

## **Draft Environmental Assessment**

# **Kuhio Highway Slope Stabilization District of Hanalei, Kaua`i, Hawai`i**

**Proponent:**

State of Hawai`i  
Department of Transportation  
Highways Division  
Honolulu, Hawai`i 96813

**Prepared by:**

Earth Tech AECOM  
841 Bishop Street, Suite 500  
Honolulu, Hawai`i 96813

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## EXECUTIVE SUMMARY

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The State of Hawai'i Department of Transportation (DOT) is proposing slope stabilization measures to be undertaken along Kuhio Highway near Hanalei, Kaua'i, Hawai'i. The proposed project is located within a State of Hawai'i Conservation District and would use State of Hawai'i funds therefore triggering the environmental review process mandated under Hawai'i Revised Statutes (HRS), Chapter 343.

This environmental assessment (EA) analyzes the potential environmental consequences of the proposed action and alternative to determine whether there would be any significant short-term, long-term, and/or cumulative impacts on the human, natural, or historic environments.

All activities conducted in support of this EA, including consultations, field investigations, technical studies, and public involvement are conducted in accordance with HRS Chapter 343, environmental impact statements; the Hawai'i Administrative Rules (HAR), Title 11, Chapter 200, State of Hawai'i Department of Health Implementing Rules for the Environmental Review Process; and Act 50, Session Laws of Hawai'i, 2000 requiring impacts to Hawai'i's culture, traditional cultural properties and practices, and customary rights be addressed in the environmental review process.

### PROPOSED ACTION AND ALTERNATIVE

The proposed action and alternative are described as follows:

**Proposed Action.** The proposed action involves mitigation of the present slope condition using anchored wire mesh and ring net systems to contain most of the potential slope failure and rockfall events. Approximately 52,000 square feet (ft<sup>2</sup>) of anchored wire mesh would be installed over the majority of the lower portion of the slope. A ring net system would also be installed over approximately 2,500 ft<sup>2</sup> on a small portion of the western lower slope. The mesh and ring net system would conform to the slope allowing re-growth of vegetation with minimal disturbance to the natural setting of the property and providing erosion protection of the soft soil areas.

Slope dressing would be performed prior to installation of the anchored mesh and ring net systems to even out the rock slope. Demolition or stabilization of unstable boulders located throughout the slope may also occur. Stabilization would be accomplished with either rock bolt anchors or a localized cable net system. Under the proposed action, an existing swale at the top of the slope within the project site would be repaired to improve surface water runoff characteristics without altering the existing drainage pattern.

**No-Action Alternative.** Under the no-action alternative, conditions at the site would be left *status quo*. The DOT would not implement slope stabilization measures. The risk to public health and safety from rockfall and landslides would remain.

### SUMMARY OF ENVIRONMENTAL IMPACTS

The environmental impacts from the proposed action and alternative are summarized below:

**Proposed Action.** The proposed action involves the implementation of slope stabilization measures adjacent to Kuhio Highway. No impacts are expected for most resources. Long-term positive impacts are expected for geology and soils, natural hazards, safety and health, and transportation. Short-term adverse construction impacts related to air quality, hazardous materials and hazardous waste, noise, safety and health, transportation, and visual resources are possible during implementation of the proposed action. However, best management practices to be implemented during construction would reduce these impacts.

**No-Action Alternative.** Under the no-action alternative, conditions at the site would be left *status quo*. The DOT would not implement slope stabilization measures. This would likely result in long-

term adverse impacts for geology and soils, natural hazards, safety and health, transportation, and surface water resources.

#### **DETERMINATION**

To determine whether the proposed action would have a significant impact on the human, natural, or historic environments, the project, its anticipated direct and indirect effects, and the short-term, long-term, and cumulative impacts have been evaluated. In making this determination, the proposed action has been evaluated with respect to the significance criteria established in HAR §11-200-12. Based on the discussion of impacts and mitigation measures contained in Section 4 of this document, and the evaluation of the significance criteria in Section 5.1, it is anticipated that the proposed project would not have a significant adverse impact on the environment. Therefore, a Finding of No Significant Impact is anticipated.

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## ACRONYMS AND ABBREVIATIONS

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§	Section
BMP	best management practice
CDP	Census Designated Place
CFR	Code of Federal Regulations
CWA	Clean Water Act
CWB	Clean Water Branch, State of Hawaii Department of Health
dB	decibel
dBA	decibel (A-weighted scale)
DLNR	Department of Land and Natural Resources, State of Hawai`i
DOT	Department of Transportation, State of Hawai`i
EA	environmental assessment
FIRM	Flood Insurance Rate Map
ft <sup>2</sup>	square foot
HAR	Hawai`i Administrative Rules
HIOSH	Hawai`i Occupational Safety and Health
HRS	Hawai`i Revised Statutes
msl	mean sea level
NAAQS	National Ambient Air Quality Standards
NPDES	National Pollutant Discharge Elimination Systems
NRHP	National Register of Historic Places
ROE	right-of-entry
ROI	region of influence
SHPD	State Historic Preservation Division
SMA	Special Management Area
SRHP	State Register of Historic Places, State of Hawaii
TMK	Tax Map Key
UIC	Underground Injection Control
U.S.	United States
U.S.C.	United States Code
yd <sup>3</sup>	cubic yards



## 1.0 INTRODUCTION

The State of Hawai'i Department of Transportation (DOT) is proposing slope stabilization measures to be undertaken along Kuhio Highway near Hanalei, Kaua'i, Hawai'i (Figure 1-1). The proposed project is located within a State of Hawai'i Conservation District and would use State of Hawai'i funds therefore triggering the environmental review process mandated under Hawai'i Revised Statutes (HRS), Chapter 343.

This environmental assessment (EA) analyzes the potential environmental consequences of the proposed action and alternatives to determine whether there would be significant short-term, long-term, and/or cumulative impacts on the human, natural, or historic environments.

All activities conducted in support of this EA, including consultations, field investigations, technical studies, and public involvement are conducted in accordance with HRS Chapter 343, environmental impact statements; the Hawai'i Administrative Rules (HAR) Title 11, Chapter 200, State of Hawai'i Department of Health (DOH) Implementing Rules for the Environmental Review Process; and Act 50, Session Laws of Hawai'i, 2000 requiring impacts to Hawai'i's culture, traditional cultural properties and practices, and customary rights be addressed in the environmental review process.

### 1.1 PURPOSE OF AND NEED FOR ACTION

The purpose of the proposed action is to reduce the potential for rockfalls and landslides adjacent to Kuhio Highway by implementation of slope stabilization measures. The existing slope has eroded and become unstable, creating a high potential for rockfalls and landslides to reach the roadway. Slope stabilization measures are needed to reduce these identified risks to public health and safety for users of the road corridor.

### 1.2 ENVIRONMENTAL PERMITS, CONSULTATIONS, AND APPROVALS

In addition to the environmental disclosure requirements of HRS Chapter 343, implementation of the proposed action would require coordination and consultation with state and county agencies for permits or approvals as presented in Table 1-1 below (see Appendix A for agency correspondence).

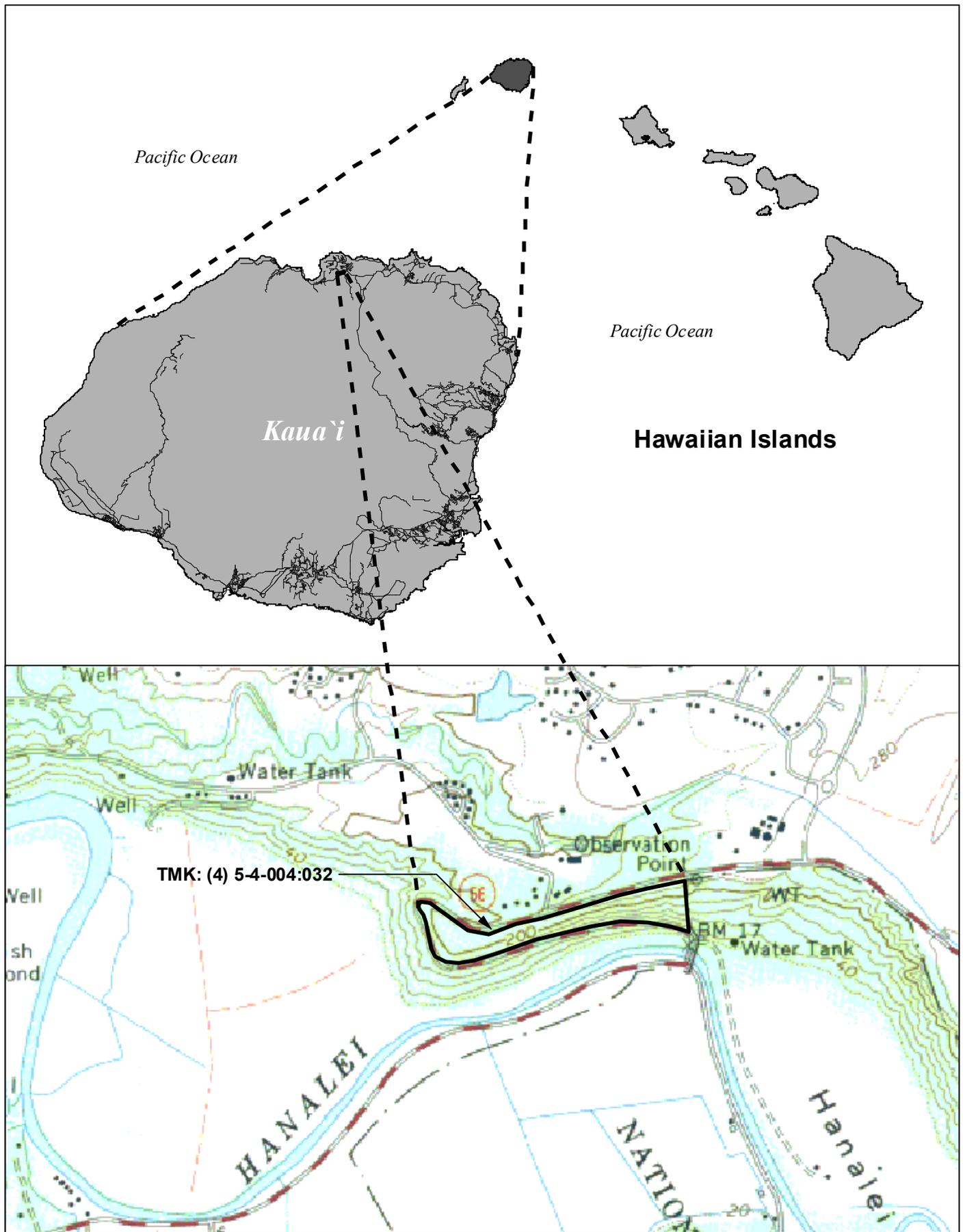
**Table 1-1: Permits and Approvals for Implementation of the Proposed Action**

Permit or Approval	Description	Regulation(s)	Administrative Authority
SMA Permit	A SMA Permit is required for any development within the SMA boundary, including construction, reconstruction, demolition, or alteration of the size of any structure. Per correspondence with the County of Kaua'i Planning Department, the proposed project would not constitute "development" and a SMA Permit would therefore not be required.	HAR 15-150	County of Kaua'i Department of Planning
Conservation District Use Permit	Land uses within any State of Hawai'i Conservation District must be approved by the Board of Land and Natural Resources or the Chairperson, prior to initiation.	HAR 13-5	DLNR OCCL
Historic Preservation Review	State projects that may affect a historic property must obtain a concurrence of "no affect" to historic properties from SHPD, prior to commencement.	HRS Chapter 6E-8; HAR 13-275	DLNR SHPD

Permit or Approval	Description	Regulation(s)	Administrative Authority
CWA Section 402 NPDES Permit	Section 402 of the CWA establishes the NPDES program regulating the discharge of pollutants to waters of the United States. NPDES permits are required to authorize discharges of storm water associated with construction activities that result in disturbance of 1 acre or more of total land area.	CWA (33 U.S.C. §§ 1251 et seq.); HRS 342D; HAR 11-55, Appendix C	DOH CWB
Grading Permit	A grading permit is required for grading that exceeds 100 yd <sup>3</sup> of cut or fill or exceeds 5 feet in vertical height at its deepest point.	Ordinance No. 808	County of Kaua`i DPW, Engineering Division

- § Section
- CWA Clean Water Act
- CWB Clean Water Branch
- DLNR Department of Land and Natural Resources
- DPW Department of Public Works
- NPDES National Pollutant Discharge Elimination System
- OCCL Office of Conservation and Coastal Lands
- SHPD State Historic Preservation Division
- SMA Special Management Area
- U.S.C. United States Code
- yd<sup>3</sup> cubic yard

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**Figure 1-1**  
**Site Location and Topographic Map**  
**Proposed Kuhio Highway Slope Stabilization**  
**District of Hanalei, Kauai, Hawaii**



## 2.0 PROJECT DESCRIPTION

This section provides background information on the proposed project and a description of the proposed action and the no-action alternative.

### 2.1 PROJECT LOCATION AND BACKGROUND

**Location.** The proposed project would occur within the roadway right-of-way near mile post 1 of Kuhio Highway (Route 560), as well as within approximately 3 acres of the 14.1-acre parcel identified by Tax Map Key (TMK) (4) 5-4-004:032 (Figure 2-1). The proposed project site is located approximately 0.5 miles south of Princeville, 1.5 miles northeast of Hanalei, and 1.3 miles from the Pacific Ocean (Figure 1-1).

**Background.** The proposed project area is undeveloped, steeply sloping conservation land, occupying approximately 3 acres of a 14.1-acre parcel (Figure 2-2). The project area has a history of rockfalls and slope failures, some of which have caused disruptions to traffic on Kuhio Highway. The slope is presently characterized as having many loose boulders, overhangs, and unstable soil with a high potential for rockfall and landslide. This potential for rockfall and landslide presents a substantial risk to public health and safety for users of the road corridor. Kuhio Highway is the only thoroughfare connecting the communities of Ha'ena, Wainiha, Hanalei, and Princeville on the North Shore of Kaua'i. A significant rockfall or landslide event could result in closure of the only highway linking these communities. Therefore, the DOT has prioritized implementation of slope stabilization measures at this location.

### 2.2 PROPOSED ACTION

Recommendations for the proposed action took into consideration various factors including public safety, construction cost, ease of maintenance, and sound engineering principles.

The proposed action involves mitigation of the present slope condition using anchored wire mesh and ring net systems to contain most of the potential slope failure and rockfall events. Approximately 52,000 square feet (ft<sup>2</sup>) of anchored wire mesh would be installed over the majority of the lower portion of the slope. A ring net system would also be installed over approximately 2,500 ft<sup>2</sup> on a small portion of the western lower slope. The mesh and ring net system would conform to the slope allowing re-growth of vegetation with minimal disturbance to the natural setting of the property and providing erosion protection of the soft soil areas.

Slope dressing would be performed prior to installation of the anchored mesh and ring net systems to even out the rock slope. Demolition or stabilization of unstable boulders located throughout the slope may also occur. Stabilization would be accomplished with either rock bolt anchors or a localized cable net system. Under the proposed action, an existing swale at the top of the slope within the project site would be repaired to improve surface water runoff characteristics without altering the existing drainage pattern. The proposed site layout is presented as Figure 2-3.

### 2.3 PROJECT SCHEDULE AND SOURCE OF FUNDING

Construction activities related to the proposed action would commence in 2009 and would take approximately six months to complete. This project would be funded by the DOT.

