative alignments in Sections I and II to any burial sites in the vicinity of the project area by means of two helicopter trips. The corridors were flown to determine whether any of the burials known to Mr. Auwae lay within or close to the corridors. One burial was identified as being in the vicinity of the project area, near Segment W-2. The distance of the burial site from the corridor boundary was measured to be more than 300 feet. No burials were indicated to be present in or near the W-7 corridor, although this area was not specifically flown.

3.19.3.2.2 Ritual Sites

For native Hawaiian ritual sites, a variable APE was defined. Such ritual sites would generally be considered "traditional cultural properties," as described in National Register Bulletin 38 of the National Park Service. A ritual site used by native Hawaiians could be adversely affected by a nearby road even if it was outside the road corridor. Ritual activity could be compromised by the sight and sound of a nearby road, or by passing motorists. It was reasoned that such adverse effects would extend much farther in the area of open terrain of the West Side than in the forested terrain of the East Side. For these reasons, the APE for potential effect for ritual sites was extended to 500 feet from the proposed centerline in forested areas and to 2,600 feet from the proposed centerline in open terrain in order to provide for a buffer between the sites and any audiovisual impacts of the proposed project.

Attempts were made to determine the relationship of the proposed road corridors to any ritual sites by means of two helicopter trips. Early in this century when Mr. Auwae was a boy, he journeyed several times through the Saddle together with his great-grandparents. His great-grandmother was an expert healer (*kahuna la'au lapa'au*) and his great-grandfather a prophet (*kula*), who came from a line of prophets. In her role as a healer, his great-grandmother traveled to see people who were sick and to collect medicinal plants. His great-grandparents had specialist knowledge of four of these areas for collection, which may be considered ritual sites. When the three of them traveled together, they shared this knowledge. Mr. Auwae had not revisited the sites since that time.

Mr. Auwae designated approximate locations for the sites, which were in the eastern part of the Saddle above Hilo, but was unable to definitively locate any of the gathering sites. The designated approximate locations are not near Keʻāmuku and thus well outside of the APE for all the corridors studied in the 1999 Final EIS and the W-7 corridor as well.

Since none of the four sites in question has been definitely located and inspected to determine physical integrity, none of them can be evaluated as eligible for the register. All four sites lie outside the APE established for the proposed project for native Hawaiian ritual sites, and in fact are dozens of miles from the W-7 corridor.

3.19.3.2.3 Mauna Kea

As part of the 1999 Final EIS, intensive consultation and research occurred concerning two areas that merited consideration as traditional cultural properties (TCP) under the NHPA: the *mamane-naio* forest, which lies east of the cantonment and airfield in PTA, and Mauna Kea, the mountain. Research with informants and consultation with Native Hawaiian organizations was undertaken from January to May 1998, designed to (1) evaluate the two areas with regard to their potential eligibility for the NRHP, and (2) determine, if the areas were eligible, the effect of the project and how to mitigate any adverse effect. As neither of these properties lies within or near the W-7 corridor, only a summary of this issue is presented below. Interested readers are referred to Section 3.1.9.3.1.3 of the 1999 Final EIS.

Based on the guidelines published in National Register Bulletin 38 (Parker and King 1992), it was concluded that the *mamane-naio* forest in question was not eligible for the NRHP as a TCP. The evidence and the issues involved in considering Mauna Kea as a TCP and the effects of Saddle Road improvement project on Mauna Kea were very complex. This is partly because there are many specific Hawaiian cultural sites on Mauna Kea to be considered and evaluated and partly because Mauna Kea is already being managed by various state entities, including the University of Hawai'i and several divisions of the DLNR.

It was difficult to separate the current adverse effects on Mauna Kea sites that came from then-inadequate State of Hawai‘i management from those potential adverse effects that would result from the implementation of improvements to Saddle Road.

As a result of this ethnographic research, it was recommended that the summit area of Mauna Kea is eligible for the NRHP as a TCP. It was also recommended that the boundary of this upper zone be defined by further consultation between Native Hawaiian organizations and ritual practitioners, and the University of Hawai'i and DLNR. As of 2009, three sites on the summit of Mauna Kea – Lake Waiau, the collection of cinder cones at the summit known as Pu‘u Kukahau‘ula, and the cinder cone Pu‘u Lilinoe – have all been designated as TCPs by the State Historic Preservation Division. A priority goal of the *Mauna Kea Cultural Resources Management Plan* is to support designation of the summit region of Mauna Kea as a TCP on the National Register of Historic Places (PCSI 2009: iii).

3.19.3.3 Environmental Consequences

No direct or indirect impacts to identified Hawaiian burials, ritual sites or TCPs are anticipated as a result of shifting the alignment in Section I from W-3 to W-7. No Hawaiian burials or ritual sites are known to be located within the Area of Potential Effect. As indicated in the MOA from 1999, all parties agreed that the effects of the entire Saddle Road project on the Mauna Kea TCPs are indirect, and mitigation of any potential effects should be addressed as part of the University of Hawai‘i’s new management structure, which has resulted in a comprehensive plan for Mauna Kea (UH Hilo OMKM 2009). This plan has been developed in consideration of the cumulative effects of all activities on the Mauna Kea summit and its resources, and includes consideration of access to the TCPs. An access plan is currently under development under the oversight of the Office of Mauna Kea Management, the Native Hawaiian council Kahu Ku Mauna, and the community representatives on the Mauna Kea Management Board.

3.19.3.4 Mitigation Measures

- In case of discovery of native Hawaiian burials or ritual sites, construction activities will cease in the vicinity of the site until appropriate regulatory and resource personnel are contacted and a determination has been made. All requirements of Chapter 6E, HRS and the administrative rules relating to burials will be satisfied.
- In order to ensure the protection of archaeological and paleontological remains during construction, Section 107.02, “Protection of Property and Landscape” *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects, FPJ-96, 1996, FHWA* will be followed.
- During clearing, grubbing, and excavation, FHWA and HDOT will provide a full-time archaeological monitor on the project site.

3.20 HAZARDOUS MATERIALS, TOXIC SUBSTANCES AND UNEXPLODED ORDNANCE

This section first deals with usual hazardous materials and toxic substances, and then discusses the special situation of unexploded ordnance. The subject of depleted uranium is discussed above, in Section 3.7, in the context of air quality.

3.20.1 Hazardous Materials and Toxic Substances

3.20.1.1 Affected Environment

A Phase I Site Assessment was performed in 1996 as part of the 1999 Final EIS to identify possible hazardous material sites, petroleum hydrocarbon sites, and underground

storage tank (UST) locations (Rust 1996). The survey consisted of a records search, visual survey of a 400-foot wide corridor around all alternative segments, and interviews with Federal, State, and County officials, industry representatives, and DOA representatives. The investigation did not evaluate the presence of any unexploded ordnance.

Records reviewed at the Hawai'i Department of Health, Environmental Management Division, include the Hawai'i Spill Reports Database, the Hawai'i Solid and Hazardous Waste Database, and the Underground Storage Tank Database. No spills or solid and hazardous waste facilities were reported in the vicinity of the W-7 alignment. No sites were recorded in the Comprehensive Environmental Response, Compensation, and Liability Information System, the Emergency Response and Notification System, or the National Priority List (NPL) database. Furthermore, no sites were recorded in the Federal Non-ASTM records including Corrective Action Reports, Facility Index System, Hazardous Materials Information Reporting System, Material Licensing Tracking System, NPL Liens, PCB (polychlorinated biphenyl) Activity Database System, RCRA (Resource Conservation Recovery Act) Administrative Action Tracking System, Records of Decision, Toxic Chemical Release Inventory System, and Toxic Substances Control Act, Active Leaking Underground Storage Tank Log Listing, State Hazardous Waste Sites, Solid Waste Facilities/Landfill Sites, or Listing of Underground Storage Tanks. Finally, no hazardous waste issues were identified through contacts with EPA (Honolulu); the U.S. Department of Agriculture, Forest Service (Honolulu); the State of Hawai'i Department of Health; the State of Hawai'i Department Land and Natural Resources; the County of Hawai'i Department of Public Works; the County of Hawai'i Fire Department; Hawai'i Electric Light Company (Hilo and Kona) utility company; PTA; or the Army.

Although the Phase I ESA is outdated and no replacement study was conducted either by the Army as part of the EIS for the Army Transformation of the 2nd Brigade, 25th Infantry Division (Light) to a Stryker Brigade Combat Team, or for this SEIS, no new activities have been conducted on or near the W-7 corridor in the interim, and the conclusions of the report are almost certainly still valid. Field inspection by the SEIS team in 2009 revealed no areas of stained soil, discarded containers or drums, Underground or Aboveground Storage Tanks, or other relevant materials or conditions.

3.20.1.2 Environmental Consequences

There was no indication in the 1996 Phase I ESA records search or site reconnaissance of hazardous waste and no activities with the potential to produce recognized environmental conditions have occurred in the area since that time. Visual reconnaissance of the survey corridor in 2009 revealed no conditions or materials. It is therefore unlikely that any adverse impacts from construction or use of Saddle Road in the W-7 alignment would occur related to hazardous materials or toxic substances resulting from existing conditions.

Military training has the potential to introduce hazardous materials or toxic substances, as discussed in the EIS for the Army Transformation of the 2nd Brigade, 25th Infantry Division (Light) to a Stryker Brigade Combat Team. Although in other parts of Pohakuloa Training Area, such hazards may include ongoing ordnance and explosives and lead and other contaminants from ammunition, live-fire training exercises will not be undertaken in Keʻāmuku. Materials such as fuels, battery fluid, petroleum lubricants, solvents, paint products, and coolants may be used and could potentially spill. All hazardous material and waste management will follow Army, Federal, and State regulations in order to prevent impacts on human health or the environment. The Army maintains site-specific spill prevention, control, and countermeasure (SPCC) plans and pollution prevention plans that regulate the storage and use of petroleum products and hazardous materials. Various Army regulations, pamphlets, training manuals, instructions, and codes address the safe storage, use, and transport of ammunition. At PTA, military unit training includes a 40-hour Hazardous Waste Operations Course, and the units deploy to PTA with spill containment and clean-up kits to immediately address any spills during training exercises.

W-7 versus W-3

There are no known differences with respect to hazardous materials between W-3 and W-7.

3.20.1.3 Mitigation Measures

- If previously unidentified hazardous substances or petroleum products are found within the W-7 corridor that indicate an existing release, a past release, or a material threat of a release of any hazardous substance or petroleum products into the corridor, further investigation will be pursued, as warranted. If previously unidentified hazardous waste is discovered during project construction, work will cease at that location and appropriate regulatory or resource personnel will be contacted.
- In areas where ROW is needed outside of that already surveyed, the project area will be further investigated prior to land acquisition or construction to confirm the absence of hazardous waste.

3.20.2 Unexploded Ordnance

3.20.2.1 Affected Environment

Unexploded ordnance (UXO) is explosive ordnance that has been primed, fused, armed, or otherwise prepared for action, and that has been fired, dropped, launched, projected or placed in such a manner as to constituted a hazard to operations, installations, personnel, or material and remains unexploded either by malfunction or design or for any other cause.

Much of South Kohala is known to contain unexploded ordnance left over from training during World War II. The U.S. Navy utilized 91,000 acres in Waikoloa in December of 1943 for an artillery firing range and troop maneuvers. In preparation for the Saipan-Tinian campaign, the military developed Camp Tarawa in Waimea. It was the largest military encampment on the island of Hawai‘i, consisting of approximately 467 acres of tents and Quonset huts. Property comprising the Waikoloa Maneuver Area was surrendered back to Parker Ranch in September 1946. At least two ordnance clearance efforts were conducted, one in 1946 just prior to the departure of the 5th Marine Division, and the other in 1954 following accidental detonation of a dud fuse or shell killing two civilians and seriously injuring three others. UXO continues to be discovered at the former Waikoloa Maneuver Area as land development progresses.

In order to address this problem, the U.S. Army Engineering and Support Center, Huntsville, and the U.S. Army Corps of Engineers (USACE), Honolulu District, teamed to produce a *Phase II Engineering Evaluation/Cost Analysis (EE/CA) for the Former Waikoloa Maneuver Area and Nansay Sites, Island of Hawai‘i, Hawai‘i* (U.S. Army Corps of Engineers 2002). The report documented the decision process to determine the most appropriate UXO response actions for the former Waikoloa Maneuver Area (WMA) and Nansay Sites. The project has been expanded from 123,000 acres to 135,000 acres in recognition of concern over UXO between Queen Ka‘ahumanu Highway and the sea, where resorts continue to develop. A program of UXO removal was developed and is currently in implementation. Over a six-year period from 2002-2008, two contracts were awarded totaling $60 million to perform Munitions and Explosives of Concern removal response actions in the WMA. The USACE awarded a five-year, $50 million contract to a private firm to initiate removal of the UXO in the WMA. The USACE oversaw completion of the first phase of ordnance clearance on 927 acres in Waikoloa, Waimea and Lalamilo in August 2004. The second phase involved more than 1,000 acres in Waikoloa, Waimea and ‘Ouli. According to USACE officials, as of June 2009, more than 10,600 acres have been cleared, 2100 Munitions and Explosives of Concern items and 260 tons of military debris removed, and $82 million expended for all services removed. Ordnance removed includes 60- and 80-mm mortar high explosives; 75-, 105- and 155-mm projectiles; 2.36-inch rocket propelled anti-tank rounds, U.S. Mk II hand grenades, M1 anti-tank mines, and Japanese ordnance. To continue the effort, the USACE solicited proposals in February 2009 for contracts totaling $100 million over five years. Even after the current five-year contract to remove UXO is complete, it is unlikely that all unexploded ordnance will have been removed and additional work will be necessary (pers. comm. Gary Shirakata, USACE, to Ron Terry, August 2009).

Sector 3 of the Waikoloa Maneuver Area study area covers about 28,058 acres of Ke‘āmuku. Parts of it were once used as a live-fire impact area, but there have been no reported discoveries of UXO in this area (U.S. Army COE 2002: 2-18). A risk-based analysis assessed this area as a low probability of UXO exposure. Until the Army

acquired the area, about 1,467 acres were used for military maneuvers and training exercises under a master lease agreement between the Army and Parker Ranch. A former tank road from Kawaihae to PTA cuts through this area, crossing the W-7 alignment. PTA trains soldiers how to identify UXO as well as the proper safety procedures for reporting UXO.

3.20.2.2 Environmental Consequences

Where present, UXO is a definite threat to humans or animals for explosive hazard. The environment is also at risk by the presence of UXO and ammunition, as chemicals such as lead and explosives propellant could leach into the soils and groundwater. Environmental surveys conducted to date by biologists and geologists familiar with the appearance of UXO have not revealed the obvious presence of any UXO in the W-7 corridor. Given the lower risk context, the primary concern would be safety of the construction operation. It should be noted that pre-construction sweeps for work on other parts of the Saddle Road Improvement Project from 2003 to 2009 successfully located and cleared training rounds and UXO, and there have been no UXO-related incidents.

W-7 versus W-3

There are no known differences with respect to UXO presence or removal between W-3 and W-7.

3.20.2.3 Mitigation

- Prior to construction, FHWA will conduct a UXO survey. If the risk of encountering UXO is low, then the USACE will be consulted to provide UXO construction support. If the risk of encountering UXO is high, then full UXO clearance will be performed to ensure the safety of the site. The Army will document UXO surveys and removal actions in full accordance with applicable laws, regulations, and guidance. All ordnance found will be removed from the project area in accordance with DOA regulations in coordination with USAG-HI.
- In all training activities at Keʻāmuku and other areas of PTA, the Army will continue to educate soldiers on how to identify UXO and the proper safety procedures for marking and reporting UXO, in order to reduce impacts not only to soldiers but also to motorists on W-7.

3.21 VISUAL

A visual resource impact assessment prepared for the entire Saddle Road project is contained in Volume VII of the 1999 Final EIS, which interested readers may consult. The methodology used was based on the FHWA's *Visual Impact Assessment for Highway Projects* procedures and the USDA-Forest Service's *National Forest Landscape Management-Roads,* which was prepared to assess the visual impacts of roads. The visual landscape of the W-7 corridor is essentially identical to that of the adjacent W-3, and therefore the conclusions of the 1999 assessment for W-3 are discussed below, adjusted as necessary.

3.21.1 Affected Environment

3.21.1.1 Existing Visual Character

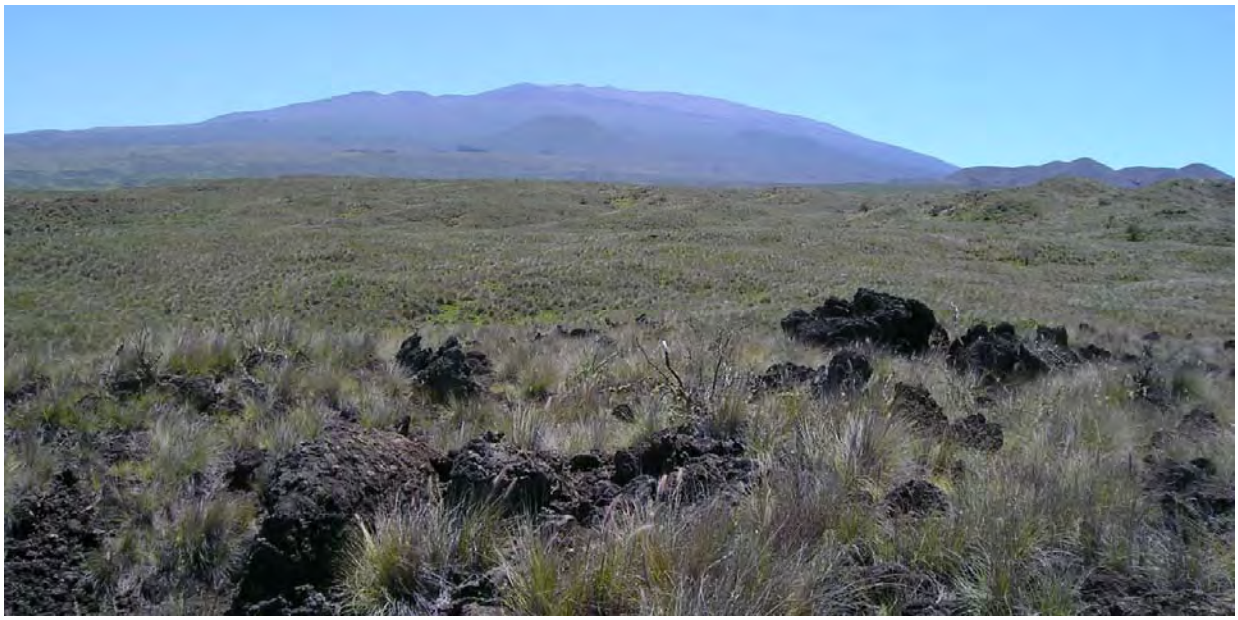
Elevational differences ranging from 2,500 to 5,500 feet above sea level and open vegetation provide panoramic vistas with interesting landscape features. Rolling hills, cone-shaped *pu'u* (hills), broad valleys, and mountains are examples of the diverse landforms found within the corridor (Figure 3.21.1).

Notable landforms or water features visible along or from the W-7 corridor include Mauna Kea, Mauna Loa, Hualālai, the Kohala Mountains, Haleakala, Pu'u Wa'awa'a, Pu'u Nohonaohae, Pu'u Ke'eke'e, Pohakuloa Gulch, and the Pacific Ocean. Rock outcrops of basaltic lava, native shrublands, and grasslands that change hue from brown to green in times of rain are visible along the corridor. Within the corridor there are only subtle cultural modifications of the natural landscapes, including rough unpaved roads, fence lines, and water tanks and troughs.

