Draft
Environmental Assessment

Aiea Stream Erosion Control
In the Vicinity of the Interstate H-1 Freeway
Aiea, Hawaii

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION

April 26, 2010

Summary Information

Project Name	Aiea Stream Erosion Control in the Vicinity of the Interstate H-1 Freeway
Proposing Agency	State of Hawaii Department of Transportation Highways Division 869 Punchbowl Street Honolulu, Hawaii 96813
Tax Map Key	9-9-042: 027 and 059
Project Description	The Highways Division of the State of Hawaii Department of Transportation (HDOT) proposes to stabilize approximately 180 linear feet of the western (Ewa) bank of Aiea Stream on the makai side of Interstate Route H-1 at Mile Post 12.8 in order to address erosion problems. HDOT proposes to use a construction method called “soil nailing and shotcrete facing” to stabilize the bank.
Required Permits	U.S. Army Corps Permit Water Quality Certification Coastal Zone Management Consistency

Table of Contents

Chapter 1 Description of the Proposed Project 1-1
1.1 Introduction 1-1
1.2 Planning Context 1-1
1.3 Purpose and Need 1-3
1.4 Description of the Proposed Project 1-3
1.5 No Build Alternative 1-6
1.6 Alternatives Considered But Rejected 1-6
Chapter 2 Affected Environment, Potential Impacts and Proposed Mitigation 2-1
2.1 Natural Environment 2-3
2.1.1 Geographic Setting 2-3
2.1.2 Water Resources 2-7
2.1.3 Biological Resources 2-13
2.1.4 Air Quality and Noise 2-13
2.1.5 Visual and Aesthetic Resources 2-14
2.2 Social and Built Environment 2-15
2.2.1 Land Use 2-15
2.2.2 Roadways and Traffic 2-18
2.3 Consistency with Government Plans, Policies, and Controls 2-18
2.3.1 Hawaii State Plan 2-18
2.3.2 Coastal Zone Management Consistency 2-19
2.3.3 City and County of Honolulu General Plan 2-19
2.3.4 Primary Urban Center Development Plan 2-19
2.4 Permits and Approvals 2-19
Chapter 3 Comments and Coordination 3-1
Chapter 4 Anticipated Finding of No Significant Impact 4-1
Chapter 5 References 5-1

Appendices
A. Agency and Stakeholder Letters
B. Hydrologic and Hydraulics Report
C. Aiea Stream Field Report

List of Figures

1-1 Project Location 1-2
1-2 Project Site 1-4
1-3 Sectional View of Proposed Bank Stabilization 1-5
2-1 Elevations in Project Study Area 2-4
2-2 Soil Types in Project Study Area 2-5
2-3 Hydraulic Analysis Study Area 2-8
2-4 Photos of Existing Aiea Stream Bank and How it May Appear under the Proposed Project 2-16
2-5 Land Uses in the Vicinity of the Project Site 2-17

List of Tables

2-1 Existing Flood Conditions, 100-Year Storm Flow 2-9
2-2 Flood Conditions under Proposed Project, 100-Year Storm Flow 2-11

CHAPTER 1
DESCRIPTION OF THE PROPOSED PROJECT

1.1 Introduction

The Highways Division of the State of Hawaii Department of Transportation (HDOT Highways) prepared this Draft Environmental Assessment (Draft EA) for its proposal to address erosion problems along approximately 180 linear feet of Aiea Stream immediately makai of the Interstate Route H-1 Freeway (H-1 Freeway) in Aiea, Oahu (see Figure 1-1). Hereinafter, this proposal will be referred to as the "Proposed Project".

The pertinent chapters of this document are summarized below:

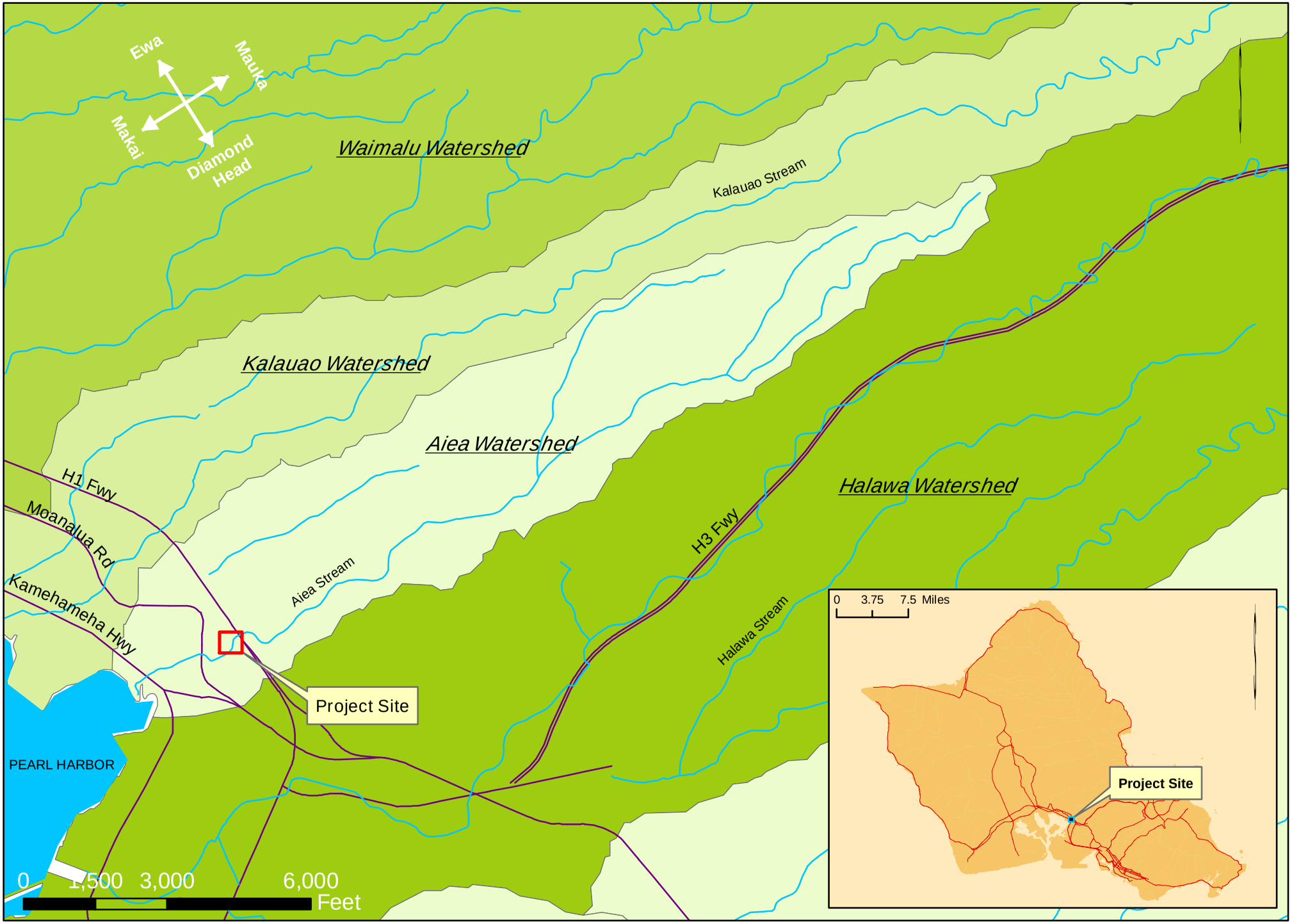
- Chapter 1 identifies the Hawaii State law that requires the preparation of this document; describes why (purpose and need) HDOT Highways is pursuing the Proposed Project; and provides a detailed description of the Proposed Project, including alternatives.
- Chapter 2 describes the existing environmental conditions potentially affected by the project; the environmental impacts (construction and long-term) that may result from implementation of the project; and the mitigation measures to address those impacts considered to be adverse.
- Chapter 3 summarizes HDOT Highway's public and agency consultation and coordination activities for the project.
- Chapter 4 provides an assessment of whether the Proposed Project would have a significant impact as defined in Section 11-200-12(b) of the Hawaii Administrative Rules.

1.2 Planning Context

The provisions of Chapter 343 of the Hawaii Revised Statutes (HRS) apply to the Proposed Project because State funds will be used for construction. In addition, the Proposed Project would not be exempted from environmental review as defined in HAR Section 11-200-8(a). The actions under the Proposed Project are not listed in HDOT's Comprehensive Exemption List (amended, November 15, 2000).

HDOT Highways rendered a preliminary determination that the Proposed Project is not likely to have a "significant" impact as defined in HRS Section HAR 11-200-12(b). After receipt of comments on this Draft EA, HDOT Highways will determine whether a Finding of No Significant Impact (FONSI) is appropriate.

This Draft EA discloses the environmental and social impacts that could result from the Proposed Project's implementation, and commits to the implementation of specific measures to prevent, minimize or mitigate adverse impacts to the environment. Additionally, this Draft EA contains a record of all comments and consultation activities that have been conducted to date as part of project planning.



Aiea Stream Erosion Control in the Vicinity of the Interstate H-1 Freeway
Environmental Assessment

Project Location
Figure 1-1

1.3 Purpose and Need

The Proposed Project's objective is to remediate erosion problems occurring along Aiea Stream immediately makai of the H-1 Freeway. The stream is highly degraded, showing extreme erosion along its banks. Under the H-1 Freeway, the stream passes through a double cell box culvert. Each culvert cell is 15 feet wide and 12 feet high. Water flow within the stream is intermittent, and therefore, erosion occurs during storm events when water flow is large and rapid. Shortly after storm events, the stream bed returns to its normal dry condition. The erosional area proposed to be remediated is along the western (Ewa) bank of the stream. The soil loss along the bank is undermining perimeter fence foundations and concrete slabs that are part of Aiea Shopping Center. The concrete slabs are used to support equipment and utility pipes. Erosion is also occurring below an existing 42-inch diameter corrugated metal drainage pipe on the stream's eastern (Diamond Head) bank, approximately 125 feet downstream from or makai of the H-1 Freeway culvert outlets. The drainage pipe carries storm water from portions of the H-1 Freeway and Laka Place, a street running parallel to the H-1 Freeway, with a cul-de-sac on the Diamond Head side of the stream.