### 2.4 ALTERNATIVES TO THE PROPOSED ACTION

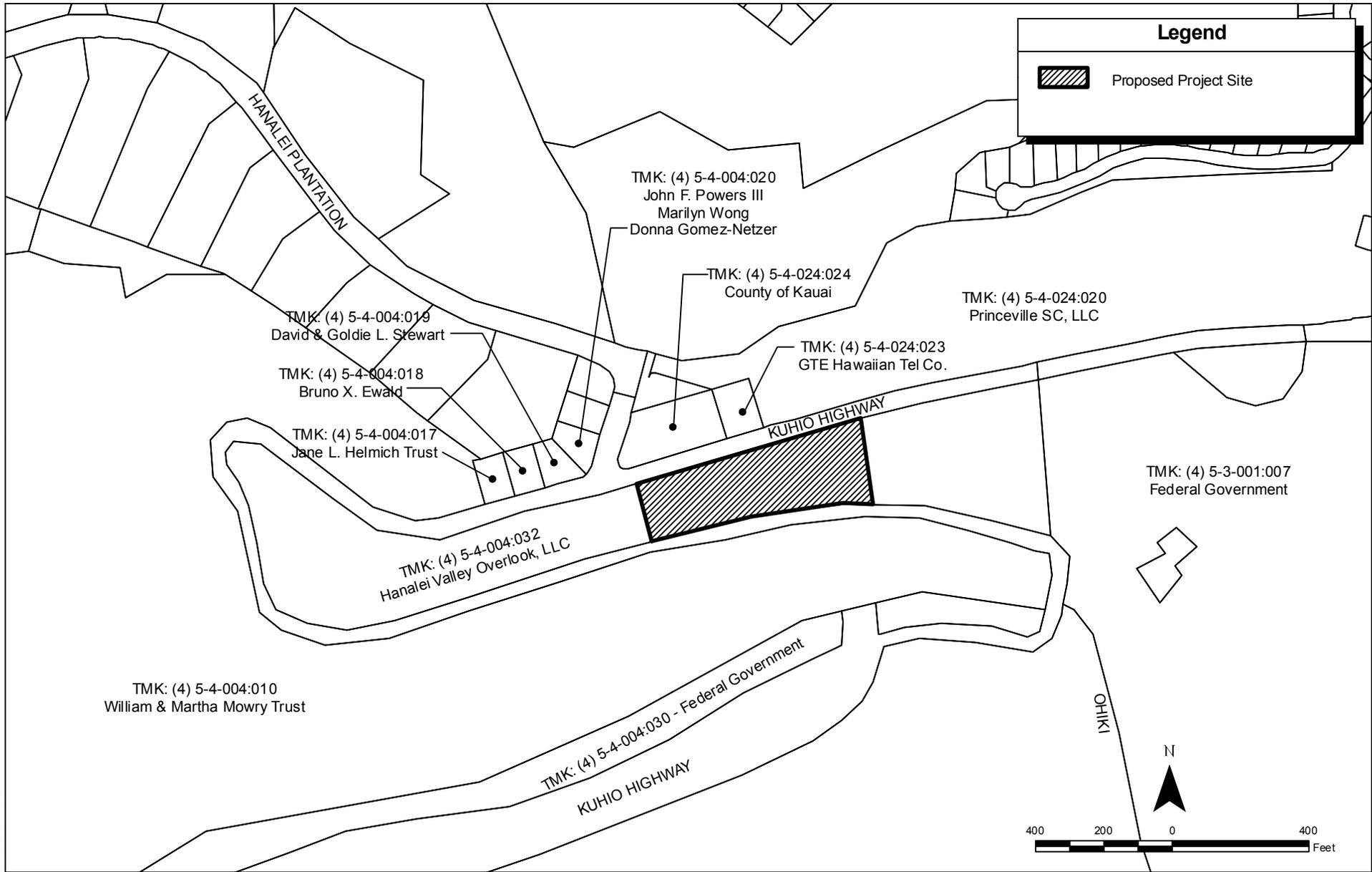
#### 2.4.1 No-Action Alternative

In addition to the proposed action, the no-action alternative will be analyzed in this EA. Under the no-action alternative, conditions at the site would be left *status quo*. The DOT would not implement slope stabilization measures. The risk to public health and safety from rockfall and landslides would remain.

#### **2.4.2 Alternatives Considered But Not Carried Forward**

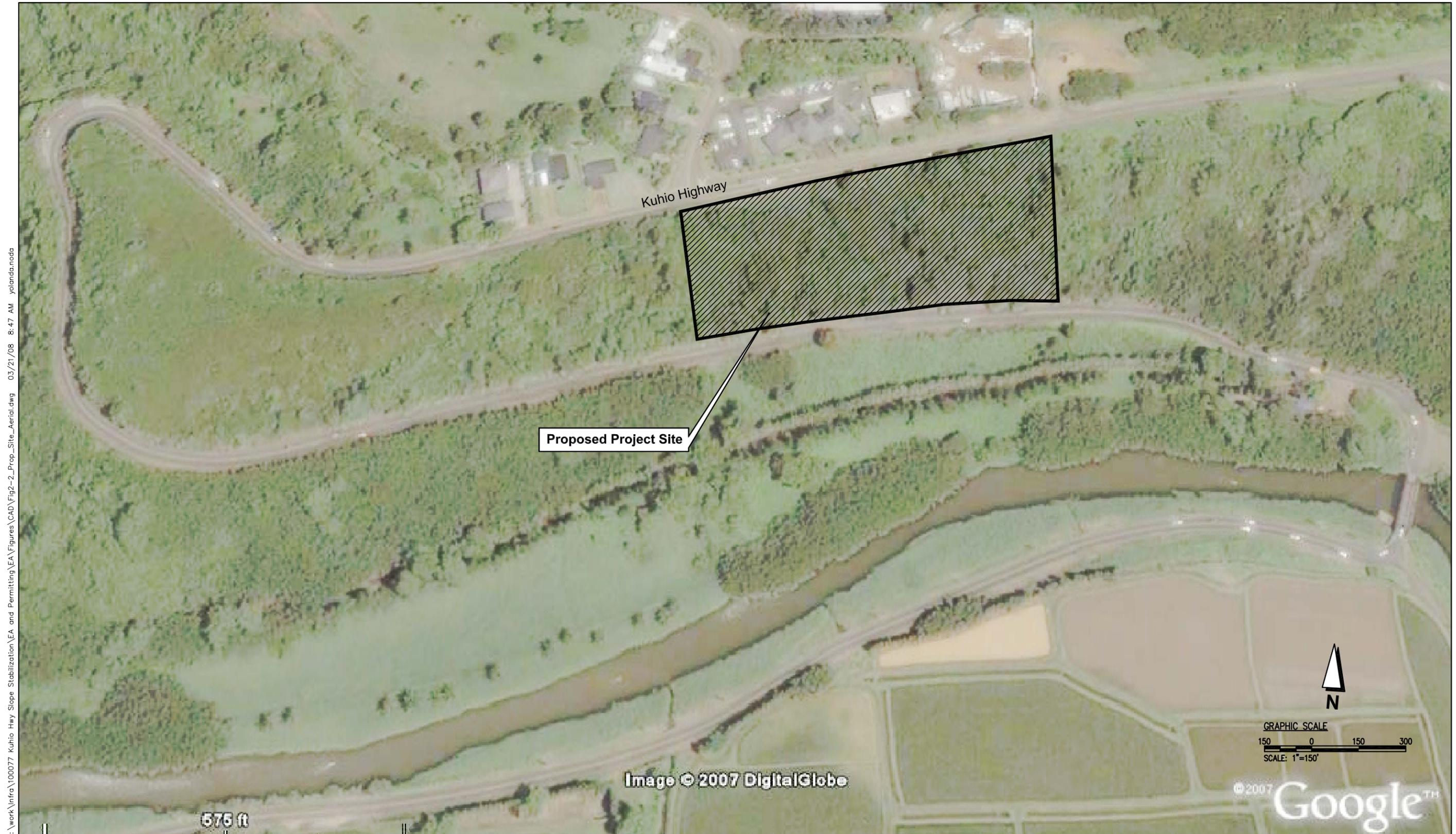
In addition to the no-action alternative, several other stabilization measures were considered but not carried forward for various reasons. Due to the presence of steep and unstable ground along the mountain slope and presence of the roadway both at the top and at the bottom there are limitations in choice of reasonable mitigation alternatives that would work. Alternatives considered but not carried forward included the following:

- Stabilization of the slope with applied shotcrete was eliminated because of the significant adverse visual impacts that would result.
- Construction of retaining walls for stabilization was eliminated because of the massive earth moving that would be required which could undermine the road above the project area. Construction of retaining walls would also have significant visual impacts for users of the road corridor.



**Figure 2-1**  
**Tax Map Key**  
**Proposed Kuhio Highway Slope Stabilization**  
**District of Hanalei, Kauai, Hawaii**

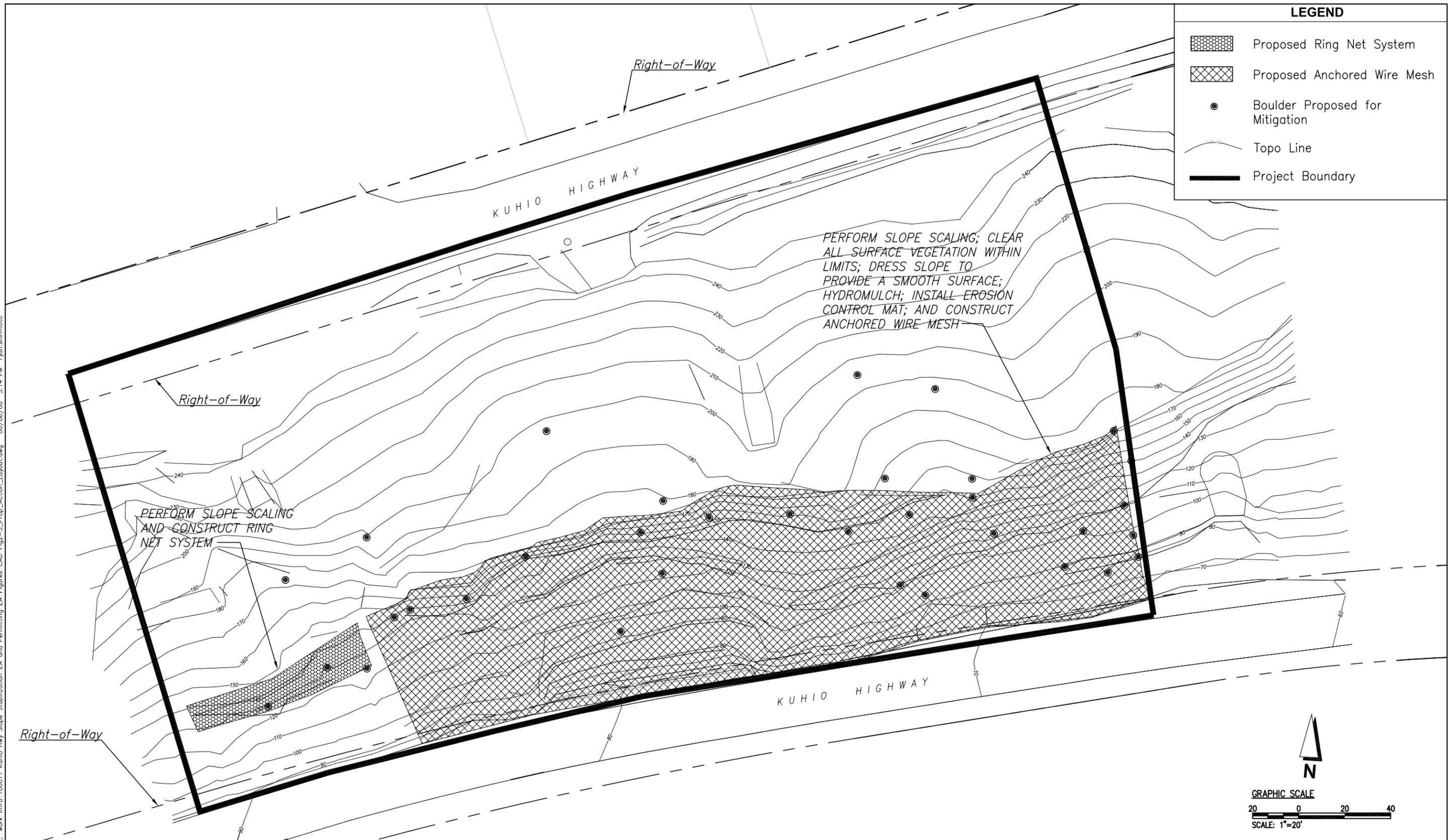




**Figure 2-2**  
**Aerial Photo of Proposed Project Site**  
**Proposed Kuhio Highway Slope Stabilization**  
**District of Hanalei, Kaua'i, Hawai'i**



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**Figure 2-3**  
**Proposed Action Layout Plan**  
**Proposed Kuhio Highway Slope Stabilization**  
**District of Hanalei, Kaua'i, Hawai'i**



### 3.0 DESCRIPTION OF THE AFFECTED ENVIRONMENT

This chapter describes the affected environment associated with the proposed action and the no-action alternative. The information provided serves as a baseline from which to identify and evaluate environmental changes resulting from implementation of the proposed action or the no-action alternative.

The affected environment describes the natural and man-made environments, which include air quality, biological resources, cultural resources, geology and soils, hazardous materials and hazardous waste, land use, natural hazards, noise, safety and health, socioeconomics, transportation, utilities and infrastructure, visual resources, and water resources. The region of influence (ROI) is defined for each resource area affected by the proposed action and the no-action alternative. The ROI determines the geographical area to be addressed as the affected environment.

#### 3.1 AIR QUALITY

The ROI for air quality is the proposed project site and downwind areas. Downwind areas vary during the year and air quality is affected by the climate. The climate is characterized by two distinct seasons, primarily defined by the annual variation in persistence of the northeast trade winds. The summer months from May to September are typically drier and warmer, while the winter months from October to April are usually wetter and cooler.

Modeling of downwind areas was not completed as part of this assessment. However, typical predominant downwind areas of the ROI would normally include places to the west or southwest. During Kona winds, downwind areas would typically be places to the north or east.

Ambient air quality, which refers to the purity of the general outdoor atmosphere, is regulated under the Clean Air Act and the United States (U.S.) Environmental Protection Agency National Ambient Air Quality Standards (NAAQS) (40 Code of Federal Regulations [CFR] Part 50). The DOH also regulates air quality and established ambient air quality standards (HAR Title 11, Chapter 59-4) that are as strict or, in some cases, stricter than the NAAQS. The State of Hawai'i has also established standards for fugitive dust emissions emanating from construction activities (HAR Title 11, Chapter 60.1-33). These standards prohibit any visible release of fugitive dust from construction sources without taking reasonable precautions.

The State of Hawai'i monitors ambient air quality for six regulated pollutants including:

- Particulate Matter less than 10 microns
- Particulate Matter less than 2.5 microns
- Carbon Monoxide
- Ozone
- Sulfur Dioxide
- Nitrogen Dioxide

Areas where ambient levels of a criteria pollutant are below the NAAQS are designated as being in "attainment." Areas where levels of a criteria pollutant equal or exceed the NAAQS are designated as being in "nonattainment." In 2006, the State of Hawai'i was in attainment for all criteria pollutants (DOH 2006).

Emissions from motor vehicles are the primary source of air pollutants in the project vicinity. Vehicular traffic is generally light and concentrations of ambient pollutants are assumed to be well below the federal and state ambient air quality standards.

### 3.2 BIOLOGICAL RESOURCES

The ROI for biological resources is the proposed project area. A botanical survey of the project area was conducted by AECOS, Inc. (AECOS) in April 2008. A total of 94 fern, fern ally, and flowering plant species were observed in the project area. Of these 94 species, only seven are considered native to the Hawaiian Islands (7.4 percent). Polynesian introductions made before the arrival of Captain James Cooke numbered five. Adding these to the count of native species, 12.8 percent of the plant species observed represent "Hawaiian" plants. These low values are typical of lowland disturbed sites on the Islands. No state or federal listed species, candidate species, or species otherwise determined to be rare or of special concern were observed within the ROI. A complete list of botanical species recorded within the ROI is provided in the botanical survey letter report included as Appendix B.

### 3.3 CULTURAL RESOURCES

The ROI for cultural resources is the proposed project area. This resource encompasses prehistoric and historic sites, structures, districts, artifacts, or any other physical evidence of human activity considered important to a culture, subculture, or community for scientific, traditional, religious, or any other reason. For the purpose of this EA, cultural resources are defined to include prehistoric and historic archaeological sites, historic buildings and structures, traditional (i.e., native Hawaiian) sites and cultural practices.

Per the *Guidelines for Assessing Cultural Impacts* (DOH 1997), the types of cultural practices and beliefs subject to assessment may include subsistence, commercial, residential, agricultural, access-related, recreational, and religious and spiritual customs. The cultural resources that support such cultural practices and beliefs are also subject to assessment.