Visual resources are defined in terms of two primary elements, visual character and quality. The landscape components of landforms, water features, vegetation types, and cultural modifications, as well as the patterns they create, provide the basis for defining the project area's visual character. The quality of the visual resources in the project area varies because of changes in the landscape components and their patterns. The visual quality of an area is rated in terms of such criteria as the landscape's distinctiveness, its visual integrity, and the compatibility of its components. Visual quality is expressed as *very high*, *high*, *moderately high*, *moderate*, *moderately low*, *low*, and *very low*.

Figure 3.21.1a
Photographs of W-7 Landscape

Figure 3.21.1b
Photographs of W-7 Landscape



The western, low-elevation portion of this segment is a broad, open valley. The visual pattern of this area of the project corridor is characterized by expansive views with Hualālai, Kohala Mountains, and the coastline as the backdrop, and the grassy rolling hills dotted with mature trees. The landscape consists of a predominantly pastoral setting with few built features. Fencing visible in the area blends with the natural setting.

At and above about the 4,500-foot elevation, the low-growing *ʻaʻaliʻi* shrub becomes as common as fountain grass. The transition from grassland to shrubland gives the landscape a darker color and more irregular texture. The terrain remains distinctly hilly. The character of the setting changes to a landscape with broad expansive views outward, gently rolling terrain, short green grasses, and a scattering of shrubs and rock outcrops. An overhead transmission line and ranch roads contrast with the landscape, but do not spatially dominate the setting. As the W-7 alignment crosses uphill from Keʻāmuku into the Keʻekeʻe area, the land is dotted with outcrops of black lava rocks. The combination of landscape elements in this area of the W-7 alignment forms a moderately memorable pattern. The built elements are noticeable and attract some attention, but the natural setting remains dominant. Overall, the existing visual quality of this area as measured by the FHWA methodology was evaluated as moderate to moderately low.

3.21.1.2 Characteristics of the Viewer

Visual assessment also considers the level of sensitivity or attitude that the viewer would have in response to the change in appearance of the existing landscape. Identification of viewer groups, duration of viewer exposure, and type of viewer activity provide an indication of the level of viewer response. The majority of the viewers now and in the future would travel the highway by vehicle, viewing the landscape at speeds of about 50-55 MPH. Other viewers are those from military facilities and, on occasion, from the dry hunting land to the south. These groups view the landscape (including the roadway) from different viewpoints, and have a stationary view rather than a changing one.

3.21.2 Environmental Consequences

Construction of the proposed roadway would result in a substantial change in visual character due to the introduction of a paved road to the existing pastoral setting. The visual impact assessment performed in 1999 predicted that this imposition of a two-lane highway would impact visual character in various ways and severely lower the existing visual quality of the foreground area. This was based partly on the appearance of the paved surface, but also on cut and fill slopes. Over its length, fill slopes would range from 6 to 40 feet, and cut slopes would range from 6 to 35 feet, although treatment of these slope faces would minimize the change in visual quality and character.

The visual appearance of the improved Saddle Road in other segments, illustrated above in Figure 1.4.1, has demonstrated that preliminary concerns about severe impacts have not been borne out, and that the road in general matches its surroundings. In addition, the

lack of vantages providing views of the W-7 alignment means that there are virtually no "views" of the area to be adversely affected; in fact, the new highway would open scenic vistas to motorists that have never before been available. The project would not interfere with vistas of Mauna Kea, Mauna Loa, Hualālai, or the Kohala Mountains, the major scenic resources in the area, regardless of viewer location.

W-7 versus W-3

There are no substantial differences between the scenic resources or impacts of W-3 and W-7.

3.21.3 Mitigation Measures

The degree of visual impact is generally lessened by minimization of the amount of cut and fill slopes, revegetation of disturbed areas, and by blending any proposed improvements into the surrounding landscape. The intent of visual impact mitigation measures is to reduce the contrast between the proposed improvements and the existing landscape. The following mitigation measures will be employed:

- Final cut and fill slope faces will be made to blend with the surrounding landscape. The natural appearance of the slopes will be improved by rounding the toe and top of slopes, warping, blending the ends of slopes, varying the slope ratios, utilizing staggered ledges, and roughening the face of cut slopes, either by ripping or blasting, where appropriate. (Warping results in a slope face that is not parallel to the roadway. Slope rounding refers to blending the slope into the natural terrain by excavating additional area at the top of the cut slope. Laying back the ends of slopes or blending provides a smooth transition to adjacent cut, fill, or drainage area by flattening the slope ratio at the ends of slopes. Varying slope ratios leaves an irregular, undulating or roughened appearance with staggered ledges rather than a uniform grade. Staggered ledges are benches with varying dimensions and heights on the cut face which do not cross the entire face.) The slope ratios will vary from the top to the bottom of the slope face as well as horizontally along the face, if practicable and feasible.
- Rock slope surface treatment will be applied to cut slopes in competent rock areas as identified in the geotechnical testing results. These treatments include roughening of the cut face to incorporate short, staggered ledges, minor warping, and other irregularities in the rock that take on a natural appearance.
- In areas not recommended for revegetation, the top three feet of lava material in disturbed areas will be stockpiled prior to construction. After construction, the stockpiled material will be used as plating material. The plating material will be placed over slope faces to resemble the adjacent, undisturbed ground surface conditions or used as rip rap material along ledges and outside of ditch backslopes.
- Intercepted drainages on cut slopes will be cut at the angle to existing joints, planes or rock features, and drainage patterns. These features will be incorporated into the NPDES SWPPP.

- Where guardrails are needed, natural-appearing guardrail material, such as naturally weathered steel or a material approved by HDOT, will be used to blend more effectively with the surrounding landscape.
- To reduce contrast and blend more effectively with the surrounding landscape, aesthetic fencing materials will be used, such as naturally weathered metal or steel, or painted or wooded posts, as approved by HDOT.
- Clearing of trees and large shrubs along an irregular edge adjacent to the recovery zone will be done to create a gradual transition or feathered edge.
- As determined appropriate during final design, the project may include informal scenic Typical Sections s with interpretive signage in a few locations, such as the Old Waimea-Kona Belt Road and the overlook above Keʻāmuku Village.

3.22 ENERGY

There are two primary energy demands associated with the proposed project. Energy would be consumed in construction activities and in operation of vehicles once the highway is open. The 1999 Final EIS calculated energy expenditures for the entire project based on existing technologies. Energy use per section was not calculated. Interested readers are referred to Section 3.22 of the 1999 Final EIS.

Then-current engineering data were used to estimate the total earthwork, aggregate base course, and pavement area for each segment. Based on the generalized working efficiency of various pieces of construction equipment (e.g., grader, roller, D-9 bulldozer, scraper), the estimated fuel consumption for construction of the entire proposed Saddle Road was calculated at approximately 0.6 to 0.7 million gallons. The energy use required for construction of W-7 was not recalculated as part of this SEIS, but there are essentially no differences between it and W-3. The cumulative use of energy for construction combined with other users on the island during the last six years of construction on Saddle Road has not exceeded the capacity of fuel or electricity supplies in the area, which periodically support multiple large construction projects. This should not represent a problem in the future.

In the 1999 FEIS, since there were no data available on levels of fuel consumption in passenger vehicles or trucks on Saddle Road, estimates were made based on estimated ADT, the average length of trips on Saddle Road, and motor fuel consumption data for the County of Hawai'i as a whole. The then-current ADT of 900 was compared with the then-projected ADT of 14,000 in 2014, which obviously resulted in a large increase in fuel consumption. However, the proposed project would conserve fuel in individual vehicles by improving the LOS and travel time, reducing curves and grades, providing safe opportunities for passing, and reducing the trip length to most destinations. Vehicles traveling at steady highway speeds use less fuel than those traveling at variable speeds due to excessive curves and steep grades.

W-7 versus W-3

The substitution of W-7 for W-3, which are almost equal in length, does not result in any differences with regard to energy consumption. The conclusion that the project would conserve fuel in individual vehicles remains valid.

Mitigation measures associated with construction equipment are presented in Section 3.23.2. No other mitigation measures related to fuel consumption are recommended.

3.23 CONSTRUCTION IMPACTS

3.23.1 Environmental Consequences

Environmental impacts associated with the construction phase of a project are generally localized and temporary in nature. Construction impacts anticipated include noise from heavy construction equipment, fugitive dust from earthmoving activities, air pollutant emissions from internal combustion engines, and soil erosion and sedimentation. Construction activities would include mobilization, clearing and grubbing, excavating and filling of earth, foundation construction, drainage structure construction or installation, preparation of highway base, paving, and cleaning up. Highway construction also generates solid waste in the form of packaging for building materials, detergents, paint, metals, solvents, and demolition of existing materials at intersections.

Due to the 47-mile length of Saddle Road, it has not been feasible to construct the entire project at one time. Each construction project has improved a 5- to 9-mile section of the highway. Because of the staggering of construction, with implementation of mitigation, construction-related impacts have not been significant and are not expected to be significant for Section I.

W-7 versus W-3

There are no differences between the construction impacts of W-3 and W-7.

3.23.2 Mitigation Measures

The following mitigation measures have been identified to minimize potential impacts. These activities will be noted as mandatory in Special Contract Requirements.

- The total amount of land disturbance will be minimized. The construction contractor will be limited to the delineated construction work areas within the ROW or clearly marked staging areas.
- Construction traffic will be limited to military roads and the construction area as much as possible, particularly traffic related to hauling of crushed rock and asphalt, to minimize interaction with vehicular traffic on the existing Saddle Road. Traffic control will assure a safe and timely flow of traffic on the adjacent

sections of Saddle Road during construction. Traffic control plans will be an integral part of the construction documents and enforced by the Project Engineer.

- Construction activities and traffic control will be coordinated with the Office of Mauna Kea Management to avoid potential conflicts with their observatory construction projects.
- Environmental awareness materials will be provided to all persons, agency personnel, construction workers, subcontractors, inspectors, and others on the project. These materials will be prepared in a checklist format and will address issues related to caves, sensitive species, cultural resources, spill management, delineation of authorized work area, pollution prevention through recycling and other efforts required by the Pollution Control Act of 1990, and other relevant factors. Contract specifications addressing environmental mitigation and procedural requirements will also be included in the contract documents and will be enforced by the on-site project engineer throughout the duration of the construction contract.
- Trucks will be covered when hauling loose material on public roads.
- Unused materials and excess fill will be removed and disposed of at an authorized waste disposal site.
- Dust control measures will be implemented. These will include, but are not limited to, the use of water trucks, the stabilization of the surfaces of stockpiled materials, and the treatment of unpaved routes with dust suppressants.
- Clearing and grubbing of construction work areas will be conducted in such a manner as to minimize the amount of exposed soil at any one time.
- Stationary equipment will be kept as far from sensitive noise receptors as practical.
- No smoking will be permitted during construction within the construction site, nor will any fires be permitted within the project corridor.
- All exhaust systems will be maintained in good working order. Properly designed engine enclosures and intake silencers will be used. Equipment will be maintained on a regular schedule.
- During construction, emergency spill treatment, storage, and disposal of all hazardous materials, both within construction limits and at staging areas, will be handled in accordance with the most recent version of FHWA's *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects*, (www.efl.fhwa.dot.gov/design/manual/Fp96.pdf), federal acquisition regulations, and appropriate EPA regulations. Special Contract Requirements shall specify that the construction contractor shall develop and adhere to "Good Housekeeping" and Spill Prevention Plans for all appropriate substances. Elements of the plan may include standards, procedures or activities such as:
    - Onsite storage of the minimum practical quantity of hazardous materials necessary to complete the job;
    - Storage and inventory of hazardous materials will be performed by designated and properly trained personnel;
    - Storage of all materials in a neat and orderly manner, under roof and/or enclosed as appropriate and practical, as required by applicable OSHA and EPA rules;

- Products will be kept in their original containers unless unresealable, and original labels and safety data will be retained;
- Whenever possible, a product will be completely consumed before disposing of empty container;
- Disposal of surplus will follow manufacturer's recommendation and adhere to all regulations;
- Manufacturers' recommendations for proper use and disposal will be strictly followed;
- Daily inspection by contractor to ensure proper use and disposal;
- Onsite vehicles and machinery will be monitored for leaks and receive regular maintenance to minimize leakage;
- Manufacturer's recommended methods for spill clean-up will be clearly posted, and site personnel will be informed of the procedures and the location of the information and clean-up supplies;
- Materials and equipment necessary for spill clean-up will be kept in the material storage area onsite;
- All spills will be cleaned up immediately after discovery, using proper materials that will be properly disposed of;
- The spill area will be kept well-ventilated, and personnel will wear appropriate protective clothing to prevent injury from contact with hazardous substances;
- Regardless of size, spills of toxic or hazardous materials will be reported to the appropriate government agency;
- Should spills occur, the spill prevention plan will be adjusted to include measures to prevent spills from re-occurring and for modified clean-up procedures. A description of the spill, its cause, and clean-up measures used will be included. If a major hazardous spill occurs, clean-up efforts will be coordinated through the Hawai‘i County Fire Department and Civil Defense Agency, and the Hawai‘i State Department of Health;
- The contractor will coordinate spill prevention and clean-up efforts. In addition, the contractor will designate at least three site personnel to receive spill prevention and clean-up training; these individuals will each be responsible for a specific phase of prevention and clean-up. The names of responsible spill personnel will be posted in the material storage area and in the office trailer onsite;
- HDOT will encourage through contract specifications the use of durable materials that will require less frequent replacement, reducing the amount of construction waste generated over time;
- HDOT will encourage through contract specifications the use of material with recycled content, such as glassphalt, where possible and in accordance with accepted standards; and
- HDOT will encourage through contract specifications the reuse in other jobs rather than disposal of project materials such as metal, wood, paper.

Mitigation measures related to construction impacts are also provided in other sections of this chapter, including 3.1.1.3, 3.3.3.3, 3.3.4.3, 3.6.3, 3.7.3, 3.12.3, 3.13.3, and 3.18.3).

CHAPTER 4 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF MAN'S ENVIRONMENT AND MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

A comparison of short-term use versus long-term productivity considers the commitments of resources that would directly or indirectly result from the project. For example, typical mining operations might significantly contribute to local short-term productivity of a land resource, but generally do not contribute to the maintenance and enhancement of its long-term productivity. For the purpose of this discussion, short-term refers to the construction phase and the first 5 to 10 years of the project. Long-term refers to the estimated life cycle of the project, or 20 years.

The proposed project would continue the ongoing improvements on Saddle Road from Mamalahoa Highway to MP 6, specifically by constructing the new W-7 alignment in place of the selected W-3 alignment in Section I of the project. The work would include the rebuilding of the existing road with major grade and alignment improvements and the realignment of portions of the road. Because the project as a whole has taken advantage of an existing road corridor for much of its length, the proposed project is considered an efficient means to achieve State and County transportation goals.

The project would require the direct taking or conversion of existing land uses into this transportation corridor use and the commitment of resources for road construction and regular maintenance. It would be expected to increase the number of cross-island vehicle trips, resulting in substantial changes in roadway use and traffic levels. It would strengthen economic conditions and increase access to public lands within the area. The improvement of Saddle Road is not expected to foster new development along Saddle Road, as most land is within highly restrictive (State Land Use Conservation District) or already prescribed (U.S. military) uses.

Approval and implementation of the Section I phase of the proposed project would begin the process of ROW acquisition and construction of the road over a period of about three years. Over the life of the project, the construction phase would likely represent the period of most concentrated impact to the natural, biological, and social environment. Construction-related impacts, such as soil erosion and sedimentation, the generation of air pollutants and dust, traffic congestion due to detours and delays, and noise from construction equipment, would be considered temporary and would not be expected to affect the area's long-term productivity.

The conversion of existing land use, the direct loss or displacement of native plants, the degradation of historic properties, and the modification of the visual environment would occur immediately; these impacts would not be retrievable for the long-term productivity of the area. Any inadvertent introduction or spread of aggressive alien species would be expected to result in a long-term impact to the region's biological resources.

Economic benefits associated with the construction efforts would occur immediately upon initiation of the project. Those economic benefits associated with increased cross-island connectivity and time-savings would begin following the construction period and would be expected to increase over time, contributing to the long-term productivity of the area.

Mitigation measures committed for the project would be initiated and maintained over time as appropriate. The mitigation measures already in place were designed to contribute to the establishment of a second population of the endangered *Palila* and to provide a higher degree of fire protection to existing *Palila* habitat. These have contributed to the maintenance and enhancement of the region's long-term productivity. No plant or wildlife species is expected to become extinct as a direct result of project activities.

Proposed improvements would enhance safety and reduce travel time for many cross-island commuters. While taking advantage of an existing road facility, the short-term use of project resources represents an efficient means to achieve a primary transportation goal.

CHAPTER 5 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Resources committed to the project would be material and nonmaterial, including financial. An irreversible commitment of resources refers to resources, which once committed to the proposed project, cannot be restored to their pre-project condition. An irretrievable commitment of resources refers to resources used, consumed, destroyed, or degraded by implementation of the proposed project such that the resource cannot be retrieved or replaced in any form. As an example, while the crushing of stone to create an aggregate base is irreversible, the commitment of the resource is only irretrievable for the life of the project. Although the crushed stone cannot be un-crushed, it could be put to another use after the life of the project.

The proposed construction of Section I of Saddle Road is planned for completion in roughly three years. The life cycle of a completed roadway segment spans a period of 20 years. Irreversible and irretrievable commitments of resources for the proposed project are summarized in Table 5.1.

Table 5.1
Irreversible and Irretrievable Commitment of Resources
Section I, with W-7 Alignment

Resource	Type of Commitment	Irreversible	Irretrievable
Land Use	Exclusion of Future Military Uses in Corridor	Project Life Only	Project Life Only
Farmland	No Loss of Use (No Use At Present or in Foreseeable Future)	N/A	N/A
ROW/Relocation	Property Acquisition Only	Yes	Project Life Only
Air Quality	Degradation of Air Quality	Construction Phase Only	Construction Phase Only
Noise	Noise Level Exceeding Ambient (But No Sensitive Uses)	Yes	Project Life Only
Fire Hazard	Change, Both Beneficial and Adverse, During Life of Project	Yes	Project Life Only
Water Resources	Sedimentation	Yes	Construction Phase Only
Wetlands, Waters of U.S. and Floodplain	No Loss	N/A	N/A
Geology and Soils	Loss From Construction	Yes	Yes
Biological Resources	Modification of Habitat, Loss of Flora and Fauna	Yes	Yes
Cultural Resources	Disturbance or Modification Of One Site	Yes	Yes
Native Hawaiian Resources	No Modification or Loss	N/A	N/A
Visual	Degradation of Natural Scenic Quality and Viewshed Intrusion	Project Life Only	Project Life Only
Construction Materials, Fuels and Energy	Use of: Aggregate Water Steel Concrete Wood Fossil Fuels	Yes Yes Yes Yes Yes Yes	No Yes No No No Yes

CHAPTER 6 CUMULATIVE IMPACTS

Introduction

Both the National Environmental Policy Act (NEPA) and the Hawai‘i Environmental Policy Act (Chapter 343, HRS) require that the direct, indirect, and cumulative impacts of proposed actions be assessed and disclosed. The NEPA definition of a cumulative impact, which is also used in Hawai‘i, comes from the Council on Environmental Quality (CEQ), which defines a cumulative impact as:

> …the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR §1508.7).

Cumulative impacts encompass the total effect on a natural resource, ecosystem, or human community due to past, present, and future activities or actions of federal, non-federal, public, and private entities. Cumulative impacts may also include the effects of natural processes and events. Accordingly, there may be different cumulative impacts on different environmental resources. A cumulative impact is defined in both spatial (geographic) and temporal terms (i.e., timeframes in which to identify past, present, and reasonably foreseeable actions). One analytic measure of cumulative impact is the health or status of an individual resource, which can help determine if it is in a sustainable state given past, present, and reasonably foreseeable actions. According to the U.S. EPA, an ecologically sustainable system will support biological processes; maintain its level of productivity; function with minimal external management; and repair itself when stressed (U.S. EPA 1999). For human resources such as archaeological sites, sustainability is more a matter of identification and care for resources. In any case, conservation actions or recovery plans identified by agencies or communities that are reversing a declining trend for the resource and helping make it sustainable must also be taken into consideration.