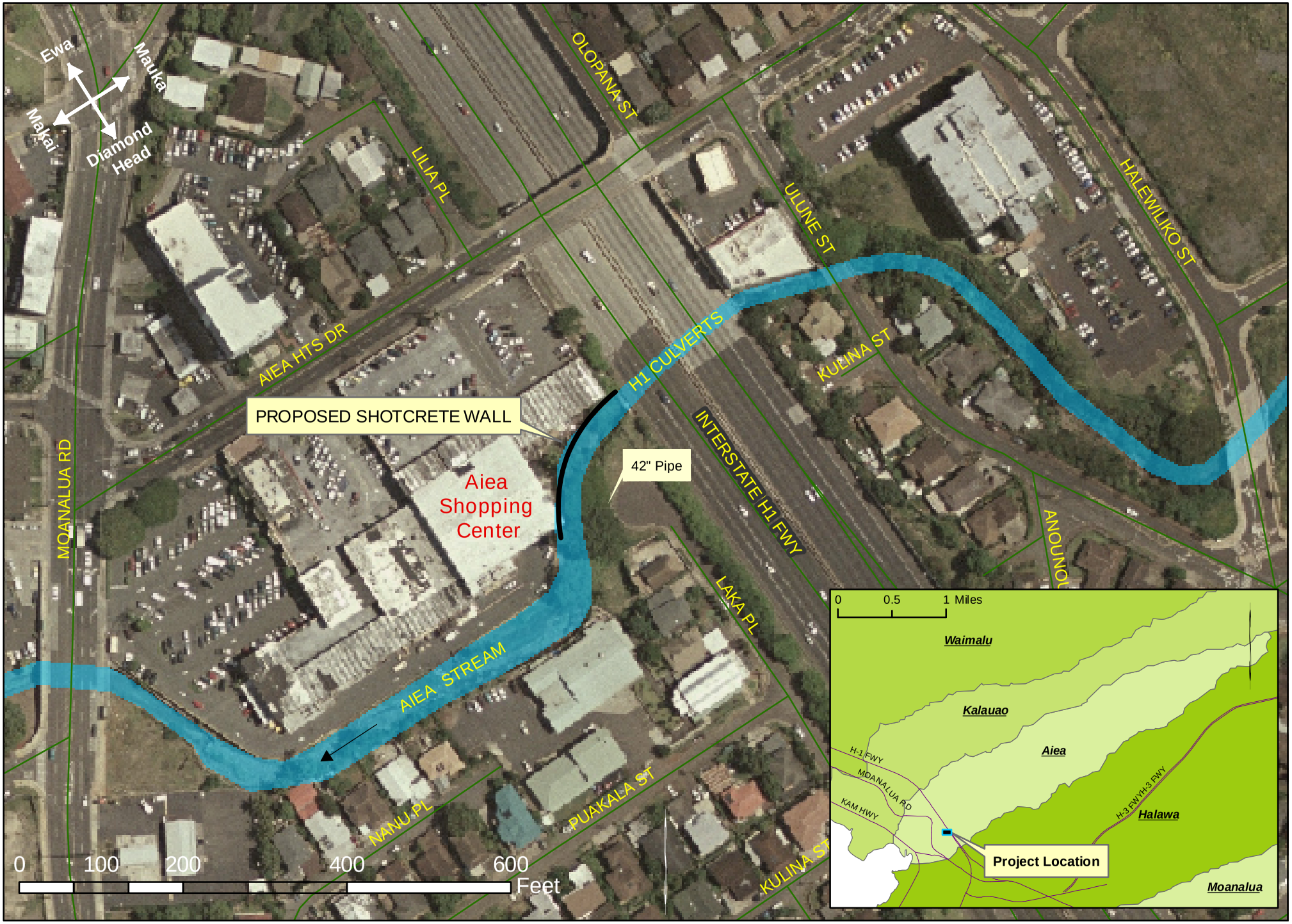
1.4 Description of the Proposed Project

The Proposed Project would stabilize a portion of the Ewa bank of Aiea Stream. The project limits would start from the H-1 Freeway culvert outlets at the upstream (mauka) end and at a point approximately 180 feet on the downstream (makai) end (see Figure 1-2). Most of the project or construction area would be within the privately-owned Aiea Shopping Center where the eroded stream bank requires protection and strengthening to prevent further undercutting. The portion of the project site that is on public property is part of the H-1 Freeway right-of-way.

The proposed method of stabilizing the stream bank is called "soil nailing and shotcrete facing". Shotcrete is a method of pneumatically applying concrete with coarse aggregate mixture on surfaces using air compression applied through a hose and nozzle. As a result of the high velocity spray from the hose nozzle, the shotcrete undergoes placement and compaction at the same instance that the shotcrete is applied to a surface. Therefore, shotcrete can be placed on a variety of surface shapes, including steep and vertical walls. Soil nailing is a technique used to reinforce and stabilize slopes, excavations or retaining walls. Narrow bars or anchors are inserted from the ground surface or fastening wall facing, such as shotcrete (see Figure 1-3).