**Registered Historic Places.** Kuhio Highway (Route 560) was placed on the Hawai'i State Register of Historic Places (SRHP) in 2003 and on the National Register of Historic Places (NRHP) in 2004 under the Site Name *Kaua'i Belt Road* (Site Number 30-03-9396). Under the criteria established by the SRHP and NRHP, the highway is recognized for its association with events that have made a significant contribution to the broad patterns of the island's history. It is also an embodiment of the distinctive type, period, and method of construction for that time in history.

Among the physical, historic, and character-defining qualities of the highway are the:

- Almost unchanged alignment of the road since its completion in the early 1900s
- Original or historic width and frequent absence of shoulders, as were the conditions in the late 1920s
- Presence of numerous one-lane bridges representing the construction methodology and material type of their original period of construction
- Guardrails and barrier walls that were constructed of timber-beam/concrete-post or masonry rock construction (Belt Collins 2005)

**Archaeological Resources.** Approximately 20 archaeological sites have been recorded in the Hanalei area. Hanalei's archaeological resources include irrigated *lo'i* or pondfields, habitation sites, other agricultural sites, *a'uwai* (irrigation ditches), and two *heiau*. While most of the archaeological sites are found near the coast, some have been found four miles up the Hanalei Valley. These inland sites include *lo'i*, habitation sites, and two *heiau*. Consultation with the SHPD did not identify any archaeological sites within the project area (Appendix A).

**Cultural Practices and Traditional Uses.** The Hanalei *ahupua'a* encompasses a variety of ecosystems from the ocean to the mountains. The *ahupua'a* provided its residents with fish from the

ocean, wild birds from the mountains, ti-leaf for wrapping, wood for fire, *olona* for fish line, and fresh mountain water for irrigating taro *lo'i*.

Hanalei has a 1,000 year history of wetland agriculture, and wetland agriculture is strongly associated with community traditions and cultural practices. In addition to wetland agricultural sites found on the alluvial flood plains of the Hanalei River, seven agricultural complexes have been recorded on the steep valley slopes above the major *a'uwai* in the Valley. Some of these agricultural sites were probably for dryland cultivations, while others may have been irrigated by springs.

In accordance with Act 50, Session Laws of Hawai'i, 2000 statements or information relating to cultural resources and practices in the project vicinity were requested from knowledgeable informants, including traditional cultural practitioners, historians, and individuals associated with community organizations. Persons contacted for information include: Ms. Maka'ala Ka'auomoana (Hanalei Watershed Hui), Ms. Barbara Robeson (Hanalei Roads Committee), and Councilman Jay Furfaro.

According to Ms. Kaumoana, the project area lies along a ridge traditionally known as Kaunuohua Ridge. The interview with Ms. Kaumoana raised concern that a fresh water spring associated with traditional uses may occur within the project area. As a follow-on to this interview, Earth Tech conducted a site walk with Mr. Matt Rosenar, a hydrologist associated with the Hanalei Watershed Hui, on April 22, 2008. A fresh water spring was not identified on this site walk. However, Mr. Rosenar did raise two concerns regarding cultural impacts and the use of hydromulch to re-seed areas cleared of vegetation: 1) there is concern that hydromulching with non-native seed sources could introduce invasive species to the area, and 2) there is concern that the slurry in which seeds are suspended could contribute pollutants to the Hanalei River, which is an important source of irrigation water.

### 3.4 GEOLOGY AND SOILS

The Island of Kaua'i consists of a single shield volcano that is deeply eroded and partly veneered with much later volcanics. The shield volcano was built by the extrusion of lava of the Waimea Canyon Volcanic Series during the late Pliocene Epoch (about 2.25 million years ago). Due to their age, these olivine basalts are usually mantled with residual and saprolite soils grading into weathered rock with increasing depth.

The proposed project site is situated on two soil classifications, with the Makapili Series being the most prominent. Soil found at the proposed project location consists of Makapili silty clay (MeB and MeE), and Rough Mountainous Land (rRT) (USDA SCS 1973).

Soils found in the Makapili Series consist of well-drained soils on uplands on the Island of Kaua'i. These soils developed in material weathered from basic igneous rock. They are nearly level to steep. Elevations range from 100 to 350 feet above mean sea level (msl). MeB and MeE are characterized as follows:

- **MeB (Makapili silty clay, 0 to 8 percent slopes).** MeB is found on broad upland ridges. In a representative profile, the surface layer is brown silty clay about 12 inches thick. The subsoil, about 48 inches thick, is reddish-brown, and yellowish-red clay loam and silty clay that has a sub-angular blocky structure. The substratum is silty clay. Permeability for this soil is moderately rapid. Runoff is slow and the erosion hazard is slight.
- **MeE (Makapili silty clay, 25 to 40 percent slopes).** MeE has a soil profile like that of MeB (0 to 8 percent slopes), except that the surface layer is thinner. Runoff is rapid and the erosion hazard is severe.

Rough Mountainous Land consists of very steep land broken by numerous intermittent drainage channels. In most places it is not stony. Elevations range from nearly sea level to more than 6,000 feet msl. Over much of the area the soil mantle is very thin. It ranges from 1 inch to 10 inches in thickness over saprolite. In most places the saprolite is relatively soft and permeable to roots and

water. The land surface is dominated by deep, V shaped valleys that have extremely steep side slopes and narrow ridges between the valleys. In most places the local relief exceeds 500 feet. The soil material on the narrow ridge tops is similar to that of the Amalu and Oloku`i series. Rock land, rock outcrop, soil slips, and eroded spots make up 20 to 40 percent of the acreage.

A soil classification map reflecting the proposed project area and the soils described above is provided as Figure 3-1.

### 3.5 HAZARDOUS MATERIALS AND HAZARDOUS WASTE

The ROI for hazardous materials and hazardous wastes is the proposed project area. For the purpose of the following analysis, the term hazardous materials or hazardous wastes will mean those substances defined by the Comprehensive Environmental Response, Compensation, and Liability Act, 42 United States Code (U.S.C.) Sections (§§) 9601 et seq., and Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901–6992. In general, these include substances that, because of their quantity, concentration, or physical, chemical, or toxic characteristics, may present an unreasonable risk to health, safety, and the environment when released. Transportation of hazardous materials is regulated by the U.S. DOT regulations within Title 49 CFR.

Current and historic land uses within the areas proposed for slope stabilization are not associated with the use, transportation, or storage of hazardous materials. Hazardous materials and/or wastes may be transported on Kuhio Highway. However, the project area should not be impacted by hazardous materials on the roadway.

### 3.6 LAND USE AND OWNERSHIP

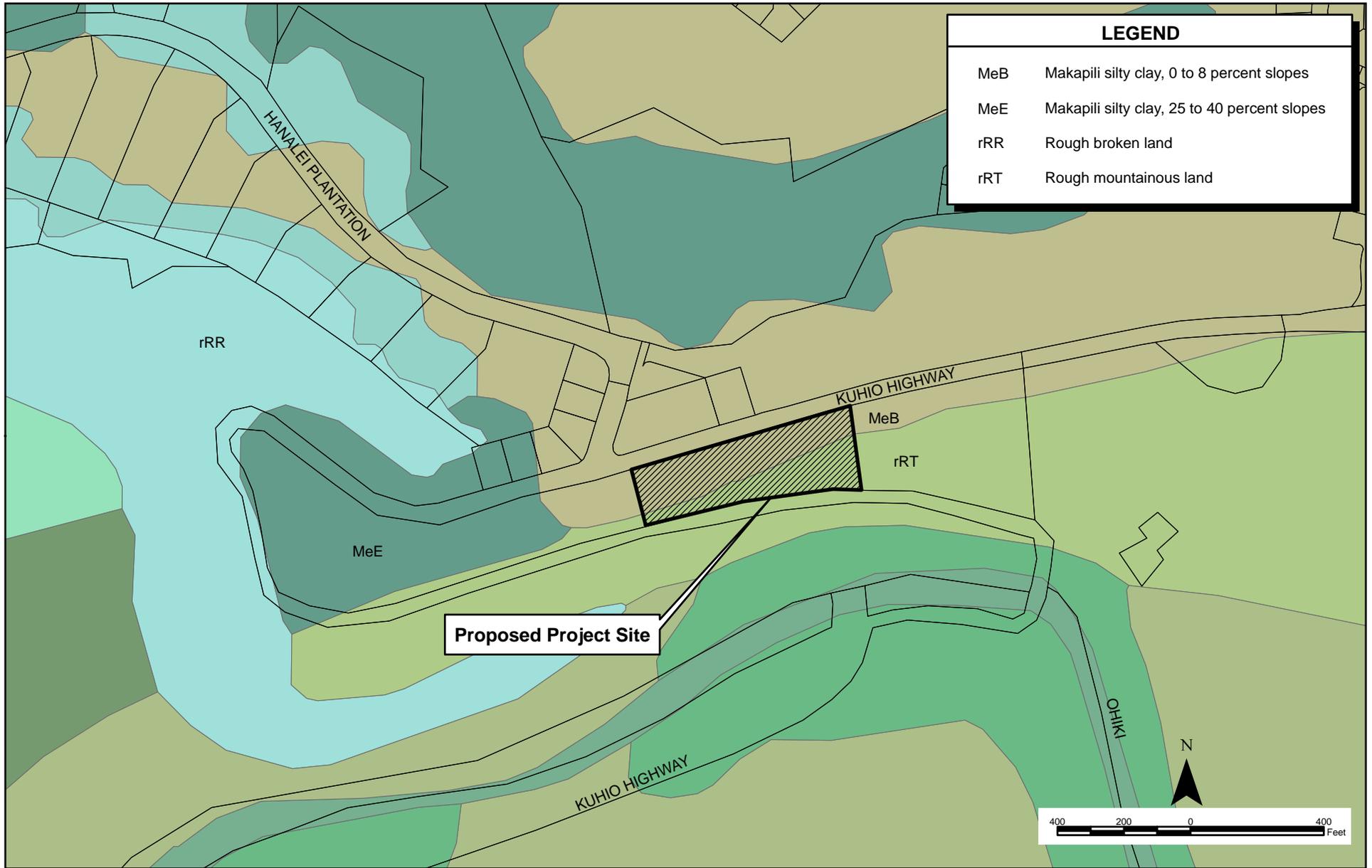
The land use and ownership ROI is the proposed project and adjacent areas. The project area consists of steeply sloping undeveloped land, occurring within the roadway right-of-way and within a portion of a privately-owned parcel identified by TMK (4) 5-4-004: 032. The project area has a state land use designation of Conservation District (Figure 3-2) and is also within a County of Kaua`i Special Management Area (SMA) (Figure 3-3). Land adjacent to the southern, eastern, and western project boundaries is undeveloped (Figure 2-2). Residential parcels, a fire station, and police station are located across from the upslope (northern) property boundary.

### 3.7 NATURAL HAZARDS

Natural hazards that may occur in and affect the proposed project area include floods, tsunamis, hurricanes, earthquakes, and other natural events. The ROI for natural hazards is the proposed project area.

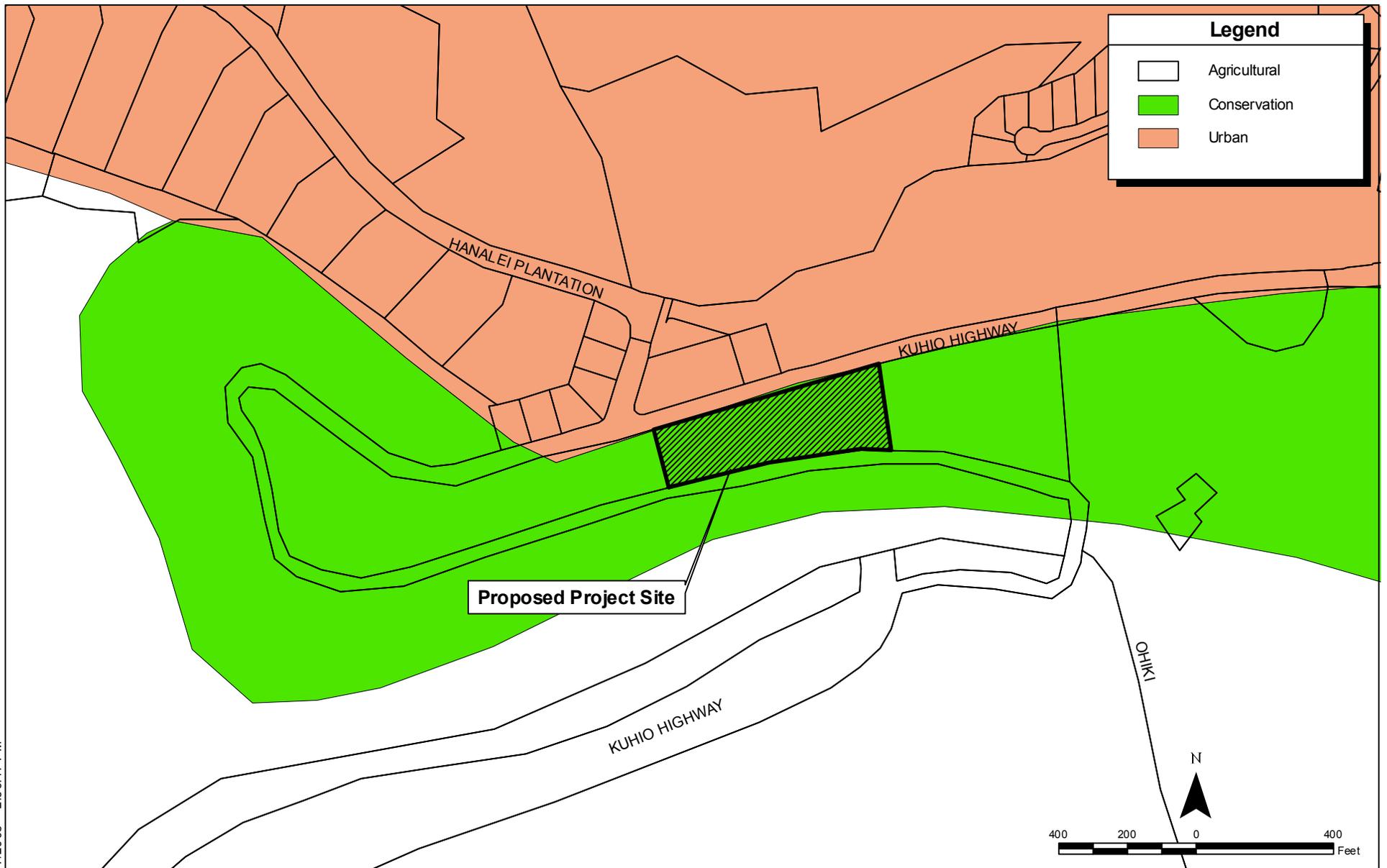
**Floods.** The Federal Emergency Management Agency Flood Insurance Rate Map (FIRM) flood zone designations are:

- A – Areas of 100-year flood, base flood elevations not determined
- AE – Areas of 100-year flood, base flood elevations determined
- XS – Areas of 500 year flood; areas of 100-year flood with average depths of less than one foot or within the drainage area less than one square mile, and areas protected by levees from 100-year flood
- X – Areas determined to be outside the 500-year flood plain
- D – Areas in which flood hazard is undetermined
- VE – Areas of 100-year coastal flood with velocity (wave action), base flood elevations determined (Coastal High Hazard District)



**Figure 3-1**  
**Soil Classification Map**  
**Proposed Kuhio Highway Slope Stabilization**  
**District of Hanalei, Kaua`i, Hawai`i**