The cumulative impact analysis approach undertaken in this SEIS is derived from several sources (Caltrans 2009; USEPA 1999; and CEQ 1997). It has been developed interactively with the direct and indirect impacts analyses from the 1999 FEIS, scoping for the SEIS in 2007, and later resource studies. The early focus on cumulative impacts helped in designing the W-7 alternative so as to avoid or minimize impacts. The analysis for identifying and assessing cumulative impacts followed here consists of seven steps:

8. Identification of resources in consultation with agencies, groups, individuals and reliable information sources.
9. Identification of the direct and indirect impacts of the proposed project that might contribute to a cumulative impact on the identified resources.
10. For all resources that have a potential to be impacted by the project, definition of a geographic boundary or Resource Study Area (RSA) for each resource to be addressed.
11. Description of the current health and the historical context of each resource.

12. Identification of the set of other current and reasonably foreseeable future actions or projects and their associated environmental impacts to include in the cumulative impact analysis.
13. Assessment of the potential cumulative impacts.
14. Assessment of the need for mitigation and the potential to avoid, minimize, rectify or compensate for impacts.

The sections in this chapter correspond to these steps. Rather than a comprehensive list of issues that have little relevance to the effect of the proposed action or the eventual decisions, this cumulative impacts analysis "counts what counts," in accordance with federal guidance (CEQ 1997).

6.1 Identification of Resources

The initial identification of resources in an EIS looks broadly at the universe of natural and cultural resources that may be present in the broader project area, generally during early coordination or scoping. These resources are intensively studied during EIS development, often through on-ground field studies that tend to concentrate on direct and secondary impacts. Table 6.1 provides an overview of resources in a wide area of the north central portion of the Island of Hawai‘i, extending from East to West Hawai‘i and from the summit of the mountains to the sea. Because of their importance, all these resources have been studied for the project corridor, as described in Chapter 4.

6.2 Identification of Direct and Indirect Project Impacts

Using the foundation of resources of concern established in the previous section, the cumulative impact analysis focused on identifying resources impacted by the project in a more than insubstantial way. For those resources for which the project will not cause direct or indirect impacts, the project will not contribute to a cumulative impact on that resource, and the resource does not require further discussion in the context of cumulative impacts. Table 6.2.1 summarizes direct and indirect impacts as described in Chapter 4. Those resources denoted with italics in the "Resource" column of Table 6.2.1 were found to be impacted by the project in a more than insubstantial way and were carried forward for further cumulative impact analysis. These resources include Floodplains and Drainage Areas, Native Ecosystems, Threatened and Endangered Species, Historic Properties, and Visual Quality.

Table 6.1.1
Resources for Initial Cumulative Impacts Consideration

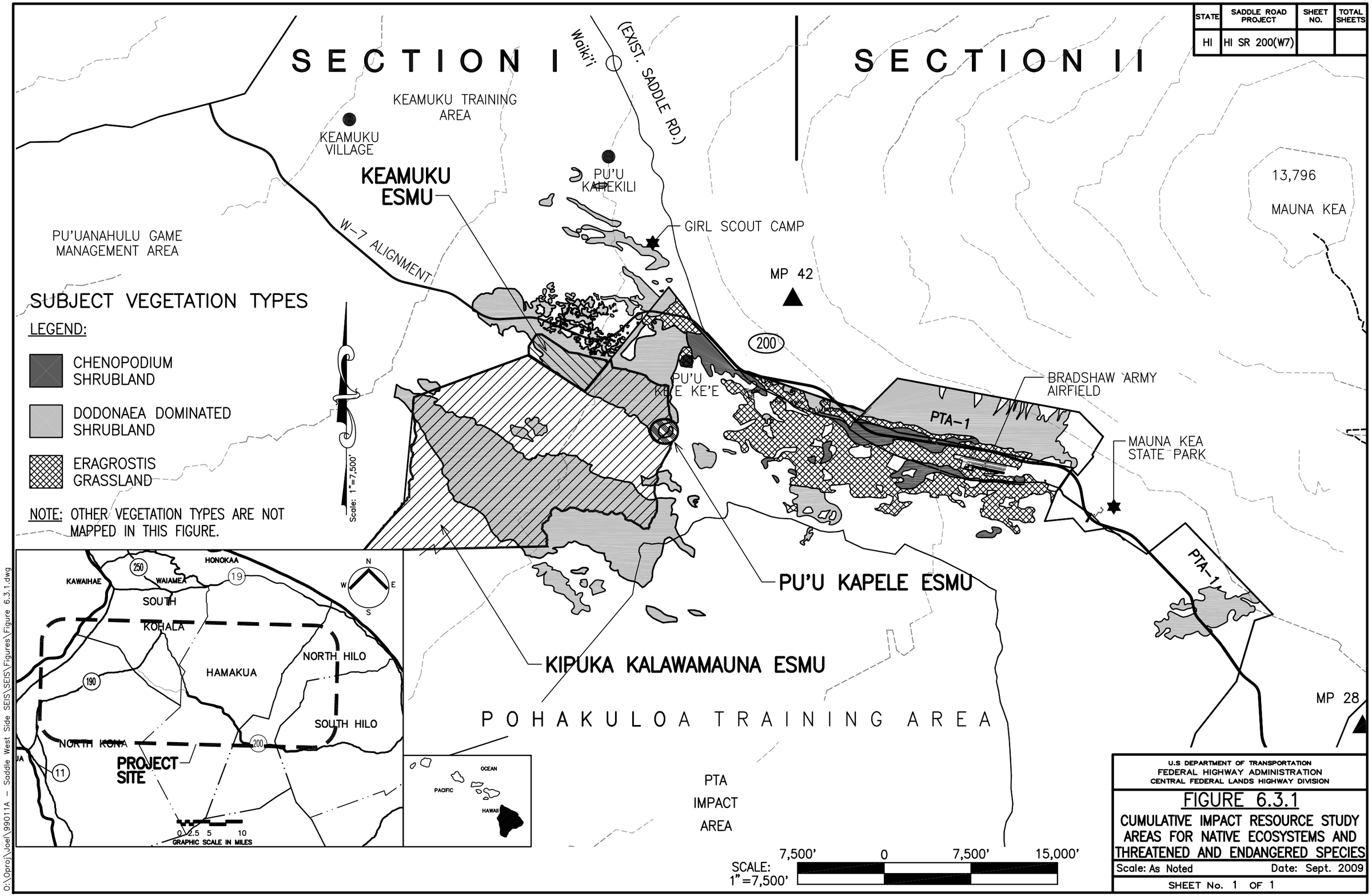
Resources of Special Concern for Cumulative Impacts in Project Area		
Resource	**Distribution**	**Critical Issues of Concern**
Surface Watersheds.	North slopes of Mauna Kea and southeastern slopes of Kohala Mts.	Water quality, including sedimentation, nutrients, microbial pollution. Avoiding floodplain effects.
Groundwater.	Aquifers, mostly basal, under all areas.	Protecting sustainable yield and water quality.
Native Ecosystems.	Concentrated at shoreline fringe and elevations higher than 5,000 feet on leeward slopes, higher than 2,000 to 3,000 feet on windward slopes.	Protecting the integrity of the ecosystems from fragmentation, loss of rare species, invasive species invasions, and overall habitat diversity and value.
Threatened and Endangered Species.	Various forest birds and seabirds primarily in wetter forests, with *Palila* in dry forest. Plants have complex distribution, primarily found in dry forests and rainforests at elevations greater than 2,000 feet.	Protection of existing populations from a variety of threats including predation, competition with introduced species, and habitat alteration/ destruction.
Important Farmland.	Primarily on lower northern and western slopes of Mauna Kea and southeastern slope of Kohala Mts. Grazing land of some value also present on western slopes of Mauna Kea.	Protection from development, particularly near urban areas. Rural areas have seen large scale abandonment of grazing and farming uses in last two decades.
Community Character, Socioeconomic Health, Economy.	Existing communities of Waimea, Waikiʻi, Waikoloa, and other areas indirectly accessed by Saddle Road.	Maintaining character of community, including avoiding growth induction from highway projects. Maintaining health economy.
Recreational Areas.	Hunting areas and park land on Mauna Kea, Mauna Loa, and coastal areas.	Loss of hunting land for conservation uses.
Historic Properties.	All parts of island.	Loss of some of the tens of thousands of uninventoried archaeological sites from historic and pre-Western contact era due to development, natural decay.
Areas for Practice of Traditional Culture.	All parts of island.	Loss of gathering and other cultural areas due to development, particularly on coast.
Visual Quality.	Places visible from Saddle Road	Degradation of scenic resources due to development.
Resources not of Special Concern for Cumulative Impacts in Project Area		
Air Quality.	Saddle Road and adjacent areas.	Air quality meets all standards by large margin. [REF: 3.71.]
Noise.	Saddle Road and adjacent areas.	Area not affected by high noise levels. [REF: 3.8.1]
Wild and Scenic Rivers.	All parts of island.	None present in State of Hawaiʻi. [REF: 3.16]
Coastal Barriers/Coastal Environments.	Coastlines of island.	Project is located over nine miles from coast with no surface water connection. No coastal barriers present in State of Hawaiʻi. [REF: 3.17.1]

Table 6.2.1
Project's Direct and Indirect Impacts on Resources of Special Cumulative Impact Concern

Resource	General Nature of Impact to Resources from Highways	Impacted Resources in Project Area	Impacts of Saddle Road Project on W-7 Alignment
Surface Watersheds.	Highway runoff to receiving waters such as streams, ponds, wetlands, and coastal waters.	None. [REF: 3.10.1, 3.11.1]	Insubstantial, as no project runoff can reach any sensitive resource. [REF: 3.10.2, 3.11.2]
Floodplains and Drainage Areas.	Designated floodplains and other areas with existing drainage patterns.	No designated floodplains, but swales that convey drainage exist. [REF: 3.10.1]	Adding runoff to drainage areas, increasing drainage quantities in swales. [REF: 3.10.2]
Groundwater.	Migration of pollutants from roadway runoff through ground into aquifer	Basal aquifers, 2,500 to 5,000 feet below land surface. [REF: 3.10.1]	Insubstantial, as runoff is filtered through soil and thick column of aerated rock. [REF: 3.10.2]
Native Ecosystems.	Direct loss of acreage, rare species, fragmentation of communities, loss of habitat value, invasive species, and wildfire.	Largely native ecosystems at highest elevations of project; semi-native ecosystems in elevations just below. [REF: 3.13.1]	Direct loss of 45.0 acres of *Dodonaea* shrubland, 12.1 acres of *Chenopodium* shrubland and 15.5 acres of *Eragrostis* grassland. [REF: 3.13.2]
Threatened & Endangered Plant and Animal Species.	Loss of existing populations from habitat take and indirect threats such as introduction of invasive species and increased propensity for wildfire.	Two endangered plants: *Haplostachys haplostachya* and *Stenogyne angustifolia* within 500 feet of W-7 [REF: 3.18.1]	Potential for impact due to wildfire in threat not minimized. [REF: 3.18.2]
Important Farmland.	Direct take of farmland and indirect effects to ability to use farmland.	Other Important Land (grazing) in W-7 alignment in military use, unavailable for farming in foreseeable future. [REF: 3.2.1]	No loss of farmland that can be used for farming because of dedication to military use. [REF: 3.2.1]
Community Character, Socioeconomic Health, Economy.	Dividing communities; presenting barriers to travel, walking, or biking; inducing inappropriate growth; bypassing communities.	No communities adjacent to W-7 alignment; Waiki'i within 2 miles, and Waikoloa within 6 miles. [REF: 3.3.2.1, 3.3.3.1, 3.3.3.1]	Benefits to Waiki'i through traffic reduction; minimal growth induction potential minimal because of existing land use regulations and lack of infrastructure in areas newly accessed. Drive-by business in existing commercial areas on island will not be reduced [REF: 3.3.2.2, 3.3.3.2, 3.4.3.2]
Recreational Areas.	Direct take of recreational areas or indirect impacts on quality of recreational areas.	No hunting or other recreational land, as land is in military use. [REF: 3.3.4.1]	Project will not involve loss of hunting land or other recreational land and may open up new hunting land. [REF: 3.3.4.2]
Historic Properties.	Direct destruction of historic properties and indirect effects on qualities that give historic property its significance.	Archaeological sites from ranching era in W-7 alignment area and adjacent areas. [REF: 3.19.2.1]	Destruction of a portion of one archaeological site, a road alignment from the early 20th century. [REF: 3.19.2.2]
Areas for Practice of Traditional Culture.	Direct loss of gathering and other cultural areas, and indirect impacts to quality of experience due to noise, increased access, etc.	No gathering or other cultural areas identified in area on or near W-7 corridor. [REF: 3.19.3.1]	No impacts. [REF: 3.19.3.2]
Visual Quality.	Loss or degradation of quality of scenic landmarks, viewpoints, vistas, and general landscape.	Project would insert built landscape in area currently without structures. [REF: 3.21.1]	Potential for degradation of scenic resources. [REF: 3.21.2]

Notes: REF = SEIS Section reference. Resources in italics in Column 1 carried forward for further analysis.

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(W7)		



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CENTRAL FEDERAL LANDS HIGHWAY DIVISION

FIGURE 6.3.1

CUMULATIVE IMPACT RESOURCE STUDY AREAS FOR NATIVE ECOSYSTEMS AND THREATENED AND ENDANGERED SPECIES

Scale: As Noted Date: Sept. 2009

SHEET No. 1 OF 1

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STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(W7)		

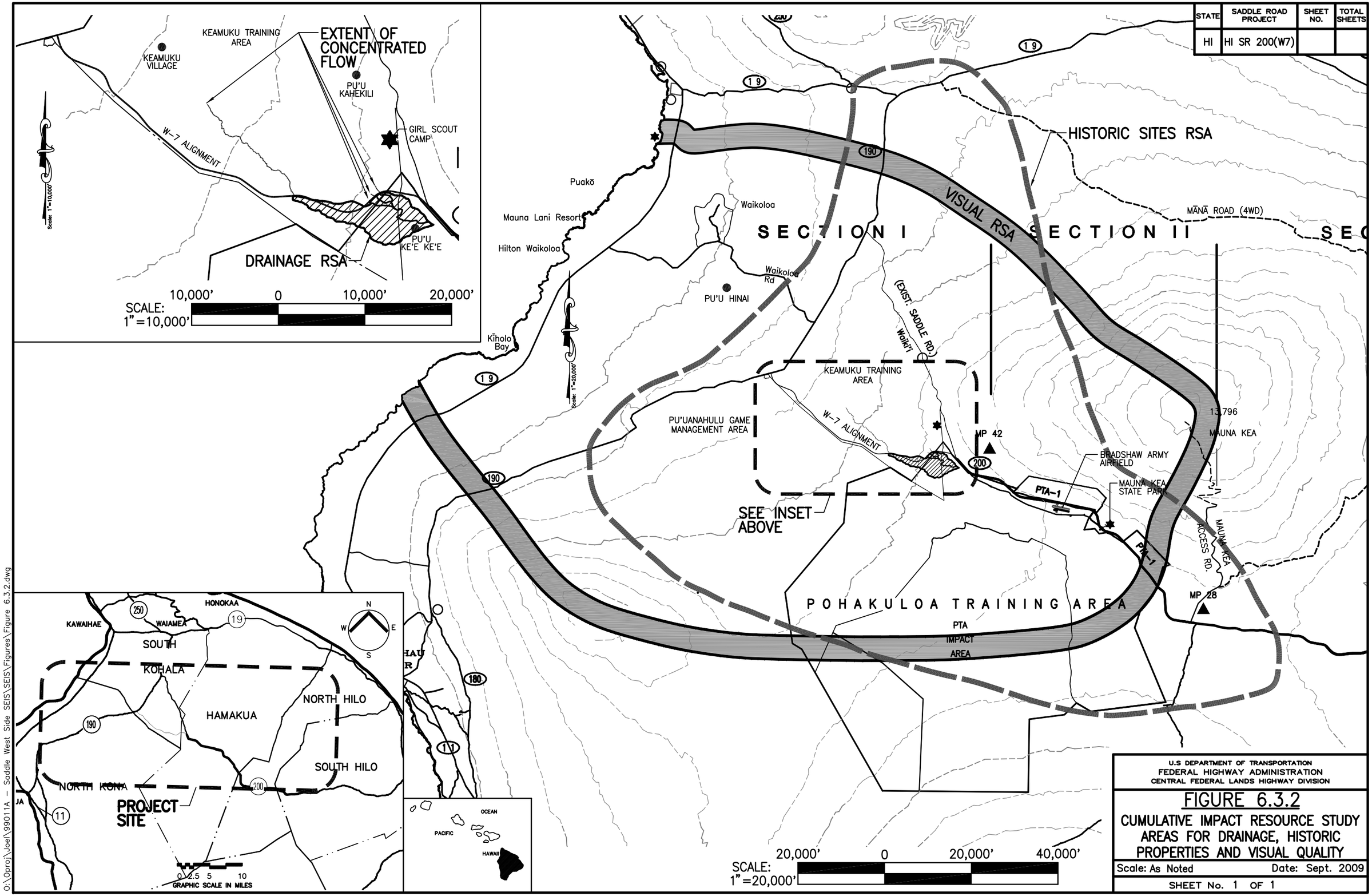

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FIGURE 6.3.2

CUMULATIVE IMPACT RESOURCE STUDY AREAS FOR DRAINAGE, HISTORIC PROPERTIES AND VISUAL QUALITY

Scale: As Noted Date: Sept. 2009

SHEET No. 1 OF 1

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6.3 Delineation of Resource Study Areas for Impacted Resources

Cumulative impacts need to be considered within spatial (geographic) and temporal boundaries. It is usually necessary to define a unique study area for each resource rather than a single, consolidated study area. To clearly understand the health of a resource, the resource must be viewed in its appropriate geographical context. A Resource Study Area (RSA) was defined for each resource for which the project had an adverse impact that might accumulate with impacts from other projects. The RSAs provided a logical unit for analysis of the existing state of a resource and effects to it. These RSAs were determined in consideration of scoping comments, subsequent agency communications, and the specialist resource studies contained in the appendices to this SEIS. Table 6.3.1 lists RSA by resource, and Figures 6.3.1 and 6.3.2 provide maps that illustrate each RSA.

Table 6.3.1
Resource Study Areas for Resources Under Study for Cumulative Impacts

Resource	Description of Study Area
Historic Properties	*Mauka* ranching areas of Northwest Hawaiʻi from Puʻu Waʻawaʻa to Waimea to Humuʻula Sheep Station.
Native Ecosystems	Areas on slopes of Mauna Kea and Mauna Loa and saddle between them, particularly on PTA, supporting *Dodonaea* and *Chenopodium* shrubland and *Eragrostis* grassland.
Threatened and Endangered Plant Species	PTA, which includes current and much of historic range of *Haplostachys haplostachya* and *Stenogyne angustifolia.*
Drainage Areas	Drainages crossed by W-7 alignment, which are potentially affected by increase in road runoff.
Visual Quality	Viewshed for drivers and others on Mamalahoa Highway and existing Saddle Road towards the coast and the mountains Mauna Loa, Mauna Kea, and Hualālai.

The rationale for each RSA is discussed below:

Historic Properties RSA. Relatively few pre-Western contact historic properties are present in the area, but there are abundant archaeological sites and other historic properties reflecting the long history of ranching. The area encompassing Waimea, Puu Waʻawaʻa and the Humuʻula Sheep Station was united by ranch ownership, trade, transportation, and social relationships during the 19th and first half of the 20th centuries, and similar historic properties and values are present.