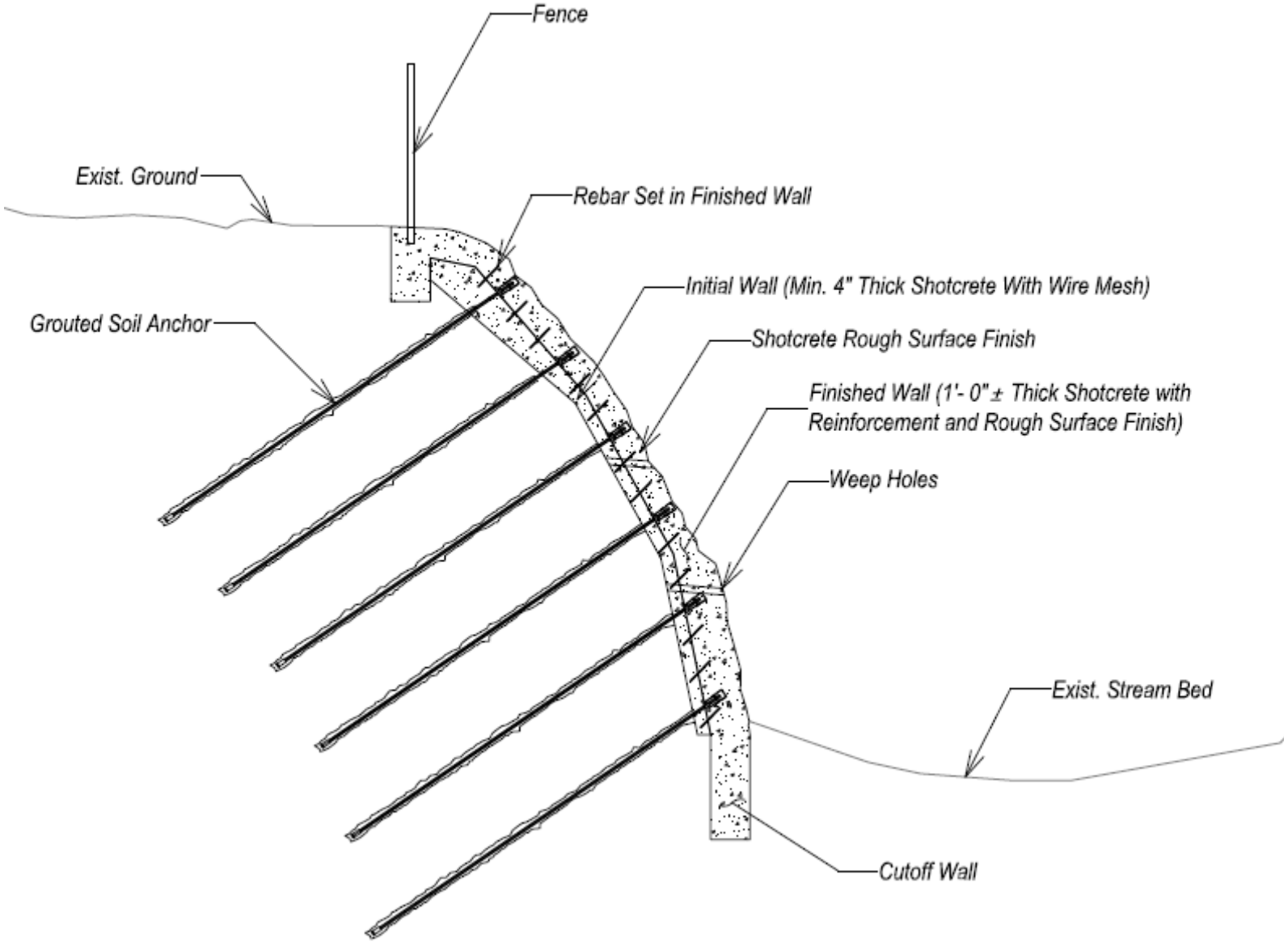
The construction process of the "soil nailing and shotcrete facing" method at the project site is as follows (see Figure 1-3):

1. Vegetation, trees and loose soils and rocks would be removed along the Ewa bank within the project limits.
2. Ground anchors will be installed on the stream bank and will extend into the Aiea Shopping Center property.
3. The ground anchors will be covered with shotcrete.
4. Drainage will be provided through the shotcrete facing.



Aiea Stream Erosion Control in the Vicinity of the Interstate H-1 Freeway
Environmental Assessment

Project Site
Figure 1-2



Sectional View of Proposed Bank Stabilization
Figure 1-3

The remaining parts of the existing stream bed unaffected by the installation of the shotcrete wall would remain relatively rough, boulder laden and undulating. However, the contractor would likely use sections of the stream bed for construction access, operation of construction vehicles and equipment, but not for storage. The contractor would be required to minimize disturbance of the stream bed and banks to the extent practicable and would be required to restore affected areas of the stream bed and banks to pre-construction conditions, where necessary.

In addition to bank stabilization work, the Proposed Project would realign the discharge of the existing 42-inch diameter drain pipe more downstream. Presently, the discharge is perpendicular to the stream flow.

The conceptual construction cost estimate of the Proposed Project would be between $900,000 and $1.1 million. Final design and the acquisition of required permits are tentatively scheduled for the latter half of calendar year 2010. Construction of the Proposed Project is scheduled to start during the first half of calendar year 2011, and would take approximately 6 months to complete.

1.5 No Build Alternative

Full consideration is given in this EA to the environmental consequences of taking no action to meet purpose and need as described in Section 1.2. For the purposes of analyzing the impacts of the Proposed Project, the No Build alternative provides a baseline condition with which to compare the consequences associated with the Proposed Project. Under the No Build alternative, no effort would be made to stabilize the Ewa bank. To lessen the impedance of stream flow as much as possible, the City has a stream maintenance easement for the purpose of periodically removing vegetation and debris from the stream bed.

1.6 Alternatives Considered But Rejected

In addition to the Proposed Project, the following two alternatives were considered to address the purpose and need described in Section 1.2:

1. U-shaped concrete channel
2. Box culvert

Both of these alternatives were rejected because in comparison to the Proposed Project described in Section 1.3, either alternative would substantially disturb or change the stream bed and banks; would be more costly; and would take longer to construct. Brief descriptions of the rejected alternatives are provided below:

U-Shaped Concrete Channel Alternative. The concrete channel would be approximately 30 feet wide at the base or along the stream bed, with 18-foot high walls. The length of the channel would be approximately 200 feet starting from the H-1 Freeway box culvert, plus a 30-foot long apron on the downstream side of the channel. Energy dissipators, which could have steps or baffles, would be placed on the channel apron to slow the velocity of the storm water as it exits the channel. Other elements of this alternative include chain link fencing on the top of both channel walls; and connecting the 42-inch drainage pipe to the channel wall where storm water from the pipe discharges into the channel. The conceptual construction cost estimate of the U-shaped concrete channel alternative is approximately $2.6 million.

Box Culvert Alternative. A wide 32-foot wide by 12-foot high single cell concrete box culvert would be installed immediately downstream of the H-1 Freeway, as an extension of the existing box culvert. The length of the culvert would be approximately 200 feet, plus a 30-foot long apron at the downstream outlet. Similar to the U-shaped concrete channel alternative, energy dissipators would be placed on the downstream side of the culvert to slow the velocity of the storm water as it exits the culvert. Also, the 42-inch drainage pipe would be connected to the culvert wall where storm water from the pipe discharges into the culvert. The conceptual construction cost estimate of the U-shaped concrete channel alternative is approximately $3.5 million.