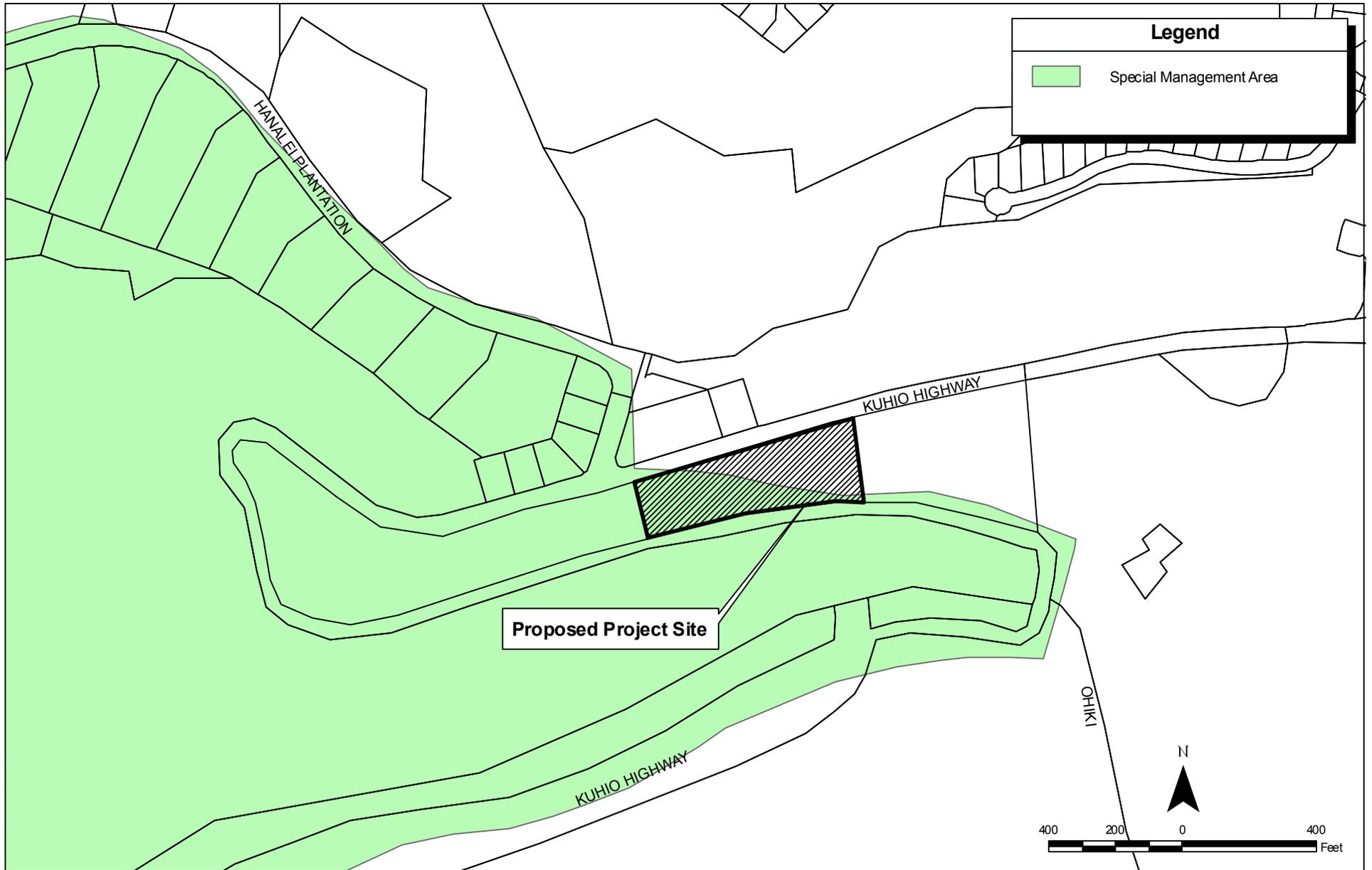




**Figure 3-2**  
**State Land Use Districts**  
**Proposed Kuhio Highway Slope Stabilization**  
**District of Hanalei, Kaua'i, Hawai'i**



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**Figure 3-3**  
**Special Management Area**  
**Proposed Kuhio Highway Slope Stabilization**  
**District of Hanalei, Kauai, Hawaii**



The 500-year floodplain is an area with a 0.2 percent chance of inundation in any given year. Per FIRM map number 1500020055E (FEMA 2005), the project area is located within Zone X, indicating that it is outside the 500-year floodplain.

**Tsunamis.** Tsunamis are a series of destructive ocean waves generated by seismic activity that could affect shorelines of Hawai'i. Tsunamis affecting Hawai'i are typically generated in the waters off South America, the west coast of the United States, Alaska, and Japan. Local tsunamis have also been generated by seismic activity on the Island of Hawai'i.

The County of Kaua'i Civil Defense Agency establishes tsunami evacuation zones and maps for all coastal areas on Kaua'i. Tsunami maps for the inland areas of Kaua'i indicate that the proposed project area is not within the tsunami evacuation zone.

**Hurricanes.** The Hawaiian Islands are seasonally affected by Pacific hurricanes from June to November. These storms generally travel toward the islands from a southerly or southeasterly direction and can deposit large amounts of rain with high winds on the Hawaiian Islands. The storms generally contribute to localized flooding and coastal storm surges. Coastal storm surges would not impact the proposed project area.

**Earthquakes.** Because Kaua'i is an older Hawaiian island with dormant volcanic activity, it is not particularly prone to seismic activity. Seismic activity usually occurs on the Island of Hawai'i, and has been felt as far away as O'ahu. Kaua'i is listed in Seismic Zone A under the Uniform Building Code (ICBO 2000). Zone A indicates a location that has low potential for ground motion created by seismic activity.

### 3.8 NOISE

The ROI for noise effects is the project area and adjacent areas. Noise is often defined as unwanted sound and is one of the most common environmental issues of concern to the public. A number of factors affect sound, as it is perceived by the human ear. These include the actual level of the sound (or noise), the frequencies involved, the period of exposure to the noise, and changes or fluctuations in the noise levels during exposure.

The accepted unit of measure for noise levels is the decibel (dB) because it reflects the way humans perceive changes in sound amplitude. Sound levels are easily measured, but human response and perception of the wide variability in sound amplitudes is subjective.

Different sounds have different frequency content. When describing sound and its effect on a human population, A-weighted (dBA) sound levels are typically used to account for the response of the human ear. The term "A-weighted" refers to a filtering of the noise signal to emphasize frequencies in the middle of the audible spectrum and to de-emphasize low and high frequencies in a manner corresponding to the way the human ear perceives sound. This filtering network has been established by the American National Standards Institute. The A-weighted noise level has been found to correlate well with a person's judgment of the noisiness of different sounds and has been used for many years as a measure of community noise.

The State of Hawai'i regulates noise exposure in the following statutes and rules: HRS §342F - *Noise Pollution*, HAR §11-46 - *Community Noise Control*, and HAR §12-200.1 *Occupational Noise Exposure*. Maximum permissible sound levels for Class A zoning districts including all areas equivalent to lands zoned residential, conservation, preservation, open space, or similar type, is 55 dBA between the hours of 7:00 AM and 10:00 PM and 45 dBA between 10:00 PM and 7:00 AM (HAR §11-46-4). The project area is located on undeveloped conservation land. Noise studies have not been performed at the project area for the purpose of this EA. Existing noise levels are consistent with residential, conservation, and open space uses and are assumed to be within the State of Hawai'i community noise exposure guidelines for a Class A zoning district.

### 3.9 SAFETY AND HEALTH

Safety and health concerns primarily relate to steep topography, geologic instability, and the potential for rockfalls to reach the roadway. The ROI for safety and health includes the project area and adjacent down gradient properties.

Rockfall rating is a subjective rating that groups the hazard conditions into three classes, as described below:

- *Class A.* High estimated potential for rockfall on adjacent property(ies) with high historical rockfall activity. A Class A rating means that the chances of rock falling in a site is moderate to high, and that when the rockfall occurs, it will certainly reach adjacent property(ies) or roadway. An example of a Class A condition is where rocks on the cut slope overhang the adjacent property(ies) and in areas where little or no rock catchment ditch is available.
- *Class B.* Presence of moderate estimated potential for a rock to fall on adjacent property(ies) or roadway with moderate historical rockfall activity. As the rockfall risk is reduced, a Class B rating indicates that although a rockfall is probable, the chances of it reaching the adjacent properties are low to moderate. A possible scenario for Class B is a condition where a rockfall from the slope is clearly possible, and the catchment ditch is large enough to prevent most of the rocks from reaching the adjacent property(ies).
- *Class C.* Low estimated potential for rockfall on adjacent property(ies) or roadway with low historical rockfall activity. Class C rating pertains to a condition in which there is a low chance for a rockfall event, but should one occur, there is no chance for the rocks to reach other properties.

The factors considered when estimating the potential for rockfall on adjacent properties include the estimated size of material, estimated quantity of material for each event, and the effectiveness of the rock catchment ditch along the property.

Based on field investigation, the project area is in a Class A rockfall condition with a high potential for rocks reaching Kuhio Highway during a rockfall event. This slope is prone to landslides, as well as rockfall, during heavy rainfall. The following criteria relate directly to the rockfall condition at the project area:

**Slope Height.** The upper portion of the property has varying heights with respect to the roadway. The slope height varies from about a few feet to approximately 200 feet high. A loose rock dislodged from upper portions of this site could gain substantial potential energy by the time it reaches the bottom elevations.

**Structural Condition of the Rocks.** The present rock formation of the site exhibits aspects of structural deficiencies from long and continuous joints and cracks in the `a`a and pahoehoe flows to weakening of the rock outcroppings resulted from excessive erosion of the clinker layers and highly weathered basaltic soil. Any of these conditions could result in an eventual rockfall event.

**Volume of Rockfall Event.** Rock sizes at the project area range from just a few inches to a number of feet in diameter having flat or semi-spherical shapes. It is a common understanding that the larger the size of a falling rock, the greater the potential energy and effects of the impact could possibly be.

**Rockfall History.** There was a major rock slide in the last few years at this site. A survey of the site indicates presence of sporadic rockfalls reaching the paved roadway and its narrow grassy shoulder. As a general rule, sites with a history of frequent rockfall are more likely to experience future rockfall events.

**Average Vehicle Risk.** The chance of a vehicle being present along this portion of Kuhio Highway at the time of a rockfall event is dependent on the frequency of travel and the speed of the vehicles.

Approximately 8,900 cars travel past the project area on a daily basis (DOT 2008). The present frequency of travel on this roadway creates a serious concern regarding the occurrence of a rockfall in this area.

**Sight Distance.** Kuhio Highway in the vicinity of the project area is a winding roadway with a number of horizontal curves that limit the line of sight for the driver of a vehicle passing through. The sight distance is limited at the sharp turns allowing the driver of a vehicle little time to react to a possible obstruction on the road. The difficulty is compounded where higher traveling speeds are involved.

**Shoulder Width.** Kuhio Highway is a two-way traffic roadway, less than 25 feet wide. The steep slope on one side and sheer cliff leading to the Hanalei River on the other side provides no shoulders on this portion of Kuhio Highway therefore adding to the limited reaction time.

### 3.10 SOCIOECONOMICS

This section summarizes the demographic and income characteristics of residents in the vicinity of the proposed project area. Data summarized in Table 3-1 are taken from the 2000 U.S. Census (U.S. Census Bureau 2007). Census data are used to describe the existing social and economic characteristics of the ROI and to determine whether any minority or low-income population may experience disproportionately high adverse impact from the proposed action or alternatives. The ROI for socioeconomics is Princeville Census Designated Place (CDP), Kaua'i, Hawai'i, in which the proposed project area is located in close proximity. Data for the County of Kaua'i is presented for the purpose of comparison.

**Table 3-1: Demographic and Income Characteristics**

Characteristic	County of Kaua'i		Princeville CDP	
	No.	Percent	No.	Percent
Population	58,463		1,698	
<b>Ethnicity</b>				
Asian	21,042	36.0	78	4.6
Pacific Islander	5,334	9.1	57	3.4
Black or African American	177	0.3	5	0.3
Hispanic or Latino	4,803	8.2	68	4.0
Caucasian	17,255	29.5	1,380	81.3
Other Ethnicity	505	0.9	17	1.0
More than one Ethnic Group	13,938	23.8	152	9.0
<b>Income</b>				
Median Family Income	\$51,378		\$67,266	
Per capita income	\$20,301		\$37,971	
<b>Poverty Status in 1999</b>				
Families below poverty level	1,224	8.4	38	7.4
Individuals below poverty level	6,085	10.5	137	8.1

Source: U.S. Census Bureau, 2000 Census of Population and Housing (U.S. Census Bureau 2007)

In 2000, the County of Kaua'i reported 58,463 residents and the Princeville CDP reported 1,698 residents. The population within the Princeville CDP is 4.6 percent Asian, 3.4 percent Pacific Islander, 0.3 percent Black or African American, 4.0 percent Hispanic or Latino, and 81.3 percent Caucasian, compared to 36.0 percent Asian, 9.1 percent Pacific Islander, 0.3 percent Black or African American, 8.2 percent Hispanic or Latino, and 29.5 percent Caucasian; within the general population of the Island of Kaua'i.

Median family income and per capita income are \$67,266 and \$37,971, respectively within the Princeville CDP. Both the percent of families below the poverty level (7.4 percent) and the percent of individuals below the poverty level (8.1 percent) are slightly lower within the CDP when compared to the County of Kaua'i.

### 3.11 TRANSPORTATION

The ROI for transportation is the project area and adjacent roadways. Access to the proposed project area is from Kuhio Highway near mile post 1. Kuhio Highway is a winding two-lane rural highway that extends from Princeville to the end of the road in Ha'ena on the North Shore of Kaua'i. It is approximately 10 miles in length and is the only thoroughfare connecting the communities of Ha'ena, Wainiha, Hanalei, and Princeville. The roadway in the project vicinity consists of two paved travel lanes and narrow unpaved shoulders. A number of sharp turns in the roadway alignment limit the line of sight for drivers passing through. Average annual daily traffic data obtained from the State DOT indicate that approximately 8,900 vehicles per day travel on Kuhio Highway between mile posts 0.38 and 1.15 (DOT 2008).

### 3.12 UTILITIES AND INFRASTRUCTURE

The ROI for utilities and infrastructure is the proposed project area. There are no existing utilities or infrastructure within the proposed project area.

### 3.13 VISUAL RESOURCES

Visual resources are the aggregate of characteristic features imparting visually aesthetic qualities to a natural, rural, or urban environment. The ROI for visual resources is the proposed project area. This resource is assessed to determine whether the proposed action and alternative would be compatible with the existing landscape and development plans for the area.

The existing visual quality of the project area is that of a rural two-lane highway corridor cut through steeply sloped and heavily vegetated undeveloped land. The Kaua'i General Plan designates Kuhio Highway a Scenic Roadway Corridor. The purpose of designating Scenic Roadway Corridors is to conserve open space, scenic features, and views within and along Kaua'i's most heavily-traveled routes.

### 3.14 WATER RESOURCES

This section describes the availability and quality of water resources, including surface water and groundwater. Surface water includes lakes, perennial/intermittent streams, and drainage ways. Groundwater includes water present in aquifers (perched, unconfined, confined, or artesian). The ROI for water resources includes the surface water bodies, streams, and drainage features identified within or downgradient of the proposed project area and the underlying aquifer.

**Surface Water.** Generation of surface water typically begins in the mountains as rainfall. As surface water proceeds downgradient it collects in streams and gulches. A portion infiltrates through the ground surface and streambeds, recharging the underlying aquifer. Potential issues arise if the course or carrying capacity of gulches and streams are changed, as this can cause flooding or scour damage and degradation of downstream water quality.

No perennial sources of surface water were observed during field investigations. Surface water within the project area drains down slope via sheet flow to a swale adjacent to Kuhio Highway. Surface water from the swale ultimately drains to Hanalei River, which is classified as a Class 2 Inland Water per HAR 11-54-3(b)(2) and is located just downgradient of the proposed project area. The objective of Class 2 waters is to protect their use for recreational purposes, the support and propagation of aquatic life, agricultural and industrial water supplies, shipping, and navigation.

The Hanalei River was recently selected as one of 14 American Heritage Rivers under Executive Order 13061. The American Heritage Rivers initiative has three objectives: natural resource and environmental protection, economic revitalization, and historic and cultural preservation. Under this initiative, the Hanalei River Hui is committed to the perpetuation of taro farming in Hanalei, much of which takes place in the Hanalei Wildlife Refuge. In response to the farmers' request, the Hanalei River Hui has approved a project to: "Coordinate efforts to resolve the urgent water supply and irrigation concerns on the Hanalei Wildlife Refuge, in a manner that meets the needs of the taro farmers and is compatible with the instream resources of the Hanalei River." That process is ongoing.