Drainage RSA. Because of the recent lava substrate, which readily soaks up rainwater, the only areas potentially affected by additional runoff quantities generated by the road are the four ephemeral drainages into which a portion of the runoff will be directed. These ephemeral drainages are short, ending in natural settling basins between lava flow hummocks. There are no FEMA-designated and mapped floodplains in the RSA.

Native Ecosystems RSA. The vegetation types with moderate ecosystem value in the W-7 area are *Dodonaea* and *Chenopodium* shrubland and *Eragrostis* grassland. These types are well-mapped within Pohakuloa Training Area (PTA) but not mapped intensively outside PTA, although they exist. For this reason, the RSA concentrates on the distribution within PTA, though the analysis discusses the wider range of these types.

Threatened and Endangered Plant Species RSA. The current range of these plants is well known and they are exclusively found within several sites in western PTA. For this reason, the entire PTA serves as an appropriate RSA.

Visual Quality RSA. The viewshed for drivers and others on Mamalahoa Highway and existing Saddle Road towards the coast and the mountains Mauna Loa, Mauna Kea, and Hualālai was selected as the RSA because these are the viewpoints from which the landscape alterations produced by the W-7 alignment will occur. This broad area offers unique, far-ranging scenic vistas with brown and black lava flows, straw-colored grasslands, rounded cinder cones, snow-capped mountains, and distant glimpses of turquoise coastal waters and expanses of the open ocean.

6.4 Description of Current Health and Historical Context of Each Resource

The next step in the cumulative impact analysis consisted of describing the current health, condition, or status of each affected resource within its respective RSA, including the recent trends. "Health," as it is used here, refers very broadly to the overall condition, stability, or vitality of a resource, regardless of whether it is natural, cultural or social. To provide a deeper context, the analysis looks at historical trends to evaluate how each resource got to its current state. The health of each resource within its RSA is discussed below.

Health of Historic Properties in the RSA. No full database of ranching archaeological sites in this broad area appears to exist, but project archaeologists believe that tens of thousands of features have been inventoried as part of resource studies over the last 40 years for proposals for land development, public infrastructure, military activities, and other projects. These included fences, trail markers, temporary camps, corrals, work areas, and other sites. Many archaeological sites and other historic properties from the ranching era in Waimea, Keʻāmuku, Waikiʻi, Puʻu Waʻawaʻa and Humuʻula have been preserved as part of community planning and private efforts for the major historical ranches that anchored the economy and social life of the area from as early as 1830 until a few decades ago. Table 6.4.1 lists selected historic properties related to ranching in the RSA, whether they have been formally inventoried or not. Based on the extensive preservation of major representative elements of the ranching era with substantial information content or interpretive value, the resource can be described as in good health.

Table 6.3.2
Partial List of Ranching Era Historic Properties Resource Study Area

Property	Location	State Historic Site No. (prefix 50-10)	Preservation Status
Parker Ranch. Parker Ranch has long been one of the largest ranches in the U.S., almost two centuries old. John Parker came to Hawai‘i in 1809 and worked for King Kamehameha. Rewarded with right to hunt wild bullock, builds salt beef and hide industry. Began ranching in Waimea in 1816. Alfred Carter led ranch through growth of late 19th century, when it acquired much adjacent land, from Humu‘ula to Waikoloa.			
Parker Race Track: Track (1901); Horse Barn (1915); Attendant House and Stallion Barn (1930).	Waimea		In use; preserved.
Parker Ranch Mana Complex (1847); Spencer Home (1875); Manager’s House (1885); Kahilu Hall (1918) Slaughter House/ Minuke Ole pen (1940s)			Preserved as part of Parker Ranch.
Pukalani Complex: Puhihale Complex, Breaking Pen Stables, Carriage Barn (Surgery Barn), Blacksmith Stable, Pukalani Stables (1800s).			Preserved; Carriage Barn converted to Surgery Barn in 1975. Complex under study for heritage center/museum
Misc: Kemole Corral. Pu‘u Kikoni Corral (1930), Pu‘u Kikoni Dairy (New Dairy (1920). Mana House Complex. Makahalau Complex: Corn Crib and Silo (1914); Cowboy Camp House (1920); Makahalau Stables and Corral (1920); Purebred Bull Barns (1935). Hanaipoe Line Cabin (1930s). Waiku‘u Complex: Corn Silos (1914); Cooking ovens (1915); Large Barn, Corn Crib and Cowboy Stable Barn (1920); Attendant Corral, Homes and Quonset Huts (various dates); Russian and Portuguese ovens.			Many preserved, some reused.
Old Lindsey House (1920s).	Waimea	06-7520 4/24/1999	Private, preserved, restored 2004.
Anna Ranch (aka Lindsey Ranch and Waiauia Ranch) (ca. 1910).	Waimea	06-9027 4/28/2008 (National)	Private, preserved
Waiki‘i Ranch: Originated as sheep station in 1882, acquired later by Parker Ranch. The village in Waiki‘i began in 1904 with water pipeline from Kohala. Between 1900 and 1957, a number of families, Hawaiians as well as immigrants from China, Germany, Japan, Portugal, and Russia, were brought in. Ranch had rich fattening paddocks, fruit orchards, fowl-raising, and at one time over 2,000 acres of corn. Also served as base for sheep operations in Ke‘āmuku and Humu‘ula. Changing transportation, markets, and weather led to closure in 1957, with most of the houses there moved to “Little Waiki‘i” in Waimea. Once had more than 20 structures, including a schoolhouse, but only a fraction remain.			
Russian camp, corn crib, stable facilities, manager’s house.	Waiki‘i		Private. Preservation status uncertain.

Keʻāmuku Sheep and Cattle Station. In 1867, Waimea Grazing and Agricultural Co. started sheep stations at Keʻāmuku, Puʻuanahulu, and Humuʻula, often disputing with Parker Ranch over land access and bullock hunting rights. One partner, Frank Spencer, built home in Keʻāmuku in 1867, and he and others raised sheep. Area acquired by Parker Ranch in 1904, sheep raising continued, along with fruit and vegetables. Combined with Waikiʻi cattle operation in 1918, sheep sent to Humuʻula. Elaborate irrigation system connected it to Kohala Mts. Keʻāmuku continued as a ranch section and in 1962 general repairs were made. Abandoned by 1965, and in 1972, the shear barn and larger (more recent) residence were dismantled. The house (bachelor's quarters) at the Keʻāmuku Section was moved to the grounds of the Japanese Church (Hongwanji) in Waimea, the shear barn was demolished, and the area around it bulldozed.			
Entire Keʻāmuku area has about 100 sites, most related to ranching. In Keʻāmuku Sheep and Cattle Station itself, 5 sites with roughly 100 features remain: surface remnants of Keʻāmuku House, with old *furo*, catchment; Lower Shear Barn, and Figure 8 corral.	Keʻāmuku	21-23499; 23515-517; 23539	Remnants of area all preserved by military.
Puʻu Waʻawaʻa Ranch. Sheep raising began in 1987. Eben Low and Robert Hind Leased 84,000 acres in 1897 by for ranching. Homesteading lots for workers later set foundation for today's traditional Hawaiian community in Puʻuanahulu. Dillingham owned from 1956-1972, with three owners since. Much of historic core of Puʻu Waʻawaʻa Ranch remains.			
Ranch HQ (1900s), Pihakalani (main ranch house) (1905-1910) worker housing, corral with old cattle chute. Hale Piula water catchment area (1930s).		20-26170 20-26171	All private. Main house restored in last decade; all planned for preservation/ adaptive reuse.
Humuʻula Sheep Station. In 1867, Waimea Grazing and Agricultural Co. started sheep stations here and elsewhere. Parker Ranch held a ranching lease from the early 1900s to 2002. Initially, Parker Ranch invested in sheep raising until 1964 and then focused on cattle operations until the end of their lease. Pasture lands were demarcated with barrier walls made of stone. The old wagon road between Waimea and Humuʻula was created to carry wool and walk sheep from the Humuʻula Sheep Station to the harbor at Kawaihae west of Waimea.			
Humuʻula Sheep Station buildings, including stables, workshops, residences. Various walls and roads	Humuʻula (Center of Saddle)	Humuʻula Sheep Station Perimeter Wall: 32-7119 Old Waimea- Humuʻula Wagon Road: 32-21150.	DHHL draft plans identify the Humuʻula Sheep Station for adaptive reuse with a mix of land uses in 3 main sub-areas: Historic/Community Center (5.5 to 6.0 acres); Open Campground (2.0 to 2.5 acres) and Commercial (7.0 to 8.0 acres), including admin, commercial, retail, lodge, and restaurant activities for visitor market.

Sources: IARII 2001; *South Kohala Community Development Plan* (County of Hawaiʻi 2008); Escott 2006; Hawaiʻi State DHHL 2009; Pers. comm. P. Ponthieux (Puʻu Waʻawaʻa architect) to R. Terry; Maly and Maly 2002: 209-210; Maly Associates 1999; Ketner et al 2008; Hawaiʻi State Register of Historic Places.

Health of Drainage Resources in RSA. As discussed above, the recent lava substrate readily soaks up rainwater, and there are few areas of widespread flooding or ponding. Ephemeral gulches run during extremely heavy rains, but since they are geologically young, they have not carved continuous courses to the sea and they outlet after short distances in natural settling basins between lava flow hummocks. None of the drainage that would outlet from the current W-7 area is known to affect any area outside the Keʻāmuku section of Pohakuloa Training Area. The Keʻāmuku property has been used for ranching for over a century, and military use to date has been light. The effects of overgrazing of the property by cattle and wild goats is apparent in places, but no quantitative or qualitative assessment of erosion rates or risk has ever been undertaken. Despite some degree of overgrazing, the health of the natural drainage in the area can be assessed as relatively good.

Health of Native Ecosystems in the RSA. All areas within these vegetation types have been moderately to heavily invaded by introduced species, particularly fountain grass (*Pennisetum setaceum*). This grass promotes fire, compounding the invasiveness and threat it poses. Domestic cattle and feral goats, pigs and sheep heavily graze natives, nearly or completely extirpating many sensitive species already threatened by other factors and radically changing species composition, promoting introduced species or hardy natives such as *Dodonaea viscosa*. This is one reason that the shrubland dominated by this plant is so pervasive in the area and can be said to be in a sustainable, if not entirely natural, state. The type found in the project area may be more specifically classified as *Dodonaea* Montane Shrubland, and it is found widely on various slopes of Mauna Kea and Mauna Loa as well as in the saddles between these mountains and between Mauna Loa and Hualālai (Wagner et al 1990:95). Under natural conditions, it appears to be a successional vegetation type that occurs in time between a forest with limited soil and a grassland (Shaw 1997). This type grades into a subalpine variety at higher elevations and a lowland type at lower elevations (Wagner et al 1990: 71, 95). On PTA alone, not counting Keʻāmuku, ecologists have calculated that *Dodonaea* shrubland makes up 6,500 acres (Shaw 1997: Table 1). In various forms, shrubland dominated by *Dodonaea* occupies tens of thousands of acres in surrounding areas, and the health of this vegetation type can be considered to be good. The other two plant communities present – *Chenopodium* shrubland and *Eragrostis* grassland – occur only on Mauna Kea and in the saddle adjacent (Ibid: 94) and are described as "rare communities" by the Hawaiʻi Natural Heritage Program. *Eragrostis* grassland has been damaged by grazing. *Chenopodium* shrubland is a subalpine community that is best developed on the flats at the base of Mauna Kea and immediately adjacent areas of the saddle, a relatively limited area (Wagner et al 1990:109). The historic range of both of these communities has been reduced, replaced by new communities dominated by fountain grass and other introduced species, and the health of these species within the ecosystems they still dominate is threatened by the factors discussed above. However, the conservation efforts within PTA have helped stabilize this community type to some degree. On PTA alone, not counting Keʻāmuku, *Chenopodium* shrubland accounts for about 354 acres, and *Eragrostis* grassland makes up about 1,166 acres (Shaw 1997: Table 1). Relatively little land outside of PTA contains these vegetation types, although the slopes of Mauna Kea just north of PTA may support several hundred acres of each type.

Health of Threatened and Endangered Plant Species in the RSA. The historic ranges of the two endangered species found near the W-7 alignment are not fully known. *Haplostachys haplostachya* was collected on ridges on Kaua‘i and various elevations on Maui, and from the Nohonaohae cinder cone in Ke‘āmuku. In recent times, at least in the wild, it has been restricted to Kipuka Kalawamauna in PTA (Wagner et al 1990: 799). *Stenogyne angustifolia* was collected in the past on Moloka‘i and Maui in addition to the various locations in the Big Island. Today it is restricted to PTA (Wagner et al 1990: 835). Endangered Species Management Units have been established within PTA at Kipuka Kalawamauna and Pu‘u Ka Pele, and these are the primary sites where *Haplostachys haplostachya* survives within the Hawaiian Islands today, whether wild or in propagation. Pu‘u Ka Pele is about 6,770 feet southeast, and the 1,400-acre Kipuka Kalawamauna is about 4,700 feet south, of the proposed W-7 corridor. A third Endangered Species Management Unit has been designated within Ke‘āmuku itself to protect and manage *Haplostachys haplostachya* and *Stenogyne angustifolia*, another endangered plant (see Figure 6.3.1). Conservation efforts within PTA, which include fencing of various areas containing endangered species, outplanting of endangered species, and periodic monitoring and remediation when necessary, are helping to stabilize the populations of these two endangered plants.

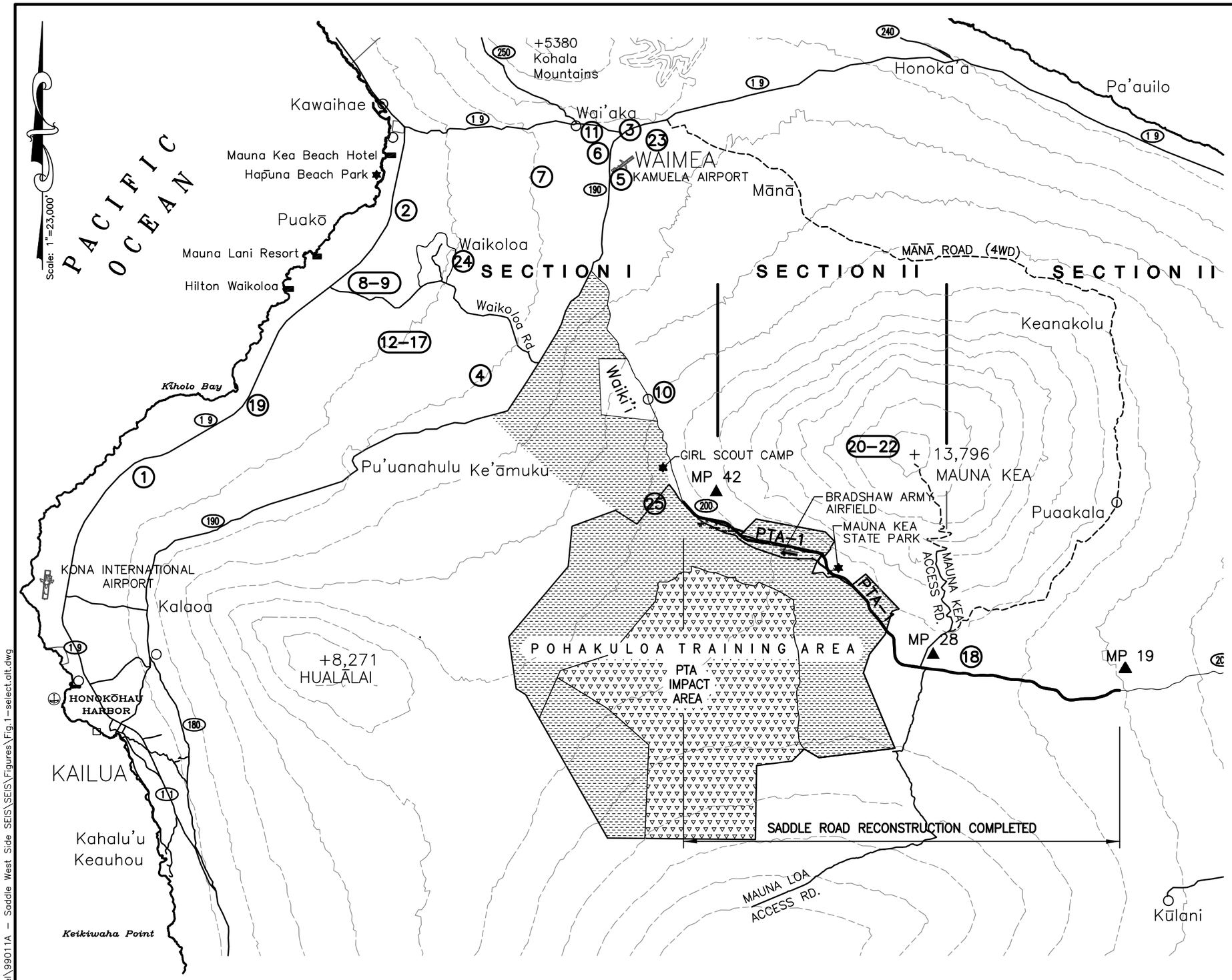
Visual Quality RSA. The viewshed for drivers and others on Mamalahoa Highway and existing Saddle Road towards the coast and the mountains Mauna Loa, Mauna Kea, and Hualālai has experienced very little alteration during the last century aside from highway development, which is the only way that most Hawai‘i residents and visitors would experience the views in this formerly remote area. There are no residential areas aside from the historic ranch homes and more recent ranch lots in Waiki‘i. Military buildings, the airport, fencing and other infrastructure at PTA are utilitarian and visually obtrusive to passing motorists, but it is relevant that the whole purpose of the original road was to access the military base; without PTA, there may never have been a Saddle Road. No commercial development is present, and there is virtually no agriculture apart from low-density grazing. A cement plant, rock quarry and asphalt plant are present within a mile of existing roads but are sufficiently set back from highways that they are almost invisible. Views in all directions from nearly every road in the RSA are panoramic and dramatic. This resource can be considered to be in good health.

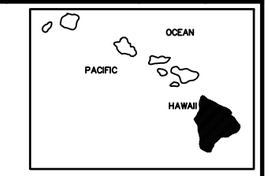
6.5 Identification of Other Reasonably Foreseeable Projects

This step of the cumulative impact analysis identified current and reasonably foreseeable transportation and non-transportation projects within the RSA for each resource. Reasonably foreseeable actions are those that are likely or probable, rather than those that are merely possible.

Table 6.5.1 includes a discussion of reasonably foreseeable projects within the RSA of all resources for which the Saddle Road project has an adverse effect. These are mapped on Figure 6.5.1. Data concerning these projects is from the Hawai‘i State OEQC *Environmental Notice*, newspaper articles, various websites, and interviews with knowledgeable individuals.