CHAPTER 2
AFFECTED ENVIRONMENT, POTENTIAL IMPACTS AND PROPOSED MITIGATION

This chapter describes potential short-term construction and long-term or operational environmental impacts of the Proposed Project. In addition, the potential long-term impacts of the No Build Alternative, or doing nothing, are also described as a point of comparison. Where an impact is considered adverse, mitigation measures are provided.

Based on the elements and potential impacts of the Proposed Project in the context of the environmental and social conditions of the study area, this chapter focuses on the following environmental issues:

Natural Environment

- Geologic and Soil Conditions: long-term impacts to surface and subsurface soils and modification of the existing topography as a result of the Proposed Project
- Water Resources: potential temporary construction-related and long-term impacts to Aiea Stream, including the potential for future erosion, the effects on water quality and whether or not the flood zone associated with the stream may change
- Biological Resources: potential temporary construction-related and long-term impacts to the biological resources within the project site
- Air Quality: potential temporary construction-related impacts to air quality in the immediate vicinity of the project site
- Noise: potential temporary construction-related impacts in the immediate vicinity of the project site
- Visual and Aesthetic Resources: the potential long-term impact to the existing visual and aesthetic environment

Social and Built Environment

- Land Use: identification of the existing land uses that may be protected from erosion by the Proposed Project
- Roadways and Traffic: potential temporary construction-related impacts to the operation of roadways near or adjacent to the project site

Consistency with Governmental Plans and Policies: The Proposed Project's consistency with the following governmental plans and land use controls that apply to the project site:

- Hawaii State Plan
- Coastal Zone Management
- City and County of Honolulu (City) General Plan
- City Primary Urban Center Development Plan

Based on site reconnaissance and project scoping activities (see Chapter 3), the following types of environmental resources are unlikely to be affected by the Proposed Project, and therefore, detailed analyses of project impacts to these resources are not included in this chapter:

Natural Environment

- Long-Term Air Quality Conditions: Upon completion, maintenance is the only activity that involves air pollutant emissions. The City maintains a maintenance easement within the stream, and City staff would continue to use hand-held equipment, such as gas-powered (and air pollutant exhaust producing) weed trimmers, to control vegetation or clear trash and debris within the stream bed, which may cause impediments to storm water flow. However, this activity would be relatively brief and infrequent, and would occur regardless of whether or not the Proposed Project is implemented.
- Long-Term Noise Conditions: Maintenance activities as described above would produce noise, but such activities would be relatively brief and infrequent, and would occur regardless of whether or not the Proposed Project is implemented. In addition, the high traffic noise levels from the H-1 Freeway dominate the ambient noise conditions in around the project site, which may make maintenance-related noise not as noticeable as one would otherwise expect.
- Wetlands: According to the U.S. Fish and Wildlife Service's (FWS) National Wetlands Inventory (NWI) and on-site observations, the project site does not contain wetlands.
- Groundwater: Any groundwater within the project site is not used for potable drinking purposes.
- Wild and Scenic Rivers: Aiea Stream is not federally designated as a wild and scenic river or State scenic river.
- Threatened and Endangered Species: The project site is highly disturbed from its original natural vegetation and habitat, having been surrounded by large-scale agriculture (sugarcane cultivation throughout the latter half of the 19th century and early part of the 20th century) and urban land uses for many decades thereafter. The project site is not considered a wildlife refuge or critical habitat, and is highly unlikely to contain federally or State-designated threatened or endangered species.

Social and Built Environment

- Social Conditions and Neighborhoods: Social, community or public service activities occurring in nearby areas would be unaffected by the Proposed Project, which would be confined to the existing Aiea Stream.
- Economic Conditions: Economic activities, such as commerce at the adjacent Aiea Shopping Center, would be unaffected by the Proposed Project, which as noted above would be confined to the existing Aiea Stream.
- Historic Properties: The project site (Aiea Stream) is highly unlikely to contain sites or resources eligible for the National Register of Historic Places or the Hawaii Register due to the disturbed condition of the project site, which have included large scale agriculture, urban development, and past storm events. In a letter dated November 4, 2009, the State Historic Preservation Division stated agreement with this assessment, noting "no historic properties affected" within the project site.
- Parks and Recreational Resources: No park or recreational resource would be affected because the Proposed Project would be confined to the existing Aiea Stream.
- Long-Term Traffic Conditions: Upon completion, traffic conditions would not be affected because the Proposed Project would be confined to the existing Aiea Stream.
- Farmland: The project site and the immediate surrounding areas do not contain working farms.
- Utilities: The only active utility within the project site is HDOT-owned 42-inch drain pipe, which would be realigned under the Proposed Project.

Governmental Plans and Policies

- Hawaii State Land Use Controls: The project site is in the State Urban area, the least restrictive of the four State classifications.
- City and County of Honolulu Zoning: Within the project site, Aiea Stream demarcates two zones: B-2 (Business District) on the Ewa side and R-5 (Residential District) on the Diamond Head side. Regardless of the zoning, the Proposed Project would be considered a "public use" and is a permitted use under both districts.
- Special Management Area: The project site is not within the Special Management Area.