**Groundwater.** Groundwater beneath the proposed project area occurs in two distinct aquifers within the Hanalei Aquifer System of the Hanalei Aquifer Sector. The upper aquifer is identified with the aquifer code 20202116. The aquifer is classified as a basal aquifer containing fresh water in contact with seawater that is unconfined in sedimentary non-volcanic lithology. The groundwater status is reported as potentially usable and ecologically important. The groundwater within this aquifer is described as containing low salinity and irreplaceable with a high vulnerability to contamination (Mink and Lau 1992).

The lower aquifer is identified with the aquifer code 20202112. The aquifer is classified as a basal aquifer containing fresh water in contact with seawater that is unconfined in dike compartments. The groundwater status is reported as potentially usable for drinking water purposes. The groundwater within the aquifer is described as fresh and irreplaceable with a moderate vulnerability to contamination (Mink and Lau 1992).

The State of Hawai'i Underground Injection Control (UIC) program was established by the DOH Safe Drinking Water Branch to protect the quality of underground sources of drinking water. As part of this program, a UIC line was delineated on U.S. Geological Survey maps for each island. Groundwater inland of this line is considered by the State to be a potential source of drinking water. Groundwater in areas seaward of this line are not considered potential drinking water sources. A review of the UIC map for the Island of Kaua'i, which includes the area of the subject property, indicates the subject property is located seaward of the UIC line.



## 4.0 ENVIRONMENTAL CONSEQUENCES

Project-related effects, both adverse and beneficial, include primary, secondary, and cumulative effects. Primary effects or direct impacts are caused by the action and occur at the same time and place. Secondary effects or indirect impacts are caused by the action and occur later in time or are farther removed in distance, but are still reasonably foreseeable. Cumulative effects refer to impacts on the environment that result from the incremental impact of an action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor yet collectively significant actions taking place over a period of time.

Effects of the proposed project are divided into short-term and long-term effects. Short-term effects are related to construction activities. Long-term effects refer to the effects caused from implementation of the proposed action, and are longer in duration. Anticipated environmental effects of the proposed action and no-action alternative, cumulative impacts, and proposed mitigation measures, where applicable, are summarized below.

### 4.1 AIR QUALITY

**The Proposed Action.** Only short-term construction related impacts to air quality are anticipated with implementation of the proposed action. During construction, potential emission sources that may affect air quality at the project site include the following:

- Diesel- and/or gasoline-powered construction equipment and motor vehicles (additional sources of carbon monoxide and carbon dioxide)
- Fugitive dust emissions resulting from rock demolition, grading, and installation of anchored wire mesh and ring net systems

Construction vehicles traveling to and from the proposed project area and onsite construction equipment consisting of primarily diesel engines would contribute to local air pollution. Construction activities may also generate short-term fugitive dust particulate emissions.

Because levels of criteria pollutants in Hawai'i are consistently well below federal and state air quality standards (DOH 2006), and because the prevailing trade winds rapidly carry pollutants offshore limiting the effect on receptors, increases in levels of criteria pollutants at the project area from construction activities are not expected to be significant.

**No-Action Alternative.** Under the no-action alternative, no construction activities would occur at the project area. No additional emission sources would be added; hence there would be no change to air quality. No impact to air quality is anticipated from the no-action alternative.

**Mitigation Measures.** Construction activities would be conducted in accordance with State of Hawai'i air pollution control regulations (HRS §11-60.1) and would employ the proper administrative and engineered controls to reduce air emissions. Dust control measures including a dust control (watering) program and revegetation of graded or cleared areas would be implemented. It is not anticipated that federal or state ambient air quality standards would be exceeded during construction activities.

### 4.2 BIOLOGICAL RESOURCES

**The Proposed Action.** The proposed action would clear approximately 0.63 acres of existing vegetation in areas to be covered with anchored wire mesh and ring net systems. Vegetation would be cut to ground level; grubbing to remove roots below ground surface is not required. No rare botanical species or species listed as endangered or threatened by the State of Hawai'i or the U.S. Fish and Wildlife Service have been identified within the project area and no significant adverse impacts to biological resources are anticipated. Hydromulch would be applied during construction for temporary erosion control. The DOT will evaluate whether it is feasible to use native plant hydroseed

for revegetation of disturbed areas at the time of construction (see Section 4.3 below for a summary of the status of native plant hydroseeding techniques). Once installed, the anchored wire mesh and ring net systems would allow for the re-growth of permanent vegetation.

**No-Action Alternative.** Under the no-action alternative, no slope stabilization measures would be implemented and there would be no change to the biological resources of the project area. Therefore, no biological impacts are anticipated with implementation of the no-action alternative.

#### 4.3 CULTURAL RESOURCES

**The Proposed Action.** The proposed action would stabilize the slope adjacent to Kuhio Highway. Construction activities would result in ground disturbance on the slope within the right-of-way boundary, as well as within the adjacent TMK. Implementation of the proposed slope stabilization measures would not alter the quality of Kuhio Highway. No significant historic properties or archaeological sites have been identified on the adjacent TMK, where most of the construction activities would take place. Historic preservation review of the proposed action was initiated with the SHPD pursuant to HRS Chapter 6E-8 in a letter dated January 31, 2008; a determination from the SHPD that "no historic properties will be affected" was subsequently obtained (see Appendix A).

A cultural impact assessment performed in accordance with Act 50, Session Laws of Hawai'i, 2000, raised two primary concerns relative to cultural impacts: 1) it was suggested that a fresh water spring associated with traditional uses may be located within the project area, and 2) there was concern that hydromulching with non-native seed sources could introduce invasive species to the area or contribute pollutants to the Hanalei River. A geologic site investigation conducted by Earth Tech to assess the slope condition did not identify a fresh water spring within the areas proposed for slope stabilization. A site walk conducted on April 22, 2008 with Mr. Matt Rosenar, a hydrologist associated with the Hanalei Watershed Hui, also did not locate a fresh water spring source within the project area. Proposed slope stabilization measures would not alter the local hydrology or surface water drainage patterns, and no adverse impacts to fresh water springs are anticipated from implementation of the proposed action.

The DOT recognizes community interest in using native seed sources for hydromulch applications on DOT projects, and is presently in the process of developing hydroseeding techniques for several native grasses deemed suitable for DOT highway and rockfall mitigation projects. Prior to incorporation into DOT projects, protocol for native plant hydroseeding must be developed and these protocols must then be translated into specifications. The DOT is presently in the second year of a three-year research project that will develop native plant hydroseeding protocol for site preparation, seed collection and handling, irrigation and weed control (Personal Communication 2008). If specifications are available at the time of construction, the DOT will evaluate whether it is feasible to use native plant hydroseed for revegetation of areas disturbed during implementation of slope stabilization measures.

Storm water discharges to State waters during construction would be regulated under a National Pollutant Discharge Elimination System General Permit administered by the DOH Clean Water Branch (CWB). Permit conditions would specify site-specific best management practices (BMPs) to be implemented during construction in order to prevent degradation of surface water quality and ensure compliance with state water quality standards. Therefore, no adverse impacts to Hanalei River are anticipated from implementation of the proposed action.

**No-Action Alternative.** Under the no-action alternative, no slope stabilization measures would be implemented and there would be no change to the cultural resources of the project area. Therefore, no cultural impacts are anticipated with implementation of the no-action alternative.

**Mitigation Measures.** In the unlikely event that historic resources including human skeletal remains are inadvertently discovered during excavation and construction activities, the construction contractor would cease all construction activities and immediately notify the SHPD, Kaua'i Section prior to the continuation of activities.

#### 4.4 GEOLOGY AND SOILS

**The Proposed Action.** The proposed action involves mitigation of the present slope condition using anchored wire mesh and ring net systems to contain most of the potential slope failure and/or rockfall events. The mesh and ring net system would blanket the hillside, thus containing soil and smaller rock particles. It would conform to the slope allowing regrowth of vegetation and providing erosion protection of the soft soil areas. Therefore, implementation of the proposed action is expected to have positive long-term impacts to geology and soils.

**No-Action Alternative.** Under the no-action alternative, no slope stabilization measures would be implemented at the project area. Structural deficiencies in the rock formations would not be addressed and erosion would continue to undermine the stability of rock formations. Therefore, the no-action alternative is anticipated to have long-term adverse impacts on geology and soils.

#### 4.5 HAZARDOUS MATERIALS AND HAZARDOUS WASTE

**The Proposed Action.** Construction equipment and vehicles contain hazardous materials such as gasoline, diesel, oil, and hydraulic and brake fluids. Accidental release of these materials into the environment is possible, but not anticipated, with implementation of the proposed action. Site-specific BMPs, including procedures for hazardous material storage, handling, and staging; spill prevention, control, and response; waste disposal; and good housekeeping would be developed and implemented by the construction contractor. These BMPs would greatly reduce the likelihood of hazardous materials being released into the environment. The construction contractor would be responsible for compliance with all applicable federal, state, and local regulations governing the transportation, use, storage, and/or disposal of hazardous material and hazardous wastes during construction. No significant impacts related to hazardous materials or hazardous wastes are anticipated with implementation of the proposed action.

**No-Action Alternative.** Under the no-action alternative, no construction activities would occur at the project area. No hazardous materials would be brought to the project area. Therefore, no short-term or long-term impacts from hazardous materials are anticipated with implementation of the no-action alternative.

**Mitigation Measures.** Site-specific BMPs, including procedures for hazardous material storage, handling, and staging; spill prevention, control, and response; waste disposal; and good housekeeping would be developed and implemented by the construction contractor. Spill control measures would entail minimization of hazardous materials on the project site, good housekeeping, and rapid spill response in the event of a release. Material management practices would be used to reduce the risk of spills or other accidental release of materials and substances into the environment or the nearby Hanalei River.

#### 4.6 LAND USE AND OWNERSHIP

**The Proposed Action.** Implementation of the proposed action would result in no change to land use or ownership within the project area. DOT right-of-entry (ROE) personnel are working with the property owner for the ROE access required to implement the proposed slope stabilization measures. Therefore, no impacts to land use and ownership are anticipated with implementation of the proposed action.

**No-Action Alternative.** Under the no-action alternative, no slope stabilization measures would be undertaken, and there would be no change to land use or ownership within the project area. Therefore, no impacts to land use and ownership are anticipated with implementation of the no-action alternative.

## 4.7 NATURAL HAZARDS

**The Proposed Action.** The proposed action would secure the slope with anchored wire mesh and ring net systems, thereby reducing the potential for rockfall and landslides to occur as a result of natural hazards (i.e. earthquake, hurricane, or severe storm). Therefore, the proposed action would have positive impacts relative to natural hazards.

**No-Action Alternative.** Under the no-action alternative, no slope stabilization measures would be implemented and the existing rockfall and landslide potential would remain. Structural deficiencies in the rock formations would not be addressed and erosion would continue to undermine the stability of the slope. Rapid surface water runoff from storm events and/or hurricanes would accelerate this process of erosion. Therefore, the no-action alternative is anticipated to have adverse impacts relative to natural hazards.

## 4.8 NOISE

**The Proposed Action.** Only short-term construction related noise impacts are anticipated with implementation of the proposed action. Construction equipment employed to implement the proposed action may include trucks, a crane, a back hoe or grader, sledge hammers, jack hammers, chain saws, drills, and air compressors. Noise generated by construction equipment could produce localized noise events of 100 dBA or higher at the construction site. Noise levels at 50 feet typically range between 55 and 88 dBA for equipment such as pick-up or dump trucks, jackhammers, lift booms, bulldozers, and excavators (Table 4-1). Construction noise would decrease with distance from the project area through divergence, atmospheric absorption, shielding by intervening structures, and absorption and shielding by ground cover. Heavy equipment for installation of the anchored wire mesh and ring net systems would be used primarily at the base of the slope and the slope itself would buffer noise exposure for residences located across Kuhio Highway at the top of the slope. Implementation of the proposed action would not result in any long-term noise impacts.

**Table 4-1: Typical Noise Emission Levels for Construction Equipment**

Type of Equipment	Noise Level at 50 feet (dBA)
Air Compressor	81
Backhoe	80
Bulldozer	82
Chain Saw	85
Concrete/Grout Pumps	82
Crawler Service Crane (100-Ton)	83
Dump Truck	88
Drill Rigs	88
Excavator	85
Front End Loader	80
Generator	81
Jackhammer (Compressed Air)	85
Lift Booms	85
Pick-Up Trucks	55
Power-Actuated Hammers	88
Water Pump	76
Water Truck	55

Source: US DOT 2006; HMMH 2006

**No-Action Alternative.** Under the no-action alternative, no construction activities would occur at the project area, and there would be no change to the noise environment. Therefore, no impacts from noise are anticipated under the no-action alternative.

**Mitigation Measures.** To minimize noise impacts, construction activities would be conducted in accordance with State of Hawai'i requirements set forth in HRS §342F - *Noise Pollution*, and HRS §11-46 - *Community Noise Control*, establishing maximum permissible sound levels from excessive noise sources, noise prevention, control and abatement guidelines, and permit criteria.

The Hawai'i Occupational Safety and Health (HIOSH) Division has set the permissible occupational noise exposure at 90 dBA for a continuous 8-hour exposure. Permissible noise exposures for shorter periods are higher, with a maximum exposure of 115 dBA permissible for a duration of 15 minutes or less (HAR §12-200.1). Enforcement of HIOSH occupational noise exposure regulations would be the responsibility of the construction contractor. If workers experience noise exceeding HIOSH standards, administrative or engineering controls shall be implemented. Use of personal protective equipment such as earplugs or muffs may also be required.

To reduce nearby residential noise exposure, construction activities would be conducted on weekdays and in daytime hours in accordance with HRS §342-F-1. In the event that work occurs after normal working hours (i.e., at night or on weekends), or if permissible noise levels are exceeded, appropriate permitting and monitoring as well as development and implementation of administrative and engineering controls shall be employed.

#### 4.9 SAFETY AND HEALTH

**The Proposed Action.** The proposed action would have long-term positive impacts on public safety and health by reducing the potential for rockfalls and landslides originating upslope of Kuhio Highway. Boulders exhibiting structural deficiencies would be stabilized or demolished, and anchored wire mesh and ring net systems would be installed to stabilize the underlying slope.

Short-term construction related impacts to safety and health relate to worker safety during construction. Health and safety issues concerning workers include, exposure to rockfalls within the project area, operation of construction equipment, traffic, occupational noise, fugitive dust, heavy lifting, slips, trips, and falls while working on uneven terrain, exposure to heat, and biological exposure (bites, stings, and allergens).

**No-Action Alternative.** Under the no-action alternative, no slope stabilization measures would be implemented. Identified risks to public health and safety from rockfall and landslide would not be mitigated. Therefore, adverse impacts to public safety and health are anticipated from implementation of the no-action alternative.

**Mitigation Measures.** The safety and health of workers during construction would be the responsibility of the construction contractor and would conform to Occupational Safety and Health Administration requirements. Mitigation measures addressing air quality at the construction site and occupational noise exposure are presented in Sections 4.1 and 4.8, respectively.

#### 4.10 SOCIOECONOMICS

**The Proposed Action.** No socioeconomic impacts are expected with implementation of the proposed action. The proposed action would not impact employment, income, or demographics within the ROI. The population within the ROI reports higher median and per capita incomes, and lower poverty rates compared to the County of Kaua'i. Therefore, it is unlikely that adverse impacts from the proposed action would disproportionately affect a minority or low-income population.

**No-Action Alternative.** No socioeconomic impacts are expected with implementation of the no-action alternative. The no-action alternative would not impact employment, income, or demographics within the ROI.

#### 4.11 TRANSPORTATION

**The Proposed Action.** The proposed action would reduce the potential for rockfall and landslide to reach the roadway, making the roadway safer for vehicular traffic. Therefore, long-term impacts to the transportation resource are expected to be positive.

Kuhio Highway is adjacent to the project area and provides the best access for construction vehicles and equipment required for implementation of the proposed action. Short-term effects of the proposed action include minor changes to traffic patterns, traffic volume, and travel times during the construction period. Required lane closures would cause minor disruptions to normal traffic patterns. The arrival and departure of construction crews, and the periodic movement of construction vehicles and materials for staging, may cause short-term increases in traffic volume and traffic delays. The need to reduce speed limits and contra flow traffic within the work zone may also cause traffic delays during construction.