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(W7)		





LEGEND

1. SR 19 (QUEEN KA'AHUMANU HWY) WIDENING, KEAHOLE AIRPORT TO WAIKOLOA ROAD
2. SR 19 (QUEEN KA'AHUMANU HWY) WIDENING, WAIKOLOA ROAD TO KAWAIHAE
3. MAMALAHOA HWY WIDENING IN WAIMEA
4. SADDLE ROAD EXTENSION
5. WAIMEA CONNECTOR RD
6. LALAMILO CONNECTOR RD
7. KAWAIHAE BYPASS
8. PANIOLO AVE PROJECT
9. KE KUMU HOUSING AREA CONNECTOR
10. PAVING OF EXISTING SADDLE RD NEAR WAIK'I
11. LALAMILO RESIDENTIAL LOTS
12. WEHILANI, KIKAHA, AND MAKENI KAI AT WAIKOLOA
13. BRIDGE AINA LE'A
14. WAIKOLOA HEIGHTS, WAIKOLOA MA LAI LLC
15. WAIKOLOA MAKAI, WAIKOLOA LAND AND CATTLE
16. HAWAI'I COUNTY/WORKFORCE HOUSING PROJECT, WAIKOLOA
17. KILOHANA KAI, WAIKOLOA
18. DEPT. OF HAWAIIAN HOME LANDS 'AINA MAUNA LEGACY PROGRAM
19. MASTER PLAN FOR WEST HAWAI'I SANITARY LANDFILL
20. MAUNA KEA MANAGEMENT PLAN
21. THIRTY METER TELESCOPE
22. PANORAMIC SURVEY TELESCOPE & RAPID RESPONSE SYSTEM (PAN-STARRS)
23. WAIMEA TOWN CENTER (PARKER RANCH 2020)
24. INDUSTRIAL USE DEVELOPMENT; BAY PACIFIC DEVELOPMENT, WAIKOLOA
25. TRANSFORMATION OF 2ND BRIGADE, 25TH LIGHT INFANTRY DIVISION (L) TO STRYKER BRIGADE COMBAT TEAM

U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

FIGURE 6.5.1
LOCATION OF ONGOING PLANNED PROJECTS

Scale: As Noted | Date: Sept. 2009

SHEET No. 1 OF 1

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Table 6.5.1
Description of Reasonably Foreseeable Project in Resource Study Areas

SR 19 (Queen Ka‘ahumanu Highway) Widening; Keahole Airport to Waikoloa Road [1]	
Summary of Project and Impacts	Summary of Mitigation
Project: Would widen highway from two to four lanes with separate turning lanes at major intersections for a length of 17 miles; Visual Impacts: Create more urban appearance for drivers on and viewers of highway.	None yet proposed.
SR 19 (Queen Ka`ahumanu Highway) Widening; Waikoloa Road to Kawaihae [2]	
Summary of Project and Impacts	Summary of Mitigation
Project: Would widen highway from two to four lanes for a length of 7 miles with separate turning lanes at major intersections. Visual Impacts: Create more urban appearance for drivers on and viewers of highway.	None yet proposed.
Mamalahoa Highway Widening in Waimea [3]	
Summary of Project and Impacts	Summary of Mitigation
Project: Widen from two lanes to four lanes with separate turning lanes at major intersections inside existing urban area of Waimea; Historic Properties Impacts: Would approach historic buildings present near Lindsey Road.	Project would likely avoid historic buildings, in keeping with previous widening projects.
Saddle Road Extension [4]	
Summary of Project and Impacts	Summary of Mitigation
Project: New two-lane highway from western terminus of Saddle Road Realignment on Mamalahoa Highway to Queen Ka‘ahumanu Highway. Visual Impacts: Insert urban feature in landscape that currently has no development; would be highly visible from Saddle Road, Mamalahoa Highway, parts of Waikoloa Road. Historic Properties Impacts: one ranching feature may be destroyed. Native Ecosystems Impacts: Eastern portion of project includes about 50 acres of *Dodonaea* shrubland clearing.	Project will minimize cut and fill to avoid landscape scarring. Historic sites have been assessed and largely avoided. Project will include landscaping with native species.
Waimea Connector Road [5]	
Summary of Project and Impacts	Summary of Mitigation
Project: New 1.2 mile two-lane street in urban Waimea with separate turning lanes at major intersections from Mamalahoa Hwy/Kamamalu intersection to Kamuela Racetrack. Historic Properties Impact: Approaches historic sites.	Routed to avoid Puhihale Pen, a historic stone enclosure from 19th century near Lindsey Road.

Table 6.5.1, continued

Lalamilo Connector Road [6]	
Summary of Project and Impacts	Summary of Mitigation
Project: New 1.7 mile two-lane street in urban Waimea from Kawaihae Road near Waiaka Bridge to Mamalahoa Hwy at Kamuela Racetrack. Historic Sites Impacts: None known.	None proposed yet.
Kawaihae Bypass [7]	
Summary of Project and Impacts	Summary of Mitigation
Project: A new $38.0 M, 15-mile major arterial highway with truck climbing lanes that realigns existing Kawaihae Road, from Waimea to Kawaihae. DEIS slated for March 2010. Historic Sites Impacts: Under study. Visual Impacts: Insert urban feature in landscape that currently has limited development; corridor would not likely be visible from existing or new Saddle Road, Mamalahoa Highway, or Waikoloa Road.	None proposed yet.
Paniolo Avenue Project [8]	
Summary of Project and Impacts	Summary of Mitigation
Project: $55.4 M extension of Paniolo Avenue in Waikoloa north as a 4-lane arterial to connect to planned Kawaihae Bypass Road and existing Kawaihae Road (and possibly Kohala Ranch). Historic Sites Impacts: Not yet studied. Visual Impacts: Insert urban feature in landscape that currently has limited development; corridor would not likely be visible from existing or new Saddle Road, Mamalahoa Highway, or Waikoloa Road (outside urban Waikoloa Village).	None proposed yet.
Ke Kumu Housing Area Connector [9]	
Summary of Project and Impacts	Summary of Mitigation
Project: New two-lane access road from Ke Kumu Housing area onto Paniolo Drive in Waikoloa. Visual Impact: Generally within existing urban area, and corridor would not likely be visible from existing or new Saddle Road, Mamalahoa Highway, or Waikoloa Road (outside urban Waikoloa Village).	None proposed yet.
Paving of existing Saddle Road near Waiki‘i [10]	
Summary of Project and Impacts	Summary of Mitigation
Project: Gradual paving of existing Section I of Saddle Road for safety purposes. Historic Properties Impacts: None, as it involves existing paved area and shoulder. Visual Impacts: Insubstantial.	None.

Table 6.5.1, continued

Hawaiian Home Lands Lalamilo Residential Lots [11]	
Summary of Project and Impacts	Summary of Mitigation
Project: $28.2 M construction of 400 residences with 10,000 sf lots. Phase I of this project is underway with construction of 36 residences. The 37-unit Phase 1 is under construction; some units already occupied. Phase 2 has an offsite water systems, and 3 increments with a total of about 320 lots, with the final increment to be complete in 2014. Historic Sites Impacts: 75 sites with 818 features present, few from historic era and no preservation ranching sites. Visual Impacts: Changes character of Waimea by expanding urban area by 250 acres. Would not be visible from existing or new Saddle Road, Mamalahoa Highway, or Waikoloa Road.	Historic Properties: impacts mitigated by data recovery and preservations. Visual Impacts: mitigated by open space, landscaping, and covenants.
Wehilani, Kikaha and Makani Kai at Waikoloa [12]	
Summary of Project and Impacts	Summary of Mitigation
Project: Total of about 700 units on 256 acres adjacent to Golf Course. Said to require "live-in" residents – no part-timers. "Entry-level," "mid-market," and "upper market" homes are all planned. Started in 2005, not complete. No budget available. *Current status of project is uncertain*. Visual Impact: Adds substantially to existing urban area at Waikoloa. May be partially visible from new Saddle Road.	Visual Impacts: mitigated by open space, landscaping, and covenants.
Bridge Aina Le‘a [13]	
Summary of Project and Impacts	Summary of Mitigation
Project: 3,000 acres at Puako Mauka. Up to 1,924 homes and several golf courses are permitted. 384 affordable units, 25-acre commercial. *Current status of project is uncertain.* Visual Impacts: Adds substantially to existing urban area below Waikoloa Village and east of coastal resorts. May be partially visible from new Saddle Road.	Visual Impacts: mitigated by open space, landscaping, and covenants.
Waikoloa Heights, Waikoloa Ma Lai LLC [14]	
Summary of Project and Impacts	Summary of Mitigation
Project: A 570-640 unit development is planned beginning soon on 800 acres, 1st phase about 2750 units. The Paniolo Road Extension is required as part of the project. *Current status of project is uncertain.* Visual Impacts: Adds substantially to existing urban area at Waikoloa. May be partially visible from new Saddle Road.	Visual Impacts: mitigated by open space, landscaping, and covenants.
Waikoloa Makai, Waikoloa Land and Cattle Company [15]	
Summary of Project and Impacts	Summary of Mitigation
Project: 140-160 condominium units, 10 lodges, an 11,500 square-foot (sf) spa facility, a 7,500-sf restaurant, a 3,000-sf recreation center, and a 4,000 sf admin and service facility on 27 acres near Ku‘uali‘i Pl. off Waikoloa Beach Dr. *Current status of project is uncertain*. Visual Impacts: Adds substantially to existing urban area at Waikoloa resort area. May be partially visible from new Saddle Road.	Visual Impacts: mitigated by open space, landscaping, and covenants.

Table 6.5.1, continued

Hawai‘i County/ Workforce Housing Project [16]	
Summary of Project and Impacts	Summary of Mitigation
Project: 1,000-1,200 units including small family homes and condos on 260 acres. Project has been seriously delayed; funding and timeline are not yet certain *Current status of project is uncertain.* Visual Impacts: Adds substantially to existing urban area at Waikoloa. May be partially visible from new Saddle Road.	Visual Impacts: mitigated by open space, landscaping, and covenants.
Kilohana Kai; Hawaiian Island Homes [17]	
Summary of Project and Impacts	Summary of Mitigation
Project: 250 lots in Waikoloa. Initial phase 31 homes. *Current status of project is uncertain.* Visual Impacts: Adds substantially to existing urban area at Waikoloa. May be partially visible from new Saddle Road.	Visual Impacts: mitigated by open space, landscaping, and covenants.
Department of Hawaiian Home Lands ‘Āina Mauna Legacy Program Projects at Humu‘ula. [18]	
Summary of Project and Impacts	Summary of Mitigation
Project: DHHL is rethinking its plans for 56,200 acres in Humu‘ula/ Pi‘ihonua, adjacent to Saddle on northeast slopes of Mauna Kea. Includes economically self-sustaining improvement and preservation program for natural and cultural resources, with invasive species eradication, native ecosystem restoration, revenue generation, reinvestment in land to sustain activities, alternative/renewable energy projects, and educational and cultural opportunities, and ecotourism. Historic Properties: Historic properties at Humu‘ula Sheep Station involved.	Historic Properties: Preservation and adaptive re-use planned for Humu‘ula Sheep Station.
Master Plan for West Hawai‘i Sanitary Landfill [19]	
Summary of Project and Impacts	Summary of Mitigation
Project: In early stages of formulation for providing for additional reuse and recycling services. Visual Impacts: Would alter existing land near landfill with up to 100 acres of additional solid waste features such as scrapyards, greenwaste facilities.	None proposed yet.

Table 6.5.1, continued

Mauna Kea Management Plan [20]	
Summary of Project and Impacts	Summary of Mitigation
Project: Implementation of plans for managing cultural and natural resources. Visual Impact: Will assist in minimizing visual impact of proposed facilities.	None needed.
Thirty Meter Telescope [21]	
Summary of Project and Impacts	Summary of Mitigation
Project: Construction and operation of a $1 billion, 30-meter diameter primary mirror optical/infrared observatory and ancillary facilities on 5 acres on north slope of Mauna Kea, with access way, improvements to Hale Pohaku; a Headquarters above UH Hilo campus; and a Satellite Office in Waimea. Visual Impact: 180-foot tall facility will be dramatically visible from RSA.	Facility surface is reflective to reduce overall visibility against sky.
Panoramic Survey Telescope & Rapid Response System (Pan-STARRS) [22]	
Summary of Project and Impacts	Summary of Mitigation
Project: Institute for Astronomy (IfA) project on Mauna Kea within footprint of the existing UH 2.2m telescope. Pan-STARRS technology consists of four optical segments, each with digital camera, with goal to discover and characterize asteroids and comets that might pose a danger to Earth. Visual Impact: On summit and will be only minimally visible from RSA.	Dome designed to fit in a reduced 3-D footprint of existing UH 80-inch scope; dome rotates to avoid sunglare to sensitive receivers.
Waimea Town Center (Parker Ranch 2020) [23]	
Summary of Project and Impacts	Summary of Mitigation
Project: Ongoing (Parker Ranch Center completed), commercial operations and industrial park planned. Further residential development also planned. Historic Properties Impacts. Numerous ranching-era and other historic properties in area.	Key component of the Parker Ranch Trust is to "Protect historical and cultural resources through the preservation of important sites and areas."
Industrial Use Development; Bay Pacific Development [24]	
Summary of Project and Impacts	Summary of Mitigation
Project: Industrial development on 14 acres near Waikoloa (TMK 6-8-2:33). Visual Impacts: Adds substantially to existing urban area at Waikoloa. May be partially visible from new Saddle Road.	None known to be proposed.

Table 6.5.1, continued

Expansion of Military Training at PTA into Keʻāmuku and Intensification of Training Elsewhere [25]	
Summary of Project and Impacts	Summary of Mitigation
Components include: Transformation of 2nd Brigade, 25th Light Infantry Division (L) to Stryker Brigade Combat Team. Army has acquired 23,000 acres and is starting to build and modernize training facilities and infrastructure. "Ground softening" would bulldoze lava for a softer training surface. Training activities to avoid rare species or cultural features. No live-fire. Substantial rise in barge, tank trail and air traffic. Project described elsewhere in this SEIS. Native Ecosystems Impacts: military training may affect *Dodonaea* shrubland. Two rarer vegetation types are on main part of PTA (outside Keʻāmuku), where training already occurs. Threatened and Endangered Plant Species Impacts: endangered species have been inventoried, marked, and protected in preserves. Historic Properties Impacts: all historic sites have been inventoried, protected and are being preserved. Visual Impacts: addition of built features, dust-generating activity.	Visual: establish minimum 1,000-foot noise buffer around the Waikiʻi Ranch property and the Kilohana Girl Scout Camp. Consider training guidelines to minimize nighttime training activities that involve weapons fire or aviation activity within a minimum of 2,000 feet of those properties. Native ecosystems: wherever practicable: construct military vehicle trails to conserve existing natural features including terrain and vegetative cover, follow slope of land, blend cut slopes into landscape. Fence or flag any sensitive plant communities from activities. Use native plants in any new landscaping or planting efforts. Keep natural habitats intact or restore adjacent areas would be restored as habitat.

Only impacts and mitigation that correspond to appropriate Resource Study Areas are included. Superscript numbers also correspond to Key Number on Figure 6.5.1. Sources and notes:
[1] Hawaiʻi Department of Transportation (HDOT), Hawaiʻi Long Range Land Transportation Plan HLRLTP
[2] HDOT; HLRTP; [3] HDOT/County of Hawaiʻi Project Updates website (CofH); HLRTP [4] HLRTP; CofH
[5] HDOT, HLRTP, EIS in preparation.
[6] http://www.waimeaplan.org/issues/roadways/lalamilo_connector.html
[7] HDOT IHLRHP, & Federal Register, 11/29/02 (V. 67, #230). OEQC Env. Notice 4/23/09
[8] County HCGP, HLRTP; Noted as Waikoloa Village-Kawaihae Connector "C-26 Proposed Road" in Hawaii County General Plan (HCGP), Transportation - Roadways, map F.
[9] County HCGP. [10] Ongoing existing County project. [11] DHHL Hawaiʻi Island Plan, 2002 (project in progress)
[12] Castle and Cooke, Waikoloa Village Association; Waimea CDP comm.
[13] http://luc.state.hi.us/ & Waimea CDP com; latest plan update in OEQC Env. Notice 12/28/07.
[14] Source: Lynch Investments, Waikoloa Village Association, Honolulu Star Bulletin, Waimea CDP comm.
[15] OEQC Env. Notice 10/7/05. [16] Waikoloa Village Association; Waimea CDP comm. [17] Waimea CDP comm.
[18] ʻĀina Mauna Legacy Program Executive Summary – 8/31/09. https://secure.logmein.com/f?k-ov2-zFW9RdP22KDVgEGf2LChqyqVNkpQ4UMQ5iVb4
[19] County of Hawaiʻi (pers. comm. M. Dworsky, Solid Waste Div., to R. Terry).
[20] University of Hawaiʻi. OEQC Env. Notice 4/23/09. [21] University of Hawaiʻi. OEQC Env. Notice 5/23/09.
[22] University of Hawaiʻi. OEQC Env. Notice 1/8/07.
[23] http://www.parkerranch.com/Parker-Ranch/214/waimea-town-center-plan
[24] http://hawaiicounty.com/planning/commission/transcripts/013004/BayPacific013004.pdf
[25] http://www.ttsfo.com/sbcteis/feis/index.htm

6.6 Assessment of Potential Cumulative Impacts

Table 6.6.1 summarizes the manner in which impacts from the proposed project will combine and interact with those of other projects. The table is followed by a discussion of the principal cumulative impacts.

Table 6.6.1
Cumulative Impact Assessment Summary

Historic Properties, Ranching Era Sites				
Historic Character	**Current Character**	**Effect of Proposed Action**	**Effects from Future Actions**	**Overall Cumulative Effect from Past, Present and Reasonably Foreseeable Future Projects**
Large variety of sites scattered on landscape; some degrading through neglect, others inventoried, yielding preserved sites and data.	Tens of thousands of inventoried features. Many high quality sites preserved in public or private hands.	Destruction of about 120-160 feet of Old Waimea-Kona road, representing less than 0.1 percent of site.	Land development will first inventory and then destroy non-preservation quality sites and preserve many additional higher quality sites. Army preserving all sites in Keʻāmuku, Saddle Road Extension impacts not yet fully determined, but no preservation designated sites inventoried to date.	Future actions will not damage the best representatives of the ranching history, which are preserved and have supplied abundant information and interpretation opportunities in a number of locations. Additional data and preservation sites will result through future actions. No substantial adverse impact.
Drainage Areas				
Historic Character	**Current Character**	**Effect of Proposed Action**	**Effects from Future Actions**	**Overall Cumulative Effect from Past, Present and Reasonably Foreseeable Future Projects**
Four drainages with downstream sections between 0.1 and 3.2 miles in length affected. No development, little alteration, some overgrazing altering runoff and erosion.	Under military use, drainages may require crossing as part of training.	Adds up to 50 percent more 50-year storm runoff to drainages that currently have minor flows between 6 and 135 cfs.	Military use may slightly alter runoff characteristics of drainage basins. As this area is planned for military maneuvers that would simulate natural and human-altered landscapes in which U.S. military action would occur, this alteration does not cause problems.	Additional runoff, but within capacity of existing drainages; no resources at risk, as drainages do not reach other waters and no drainage sensitive uses are/will be present in affected area.

Table 6.6.1, continued

Native Ecosystems				
Historic Character	**Current Character**	**Effect of Proposed Action**	**Effects from Future Actions**	**Overall Cumulative Effect from Past, Present and Reasonably Foreseeable Future Projects**
Dodonaea shrubland area reduced but relatively stable, *Chenopodium* shrubland and *Eragrostis* grassland ranges reduced by effects from fountain grass, fire, predation, competition.	*Chenopodium* shrubland and *Eragrostis* grassland are considered "rare communities" by the Hawai'i Natural Heritage Program.	Destruction of approximately 45.0 acres of *Dodonaea* shrubland, 12.1 acres of *Chenopodium* shrubland and 15.5 acres of *Eragrostis* grassland.	Loss of <50 acres of *Dodonaea* shrubland in Saddle Road Extension. Military training will affect all types, but PTA conservation actions preserving much of these ecosystems. All persist in presence of military training, indicating these types may continue to be sustaining, although uncertainty exists. Both projects pose risk of additional wildfire ignition sources.	In context of existing overall minimum of tens of thousands of acres of *Dodonaea* shrubland, impact is negligible. Loss of 12.1 acres of *Chenopodium* shrubland in context of 354 acres within PTA alone, and 15.5 acres of *Eragrostis* grassland in context of 1,166 acres within PTA alone. The loss of the two rarer types primarily involves more degraded habitat areas surrounded by existing roads. No unique ecosystem relationships with other organisms known that would elevate nature of effect beyond proportional acreage loss. Habitat is not highly vulnerable to fragmentation. Invasive plant species may be slightly more effective, but effect is not substantial. Wildfire a risk, but *Chenopodium* and *Eragrostis* both species readily sprout after fires.