2.1 Natural Environment

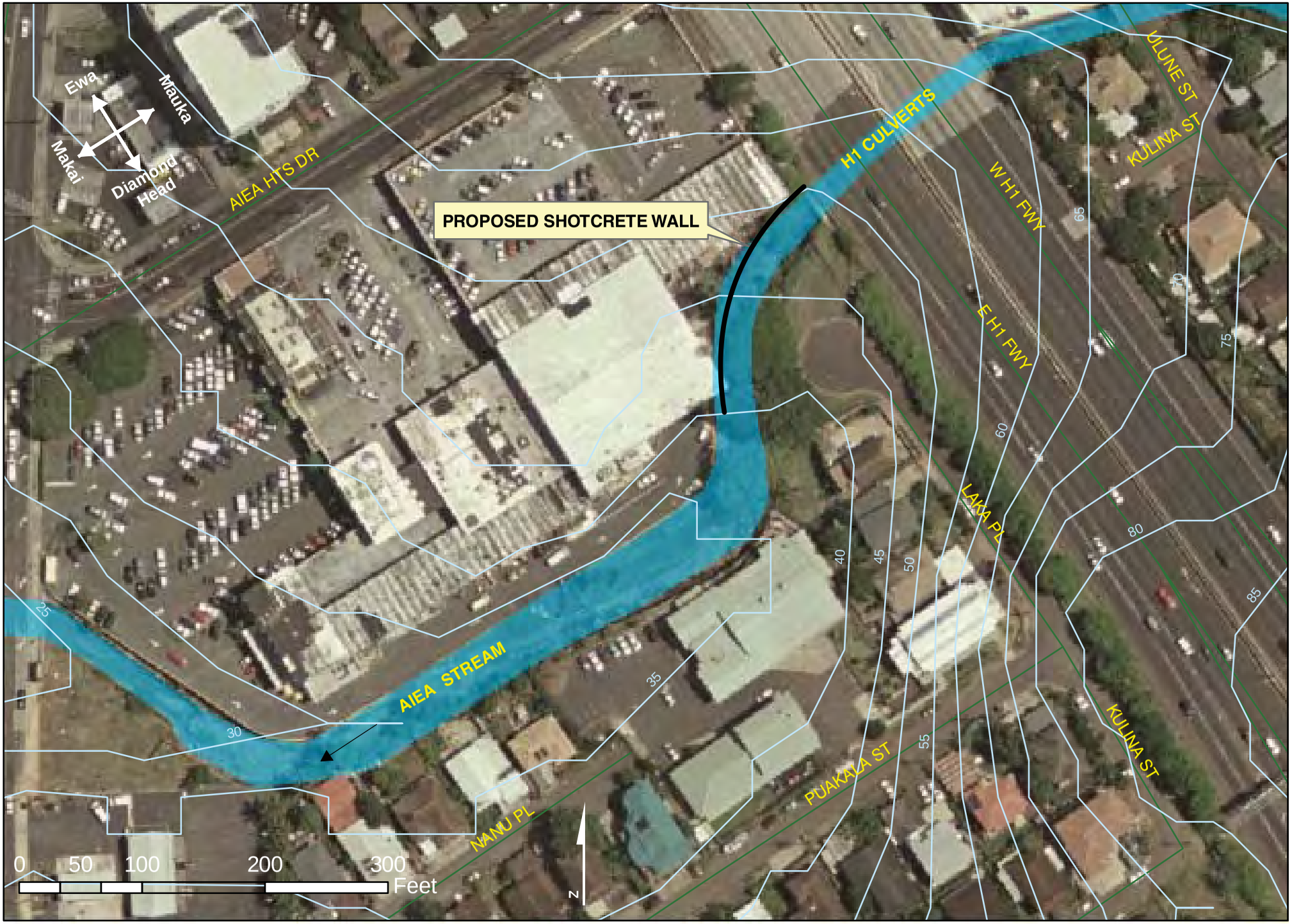
2.1.1 Geographic Setting

2.1.1.1 Existing Conditions

As shown in Figure 2-1, the area surrounding the Aiea Stream within the project site slopes moderately from northeast to southwest, generally following the alignment of the stream. At the H-1 Freeway, the top of the stream bank is approximately 60 feet above mean sea level (msl). The elevations at the downstream portion of the project site are relatively level because the alignment of the stream is somewhat diagonal with the general grade surrounding the stream (see Figure 2-1). The elevations along the Diamond Head bank are a relatively constant 57-59 feet within the project site. The elevation at the downstream end along the Diamond Head bank is actually a half-foot higher than the elevation at the upstream end. Along the Ewa bank, the elevation drops only two feet at the downstream end in relation to the upstream end. The stream bed invert drops in elevation by approximately seven feet within the project site, causing the depth of the channel from stream bed to the top of the banks to increase from approximately 11 feet at the upstream end near the H-1 Freeway culverts to approximately 20 feet at the downstream end.

The slopes mauka and makai of the Proposed Project are substantially steeper. For instance, within 400 feet downstream of the project site, the elevations of the top of banks drop by approximately 15 feet because the stream shifts to a mauka-makai alignment beyond the project site. On the Diamond Head bank, the elevation drops by almost ten feet just 40 feet downstream from the makai end of the project site. The elevation drop along the stream bed is not nearly as steep, which exposes the land uses makai of the project site to flooding during very low frequency storm events (see Section 2.1.2 for further information).

Figure 2-2 shows the underlying soils in the general vicinity of the project site. According to the U.S. Natural Resources (previously "Soil") Conservation Service's soil survey, the area at and near the project site contains two types of soils: Hanalei silty clay of 2 to 6 percent slope (HnB) and Waipahu silty clay of 0 to 2 percent (WzA) and 6 to 12 percent slope (WzC). "Hanalei" and "Waipahu" soils are alluvium (soil and sediments deposited by a river or other running water) formed from basic igneous rock. The permeability of HnB and WzA/WzC is moderate and moderately slow, respectively. Storm water runoff from HnB, WzA and WzC is slow, slow to very slow and medium, respectively. Erosion hazard from HnB, WzA and WzC is slight, none to slight, and moderate, respectively. A field survey of the stream noted that the upper section of slope along the Ewa bank next to the Aiea Shopping Center, or where the shotcrete wall would be located, may be fill material due to the lack of layering and the presence of angular rocks.