**No-Action Alternative.** Under the no-action alternative, no slope stabilization measures would be implemented. The existing rockfall condition and associated risk to drivers on Kuhio Highway would remain. Therefore, adverse impacts to transportation may result from implementation of the no-action alternative.

#### 4.12 UTILITIES AND INFRASTRUCTURE

**The Proposed Action.** No impacts to utilities or infrastructure are anticipated with implementation of the proposed action.

**No-Action Alternative.** No impacts to utilities or infrastructure are anticipated with implementation of the no-action alternative.

#### 4.13 VISUAL RESOURCES

**The Proposed Action.** Proposed slope stabilization measures include installation of an anchored wire mesh and ring system along the slopes facing approximately 400 linear feet of Kuhio Highway and stabilization or demolition of isolated boulders in the interior portion of the project area. Removal of surface vegetation would be required to install the anchored wire mesh and ring system, which would result in short-term adverse impacts to visual resources. Once installed, the anchored wire mesh and ring systems would conform to the slope. New vegetation would grow through the mesh openings rendering a natural view along the project site. Once installed, this system would result in little or no disturbance to the natural setting of the property. Therefore, no significant long-term impacts to visual resources are anticipated.

**No-Action Alternative.** Under the no-action alternative, no slope stabilization measures would be implemented and there would be no change to the visual quality of the project area. However, in the event of a significant rockfall event or large landslide, the visual integrity of the area could be compromised. These impacts, however, would be temporary. No significant adverse impacts to visual resources would be anticipated with implementation of the no-action alternative.

#### 4.14 WATER RESOURCES

**The Proposed Action.** Under the proposed action, an existing swale at the top of the slope within the project site would be repaired to improve surface water runoff characteristics without altering the existing drainage pattern. No impacts to surface water or groundwater resources are anticipated.

**No-Action Alternative.** Under the no-action alternative, no slope stabilization measures would be implemented and there would be no changes to surface water drainage patterns in the project area. Surface waters would continue to sheet flow across soft soil areas causing further erosion.

Therefore, adverse impacts to surface water resources are anticipated with implementation of the no-action alternative.

**Mitigation Measures.** Due to the proximity of the Hanalei River, stringent construction BMPs would be implemented and maintained during all construction activities, including but not limited to the use of silt fences, hay bales, etc. to control runoff to state waters. These BMPs would greatly reduce the likelihood of sediments or other pollutants being released into the environment and subsequently the Hanalei River. Therefore, no significant impacts related to water resources are anticipated with implementation of the proposed action.

#### 4.15 CUMULATIVE IMPACTS

Cumulative impacts refer to impacts on the environment that result from the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such actions. Cumulative impacts can result from individually minor yet collectively significant actions taking place over a period of time. Land use in the proposed project vicinity is comprised of conservation land and undeveloped open space. No other past, present, or planned actions associated with these land uses have been identified that would contribute to cumulative impacts for any of the resources considered in this EA. Based on this analysis, no significant cumulative impacts would be anticipated from implementation of either the proposed action or the no-action alternative.

#### 4.16 COMPATIBILITY OF THE PROPOSED ACTION WITH OBJECTIVES OF STATE AND LOCAL LAND USE PLANS AND POLICIES

Compatibility of the proposed action with land use plans and policies is discussed below:

**State Land Use Plans.** The project area lies within the Resource Subzone of the Conservation District. Slope stabilization is an identified land use pursuant to HAR §13-5-22, P-6 PUBLIC PURPOSE USES, (D-1) "Land uses undertaken by the State of Hawai'i or the counties to fulfill a mandated governmental function, activity, or service for public benefit and in accordance with public policy and the purpose of the conservation district" and HAR §13-5-23, L-3 EROSION CONTROL, (D-1) "Erosion control, flood control, and other hazard prevention devices or facilities." The proposed use would require the filing of a Conservation District Use Application for a Board permit.

**Kaua'i General Plan.** The proposed action would remove surface vegetation prior to installation of the anchored wire mesh and ring system, which would result in short-term adverse impacts to visual resources. Once installed, the anchored wire mesh and ring systems would conform to the slope. New vegetation would grow through the mesh openings rendering a natural view along the project site. The proposed action would have no long-term adverse impacts on the scenic quality of the roadway corridor and is consistent with the roadways designation as a Scenic Roadway Corridor in the Kaua'i General Plan.

**Kaua'i Special Management Area Rules and Regulations.** The proposed action would reduce the potential for erosion, rockfall, and landslide within the project area and is consistent with the purpose of the Special Management Area to preserve, protect, and where possible, to restore the natural resources of the coastal zone of Hawai'i. Per correspondence with the County of Kaua'i Planning Department, the proposed project would not constitute "development" and a SMA Permit would therefore not be required (Appendix A).

**DOT, Kaua'i District, Kuhio Highway (Route 560) Historic Roadway Corridor Plan.** The proposed action would not alter any of the physical elements of Kuhio Highway or impact the historic or scenic value of the roadway and is therefore consistent with the purposes and objectives of the *Kuhio Highway (Route 560) Historic Roadway Corridor Plan* developed by the DOT, Kaua'i District (Belt Collins 2005).

#### **4.17 RELATIONSHIP BETWEEN SHORT-TERM USES OF THE ENVIRONMENT AND LONG-TERM PRODUCTIVITY**

Construction of the proposed action may result in short-term adverse impacts to air quality, noise, transportation, and visual resources. However, BMPs and other mitigation measures to be implemented during construction would reduce these impacts to a level of non-significance. The implementation of slope stabilization measures would reduce the potential for rockfall and landslide adjacent to Kuhio Highway, resulting in long-term positive impacts for geology and soils, natural hazards, safety and health, and transportation.

#### **4.18 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES**

Implementation of the proposed action would not result in an irreversible or irretrievable commitment of resources, except for the financial resources, fuel, and other consumable materials required for construction.

## 5.0 FINDINGS AND DETERMINATION

The following sections summarize the significance criteria used to determine whether the proposed action would have a significant effect on the environment (Section 5.1) and the resulting determination (Section 5.2).

### 5.1 SIGNIFICANCE CRITERIA

In accordance with HAR §11-200-12, the proposing agencies have considered every phase of the proposed action, the expected consequences, both primary (direct) and secondary (indirect), and the cumulative as well as the short-term and long-term effects of the action, in order to determine whether the proposed action may have a significant effect on the environment. In making this determination, the proposed action has been evaluated with respect to the significance criteria established in HAR §11-200-12. These significance criteria are summarized below:

- **Involves an irrevocable commitment to, loss or destruction of any natural or cultural resources.** The proposed action would result in positive impacts for geology and soils. Only short-term construction related impacts are anticipated for ambient air quality and biological resources. The proposed action would clear approximately 0.63 acres of existing vegetation in areas to be covered with anchored wire mesh and ring net systems. No special status species have been identified within the project area. Once installed, the anchored wire mesh and ring net systems would allow for the re-growth of vegetation cleared for construction. SHPD concurrence that “no historic properties will be affected” by the proposed action was obtained in a letter dated February 24, 2008 (Appendix A). Therefore, implementation of the proposed action is not anticipated to result in the irrevocable commitment to, loss or destruction of any natural or cultural resource.
- **Curtails the range of beneficial uses of the environment.** There would be no change to the current or potential land use within the project area as a result of the proposed action. Management and use of the land would remain consistent with a conservation district.
- **Conflicts with the State’s long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.** The proposed action is consistent with the state environmental policies, goals, and guidelines established in Chapter 344, HRS. The DOT has integrated the review of environmental effects with existing planning processes, and has developed the design for the slope stabilization with consideration for avoiding, minimizing, and mitigating any adverse environmental effects. Other agencies identified as having expertise or jurisdiction by law, were also consulted during the planning and permitting processes. In accordance with HRS §344-5, this EA is made available for public review and comment for a period of 30 days. All comments received during the public comment period will be responded to in the Final EA.
- **Substantially affects the economic welfare, social welfare, and cultural practices of the community or State.** No socioeconomic impacts to the community are anticipated with implementation of the proposed action. A cultural impact assessment of the proposed action identified community concerns over potential impacts to a fresh water spring that was believed to be present within the project area. A geologic site investigation was completed for the project and no fresh water springs were identified within the project limits. Community concerns over the use of hydromulch with non-native seed sources were also raised. The DOT recognizes community interest in using native seed sources for hydromulch applications on DOT projects, and in response has stated that if specifications native plant hydroseeding are available at the time of construction, the DOT will evaluate whether it is feasible to use native plant hydroseed for revegetation of areas disturbed during implementation of slope stabilization measures (see Section 4.3).

- **Substantially affects public health.** The proposed action would have long-term positive impacts on public safety and health by reducing the potential for rockfalls and landslides originating upslope of Kuhio Highway.
- **Involves substantial secondary impacts, such as population changes or effects on public facilities.** No adverse secondary impacts are anticipated with implementation of the proposed action.
- **Involves a substantial degradation of environmental quality.** No long-term adverse impacts to any resource evaluated in this EA are anticipated with implementation of the proposed action.
- **Is individually limited, but cumulatively has considerable effect on the environment, or involves a commitment for larger actions.** The proposed action does not involve a commitment for larger actions. Land use in the proposed project vicinity is comprised of conservation land and undeveloped open space. No other past, present, or planned actions associated with these land uses have been identified that would contribute to adverse cumulative impacts for any of the resources considered in this EA.
- **Substantially affects a rare, threatened, or endangered species or its habitat.** No special status species have been identified within the project area. No adverse impacts to rare, threatened, or endangered species or its habitat are anticipated with implementation of the proposed action.
- **Detrimentially affects air or water quality or ambient noise levels.** Short-term adverse construction impacts to air quality and ambient noise levels are possible during implementation of the proposed action. However, BMPs to be implemented during construction would reduce these impacts. The proposed action would have no long-term impacts on air quality noise, or surface water quality.
- **Affects or is likely to suffer damage by being located in an environmentally sensitive area, such as flood plain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, freshwater, or coastal waters.** The project area is not located in a flood plain, tsunami zone, or coastal area. The presence of steep slopes and rocky soils at the project area does make the area susceptible to erosion and presents geologic hazards such as rockfall and landslides. The purpose of the proposed action is to reduce the potential for rockfall and landslides originating from the project area.
- **Substantially affects scenic vistas and view planes identified in County or state plans or studies.** The proposed action would have no long-term adverse impacts on the scenic quality of the roadway corridor and is consistent with the roadways designation as a Scenic Roadway Corridor in the Kaua'i General Plan.
- **Requires substantial energy consumption.** Implementation of the proposed action is not anticipated to require substantial energy consumption beyond what is required to operate equipment and tools during construction.

## 5.2 DETERMINATION

To determine whether the proposed action would have a significant impact on the human, natural, or historic environments, the project, its anticipated direct and indirect effects, and the short-term, long-term, and cumulative impacts have been evaluated. In making this determination, the proposed action has been evaluated with respect to the significance criteria established in HAR §11-200-12. Based on the discussion of impacts and mitigation measures contained in Section 4.0 of this EA and the evaluation of the significance criteria in Section 5.1, it is anticipated that the proposed project would not have a significant adverse impact on the environment. Therefore, a Finding of No Significant Impact is anticipated.

## 6.0 DISTRIBUTION LIST

Copies of the Draft EA are provided to the recipients listed below and are also available upon request.

Office of Environmental Quality Control  
235 South Beretania Street, Suite 702  
Honolulu, HI 96813

Chief of Police  
Kaua'i Police Department  
3990 Kaana Street  
Lihue, HI 96766

State Department of Transportation  
869 Punchbowl Street  
Honolulu, HI 96813

Kaua'i Fire Department  
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Mr. Mike Loo  
Princeville at Hanalei  
P.O. Box 223040  
Princeville, HI 96722

Princeville Public Library  
4343 Emmalani Drive  
Princeville, HI 96722

Mr. Tom Thompson  
Princeville at Hanalei  
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Princeville, Kauai, Hawaii 96722

Hawai'i State Library  
Hawai'i Documents Section  
478 South King Street  
Honolulu, HI 96813-2901

Office of Planning  
State Dept. of Business, Economic  
Development & Tourism  
P.O. Box 2359  
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Maka'ala Ka'auomoana  
Executive Director  
Hanalei Watershed Hui  
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State Department of Health  
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State Historic Preservation Division  
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Hanalei, HI 96714

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Honolulu, HI 96813

David and Goldie Stewart  
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Hanalei, HI 96714

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Ms. Marilyn Wong  
Ms. Donna Gomez-Netzer  
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Lihue, HI 96766

William and Martha Mowry Trust  
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Honolulu, HI 96816



## **7.0 LIST OF PREPARERS**

Individuals contributing to the preparation of the EA are listed below.

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Years of Experience: 20

Ms. Tanya Copeland, Project Environmental Professional  
MS, Ecology and Evolution, University of Illinois, Chicago, 1999  
BA, Chemistry, University of Illinois, Chicago, 1991  
Years of Experience: 14

Mr. Dan Frerich, Staff Environmental Scientist  
BA, Environmental Science, Oregon State University, Corvallis, 2000  
Years of Experience: 6



## 8.0 REFERENCES

- Belt Collins Hawaii, Ltd. (Belt Collins). 2005. *Kuhio Highway (Route 560) Historic Roadway Corridor Plan, Hanalei, Kauai, Hawaii*. Honolulu: Department of Transportation, State of Hawaii.
- Department of Health, State of Hawai'i (DOH). 1997. *Guidelines for Assessing Cultural Impacts*. Adopted by the State of Hawai'i Environmental Council. Honolulu: Office of Environmental Quality Control. November 19.
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- U.S. Department of Transportation (US DOT). 2006. *Federal Highway Administration Roadway Construction Noise Model (FHWA RCNM) Version 1.0*. Federal Highway Administration. February.



**Appendix A**  
**Agency Correspondence**



LINDA LINGLE  
GOVERNOR

BRENNON T. MORIOKA  
INTERIM DIRECTOR

Deputy Directors  
MICHAEL D. FORMBY  
FRANCIS PAUL KEENO  
BRIAN H. SEKIGUCHI

JAN 31 2008

IN REPLY REFER TO:  
**HWY-DD 2.6755**

TO: THE HONORABLE LAURA H. THIELEN, CHAIRPERSON  
DEPARTMENT OF LAND AND NATURAL RESOURCES

ATTN: STATE HISTORIC PRESERVATION DIVISION

FROM: BRENNON T. MORIOKA, PH.D., P.E.   
INTERIM DIRECTOR OF TRANSPORTATION

SUBJECT: CHAPTER 6E-8 HISTORIC PRESERVATION REVIEW FOR KUHIO  
HIGHWAY SLOPE STABILIZATION, VICINITY OF HANAIEI BRIDGE,  
PROJECT NO. 560A-02-03, DISTRICT OF HANAIEI, ISLAND OF KAUAI,  
TMK: (4) 5-4-04:32

The Hawaii Department of Transportation (HDOT), Highways Division is planning slope stabilization measures for the slope along Kuhio Highway near Mile Post 1, District of Hanalei, Island of Kauai. The purpose of the proposed project is to substantially reduce rockfall and landslide risks for drivers by removing or mitigating unsafe conditions on the slope adjacent to Kuhio Highway. Work is scheduled to commence in fiscal year 2009 or 2010.

Proposed slope stabilization measures include:

- Installation of approximately 26,000 sq. ft. of anchored wire mesh. The anchored wire mesh system would blanket the majority of the lower portion of the slope. Superficial slope dressing would be performed prior to installation of the mesh system to even out the rock slope.
- Installation of approximately 1,200 sq. ft. of the slope would be covered with a ring net system. The ring net system would be installed on a small portion of the western lower slope. Again, superficial slope dressing would be performed prior to installation of the ring net system to even out the rock slope.
- Demolition or stabilization of unstable boulders located throughout the slope of the project location may also occur. Stabilization would be accomplished with either rock bolt anchors or a localized cable net system.

- Re-grading and restoration of the existing swale along the roadway at the top of the slope/project site. This action would prevent storm water run off from draining down the slope and causing further erosion and risk to public safety and health.