Threatened and Endangered Species				
Historic Character	**Current Character**	**Effect of Proposed Action**	**Effects from Future Actions**	**Overall Cumulative Effect from Past, Present and Reasonably Foreseeable Future Projects**
Shrinking range from wide areas in Saddle and other islands to ever narrower distribution.	Endangered Species Management Units (ESMU) within PTA: Ke'āmuku, Kipuka Kalawamauna, Pu'u Ka Pele to help stabilize species.	Avoids areas with individuals, places road within 500 feet of an ESMU, posing potential wildfire danger, although mitigated by project design.	Continuing training at PTA poses risks, but mitigation benefits for fire and species preservation may outweigh adverse impacts. Saddle Road Extension poses another highway wildfire ignition source, but eight miles away, reducing severity.	Mitigation efforts of PTA specified in Transformation EIS, IWFMP, and existing Biological Opinions for training, combined with W-7 highway design, will result in increased propagation of these species and protection of ESMUs.

Visual Quality				
Historic Character	**Current Character**	**Effect of Proposed Action**	**Effects from Future Actions**	**Overall Cumulative Effect from Past, Present and Reasonably Foreseeable Future Projects**
Viewshed has not been highly subject to major landscape alterations, but subtle effects from plant community change and fire are present.	Viewshed offers unique, far-ranging scenic vistas that are relatively pristine.	Will insert a built element into the environment, changing the vistas.	Military training will insert scattered structures and periodically raise visible dust. Saddle Road Extension will have effects similar to Saddle Road. Limited portions of several thousand acres of proposed Waikoloa development will be visible in the distance.	The scenic vistas that are currently enjoyed from most of the existing Saddle Road and Mamalahoa Highway will not be altered. Viewsheds for drivers in a limited area near the junction of W-7 and Mamalahoa Highway will be altered to include elements of a more urban character from the cumulative impact of the Saddle Road, the Saddle Road Extension, military training, and urban development.

6.7 Need for and Potential Efficacy of Mitigation

FHWA's NEPA implementing regulations call for the consideration of mitigation for all adverse impacts. With cumulative impacts, determining feasible mitigation measures is often difficult. In many cases, a cumulative impact results from the combined actions of numerous agencies and private entities. The requirement to implement a potential mitigation measure to address a cumulative impact is often beyond the jurisdiction of highway or cooperating agencies. Therefore, development of mitigation for cumulative impacts is not based on or limited to specific mitigation measures that can be implemented by the lead agency. However, a project may provide opportunities for the project proponent to propose innovative cumulative impacts solutions. If it is not possible to identify a mitigation measure, the discussion may consist of listing the agencies that have regulatory authority over the resource and recommending actions those agencies could take to influence the sustainability of the resource. By doing so, the needed mitigation would be disclosed to the public and reviewing agencies even though it could not be implemented by the lead agencies. Once disclosed, the information could be used to influence future decisions or to help identify opportunities for avoidance and minimization when other projects are proposed.

The following provides a discussion of proposed mitigation, if any, by resource category. For the resources of historic properties and drainage areas, there are no adverse cumulative impacts that require mitigation.

The primary cumulative impact on native ecosystems and threatened and endangered species attributable to the Saddle Road Improvement Project and other foreseeable projects, particularly the Saddle Road Extension and increased military training at PTA, is additional wildfire ignition sources. Extensive wildfire mitigation is in place for military training, as described in Section 3.9. The Saddle Road Improvement project design has included coordination with the Army to determine a Typical Section design that would be effective in preventing fires and maximizing fire-fighting benefits of the road corridor. Additional proposed mitigation is for the Saddle Road Extension to continue coordination with the Army, the U.S. Fish and Wildlife Service, and the Department of Land and Natural Resources to formulate Typical Section design, and other mitigation if necessary, that takes into account the cumulative effects on wildfire.

The cumulative impact to visual quality is primarily a concern at and near the junction of the W-7 alignment and Mamalahoa Highway. Design for Saddle Road has included minimization of the amount of cut and fill slopes, revegetation of disturbed areas, and blending any proposed improvements into the surrounding landscape. Specific measures are outlined in Section 3.21.3. It is recommended that the Saddle Road Extension adopt these design methods to minimize visual impact, particularly in the area within a mile of Mamalahoa Highway, where all three highways will be highly visible.

As the Saddle Road Extension is an HDOT project, the mitigation related to fire and visual impacts is likely to occur and to be effective if the project occurs.

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CHAPTER 7 DRAFT SECTION 4(f) EVALUATION

Section 4(f) statute language (49 USC Section 303) states that the Department of Transportation may not approve the use of land from a significant publicly owned public park, recreation area, or wildlife and waterfowl refuge, or a significant historic site unless it determined that: 1) there is no feasible and prudent alternative to the use of Section 4(f) land; and (2) the project includes all possible planning to minimize harm to any such 4(f) facility. A project may also be approved if it has only *de minimus* impacts to a resource, as defined in the statute. Due to the sensitive nature of historic sites, information that would reveal their exact locations are not included in this evaluation. Maps showing cultural resource locations are provided in the report entitled *An Archaeological Inventory Survey Report for 600 Acres Located on Lands of Keʻāmuku, Waikoloa Ahupuaʻa, South Kohala District, Hawaiʻi Island [TMK (3) 6-7-001:09]*.

7.1 Background and Proposed Action

Saddle Road is the shortest and most direct route across the island of Hawaiʻi, linking the historical main population centers of the island in East Hawaiʻi with the growing west side, where the economy is anchored by tourism. It extends 47 miles from Kaumana, above Hilo, to an intersection with Mamalahoa Highway 7 miles south of Waimea (Figure 7-1). It is the only road serving the Pohakuloa Training Area (PTA), the Mauna Kea Astronomical Observatory Complex, the Mauna Loa atmospheric observatory complex, the ranching and residential areas of Waikiʻi Ranch and Kaumana City, Mauna Kea State Park and other recreational areas.

Built by the Army to access PTA in World War II, it was not originally designed to State highway standards. In 1992, when project planning began, the entire Saddle Road was a narrow, winding, two-lane road with steep grades, sharp curves, poor pavement conditions, substandard drainage, and high accident rates. Despite its poor conditions, Saddle Road was becoming increasingly important for access to PTA, Mauna Kea, and outdoor recreation areas. Furthermore, its role was increasing as a cross-island transportation route linking East and West Hawaiʻi for business travel, the transport of goods and services, tourism/recreation, shopping, and for daily commuting.

In response to these problems, the Federal Highway Administration, Central Federal Lands Highway Division (FHWA), in cooperation with the Hawaiʻi State Department of Transportation (HDOT) and the U.S. Department of the Army (the Army), Surface Deployment and Distribution Command (SDDC), initiated the Saddle Road Improvement Project. In 1994, the Environmental Impact Statement (EIS) process began. The EIS was funded through the Defense Access Road (DAR) program, in which FHWA served as co-administrator with SDDC.

A Draft EIS released in 1997 examined the No Action Alternative and twelve action alternatives incorporating various combinations of the existing alignment and potential

new alignments in four different sections of the road, Sections I, II, III and IV. All action alternatives planned to reconstruct the roadway to a two-lane highway with climbing lanes where appropriate, paved shoulders, and a design speed of 60 miles per hour (MPH). All alternative alignments included improved pavement conditions, increased safety and capacity, improved quality of traffic flow, decreased cross-island travel times, and the stimulation of economic growth and development. Two alternative alignments were evaluated in detail for Section I, the area under consideration in this document. W-2 traversed northwest through the center of a property known as the Keʻāmuku parcel, which then belonged to Parker Ranch, and terminated on Mamalahoa Highway at the Waikoloa Road intersection (Figure 7-1). W-3 headed more directly west, terminating on Mamalahoa Highway about three miles south of Waikoloa Road. The Final EIS was released in September 1999, presenting a Recommended Alternative that included an alignment termed W-3 in Section I. The Record of Decision (ROD) was released in October 1999, selecting W-3 as the alignment within Keʻāmuku.

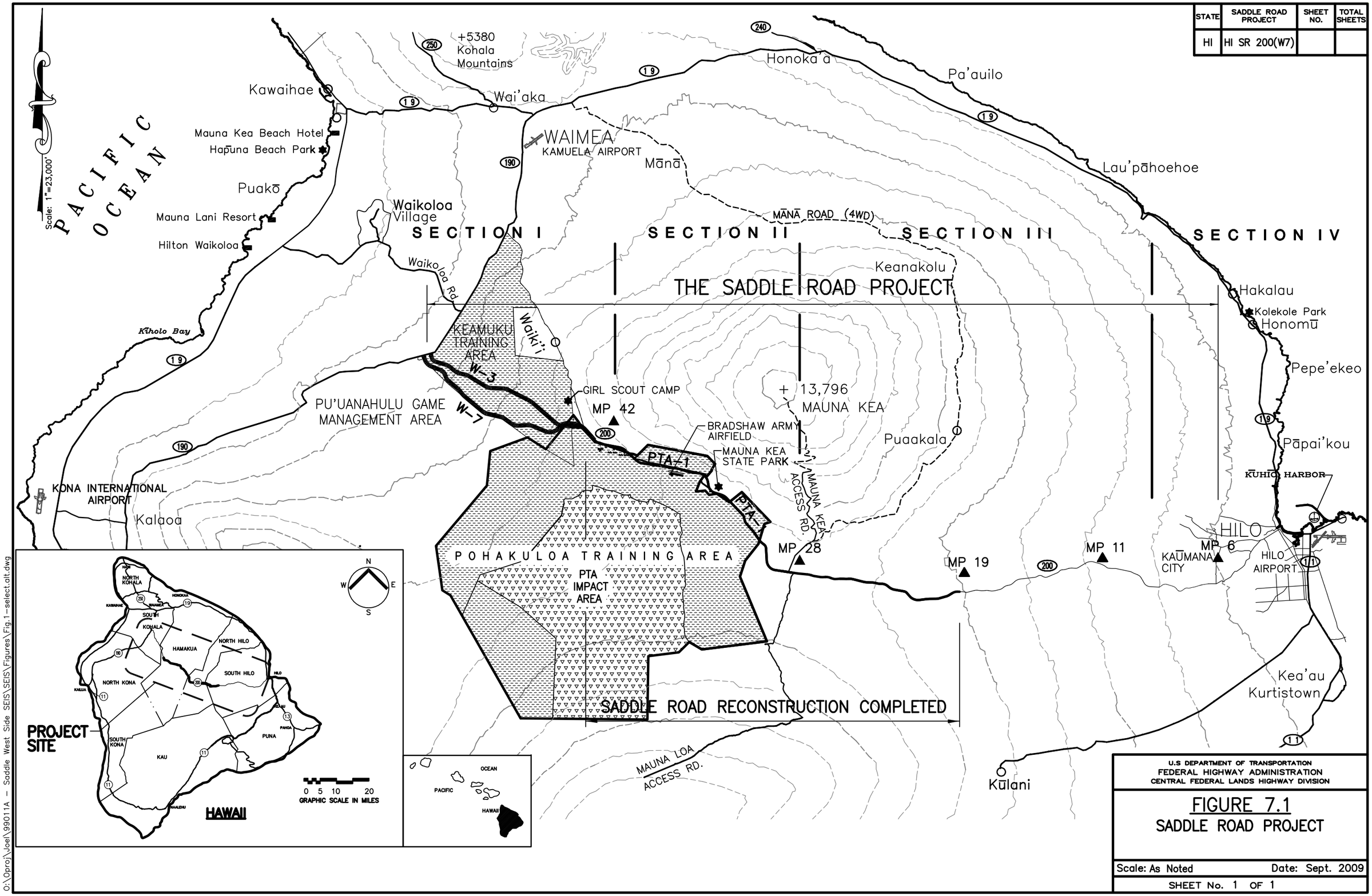
After this time, final highway design proceeded and the necessary construction and land use permits were obtained to begin construction. The first segment built was a 6.5-mile portion of Saddle Road in Section II from Milepost (MP) 28 to 35 within PTA, which was opened to traffic in May 2007. Construction for the portion in Section III between MP 19 and 28 was completed in October 2008. The final part of Section II, north of the PTA cantonment area from MP 35 to 41, was completed and opened in August 2009. A portion of Section III between MP 11 and 19 is scheduled to begin construction in late 2009 and be completed in 2011. The remainder of the eastern side of project – i.e., the portion in Sections III and IV from MP 6 to MP 11 – is in final design but has not yet been fully funded for construction.

In 2006, the Department of the Army (the Army) purchased the Keʻāmuku parcel for military training. The W-3 alignment, selected for Section I of the improved Saddle Road in the 1999 ROD, essentially divides the Keʻāmuku parcel in half (see Figure 7-1). In order to provide a safe separation of civilian transportation and military training, the Army requested that FHWA and HDOT investigate another alternative alignment near the southern boundary of Keʻāmuku for the realignment of this section of Saddle Road.

The Draft Supplemental Environmental Impact Statement (DSEIS) of which this analysis is a part describes and evaluates the impacts associated with a new alternative alignment, termed W-7, for the proposed improvement of Section I of Saddle Road, which extends from Mamalahoa Highway (SR 190) near MP 53, to MP 41. The existing Saddle Road, which passes through the ranching community of Waikiʻi, would remain open for local access.

The improvements within Section II have been totally funded through the DAR program; DAR funding must be authorized and appropriated by Congress on an annual basis. The improvements within Section III and IV are being funded with HDOT Federal-aid highway funds. HDOT has also committed to funding Section I. Additional or other funding of construction within Section I is pending the outcome of this SEIS, which will determine whether W-7 is an acceptable substitute for the 1999 ROD-selected W-3.

STATE	SADDLE ROAD PROJECT	SHEET NO.	TOTAL SHEETS
HI	HI SR 200(W7)		



U.S DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
CENTRAL FEDERAL LANDS HIGHWAY DIVISION

FIGURE 7.1
SADDLE ROAD PROJECT

Scale: As Noted | Date: Sept. 2009

SHEET No. 1 OF 1

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7.2 Purpose and Need

The purpose of the overall Saddle Road Improvement Project is to provide a safe and efficient route for access to land uses along Saddle Road and for cross-island traffic between East and West Hawai‘i. The ongoing and planned improvements to Saddle Road would also address five general types of needs: roadway deficiencies; conflicts and hazards with military operations; capacity; safety; and social demand and economic development.

Roadway Deficiencies

With horizontal and vertical alignment deficiencies, the unimproved sections of Saddle Road have steep grades and sharp curves, which in many places prevent motorists from being able to see an adequate distance ahead to stop safely. Deterioration of the pavement has reduced much of the road to one asphalt travel lane, 12 to 15 feet wide, with deteriorated shoulders two feet in width. Motorists tend to drive in the center of the road, increasing the potential for accidents, including head-on collisions. The 11-mile stretch of Saddle Road in Section I contains seven one-lane bridges.

Conflicts/Hazards with Military Operations

Prior to the realignment of Saddle Road in Section II, live fire and aerial and ground exercises created conflict between the traveling public and military training, which presented serious safety hazards to both the motoring public and military units training at PTA. The conflicts also reduced the quality of some of the training undertaken at PTA. To address this safety concern and impacts to training, Saddle Road was realigned to north of the base to avoid public traffic from passing through PTA in Section II. Subsequent to the Army’s acquisition of the Ke‘āmuku parcel in 2006, a realignment is now sought for Section I to reduce similar potential conflicts if alignment W-3 was used.

Capacity

The existing capacity is currently inadequate. Level of Service, which measures the quality of traffic flow, is currently E, or poor. Without improvements, LOS is expected to decline to F, the worst level. Traffic volumes are expected to almost triple from the current average daily traffic (ADT) of 1,400 to 4,058 by 2013, because of improvements taking place in the other sections of Saddle Road. After this, traffic volumes would depend on whether the highway is realigned:

- If Section I is realigned on either W-3 or W-7, ADT would increase on the realigned highway to 4,211 by 2020, and to 6,500 by 2034. The existing Saddle Road would see a drop to 840 ADT after construction.
- If the highway is not realigned and improved in Section I, traffic is forecast to rise to about 4,172 by 2020 and 4,400 by 2034.

With realignment and improvements, LOS would be at B upon completion of the improvements, and would remain at least C, which is acceptable, throughout the design life of the project, on the realigned highway.

Safety

Roadway deficiencies, conflicts/hazards with military operations, and capacity limitations contribute to safety concerns on Saddle Road. Analysis of accidents indicates that the most important factors are the horizontal and vertical alignment (leading to limited sight distance), road width, and pavement conditions.

Social Demand and Economic Development

A safe and efficient Saddle Road is needed for access to employment and recreation areas located between Mauna Kea and Mauna Loa, and more importantly, as a cross-island transportation route to connect East and West Hawaiʻi for business travel, the transport of goods and services, tourism/recreation, shopping, and commuting. East and West Hawaiʻi differ in economic and development patterns and opportunities. Most government functions and the main University of Hawaiʻi system campus on the island are located in Hilo, where housing costs are generally lower. Over the last thirty years, however, much of the tourism-related growth in employment and the economy has been occurring in West Hawaiʻi. Tourists currently do not have easy access to the interior of the island. Even with the improvements made to date, some automobile rental agencies still restrict or prohibit use of their vehicles on the road due to the condition of the unimproved sections of Saddle Road, preventing many tourists from experiencing the attractions within the saddle area and from easily traveling between East and West Hawaiʻi.

7.3 Alternatives

This SEIS considers only Section I of Saddle Road, as the remainder of Saddle Road has already mostly been built using the alternative alignments selected in the 1999 ROD. Various alternatives for Section I that were developed as part of the 1999 FEIS or later were initially evaluated early in the SEIS process for their potential to satisfy the purpose and need. In the end, only one alternative, W-7, has been advanced for consideration. The No Action Alternative, which was not selected in the 1999 ROD for reasons of safety for motorists and non-motorized traffic, circulation, and land use impacts, would continue use of the existing alignment. As it has already been rejected, the No Action Alternative is not under consideration in this SEIS and is referenced for baseline purposes only, as is W-3. If it is not feasible to construct W-7, FHWA and HDOT expect to build W-3.

Under Alternative W-3, a 10.3-mile route would extend almost due west from MP 41 for 1.2 miles on the foothill slopes of Puʻu Keʻekeʻe. Once inside the Keʻāmuku parcel, W-3 turns west by northwest and roughly keeps this bearing over the next eight miles to Mamalahoa Highway, passing about a half mile south of the old Keʻāmuku ranch village.

Construction of W-3 would require ROW land conversion of approximately 250 acres. The estimated construction cost for alternative alignment W-3 was $39 million in 1999 dollars and the estimated cost for mitigation was $500,000. The W-7 Alternative traverses the Keʻāmuku parcel in a westerly direction, roughly paralleling the southern boundary of Keʻāmuku until near Mamalahoa Highway, where it veers slightly north to take advantage of more favorable terrain for a major highway intersection. About 250 acres of right-of-way would be required. Mamalahoa Highway would be crossed at-grade or by a grade-separated structure. The total length is approximately 10.3 miles. Construction would cost about $58 million in 2007 dollars.

The No Action Alternative would have maintained the westernmost section of Saddle Road as it was prior to the start of the project and included the completion of short-term, or minor, maintenance and restoration activities. The No Action Alternative was rejected because it failed to meet the purpose and need, and is included for comparison purposes only.