Aiea Stream Erosion Control in the Vicinity of the Interstate H-1 Freeway
Environmental Assessment

Elevations in Project Study Area
Figure 2-1

Aiea Stream Erosion Control in the Vicinity of the Interstate H-1 Freeway
Environmental Assessment

Soil Types in Project Study Area
Figure 2-2

2.1.1.2 Potential Impacts

Construction

During construction, the Proposed Project along the Ewa bank would require removing loose rocks and soil, vegetation and tree roots. Other activities would include trenching along the toe of the slope for a cutoff wall (see Section 1.4). All excess materials excavated from the project site would be transported away from the site and would be disposed of in a manner compliant with federal, State and City and County of Honolulu regulations. The soil conditions described above are not expected to cause any unusual problems to the design and construction of the Proposed Project, but further investigation, which would include soil boring samples taken from the top of the bank, would be needed to determine the design lengths of the soil nails. The Proposed Project is not expected to affect the structural integrity of the existing Aiea Shopping Center building adjacent to the Proposed Project based on available information about the design of the building.

Long-Term

Once completed, the Proposed Project would maintain the existing topography of the project site, including the shape and alignment of Aiea Stream, although the appearance or façade of the Ewa bank would change to a shotcrete finished wall (see Section 2.1.5). The Proposed Project would generally maintain the shape of the stream bed and its elevations.

The No Build alternative would also maintain the topographic conditions of the project site. However, further erosion may alter the shape and alignment of the stream, which could eventually affect the structural integrity of Aiea Shopping Center. In this case, the shopping center owner may have to take remedial steps to preserve the integrity of its building.

2.1.1.3 Mitigation Measures

The Proposed Project's construction contract documents would require that the contractor practice good housekeeping, such as ensuring that:

- All waste materials be collected and stored in securely lidded metal dumpsters and not buried on site;
- Materials stored on-site be stored in a neat, orderly manner in appropriate containers (i.e., per manufacturer's recommendations);
- All on-site vehicles be monitored for leaks and receive regular preventive maintenance to reduce the chance of leakage; and
- A spill prevention and clean-up plan is prepared and implemented.

All sanitary waste generated during the construction phase would be placed in portable units, as required, for offsite disposal.

If unexpected soil contamination were identified during construction, the contractor would be required to report its findings immediately to HDOT Highways. The handling, treatment and disposal of hazardous materials would be conducted in accordance with applicable State and federal laws.

2.1.2 Water Resources

2.1.2.1 Existing Conditions

The Aiea Stream watershed is located on the leeward slopes of the Koolau Mountain range, between the Halawa Stream and Kalauao Stream watersheds (see Figure 1-1). The Aiea Stream watershed is approximately three and one-half miles long and only 0.65 miles wide at its widest point, with a total area of approximately 834 acres. The upper reaches of the watershed is in a forest preserve called the Keaiwa Heiau State Recreation Area. Approximately two-thirds of the watershed is mixed forest, with the remainder used for urban land uses of mostly residences. Storm water conveyed through Aiea Stream empties into Aiea Bay of Pearl Harbor, approximately a quarter-mile downstream from the project site.

According to the State of Hawaii Department of Health (SDOH), Aiea Stream is listed as a 303(d) water body in accordance with the federal Clean Water Act (CWA). A Section 303(d) listed water body means that it is impaired by at least one pollutant, which affects recreation or the protection and propagation of fish, shellfish and wildlife. According to SDOH, Aiea Stream is impaired by trash and turbidity, and SDOH is in the process of developing or calculating Total Maximum Daily Loads (TMDL) for these pollutants attributable to the stream as required by the CWA. Following development of the TMDL, SDOH would be able to assign Waste Load Allocations (WLA) of the pollutants to certain landowners within the watershed.

Within the project site, Aiea Stream is dry throughout most of the year, with occasional small isolated pools of water. The stream within the project site conveys water only during storm events. The stream bed is rough and undulating, and covered with gravel, cobbles, boulders, weedy vegetation and some trash. As noted in Section 1.3, the Ewa bank is eroded showing bare soil and rocks and exposed tree roots. Despite its intermittent status, Aiea Stream's ordinary high water mark (OHWM) within the project site ranges from approximately one to two feet above the lowest point of any stream cross section within the project site. The OHWM is slightly lower within the H-1 Freeway culverts because the velocity of stream flow within the culverts is relatively higher than velocities along the stream bed.

A hydraulic analysis for the Proposed Project was conducted using the computer model, HEC-RAS version 4.0 (see Appendix B). For purposes of the analysis, the study area extended beyond the project site to an upstream location approximately 150 feet mauka of Ulune Street and a downstream location approximately 400 feet makai of the project site or 300 feet mauka of Moanalua Road (see Figure 2-3). The total length of the study area is approximately 1,100 feet, and includes two culvert crossings, one of which is beneath the H-1 Freeway and the other is beneath Ulune Street. The flood water heights during a 100-year storm event were modeled at 37 cross sections throughout the hydraulic analysis study area based on the existing condition of Aiea Stream. The results are presented in Table 2-1.