The Kuhio Highway Slope Stabilization project was specifically chosen for slope protection actions because of the amount of rockfalls and landslides that have occurred in the past and the risk to public safety and health associated with falling rocks onto the highway. Presently, this short stretch of the roadway contains many loose boulders, overhangs, and unstable soil and any major disruption to the highway resulting from falling rocks or debris could close the highway indefinitely thus impacting the livelihood of the communities in the area.

Proposed slope stabilization measures are planned within Tax Map Key (4) 5-4-04:32. The general site location is presented on Sheet 1. Design plans for the slope stabilization is presented on Sheet 3.

Proposed slope stabilization would be State funded and therefore subject to review under Hawaii Revised Statutes, Chapter 6E-8. Actions relevant to the State Historic Preservation Division for this project include historic preservation clearance. As the proposed repair work would be conducted in areas recently disturbed by landslides, the HDOT Highways Division is seeking concurrence that the proposed repairs will have no adverse effect on significant historic properties.

Should you have any questions, please call Christine Yamasaki at 692-7572, Design Section, Design Branch, Highways Division. If submitting a written reply, please reference HWY-DD 2.6755 as shown above.

Enclosures

c: Earth Tech  
(Jennifer Lutz)  
(Michelle Mason)

bc: HWY-DD (CY) 

MQ:amk



LINDA LINGLE  
GOVERNOR OF HAWAII  
DIRECTOR'S OFFICE  
DEPT. OF  
TRANSPORTATION  
2008 MAR -4 P 4:03



STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES  
STATE HISTORIC PRESERVATION DIVISION  
601 KAMOKILA BOULEVARD, ROOM 555  
KAPOLEI, HAWAII 96707

LAURA H. THIELEN  
CHAIRPERSON  
BOARD OF LAND AND NATURAL RESOURCES  
COMMISSION ON WATER RESOURCE MANAGEMENT  
DEPT. OF TRANSPORTATION  
2008 MAR -6 A 9:25  
KENSU KAWAHARA  
DEPT. HIGHWAY DIVISION  
HIGHWAYS DIVISION  
AGRICULTURE RESOURCES  
BOATING AND RECREATION  
BUREAU OF CONVEYANCES  
BUREAU OF RESOURCE MANAGEMENT  
DIVISION OF LAND AND NATURAL RESOURCES  
OCCUPATION AND RESOURCE ENFORCEMENT  
ENGLISH BIRD  
FOREST AND WILDLIFE  
HISTORIC PRESERVATION  
NATURAL AREA AND REGIONAL COMMISSION  
LAND  
STATE PARKS

February 24, 2008

Brennon T. Morioka, Director- Highways  
Department of Transportation  
869 Punchbowl Street  
Honolulu, Hawaii 96813

LOG NO: 2008.0404  
DOC NO: 0802NM28  
Archaeology

Dear Dr. Morioka:

**SUBJECT: Chapter 6E-42 Historic Preservation Review (County) for Kuhio Highway Slope  
Stablization, Vicinity of Hanalei Bridge Project No 560A-02-03  
District of Hanalei, Island of Kaua'i  
TMK: (4) 5-4-04: 32**

The aforementioned project consists of Repairs and Slope Stablization.

We believe that "no historic properties will be affected" by this undertaking because:

- Intensive cultivation has altered the land
- Residential development/urbanization has altered the land
- Previous grubbing/grading has altered the land
- An accepted archaeological inventory survey (AIS) found no historic properties
- SHPD previously reviewed this project and mitigation has not been completed
- Other: *No subsurface excavation in previously-undisturbed sediments is included in this project.*

In the event that historic resources, including human skeletal remains, are identified during the construction activities, all work needs to cease in the immediate vicinity of the find, the find needs to be protected from additional disturbance, and the State Historic Preservation Division, Kauai Section, needs to be contacted immediately at (808) 241-3690.

Aloha,

Nancy McMahon, Acting Archaeology Branch Chief  
State Historic Preservation Division

NM:

RECEIVED  
MAR 11 P 12:41  
15-KAUAI



JAN 16 2008

HWY-DD 2.6743

TO: THE HONORABLE LAURA H. THIELEN, CHAIRPERSON  
DEPARTMENT OF LAND AND NATURAL RESOURCES

ATTN: SAMUEL J. LEMMO  
OFFICE OF CONSERVATION AND COASTAL LANDS

FROM: BRENNON T. MORIOKA, PH.D., P.E.   
ACTING DIRECTOR OF TRANSPORTATION

SUBJECT: REQUEST FOR DETERMINATION, CONSERVATION DISTRICT USE  
PERMIT FOR KUHIO HIGHWAY SLOPE STABILIZATION, VICINITY OF  
HANALEI BRIDGE, PROJECT NO. 560A-02-03, DISTRICT OF HANALEI  
ISLAND OF KAUAI, TAX MAP KEY (TMK) (4) 5-4-004:032

The Hawaii Department of Transportation (HDOT), Highways Division is planning slope stabilization measures for the slope along Kuhio Highway near Mile Post (MP) 1, District of Hanalei, Island of Kauai, Hawaii. The purpose of the proposed project is to substantially reduce rockfall and landslide risks for drivers by removing or mitigating unsafe conditions on the slope adjacent to Kuhio Highway. Work is scheduled to commence in fiscal year 2009 or 2010.

Proposed slope stabilization measures include:

- Installation of approximately 26,000 square feet (sq. ft.) of anchored wire mesh. The anchored wire mesh system would blanket the majority of the lower portion of the slope. Superficial slope dressing would be performed prior to installation of the mesh system to even out the rock slope.
- Installation of approximately 1,200 sq. ft. of the slope would be covered with a ring net system. The ring net system would be installed on a small portion of the western lower slope. Again, superficial slope dressing would be performed prior to installation of the ring net system to even out the rock slope.
- Demolition or stabilization of unstable boulders located throughout the slope of the project location may also occur. Stabilization would be accomplished with either rock bolt anchors or a localized cable net system.

- Re-grading and restoration of the existing swale along the roadway at the top of the slope/project site. This action would prevent storm water run off from draining down the slope and causing further erosion and risks to public safety and health.

The Kuhio Highway Slope Stabilization project was specifically chosen for slope protection actions because of the amount of rockfalls and landslides that have occurred in the past and the risk to public safety and health associated with falling rocks onto the highway. Presently, this short stretch of the roadway contains many loose boulders, overhangs, and unstable soil and any major disruption to the highway resulting from falling rocks or debris could potentially close the highway indefinitely thus impacting the livelihood of the communities in the area.

Slope stabilization measures are proposed within Tax Map Key (TMK) (4) 5-4-04:032. The State land use designation for the referenced TMK is that of a Conservation District; therefore, the proposed work is subject to the provisions of Title 13, Chapter 5 of the Hawaii Administrative Rules pertaining to Conservation Districts. However, the proposed maintenance and repair work is being implemented in order to ensure public safety, health, and welfare. HDOT is requesting a determination, at your earliest convenience, as to whether a Conservation District Use Permit (CDUP) will be required for this proposed maintenance and repair work.

Thank you for your assistance, and should you have any questions, please call Christine Yamasaki of the Highways Division at 692-7572. If submitting a written reply, please reference HWY-DD 2.6743 as shown above.

Enclosures

c: Earth Tech  
(Jennifer Lutz)  
(Michelle Mason)

bc: HWY-DD (CY) 

MQ:amk

DIR 0202

LINDA LINGLE  
GOVERNOR OF HAWAII



Laura H. Thelen  
Chairperson  
Board of Land and Natural Resources  
Commission on Water Resource Management

Russell Y. Tsuji  
First Deputy

Ken C. Kawahara  
Deputy Director - Water

Aquatic Resources  
Boating and Ocean Recreation  
Bureau of Conveyances  
Commission on Water Resource Management  
Conservation and Coastal Lands  
Conservation and Resources Enforcement  
Engineering  
Forestry and Wildlife  
Historic Preservation  
Kahoolawe Island Reserve Commission  
Land  
State Parks

STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES

OFFICE OF CONSERVATION AND COASTAL LAND  
POST OFFICE BOX 621  
HONOLULU, HAWAII 96809

DEPT OF TRANSPORTATION  
2008 FEB 11 A 8:18  
HIGHWAYS DIVISION

REF:OCCL:TM

Correspondence: KA 08-160

Brennon T. Morioka, Acting Director  
Department of Transportation  
869 Punchbowl Street  
Honolulu, Hawaii 96813-5097

FEB - 4 2008

Dear Mr. Morioka,

SUBJECT: Proposed Rockfall Mitigation (Project # 560A-02-03) Located at Hanalei, Kauai, TMK:  
(4) 5-4-004:032

The Office of Conservation and Coastal Lands (OCCL) has reviewed your Department's inquiry regarding slope stabilization measures for the slope along Kuhio Highway to reduce rockfall and landslide risks to drivers. According to the information provided, the Department of Transportation-Highways Division (DOT-HWY) is proposing to install approximately (~) 26,000 ft<sup>2</sup> of anchored wire mesh and ~ 1200 ft<sup>2</sup> of a ring net system on the slope along Kuhio Highway. Demolition and rock stabilization consisting of bolt anchors or a localized cable net system may also occur. In addition re-grading and restoration of the existing swale along the roadway at the top of the project site are also proposed to prevent storm water run off from draining down the slope and causing further erosion. The purpose of the project is to decrease risk to public safety and health.

The OCCL notes the subject area appears to lie within the Resource subzone of the Conservation District. Rockfall mitigation is an identified land use pursuant to § 13-5-22, Hawaii Administrative Rules, (HAR), P-6 PUBLIC PURPOSE USES, (D-1) "Land uses undertaken by the State of Hawaii or the counties to fulfill a mandated governmental function, activity, or service for public benefit and in accordance with public policy and the purpose of the conservation district. Such land uses may include transportation systems, water systems, communication systems, and recreational facilities." The proposed use would require the filing of a Conservation District Use Application (CDUA) for a Board permit.

Chapter 13-5, HAR, and the CDUA may be found on our website at [www.hawaii.gov/dlnr/occl](http://www.hawaii.gov/dlnr/occl). The Department looks forward to your future CDUA. Should you have any questions regarding this matter, contact Tiger Mills of our Office of Conservation and Coastal Lands staff at 587-0382.

Aloha,

Samuel J. Lemmo, Administrator  
Office of Conservation and Coastal Lands

DIRECTOR'S OFFICE  
DEPT. OF  
TRANSPORTATION

2008 FEB - 7 A 11:38

c: Kauai County, Department of Planning  
KDLO



JAN 16 2008

HWY-DD 2.6756

Mr. Ian Costa  
Director, Planning Department  
County of Kauai  
4444 Rice Street, Suite A473  
Lihue, Hawaii 96767

Dear Mr. Costa:

Subject: Request for Special Management Area Determination for Kuhio Highway Slope Stabilization, Vicinity of Hanalei Bridge, Project No. 560A-02-03, District of Hanalei, Island of Kauai, Tax Map Key (TMK): (4) 5-4-04:32

The Hawaii Department of Transportation (HDOT) Highways Division is proposing slope stabilization measures for the slope along Kuhio Highway near Mile Post 1, District of Hanalei, Island of Kauai. The proposed project location is located on the boundary of the Special Management Area (SMA) (Figure 1). Proposed repairs and maintenance would substantially reduce rockfall and landslide risks for drivers by removing or mitigating hazardous conditions on the slope adjacent to Kuhio Highway. Work is scheduled to commence during fiscal year 2009 or 2010.

Proposed slope stabilization measures occurring within the SMA include:

- Installation of approximately 16,000 square feet (sq. ft.) of anchored wire mesh would occur within the SMA; the total area of the project site to be covered with anchored wire mesh encompasses approximately 26,000 sq. ft. The anchored wire mesh system would blanket the majority of the lower portion of the slope. Superficial slope dressing would be performed prior to installation of the mesh system to even out the rock slope.
- Installation of approximately 1,200 sq. ft. of the slope located within the SMA would be covered with a ring net system. The ring net system would be installed on a small portion of the western lower slope. Again, superficial slope dressing would be performed prior to installation of the ring net system to even out the rock slope.
- Demolition or stabilization of unstable boulders located on the upper portion of the slope. Stabilization would be accomplished with either rock bolt anchors or a localized cable net system.

Proposed slope stabilization measures occurring outside of the SMA include:

- Re-grading and restoration of the existing swale along the roadway at the top of the slope/project site. This action would prevent storm water run off from draining down the slope and causing further erosion and risks to public safety and health.

The general site location is presented on Plan Sheet 1. Design plans for the slope stabilization measures are presented on Plan Sheet 3.

Work to be performed would occur outside the existing roadway right-of-way, but within Tax Map Key (TMK) parcel: (4) 5-4-004:032. The proposed slope stabilization measures would not have a cumulative impact, or a significant adverse environmental or ecological effect on the SMA. The proposed measures would have a positive effect to the safety and health of the users of Kuhio Highway by eliminating potential rockfall and landslide risks.

The HDOT respectfully requests a determination as to whether slope stabilization measures would require a Special Management Area Permit.

Should you have any questions, please call Christine Yamasaki of the Highways Division at 692-7572. If submitting a written reply, please reference HWY-DD 2.6756 as shown above.

Very truly yours,



BRENNON T. MORIOKA, Ph.D., P.E.  
Acting Director of Transportation

Enclosures

c: Earth Tech  
(Jennifer Lutz)  
(Michelle Mason)

bc: HWY-DD (CY) 

MQ:amk

**BRYAN J. BAPTISTE**  
MAYOR



**IAN K. COSTA**  
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LIHU'E, KAUA'I, HAWAII 96766-1326

TEL (808) 241-6677 FAX (808) 241-6699

April 30, 2008

Christine Yamasaki  
DOT-Highways, Design Branch  
601 Kamokiloa Blvd  
Kapolei, Hawaii'i 96707

**Subject: Kūhi'ō Highway Slope Stabilization, Vicinity of Hanalei Bridge,  
Project No. 560A-02-03, District of Hanalei, Kauai  
TMK 5-4-4: 32**

Dear Christine:

We have had an opportunity to review your letter and plans of January 16, 2008 regarding the above referenced subject matter. You have proposed repairs and maintenance which would substantially reduce rockfall and landslide risks for drivers on Kūhi'ō Highway by removing or mitigating hazardous conditions on the slope adjacent to the highway. Work is scheduled to commence during fiscal year 2009 or 2010.

The proposed slope stabilization measures include:

- Installation of approximately 16,000 sq.ft. of anchored wire mesh would occur within the SMA ; the total area of the project site to be covered with anchored wire mesh encompasses approximately 26,000 sq.ft. The anchored wire mesh system would blanket the majority of the lower portion of the slope. Superficial slope dressing would be performed prior to installation of the mesh system to even out the rock slope.
- Installation of approximately 1,200 sq.ft. of the slope located within the SMA would be covered with a ring net system. The ring net system would be installed on a small portion of the western lower slope. Superficial slope dressing would be performed prior to installation of the ring net system to even out the rock slope.
- Demolition or stabilization of unstable boulders located on the upper portion of the slope. Stabilization would be accomplished with either rock bolt anchors or a localized cable

net system.

Proposed slope stabilization measures occurring outside of the SMA include re-grading and restoration of the existing swale along the roadway at the top of the slope/project site. This action would prevent storm water run off from draining down the slope and causing further erosion and risks to public safety and health.

Additionally, we concur that the Department of Transportation's Exemption List, as amended, specifically Exemption Class 1, D.1 and D.2, and Exemption Class 4, 1 and 2 confirms that the proposed activities are reflected on your Exemption list.

Section 1.4 Definitions of the Special Management Area Rules and Regulations of the County of Kaua'i defines "Development" as not including the following:

- (2) Repair or maintenance of roads and highways within existing rights of way;
- (3) Routine maintenance dredging of existing streams, channels, and drainage ways;

Based on the above, your proposed work project can be considered exempt from the Special Management Area Rules and Regulations since such work would be considered as "not development." However, it is suggested that you present these plans to the Princeville and Hanalei communities for consensus building purposes.

Also, please provide us with before and after photographs of the work.

Should there be any questions regarding the above, please contact planner Michael Laureta at 241-6677.

A handwritten signature in black ink, appearing to read 'Ian Costa' with 'D.D. FOR' written below it.