7.4 Section 4(f) Properties

One historic property, the Old Waimea-Kona Belt Road (Site 50-10-21-20855), is located partially within the W-7 Alternative project corridor and would be subject to Section 4(f) use. This site has been determined eligible for listing on the National Register of Historic Places. This site is a 39-mile-long historic road from Waimea to Kona and corresponds in many locations to the Mamalahoa Highway. The road dates to about 1920. In 1909, the road was just a wagon track through the pasture where the Old Waimea-Kona Belt Road now runs. The first paved road was built by Hawaiʻi County, from Waimea to Kaʻupulehu, during the years 1916 to 1922, mostly using prison labor (Territory of Hawai'i 1916 to 1922). One camp for the prisoners who built the road was located on the down slope side of the existing Saddle Road intersection, where a grove of eucalyptus trees stands today. They built the road from there south, to near the Waikoloa-Puʻuanahulu boundary (492 feet north of the W-3 alignment) setting rocks, rolling with a steam roller, and pouring tar heated in a pot. From Puʻuanahulu south to Puʻu Waʻawaʻa, the road was built under the direction of Eben Low, by prisoners living at a second camp located downslope of the road, at Keʻenaki, at the 18-mile marker. In 1939, the Waimea-Kona road was rebuilt and straightened, in the area down slope from the Keʻāmuku Sheep Station, by contractor Medeiros, leaving the old road to the east.

7.5 Impacts on Section 4(f) Properties

The Old Waimea-Kona Belt road intersects the W-7 alignment at Station 9+00. The proposed W-7 alignment will adversely affect a small portion of the Old Waimea-Kona Belt Road. The W-7 alignment right of way is 200 feet wide. The Old Waimea-Kona Belt Road is 16 feet wide. Consequently, the W-7 alignment will take 3,200 square feet of the Old Waimea-Kona Belt Road. This take is approximately 0.1 percent of the total area of the Old Waimea-Kona Belt Road.

The W-3 alignment would also cross the Old Waimea-Kona Belt Road. It would also result in a Section 4(f) take. Since the W-3 right of way is also 200 feet wide, the W-3 alignment would also result in a 3,200 square foot take. There are no unique features or attributes at either alignment's crossing.

7.6 Avoidance Alternatives

The historic Old Waimea-Kona Belt Road is a linear resource that runs perpendicular to and crosses both the W-3 and W-7 alignments. Several other alignments considered in the EIS process that would lie north or south of W-3 or W-7 also could not avoid this resource because of the perpendicular nature of the resource. All potential alternative alignments would result in the same or very similar amounts of take, because the standard right-of-way for Saddle Road is 200 feet wide.

The alignment of the historic Waimea-Kona Belt Road is perpendicular to and crosses the W-7 Alternative at Station 9+00.

To avoid the Old Waimea-Kona Belt Road, a new alignment would have to be located several miles to the north or south of the W-7 alignment. It would have to go around either Waimea or Kona. This would not be prudent because the road would cease to function as a logical cross-island route, which is a primary purpose of the project. Traffic would more logically use Highway 19, which cannot meet the capacity needs of the island. This would result in a much longer alignment, which would have severe impacts to both the natural environment, in terms of the expanded footprint of the road, and to the economic setting, in terms of drive time. In short, realigning around the feature would compromise the project to a degree that it is unreasonable to proceed with the project in light of its stated purpose and need.

Another potential avoidance alternative would be to construct Saddle Road with an overpass for the Old Waimea-Kona Belt Road. However, that alternative would not be prudent. Since there is not a topographic feature that necessitates an overpass, the fill structure needed to raise Saddle Road to go over the road would be very costly (approximately $2.5 million) and would have a footprint of approximately four times the currently proposed footprint, with commensurate impacts to vegetation and scenic resources. In addition, the creation of an overpass without the associated change in terrain would create a severe visual impact associated with a massive out-of-character structure in a relatively undeveloped area.

Consequently there is no feasible or prudent alternative that would avoid the Old Waimea-Kona Belt Road or eliminate a take of 3,200 square feet of this historic property.

7.7 Measures to Minimize Harm

The archaeological report discussing historic properties was provided to various agencies and groups, including the Hawaii State Historic Preservation Division, the Office of

Hawaiian Affairs, Hawaiian Civic Clubs, the Royal Order of Kamehameha, and others, for their comment, as part of consultation under Section 106 of the National Historic Preservation Act. The Final SEIS will present the results of this coordination. For reference concerning the larger Saddle Road project, it should be noted that an MOA was executed among the FHWA, SHPO, Advisory Council on Historic Preservation (ACHP), HDOT, and Office of Hawaiian Affairs (OHA) agreeing upon a mitigation plan to mitigate adverse effects to historic sites contained in various portions of the Recommended Alternatives (which included W-3 in Section I). The mitigation plan prescribes how each archaeological site will be treated and provides a schedule for plan development and review procedures in the mitigation process. The requirements of the MOA applicable to each segment have been fulfilled prior to construction of improvements in the segment. Because the W-3 Alternative would also intersect the Old Waimea-Kona Belt Road, a Section 4(f) analysis was completed in the 1999 Final EIS and mitigation measures provided to address adverse effects to the site. For the W-7 alternative, the remaining task is to amend the existing MOA to mitigate the adverse effect of the W-7 Alternative to the Old Waimea-Kona Belt Road (Site 50-10-33-20855). The mitigation plan includes fabrication of an interpretative sign, which provides a history of the road, and a pullout adjacent to the Old Waimea-Kona Belt Road for the general public.

7.8 Least Harm Analysis

All potential viable alternatives have the same amount of harm to the Section 4(f) resource. However, the W-7 alternative best meets the project's purpose and need.

7.9 Coordination

The FHWA as lead agency, for the purpose of Section 106 of the National Historic Preservation Act, has found that the W-7 alternative will adversely affect Waimea-Kona Belt road (Site 50-10-21-20855). The FHWA has consulted with the Hawai‘i State Historic Preservation Office and the Office of Hawaiian Affairs on the adverse effect. The Advisory Council on Historic Preservation has been notified of the adverse effects in accordance with 36 CFR 800.11(e). The FHWA is currently in consultation with the State Historic Preservation Office to amend the existing MOA for the Old Waimea-Kona Belt Road.

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CHAPTER 8 SUMMARY OF MITIGATION COMMITMENTS

Resources for which mitigation commitments have been made are listed, as well as the associated mitigation measures. In the event that no mitigation commitments are necessary, the resource is not included in this section.

LAND USE AND RELATED GOVERNMENTAL PLANS AND POLICIES

- Construction contract conditions will require access to public use and recreation areas, ranching operations, residences, and the PTA to be maintained at all times during construction.

SOCIOECONOMIC

- HDOT will install signage to remind visitors that there are no services on Saddle Road.

COMMUNITY IDENTITY AND COHESION

- A traffic control plan will be developed to outline the steps needed to minimize congestion and maintain access to adjacent properties at all times during construction.
- As feasible, construction-related delays will be minimized during normal rush hours for commuters.
- Since construction work on W-7 would avoid the existing Saddle Road alignment, construction impacts are expected to minimal on cross-island traffic. However, if delays or closures are anticipated at the project corridor's intersections with Mamalahoa Highway or Saddle Road, information will be publicized on a regular, on-going basis through posted advertisements, radio and newspaper bulletins, and road signs at each end of Saddle Road and along Mamalahoa Highway (SR 190) and Kaumana Drive in Hilo.

OUTDOOR RECREATION RESOURCES AND HUNTING

- The traffic control plan will specify that during construction, access will be maintained at all times to areas of Saddle Road that serve recreational areas, including hunting units.

PUBLIC SERVICES, COMMUNITY CENTERS AND LOCAL BUSINESSES

- Emergency service providers, including the Hawai‘i County Fire Department, the Hawai‘i Police Department, and the PTA, will be kept informed on the location and schedule of construction along the length of the project.

- Traffic control plans prepared for construction of Saddle Road will include provisions for allowing emergency vehicles to pass through construction zones without delays and to have unimpeded access to roadside facilities at all times.

NATIVE HAWIIAN CULTURES AND VALUES

- As has occurred previously when newly-constructed segments of Saddle Road were opened for public use, proper cultural protocol will be completed by a native Hawaiian who follows the ways of the old culture to release and sanctify or bless the construction project.

RIGHT-OF-WAY AND RELOCATION

- The acquisition of property necessitated by the project would be completed in accordance with Federal Uniform Relocation and Real Property Acquisition Policies Act of 1970 (P.L. 91-646), as amended, and applicable State regulations.

PEDESTRIAN AND BICYCLE FACILITIES AND USE

- The project will accommodate bicycles and pedestrians through a signed, shared route on the shoulder.
- Project construction will include provisions for pedestrian and bicycle crossings of Saddle Road during construction periods.

AIR QUALITY

- Standard dust control and construction equipment emission control measures will be implemented as necessary to reduce temporary impacts to air quality during construction activities. Water or a dust palliative will be applied as necessary to minimize particulate pollution. Areas to receive such treatment will include unpaved access roads, staging sites, and construction areas where the movement and operation of construction equipment produces airborne dust.
- Construction equipment will be required to meet all applicable emission standards.
- FHWA and HDOT will keep apprised of the results of monitoring for depleted uranium by the Hawai‘i State DOH and the Army and take any necessary precautionary measures.

FIRE HAZARD

The Typical Sections for the project are discussed and depicted in Section 2.2.1, above. The expanded and modified Typical Sections for the roadway would both reduce the likelihood of accidental ignition from unintentional road sources (car fires, catalytic converters, cigarettes, etc.) and assist in creating a firebreak and fuelbreak. The Typical

Sections have been specially designed to reduce wildfire impacts, in ways specific to the segments of Section I through which they pass. All share the base characteristics of Typical Section A (Figure 2.2.1.a), which extends east from Mamalahoa Highway. It incorporates two 12-foot travel lanes, two 8-foot paved shoulders, and a passing lane for most of the length.

To reduce the threat of wildfires between the eastern boundary of the Keʻāmuku parcel and approximately MP 41, which passes adjacent to *Palila* critical habitat, B has additional features (Figure 2.2.1.b, Section B):

- Two 12-foot travel lanes with 8-foot paved shoulders.
- An 8-foot strip of pavement on the north side of the highway, which would serve as a firebreak, with a four-inch high curb on the outside.
- At the outside edge of the firebreak, a wire fence with metal posts would be constructed to a height of four feet on the edge of the pavement.

Further east, as W-7 crosses the Keʻāmuku and descends into lower elevations, the primary concern is to prevent fires from Saddle Road spreading southwards, towards the western boundary of the Keʻāmuku Endangered Species Management Unit containing *Haplostachys haplostachya*. Typical Section C is illustrated in Figure 2.2.1.b, Section C, and is modified from Typical Section A as follows:

- Three 12-foot travel lanes with 8-foot paved shoulders, with a four-inch high extruded asphalt curb at the outside of the shoulder.

In addition, the following mitigation measures are planned:

- The PTA Fire Department will install additional fire risk signs along Saddle Road at the western boundary of PTA (one is currently present at the eastern end). Sign information will be based upon the National Fire Danger Rating.
- To minimize the risk of wildfire during construction, the Special Contract Requirements will mandate that all construction activity shall be restricted to within the clearly delineated ROW and that entry and exit into the ROW by all construction personnel and equipment shall be at previously identified and marked non-sensitive areas.

WATER RESOURCES

The Stormwater Pollution Prevention Plan (SWPPP) will include the following types of BMPs.

- Practices that prevent erosion, including the stabilization of cut and fill slopes by vegetative as well as non-vegetative means.
- Practices that trap pollutants before they can be discharged, such as silt fences and sedimentation basins.

- Practices that prevent the mixing of pollutants from construction materials and stormwater, such as providing protected storage for chemicals, paints solvents, and other toxic materials.
- During construction, erosion will be minimized by applying temporary measures that will reduce the velocity of the runoff and retain sediment on-site. Examples of these measures may include but are not limited to: silt fences, check dams, mulching, culvert outlet protection, and sedimentation basins. Construction materials will be stored in a protected area with measures in place to contain and clean-up spills.
- Permanent pollution control measures will be applied to minimize degradation of stormwater quality after construction of the road has been completed. These measures include but are not limited to, the following examples: providing velocity reducers and/or settlement basins at culvert outlets, vegetating slopes, minimizing the steepness of slopes where possible, providing stream bank stabilization where required, and managing the use of chemicals for roadway maintenance.
- Cut slopes will be revegetated to reduce highway runoff pollution.
- If a major hazardous spill occurs, cleanup efforts will be coordinated through both the County of Hawai‘i Civil Defense Agency and the State of Hawai‘i Department of Health.

CLIMATE, GEOLOGY, AND SOILS

- Prior to construction, a final review will be conducted to determine the probability of caves or lava tubes in the construction corridor. Should significant caves be present, final design and/or construction techniques will be developed to avoid or minimize impacts.
- If a significant cave or lava tube is inadvertently encountered during construction, all construction activity will cease immediately at the location in question and the Project Engineer will be notified. Consultation will be conducted with appropriate resource or regulatory personnel to ensure that unique biological, cultural, or geological resources associated with these features are adequately protected, or investigated and documented.
- Construction specifications would be incorporated to minimize potential hazards of caves to construction workers.
- During the rainy season, following completion of construction, slopes and denuded areas will be allowed to revegetate with natural seed sources, such as kikuyu grass and *‘a‘ali‘i*, to minimize soil erosion.

BOTANICAL RESOURCES

- All equipment, material, and support structures will be stored and maintained within the ROW or in designated staging areas that have been approved as being areas where the storing, servicing, and staging of equipment and material will not adversely impact native species. These areas will be clearly demarcated and fenced prior to construction.
- All construction activity will be restricted to the clearly delineated ROW.
- A Project Engineer or representative will be on site at all times during construction to ensure implementation and compliance with environmental mitigation requirements as stated in the contract documents.
- Contractors will be required to participate in an environmental quality control program similar to required safety programs contained in Contract Specifications.
- Immediately after construction in this Section I is completed, in conformance with conditions of the NPDES permit, some areas in the margins of the roadway will be covered with stockpiled grubbed material to allow natural regeneration of vegetation. In some areas of the Saddle Road Improvement project, native species such as *ʻaʻaliʻi* have taken hold in cut slopes with soil. These areas will be irrigated for 30 days.
- After construction, HDOT will maintain the area to keep the unpaved road verges vegetation-free or closely mowed, which will also aid in reducing the spread of alien weeds.
- The following standard management requirements will be implemented to prevent introduction of noxious weeds:
    - All heavy equipment will be cleaned prior to entering the project area;
    - All equipment entering the project area will be covered when loaded; and
    - All plant material used for erosion control and road maintenance will be certified weed free.

WILDLIFE AND OTHER FAUNAL RESOURCES

All mitigation committed to in the original ROD is still applicable to the project. Additional measures are provided under the Threatened and Endangered Species section.

FLOODPLAINS AND DRAINAGE

- Saddle Road will be designed as an all-weather facility, with new drainage structures designed to handle the minimum 50-year design storm in accordance with existing State requirements.

THREATENED AND ENDANGERED SPECIES

- To avoid the potential downing of Hawaiian Petrels and Newell's Shearwaters by their interaction with external construction lighting, no construction or unshielded equipment maintenance lighting will be permitted after dark between the months of April and October. This prohibition will be one of the Special Contract Requirements, which will be incorporated in the construction contract documents.
- No nighttime construction will occur during the peak seabird fallout period, between September 15 and December 15 annually.
- Any streetlights that may be installed as part of this action will be shielded to reduce the potential for interactions of nocturnally flying Hawaiian Petrels and Newell's Shearwaters with external lights and man-made structures. This minimization measure will minimize the threat of disorientation and downing of Hawaiian Petrels and Newell's Shearwaters and also comply with the Hawaii County Code § 14 – 50 et seq., which requires the shielding of exterior lights so as to lower the ambient glare to the astronomical observatories located on Mauna Kea.
- To minimize collateral damage to areas outside of the ROW and the risk of wildfire during construction, the Special Contract Requirements will mandate that all construction activity shall be restricted to within the clearly delineated ROW and that entry and exit into the ROW by all construction personnel and equipment shall be at previously identified and marked non-sensitive areas.
- Special Contract Requirements will be incorporated into the construction documents directing the contractor's work consistent with specific minimization commitments that are outlined in this section and in the BO for the project. The Contracting Officer will have the authority to shut down construction should violations of Special Contract Requirements be detected; furthermore, the project engineer will be responsible for ensuring compliance with all environmental restrictions and minimization measures.

Additional construction mitigation measures that, among other effects, would reduce the possibility of wildfire, are listed in Section 3.23 and above, under Fire Hazard.

At the current time there is no known conflict between Nēnē and the proposed W-7 alignment. If such a conflict arises, FHWA will address the issue with a multi-pronged approach utilizing measures detailed in the September 11, 2009 BO for activities in the recently constructed Section II of Saddle Road designed to minimize vehicle-Nēnē interactions. Field trials are being implemented between approximately MP 29 and MP 30.2, which may modify the measures, but as currently formulated, these include:

- The erection of a permanent fence along both the north and south sides of the roadway within any section that appears to attract Nēnē on a regular basis. The fence will be placed as close to the roadside as permissible under ASHTO federal safety guidelines.
- Vegetation will be removed between the aforementioned fence and the edge of the roadway by the use of herbicides or by paving the area.

- The loose gravel along the roadside in any such identified area will be secured with a tacking agent, or asphalt paving, so that Nēnē are unable to gather gravel for use in their crops.
- FHWA will install enhanced Nēnē crossing and traffic advisory signs to warn motorists of the potential danger they pose to Nēnē along any such identified roadway section.

ARCHAEOLOGICAL, HISTORIC, AND TRADITIONAL CULTURAL RESOURCES

- To comply with the MOA, the project will provide a pullout adjacent to the Old Waimea-Kona Belt Road and fabrication of an interpretative sign, which will provide a history of the road.
- In case of discovery of native Hawaiian burials or ritual sites, construction activities will cease in the vicinity of the site until appropriate regulatory and resource personnel are contacted and a determination has been made. All requirements of Chapter 6E, HRS and the administrative rules relating to burials will be satisfied.
- In order to ensure the protection of archaeological and paleontological remains during construction, Section 107.02, "Protection of Property and Landscape" *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects, FPJ-96, 1996, FHWA* will be followed.
- During clearing, grubbing, and excavation, FHWA and HDOT will provide a full-time archaeological monitor on the project site.

HAZARDOUS MATERIALS, TOXIC SUBSTANCES AND UNEXPLODED ORDNANCE

- If previously unidentified hazardous substances or petroleum products are found within the W-7 corridor that indicate an existing release, a past release, or a material threat of a release of any hazardous substance or petroleum products into the corridor, further investigation will be pursued, as warranted. If previously unidentified hazardous waste is discovered during project construction, work will cease at that location and appropriate regulatory or resource personnel will be contacted.

- Prior to construction, FHWA will conduct a UXO survey. If the risk of encountering UXO is low, then the USACE will be consulted to provide UXO construction support. If the risk of encountering UXO is high, then UXO clearance will be performed to ensure the safety of the site. The Army will document UXO surveys and removal actions in full accordance with applicable laws, regulations, and guidance. All ordnance found will be removed from the project area in accordance with DOA regulations in coordination with USAG-HI.
- In all training activities at Keʻāmuku and other areas of PTA, the Army will continue to educate soldiers on how to identify UXO and the proper safety procedures for marking and reporting UXO, in order to reduce impacts not only to soldiers but also to motorists on W-7.

VISUAL

- Final cut and fill slope faces will be made to blend with the surrounding landscape. The natural appearance of the slopes will be improved by rounding the toe and top of slopes, warping, blending the ends of slopes, varying the slope ratios, utilizing staggered ledges, and roughening the face of cut slopes, either by ripping or blasting, where appropriate. (Warping results in a slope face that is not parallel to the roadway. Slope rounding refers to blending the slope into the natural terrain by excavating additional area at the top of the cut slope. Laying back the ends of slopes or blending provides a smooth transition to adjacent cut, fill, or drainage area by flattening the slope ratio at the ends of slopes. Varying slope ratios leaves an irregular, undulating or roughened appearance with staggered ledges rather than a uniform grade. Staggered ledges are benches with varying dimensions and heights on the cut face which do not cross the entire face.) The slope ratios will vary from the top to the bottom of the slope face as well as horizontally along the face, if practicable and feasible.
- Rock slope surface treatment will be applied to cut slopes in competent rock areas as identified in the geotechnical testing results. These treatments include roughening of the cut face to incorporate short, staggered ledges, minor warping, and other irregularities in the rock that take on a natural appearance.
- In areas not recommended for revegetation, the top three feet of lava material in disturbed areas will be stockpiled prior to construction. After construction, the stockpiled material will be used as plating material. The plating material will be placed over slope faces to resemble the adjacent, undisturbed ground surface conditions or used as rip rap material along ledges and outside of ditch backslopes.
- Intercepted drainages on cut slopes will be cut at the angle to existing joints, planes or rock features, and drainage patterns. These features will be incorporated into the NPDES SWPPP.
- Where guardrails are needed, natural-appearing guardrail material, such as naturally weathered steel or a material approved by HDOT, will be used to blend more effectively with the surrounding landscape.