IAN COSTA  
Planning Director

**Appendix B**  
**Botanical Survey Letter Report**



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# Botanical survey for a proposed slope stabilization project along Kuhio Highway at Princeville, Kaua'i.

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March 17, 2008

*Letter Report*

AECOS 1170

Eric B. Guinther  
 AECOS Inc.  
 45-939 Kamehameha Hwy. Suite 104  
 Kane`ohe, Hawai`i 96744  
 Phone: (808) 234-7770 Fax: (808) 234-7775 Email: guinther@aecos.com

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The contract for this effort called for a botanical field survey and generation of a plant species list for an Earth Tech Environmental Assessment (EA) for a proposed Kuhio Highway Slope Stabilization project located near mile post 1 at Princeville, Kaua'i. The site was visited twice, initially on February 22, 2008 to assess the practicality of scaling the steep slopes (and a survey of the highway verge above and below the project was completed) and again on March 12, 2008 to undertake the survey of the slope itself. The survey was undertaken by Eric Guinther and Susan Burr of AECOS Inc. This letter report presents—in the form of Table 1 (a listing of the plant species observed and their relative abundances)—the results of the completed survey.

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Table 1. Listing of plants (flora) for the proposed Princeville rockfall mitigation, Kaua'i, February-March 2008.

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Species	Common name	Status	Abundance		Notes
			VE	FO	
<i>FERNS and FERN ALLIES</i>					
<b>BLECHNACEAE</b>					
<i>Blechnum appendiculatum</i> Willd.	---	Nat.	--	R1	
<b>GLEICHENIACEAE</b>					
<i>Dicranopteris linearis</i> (Burm. f.) Underw.	<i>uluhe</i>	<b>Ind.</b>	--	U3	(2)
<b>NEPHROLEPIDACEAE</b>					
<i>Nephrolepis multiflora</i> (Roxb.) F.M. Jarrett ex C.V. Morton	---	Nat.	O3	C	
<b>POLYPODIACEAE</b>					
<i>Lepisorus thunbergianus</i> (Kaulf.) Ching	<i>pākahakaha</i>	<b>Ind.</b>	--	R	
<i>Phlebodium aureum</i> (L.) J. Sm.	rabbit's-foot fern	Nat.	U	R	
<i>Phymatosorus scolopendria</i> (Burm.) Pic.-Ser.	<i>laua'e</i>	Nat.	--	A	

Table 1 (continued).

Species	Common name	Status	Abundance		Notes
			VE	FO	
<b>PSILOTACEAE</b>					
<i>Psilotum nudum</i> (L.) P. Beauv.	<i>moa</i>	<b>Ind.</b>	--	R	
<b>PTERIDACEAE</b>					
<i>Adiantum raddianum</i> C. Presl	maidenhair fern	Nat.	--	U2	(1)
<b>THELYPTERIDACEAE</b>					
<i>Christella dentata</i> (Forssk.) Brownsey & Jermy	oak fern	Nat.	--	O	
<i>Christella parasitica</i> (L.) Lev.	oak fern	Nat.	R	O	
<b>FLOWERING PLANTS</b>					
<b>DICOTYLEDONE</b>					
<b>AMARANTHACEAE</b>					
<i>Amaranthus spinosus</i> L.	spiny amaranth	Nat.	U	--	
<b>ANACARDIACEAE</b>					
<i>Mangifera indica</i> L.	mango	Nat.	O	U	
<i>Schinus terebinthefolius</i> Raddi	Christmas berry	Nat.	---	U	
<b>ARALIACEAE</b>					
<i>Schefflera actinophylla</i> (Endl.) Harms	octopus tree	Nat.	U	A	
<b>ASTERACEAE (COMPOSITAE)</b>					
<i>Ageratum conyzoides</i> L.	ageratum	Nat.	R	--	
<i>Ageratum houstonianum</i> Mill.	<i>maile honohono</i>	Nat.	U	--	
<i>Crassocephalum crepidioides</i> (Benth.) S. Moore	---	Nat.	R	R	
<i>Elephantopus mollis</i> Kunth	---	Nat.	U	O	
<i>Elephantopus spicatus</i> Jus ex Aubl.	---	Nat.	U2	---	
<i>Pluchea carolinensis</i> (Jacq.) G. Don	sourbush	Nat.	O	O	
<i>Sphagneticola trilobata</i> (L.) Pruski	wedelia	Nat.	A	AA	(2)
<i>Synedrella nodiflora</i> (L.) Gaertn.	nodeweed	Nat.	U	--	
<i>Vernonia cinerea</i> (L.)	little ironweed	Nat.	R	--	
<b>BIGNONIACEAE</b>					
<i>Spathodea campanulata</i> P. Beauv.	African tulip tree	Nat.	U	O	
<b>CARICACEAE</b>					
<i>Carica papaya</i> L.	papaya	Nat.	--	R	
<b>CONVOLVULACEAE</b>					
<i>Ipomoea obscura</i> (L.) Ker-Gawl.	---	Nat.	R	--	
<i>Ipomoea indica</i> (J. Burm.) Merr.	<i>koali'awa</i>	<b>Ind.</b>	O	U	
<b>CUCURBITACEAE</b>					
<i>Momordica charantia</i> L.	balsam pear	Nat.	--	R	
<b>EUPHORBIACEAE</b>					
<i>Chamaesyce hirta</i> (L.) Millsp.	garden spurge	Nat.	U	--	
<i>Chamaesyce hypericifolia</i> (L.) Millsp.	graceful spurge	Nat.	U	--	

Table 1 (continued).

Species	Common name	Status	Abundance		Notes
			VE	FO	
<b>EUPHORBIACEAE (continued)</b>					
<i>Euphorbia heterophylla</i> L.	<i>kaliko</i>	Nat.	R	--	
<i>Macaranga tanarius</i> (L.) Müll. Arg.	---	Nat.	--	R	
<i>Phylanthus debilis</i> Klein ex Willd.	niruri	Nat.	U	R	
<b>FABACEAE</b>					
<i>Albizia lebeck</i> (L.) Benth.	siris tree	Nat.	U	C	
<i>Caesalpinia decapetala</i> (Roth) Alston	wait-a-bit	Nat.	O	C	
<i>Chamaecrista nictitans</i> (L.) Moench	partridge pea	Nat.	R	--	
<i>Crotalaria pallida</i> Aiton	smooth rattlepod	Nat.	R	--	
<i>Delonix regia</i> (Bojer ex Hook.) Raf.	royal poinciana	Nat.	R	--	
<i>Desmodium incanum</i> DC	Spanish clover	Nat.	O3	--	
<i>Leucaena leucocephala</i> (Lam.) deWit	<i>koa haole</i>	Nat.	O	O	
<i>Macroptilium atropurpureum</i> (DC) Urb.	---	Nat.	R	--	
<i>Macroptilium lathyroides</i> (L.) Urb.	cow pea	Nat.	R	--	
<i>Mimosa pudica</i> L.	sensitive plant	Nat.	U	R	
<i>Mucuna gigantea</i> (Willd.) DC	sea bean, <i>ka'e'e</i>	<b>Ind.</b>	U	U	
<i>Neonotonia wightii</i> (Wight & Arnott) Lackey	---	Nat.	--	R	(2)
<i>Senna pendula</i> (Humb. & Bonpl. ex Willd.) H. Irwin & Barneby	---	Nat.	--	U	
<b>LAMIACEAE</b>					
<i>Hyptis pectinata</i> (L.) Poir.	comb hyptis	Nat.	--	U	
<b>LAURACEAE</b>					
<i>Persea americana</i> Mill.	avocado	Nat.	O	U	
<b>MALVACEAE</b>					
<i>Hibiscus tiliaceus</i> L.	<i>hau</i>	<b>Ind.</b>	--	U3	
<i>Sida rhombifolia</i> L.	Cuba jute	Nat.	O	--	
<b>MELASTOMATACEAE</b>					
<i>Clidemia hirta</i> (L.) D. Don	Koster's curse	Nat.	U2	C	
<b>MORACEAE</b>					
<i>Artocarpus altilis</i> (Z) Fosberg	'ulu, breadfruit	Pol.	--	R	
<b>MYRSINACEAE</b>					
<i>Ardesia elliptica</i> Thunb.	shoebuttton ardesia	Nat.	--	R	
<b>MYRTACEAE</b>					
<i>Psidium cattleianum</i> Sabine	strawberry guava	Nat.	--	AA	
<i>Psidium guajava</i> L.	guava	Nat.	U	O	
<i>Syzygium cumini</i> (L.) Skeels	Java plum	Nat.	--	O	
<b>ONAGRACEAE</b>					
<i>Ludwigia octovalvis</i> (Jacq.) Raven.	primrose willow	Pol.	R	--	(1)

Table 1. (continued)

Species	Common name	Status	Abundance		Notes
			VE	FO	
PLANTAGINACEAE					
<i>Plantago major</i> L.	common plantain	Nat.	A	--	
<i>Plantago lanceolata</i> L.	nrv-leaved plantain	Nat.	U	--	
POLYGALACEAE					
<i>Polygala paniculata</i> L.	milkwort	Nat.	R	--	
PROTEACEAE					
<i>Grevilia robusta</i> A. Cunn. Ex R. Br.	silk oak	Nat.	--	U	
RUBIACEAE					
<i>Morinda citrifolia</i> L.	<i>noni</i>	Pol.	--	U	
<i>Spermacoce assurgens</i> Ruiz & Pavon	buttonweed	Nat.	U	--	
SOLANACEAE					
<i>Capsicum frutescens</i> L.	chili pepper	Nat.	--	R	
ULMACEAE					
<i>Trema orientalis</i> (L.) Blume	gunpowder tree	Nat.	--	R1	
VERBENACEAE					
<i>Lantana camara</i> L.	lantana	Nat.	--	U3	
<i>Stachytarpheta cayennensis</i> (Rich.) Vahl	---	Nat.	--	O	
<i>Stachytarpheta mutabilis</i> (Jacq.) Vahl	---	Nat.	--	R	
MONOCOTYLEDONES					
AGAVACEAE					
<i>Cordyline fruticosa</i> (L.) A. Chev.	<i>ki, ti</i>	Pol.	U	C	
<i>Dracaena fragrans</i> (L.) Ker Gawl.	fragrant dracaena	Orn.	--	R	
ARACEAE					
<i>Alocasia macrorrhizos</i> (L.) G. Don	'ape	Nat.	--	R	
<i>Epipremnum pinnatum</i> (L.) Engler	pothos	Nat.	U	O2	
ARECACEAE					
<i>Cocos nucifera</i> L.	<i>niu, coconut</i>	Pol.	R	O	
COMMELINACEAE					
<i>Commelina diffusa</i> N.L. Burm.	dayflower	Nat.	R	--	(1)
CYPERACEAE					
<i>Kylinga brevifolia</i> Rottb.	<i>kili'o'opu</i>	Nat.	U	--	(1)
HELICONIACEAE					
<i>Heliconia</i> cf. <i>psittacorum</i> L.	rhizomatosa heliconia	Orn.	--	R	(3)
LILIACEAE					
<i>Asparagus densiflorus</i> (Kunth) Jessop	asparagus fern	Orn?	--	R	
PANDANACEAE					
<i>Pandanus tectorius</i> Z	<i>hala</i>	<b>Ind.</b>	--	C	

Table 1 (continued).

Species	Common name	Status	Abundance		Notes
			VE	FO	
<b>POACEAE (GRAMINEAE)</b>					
<i>Axonopus compressus</i> (Swartz) P. Beauv.	brd-lvd carpet grass	Nat.	C	--	
<i>Axonopus fisifolius</i> (Raddi) Kuhlm.	nrw-lvd carpet grass	Nat.	A	--	
<i>Chloris radiata</i> (L.) Sw.	radiate fingergrass	Nat.	R	--	
<i>Chloris barbata</i> (L.) Sw.	swollen fingergrass	Nat.	O3	--	
<i>Chloris divaricata</i> R. Br.	star grass	Nat.	U	--	
<i>Cynodon dactylon</i> (L.) Pers.	Bermuda grass	Nat.	O3	--	
<i>Coix lachryma-jobi</i> L.	Job's tears	Nat.	R	--	(1)
<i>Digitaria violascens</i> Link	violet crabgrass	Nat.	R	--	
<i>Eleusine indica</i> (L.) Gaertn.	beach wiregrass	Nat.	C	--	
<i>Eragrostis pectinacea</i> (Michx.) Nees	Carolina lovegrass	Nat.	C3	--	
<i>Oplismenus hirtellus</i> (L.) P. Beauv.	basket grass	Nat.	U2	--	
<i>Paspalum</i> sp. indet.	hairy inflorescence	Nat.	R	--	
<i>Setaria palmifolia</i> (J. König) Stapf	palm grass	Nat.	--	C	
<i>Sporobolus africanus</i> (Poir.) Robyns & Tournay	African dropseed	Nat.	O3	--	
<i>Urochloa maxima</i> (Jacq.) Webster	Guinea grass	Nat.	C3	U	(2)
<i>Urochloa mutica</i> (Forsk.) Webster	para grass	Nat.	U2	U3	(2)

## Legend to Table 1

Status = distributional status

- End.** = endemic; native to Hawaii and found naturally nowhere else.  
**Ind.** = indigenous; native to Hawaii, but not unique to the Hawaiian Islands.  
**Nat.** = naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.  
**Orn.** = exotic, ornamental or cultivated; plant not naturalized (not well-established outside of cultivation).  
**Pol.** = Polynesian introduction before 1778.

Abundance = occurrence ratings for plants by area in February-March, 2008 (Area VE =highway verge; more or less level or low-sloping edges of the highway, maintained (lower verge area was graded clear of all vegetation after the February visit) ; Area FO = steep to cliff slope, mostly forested area that comprises most of the project area.

- R - Rare - only one or two plants seen.  
U - Uncommon - several to a dozen plants observed.  
O - Occasional - found regularly, but not abundant anywhere.  
C - Common - considered an important part of the vegetation and observed numerous times.  
A - Abundant - found in large numbers; may be locally dominant.  
AA - Abundant - abundant and dominant; a defining vegetation type.

A number following an abundance rating adjusts the occurrence to account for plants that are more numerous within a small or local area. Thus, R1 reflects a plant species seen in only one or two locations, but each location had several individuals; U2 is a plant seen several to perhaps a dozen times, but usually in clusters of many individuals; R3 is a plant seen in perhaps only one localized place, but very abundant at that local.

Notes:

- (1) Associated with seeps.  
(2) Particularly characteristic of areas of openings in the forest.  
(3) Vegetative tissues only; no flowers or fruit observed in February-March 2008.

A total of 94 fern, fern ally, and flowering plant species were observed in the project area. Of these 94 species, only seven (7) are considered native to the Hawaiian Islands (7.4%). Polynesian introductions made before the arrival of Capt. James Cooke numbered five (5). If we add these to the count of native plant species, then species representing "Hawaiian" plants comprise 12.8% of the total species. Only *Pandanus tectorius* (*hala*) and *Cordyline fruticosa* (*ki*) are common; all the other "natives" being uncommon or rare or (in the case of *Ipomoea indica* or *koali'awa*), occasional at the site. These low values for natives are typical for most lowland, disturbed sites in the Islands. No species that is listed by the state or federal governments or considered a candidate species, or is rare, or is of any special concern was observed at the site. Therefore, no mitigations measures are proposed based upon specifics of the flora. A majority of the upper slope is soil; significant rock faces are limited to the lower half of the project area. The site is predominantly a mature secondary forest of mixed tree species (Fig. 1) with a sparse understory.



Figure 1. Lower end of the project area showing the project slope on the left.

Eric Guinther  
AECOS Inc.



**About AECOM**

AECOM (NYSE: ACM) is a global provider of professional technical and management support services to a broad range of markets, including transportation, facilities, environmental and energy. With more than 40,000 employees around the world, AECOM is a leader in all of the key markets that it serves. AECOM provides a blend of global reach, local knowledge, innovation, and technical excellence in delivering solutions that enhance and sustain the world's built, natural, and social environments. AECOM serves clients in more than 100 countries and had revenue of more than \$4.5 billion during the 12-month period ended March 31, 2008. More information on AECOM and its services can be found at [www.aecom.com](http://www.aecom.com).

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