- To reduce contrast and blend more effectively with the surrounding landscape, aesthetic fencing materials will be used, such as naturally weathered metal or steel, or painted or wooden posts, as approved by HDOT.

- Clearing of trees and large shrubs along an irregular edge adjacent to the recovery zone will be done to create a gradual transition or feathered edge.
- As determined appropriate during final design, the project may include informal scenic Typical Sections s with interpretive signage in a few locations, such as the Old Waimea-Kona Road and the overlook above Keʻāmuku Village.

CONSTRUCTION

- The total amount of land disturbance will be minimized. The construction contractor will be limited to the delineated construction work areas within the ROW or clearly marked staging areas.
- Construction traffic will be limited to military roads and the construction area as much as possible, particularly traffic related to hauling of crushed rock and asphalt, to minimize interaction with vehicular traffic on the existing Saddle Road. Traffic control will assure a safe and timely flow of traffic on the adjacent sections of Saddle Road during construction. Traffic control plans will be an integral part of the construction documents and enforced by the Project Engineer.
- Construction activities and traffic control will be coordinated with the Office of Mauna Kea Management to avoid potential conflicts with their observatory construction projects.
- Environmental awareness materials will be provided to all persons, agency personnel, construction workers, subcontractors, inspectors, and others on the project. These materials will be prepared in a checklist format and will address issues related to caves, sensitive species, cultural resources, spill management, delineation of authorized work area, pollution prevention through recycling and other efforts required by the Pollution Control Act of 1990, and other relevant factors. Contract specifications addressing environmental mitigation and procedural requirements will also be included in the contract documents and will be enforced by the on-site project engineer throughout the duration of the construction contract.
- Trucks will be covered when hauling loose material on public roads.
- Unused materials and excess fill will be removed and disposed of at an authorized waste disposal site.
- Dust control measures will be implemented. These will include but are not limited to the use of water trucks, the stabilization of the surfaces of stockpiled materials, and the treatment of unpaved routes with dust suppressants.
- Clearing and grubbing of construction work areas will be conducted in such a manner as to minimize the amount of exposed soil at any one time.
- Stationary equipment will be placed as far away from sensitive noise receptors as practical.

- No smoking will be permitted during construction within the construction site, nor will any fires be permitted within the project corridor.
- All exhaust systems will be maintained in good working order. Properly designed engine enclosures and intake silencers will be used. Equipment will be maintained on a regular schedule.
- During construction, emergency spill treatment, storage, and disposal of all hazardous materials, both within construction limits and at staging areas, will be handled in accordance with the most recent version of FHWA's *Standard Specifications for Construction of Roads and Bridges on Federal Highway Projects*, (www.efl.fhwa.dot.gov/design/manual/Fp96.pdf), federal acquisition regulations, and appropriate EPA regulations. Special Contract Requirements shall specify that the construction contractor shall develop and adhere to "Good Housekeeping" and Spill Prevention Plans for all appropriate substances. Elements of the plan may include standards, procedures or activities such as:
    - Onsite storage of the minimum practical quantity of hazardous materials necessary to complete the job;
    - Storage and inventory of hazardous materials will be performed by designated and properly trained personnel;
    - Storage of all materials in a neat and orderly manner, under roof and/or enclosed as appropriate and practical, as required by applicable OSHA and EPA rules;
    - Products will be kept in their original containers unless unresealable, and original labels and safety data will be retained;
    - Whenever possible, a product will be completely consumed before disposing of empty container;
    - Disposal of surplus will follow manufacturer's recommendation and adhere to all regulations;
    - Manufacturers' recommendations for proper use and disposal will be strictly followed;
    - Daily inspection by contractor to ensure proper use and disposal;
    - Onsite vehicles and machinery will be monitored for leaks and receive regular maintenance to minimize leakage;
    - Manufacturer's recommended methods for spill clean-up will be clearly posted, and site personnel will be informed of the procedures and the location of the information and clean-up supplies;
    - Materials and equipment necessary for spill clean-up will be kept in the material storage area onsite;
    - All spills will be cleaned up immediately after discovery, using proper materials that will be properly disposed of;
    - The spill area will be kept well-ventilated, and personnel will wear appropriate protective clothing to prevent injury from contact with hazardous substances;
    - Regardless of size, spills of toxic or hazardous materials will be reported to the appropriate government agency;

- Should spills occur, the spill prevention plan will be adjusted to include measures to prevent spills from re-occurring and for modified clean-up procedures. A description of the spill, its cause and clean-up measures used will be included. If a major hazardous spill occurs, clean-up efforts will be coordinated through the Hawai‘i County Fire Department and Civil Defense Agency, and the Hawai‘i State Department of Health;
- The contractor will coordinate spill prevention and clean-up efforts. In addition, the contractor will designate at least three site personnel to receive spill prevention and clean-up training; these individuals will each be responsible for a specific phase of prevention and clean-up. The names of responsible spill personnel will be posted in the material storage area and in the office trailer onsite;
- HDOT will encourage through contract specifications the use of durable materials that will require less frequent replacement, reducing the amount of construction waste generated over time;
- HDOT will encourage through contract specifications the use of material with recycled content, such as glassphalt, where possible and in accordance with accepted standards; and
- HDOT will encourage through contract specifications the reuse rather than disposal of project materials such as metal, wood, paper in other jobs where practical.

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CHAPTER 9 PREPARERS

The following is a listing of persons who were primarily responsible for preparing and/or reviewing the Supplemental Environmental Impact Statement (SEIS), their titles, years of experience, and educational background.

Name	**Educational Background**	**Applicable Experience (Years of Experience)**	**Project Responsibility**
Federal Highway Administration, Central Federal Lands Highway Division (Co-Lead Agency)			
Dave Gedeon, P.E.,	B.S.C.E. Ohio University, 1970 M.B.A. Univ. of Colorado, 1981	36 years in civil engineering Licensed Civil Engineer in Colorado	Project Manager, transportation design, project management, funding and resource scheduling
Melissa Dickard	B.S. in Wildlife Biology, Colorado State Univ., 1999 M.S. in Wildlife and Fisheries Science, The Pennsylvania State University, 2003	7 years in wildlife and environmental biology	Environmental Biologist
Stephen Hallisy	B.A., M.A. Anthropology, University of Colorado, Boulder	24 years in Archaeology/Environment	Environmental Oversight
State of Hawai‘i Department of Transportation, Co-Lead Agency			
Glenn Yasui, P.E.	B.S.C.E. Univ. of Hawai‘i, 1964 M.P.A. Univ. of Southern California, 1985 Licensed Civil Engineer in Hawai‘i	45 years in civil engineering	Highways Administrator
Nelson A. Sagum, P.E.	B.S. University of Hawai‘i	36 years in civil engineering Licensed Civil Engineer in Hawai‘i	Project Manager
Dina U. Lau, P.E.	B.S. Univ. of Hawai‘i M.S. Univ. of California at Berkeley	14 years in civil engineering Licensed Civil Engineer in Hawai‘i and California	Project Engineer
Okahara and Associates, Prime Consultant			
Donald K. Okahara, P.E.	B.S.M.E. Oregon State Univ., 1962	32 years in civil engineering Licensed Civil, Mechanical and Structural Engineer in Hawai’i	Principal-In-Charge
Bruce K. Meyers, P.E.	B.S.C.E. Brigham Young Univ., 1989	20 years in civil engineering Licensed Civil Engineer in Hawai’i	Transportation Design and Project Management

Name	Educational Background	Applicable Experience (Years of Experience)	Project Responsibility
EIS Consultants			
Ron Terry, Geometrician Associates	B.A. Univ. of Hawai‘i, Geography Ph.D. Louisiana State Univ., Geography	20 years experience preparing environmental documents	Lead EIS Scientist
Reginald David, Rana Biological Consulting Inc.	B.A, Univ. of Denver, 1972	25 years experience preparing faunal assessments	Zoological Studies
Robert T. Shirai, PLS Island Survey, Inc.	A.S. Hawai‘i Community College, 1974	23 years in land surveying Licensed Land Surveyor in Hawai‘i	Alignment Staking
John Kirkpatrick, Belt Collins	Ph.D. Anthropology, Univ. of Chicago	30 years experience social impact assessment	Socioeconomic Studies
Grant Gerrish	B.S., Biology, Ball State Univ., Indiana, Biology Ph.D. Univ. of Hawai‘i, Botanical Science	25 years experience consulting in botany	Botanical Studies
Randall Okaneku, The Traffic Management Consultant	B.S, Univ. of Hawai‘i, Civil Engineering M.S., Univ. of Hawai‘i, Civil Engineering/Transportation Engineering MBA, Univ. of Hawai‘i	25 years experience traffic engineer. Licensed Professional Civil Engineer in the State of Hawai‘i	Traffic Engineering
Russell Okoji, AMEC Earth and Environmental Inc.	B.S. Univ. of Cal., Irvine, Applied Ecol. Ph.D. Univ. of Cal., Los Angeles, Environ. Health Sciences/ Toxicology	9 years experience in preparing human health risk assessments	Depleted Uranium Risk Assessment
Robert L. Spear, Scientific Consultant Services, Inc.	B.A., M.A., 1977, Western Washington State College, 1973 Ph.D., University of Oregon, 1986	30 years of Hawaiian and Pacific archaeological experience	Archaeological Studies
Glenn G. Escott	B.A., Univ. of Massachusetts – Amherst, Chinese Language and Literature M.A., Univ. of Hawai’i, Archaeology	12 years experience in archaeology	Senior Archaeologist

CHAPTER 10 CONSULTATION HISTORY AND LIST OF AGENCIES, ORGANIZATIONS, AND PERSONS TO WHOM THE DRAFT EIS WAS SENT

The Federal Highway Administration and the State Department of Transportation are serving as joint lead agencies to prepare an SEIS in compliance with both NEPA and State requirements. The following sections provide a chronology of the consultation and coordination events that were conducted as part of the preparation of this document.

10.1 1999 EIS Public Involvement

This section briefly summarizes the project's development leading up to the 1999 FEIS, emphasizing those actions related to the agency and public involvement process. The input received during this process was voluminous and extremely varied in content regarding issues and concerns. For this reason, the reader is referred to Part II of the 1999 FEIS for additional, more detailed information.

To incorporate input from participating agencies throughout the project development process, a Social, Economic, and Environmental Team (SEE Team) was established in 1990. The SEE Team is comprised of representatives from each participating agency (ref: FEIS - Part II, 1.2.2). A series of SEE Team meetings were held from January 1990 to March 1998 (ref: FEIS - Part II, 1.1). In May 1993, various citizens of the County of Hawai‘i were invited by U.S. Senator Daniel K. Inouye to form the Saddle Road Task Force to solicit and disseminate information about the project within the community (ref: FEIS - Part II, 1.2.1). A series of SRTF meetings were held from June 1993 to July 1999.

From January 1994 to 1999, numerous one-on-one meetings were held upon request with interested individuals, agency representatives, and public and private organizations to provide project briefings and/or receive input on project issues and concerns. These included groups such as community councils, community associations, chambers of commerce, and clubs.

A Letter of Intent was sent to all interested parties, agencies, and organizations, and a Notice of Intent was published in the Federal Register, March 1994 (ref: FEIS - Part II, 1.4.1). Notifications of public scoping meetings were mailed in April 1994 (ref: FEIS, Part II, 1.4.1) and Public Scoping Meetings were held in Hilo (May 10), Kona (May 11), and Waimea (May 12). An Interagency Scoping Meeting was held in Hilo (May 10).

In July 1994, project information centers were maintained in Hilo and Kona for several months to make project information available to interested persons and to receive comments. Notices of these centers were published in Hilo and Kona newspapers.

Newsletters were prepared and distributed to a mailing list of over 1,500 people. The first was published in November 1994. To report on the progress of the project, four additional newsletters were subsequently published and distributed, from November 1996 through August 1999 (ref: FEIS - Part II, 1.5).

In October 1995, pursuant to State law, an Environmental Assessment and Notice of Preparation of an EIS was submitted to the State of Hawai‘i Office of Environmental Quality Control (ref: FEIS, Part II, 1.4.2). This notice was published in their environmental bulletin which is monitored regularly by interested agencies, organizations, and the public.

In May 1996, sixteen invitations were extended Cooperating Agency status on the project. Only three agencies acknowledged receipt of the invitation.

In the summer and fall of 1998, numerous meetings and exchange of correspondence occurred between FHWA and the USFWS, the EPA, and numerous other agencies to resolve issues related to Section 7 Endangered Species Act consultation and *Palila* mitigation, as well as Section 404 Clean Water Act compliance. The results of this consultation and coordination are contained in the USFWS Final Biological Opinion (BO), the *Palila* MOU, and the 404 (b)(1) Analysis Report (ref: FEIS - Part III).

A formal public comment period began with the issuance of the DEIS in October 1997 and the publishing of the Notice of Availability in the Federal Register and Hawai‘i Office of Environmental Quality Control Bulletin (ref: FEIS - Part II, 2.1). Two public hearings were held (Waikoloa - Thursday, December 11, 1997 and Hilo - Saturday, December 13, 1997) during this comment period to provide information and solicit formal comments on the project. The hearing transcripts are included in the FEIS (ref: Part II, 2.2). Approximately 100 members of the public provided written comments on the DEIS; roughly 20 individuals presented oral comments at the Waikoloa hearing and approximately 30 individuals presented oral comments at the Hilo hearing. All public and agency comments are included in their entirety in the FEIS (ref: Part II, 2.2, 3.2, and 4.2). A summary of agency comments and associated responses was also prepared and included in the FEIS (ref: Part II, 3.1). Public comments were also summarized, resulting in nearly 320 representative comments (ref: FEIS - Part II, 4.1). In response to agency and public comments received on the DEIS, the FHWA project team undertook additional studies and analyses as warranted, prepared responses, and incorporated additional information into the FEIS.

The release of the FEIS was announced in the Federal Register on September 3, 1999, and in the Hawai‘i State Office of Environmental Quality Control’s *Environmental Notice* on September 8, 1999. The Final EIS presented a Recommended Alternative that consisted of E-3 in Section IV, EX-3 in Section II, PTA-1 in Section II, and W-3 in Section I (see Figure 1.1.2). The Recommended Alternative minimized conflicts between military and public uses within the PTA, minimized socioeconomic disruption in the Kaumana area of Hilo, and provided an outlet to Mamalahoa Highway that met the destination needs of motorists while minimizing impact to homes in the Waiki‘i area. Substantive environmental issues, which included protected species of flora and fauna, critical habitat for the endangered bird *Palila*, wetlands and biological habitats of importance, archaeological resources, fire hazards, hunting lands, access to trails and

roads, and potential noise increases, were investigated and resolved. A Record of Decision (ROD), finalized on October 30, 1999, presented the selection of the Recommended Alternative by the agencies and formalized the mitigation commitments.

The Saddle Road Task Force has continued to meet during the permitting and construction of the various phases of Saddle Road from 1999 to 2009 in order to provide citizen input and disseminate information about the project to the public.

10.2 Notice of Intent and SEISPN

After determining that an SEIS would be necessary because of the proposed use of W-7 instead of W-3, the responsible agencies published a Notice of Intent (NOI) in the *Federal Register* on December 10, 2007, and issued an SEIS Preparation Notice (SEISPN) on January 8, 2008 (see copy of Federal Register and OEQC publication notice in Appendix A1).

The publication of these documents allowed the public the opportunity to provide comments. Two comments, one from the federal Environmental Protection Agency and one from the U.S. Fish and Wildlife Service, were received in response to the NOI; these are included in Appendix A2. The publication of the SEISPN initiated a 30-day comment period per State of Hawai‘i law. Twenty comment letters were received in response to the SEISPN. These comments and the responses of HDOT to each commenter’s letters are attached as Appendix A2. The following agencies, organizations and individuals commented on the SEISPN:

Federal:

- U.S. Geological Survey, Hawaiian Volcano Observatory

State of Hawai‘i:

- Office of Hawaiian Affairs
- Department of Accounting and General Services
- Department of Human Service, Hawai‘i Public Housing Authority
- Department of Defense, Office of Civil Defense
- Department of Health

County of Hawai‘i:

- Department of Water Supply
- Planning Department
- Department of Environmental Management
- Department of Research and Development

Organizations and Individuals:

- Sierra Club
- Hawai‘i Island Chamber of Commerce
- People’s Advocacy for Trails Hawai‘i

- Malu ‘Aina
- Big Island Bird Hunters
- South Kohala Traffic Safety Committee
- Waiki‘i Ranch Homeowners’ Association
- Paul Normann
- Aaron Stene
- Robert Ward

The major issues brought up in the comment letters are presented below.

Suggestions for study:

- Native Hawaiian traditional and customary practices and Traditional Cultural Properties.
- Direct and wildfire impacts on endangered plant species.
- Waters of U.S., particularly in relation to Corps of Engineers *Rapanos* guidance.
- Quantification and analysis of impacts to waters of U.S. impacted.
- Analysis of indirect and cumulative impacts.
- Potential for depleted uranium.

Suggestions for inclusion in the project:

- Constructing the bike lanes specified in the Bike Plan Hawai‘i.
- Shared-use path system, with a winding trail parallel to highway with pedestrian, bicycle, and equestrian facilities, with provision for motorized off-road vehicles.
- Grade-separated interchange at Mamalahoa Highway.
- Design for a four-lane divided highway.
- Wide right-of-way to account for future expansion.
- A design that minimizes civilian and military interference.
- Scenic Typical Sections s.
- Illustrations of location of military trail(s) and grade-separated crossing(s).
- Adherence to all laws and regulations concerning water quality.
- Utilization of native vegetation and measures to avoid spread of invasives.
- Follow NEPA-404 Memorandum of Understanding Procedures for waters of U.S.
- Avoidance measures if waters of U.S. impacted.
- BMPs for reduction of air quality impacts.
- Provide affected environmental justice populations opportunities for public input.
- Avoid infringement of Ka‘ohe Game Management Area between MP 41 and Ke‘āmuku

Other comments:

- OHA requested Section 106 consultation.
- Provision of references for seismic information.
- Urge timely completion of road.

The Draft SEIS has attempted to address each of these issues.

10.3 Planned Post-Draft SEIS Consultation and Coordination

The availability of the Draft SEIS will be announced in the *Federal Register* and in the Hawai‘i State Office of Environmental Quality Control (OEQC) Environmental Notice. This will initiate a 45-day comment period during which agencies and the public are invited to provide written comments. Two public hearings, one in Hilo and one in West Hawai‘i, will be held during the comment period at a time and place to be announced in local media. The Final SEIS will contain an appendix containing comments to the Draft SEIS along with detailed response letters to each individual comment. This appendix will also contain a transcript of the public hearings. This chapter will be augmented in the Final SEIS to include a section providing a detailed summary of issues raised in comments and at the public hearing.

10.4 List of Parties to Whom Draft SEIS Was Sent

The following agencies, organizations, and individuals have been provided with a copy of the Draft SEIS and/or provided with the website address where the document is available for review.

FEDERAL AGENCIES

George P. Young, Chief
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CHAPTER 11 UNRESOLVED ISSUES

11.1 UNRESOLVED ISSUES

No unresolved issues exist.

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