Due to the steepness of the stream channel and the H-1 culverts (see Section 2.1.1), the existing flow velocity within the project site is relatively high. In the vicinity of the Aiea Shopping Center where severe erosion is evident, the flow velocity during a 100-year storm event would be nearly 11 feet per second. High flow velocities within the culverts have likely caused scouring below the culvert outfalls. The results of the hydraulic analysis shows that despite the high velocities, Aiea Stream within the Proposed Project site would be able to contain the flood flow during a 100-year storm, as shown in Table 2-1. The

Aiea Stream Erosion Control in the Vicinity of the Interstate H-1 Freeway
Environmental Assessment

Hydraulic Analysis Study Area
Figure 2-3

project site is located between stations 306+62 and 304+64 (see Table 2-1). Within this section, the storm water flows would not overtop either bank, with predicted elevations ranging from about 1 ½ feet to almost 10 feet below the banks. However, downstream from the project site, the elevation of the Diamond Head bank drops substantially in comparison to the gradient of the stream bed, which drops relatively moderately (see Section 2.1.1). During a 100-year storm, the Diamond Head bank downstream of station 303+59 would not be able to contain water flows and flooding may occur on adjacent properties. At station 300+42, which is the second to the most makai cross section of the hydraulic analysis study area, the height of the flood waters under existing condition would be over seven feet higher than the top of the Diamond Head bank (see Table 2-1).

Table 2-1
Existing Flood Conditions, 100-Year Storm Flow

Cross Section Station	Elevation - Top of Banks (feet)		Flood Elevation (feet)	Feet Under (-) or Over Stream Bank	
	Diamond Head	Ewa		Diamond Head	Ewa
311+19	75.75	75.64	73.03	-2.72	-2.61
310+87	75.59	76	72.61	-2.98	-3.39
310+57	74.77	74.51	72.04	-2.73	-2.47
310+25	76.57	78	72.06	-4.51	-5.94
309+97	76.05	76.01	72.07	-3.98	-3.94
Ulune St. Culvert	--	--	--	--	--
309+49	69.53	71.8	69.78	0.25	-2.02
309+32	67	71.56	68.28	1.28	-3.28
309+08	68	71.56	66.01	-1.99	-5.55
308+89	66.42	71.56	64.17	-2.25	-7.39
308+69	63.64	71.56	61.79	-1.85	-9.77
308+54	60.9	71.56	57.85	-3.05	-13.71
308+42	60.58	60.48	50.34	-10.24	-10.14
H-1 Fwy. Culvert	-	--	--	--	--
306+62	57.64	60	56.78	-0.86	-3.22
306+46	57.97	58	56.31	-1.66	-1.69
306+29	57.93	62	56.21	-1.72	-5.79
306+09	59.9	62.18	54.93	-4.97	-7.25
305+79	58.8	59.99	54.36	-4.44	-5.63
305+51	57.99	61.99	52.01	-5.98	-9.98
305+23	58	59.98	50.42	-7.58	-9.56
304+92	58.17	58.09	49.41	-8.76	-8.68
304+84	58	58.05	49.47	-8.53	-8.58
304+64	58.02	57.8	48.14	-9.88	-9.66
304+44	48.21	56.1	47.47	-0.74	-8.63
304+21	46.67	54	46.58	-0.09	-7.42
303+93	46.36	55	46.15	-0.21	-8.85
303+59	44.21	53.95	45.40	1.19	-8.55
303+19	42.83	50.15	44.47	1.64	-5.68

Table 2-1
Existing Flood Conditions, 100-Year Storm Flow
(continued)

302+92	41.74	48.2	43.20	1.46	-5
302+50	40.81	45.5	41.87	1.06	-3.63
302+10	40.07	43.27	40.40	0.33	-2.87
301+78	39.79	43.21	40.05	0.26	-3.16
301+49	36.86	44.19	39.89	3.03	-4.3
301+22	37.33	44.56	39.61	2.28	-4.95
300+95	35.42	44.4	39.36	3.94	-5.04
300+68	34.44	43.24	39.29	4.85	-3.95
300+42	32	42.75	39.27	7.27	-3.48
300+16	33.39	42.75	38.89	5.5	-3.86

Source: PB Americas, Inc.

The results of the hydraulic analysis are generally consistent with existing flood insurance rate maps (FIRM) of the study area. Similar to the results of the hydraulic analysis, the FIRM maps show the width of the floodway bulging outside the stream just makai of the project site.

2.1.2.2 Potential Impacts

Construction

During construction, additional erosion and sedimentation (from normal conditions) within Aiea Stream could occur during a storm event when water flow is present, which may adversely affect the quality of the water that is discharged into Aiea Bay in Pearl Harbor. The Proposed Project would be under the one acre which is the threshold that would trigger the need for a National Pollutant Discharge Elimination System (NPDES) permit associated with construction activities storm water runoff. Best Management Practices (BMP) measures would be implemented during construction as required by the construction contract documents and in compliance with HDOT's Oahu Storm Water Management Program (SWMP).

The lower portion of the shotcrete wall and the cutoff wall would be constructed below the OHWM, which means that the Proposed Project would require a Department of Army permit, pursuant to Section 404 of the Clean Water Act (CWA) from the U.S. Army Corps of Engineers. In addition, a water quality certification (WQC) pursuant to CWA Section 401 would be obtained from the SDOH. Similar to the requirements of the NPDES permit and the Oahu SWMP's Construction Site Runoff Control Program, the WQC requires preparation of erosion control plans and BMPs.

Long-Term

The Proposed Project would not affect SDOH's effort to develop or calculate the TMDL for Aiea Stream, which would remain a 303(d) listed water body with or without the Proposed Project at least within the immediate future. In other words, the TMDL and WLA results would be the same under both the Proposed Project and the No Build alternative. Under the Proposed Project, a shotcrete wall would replace approximately 180 feet of the existing Ewa bank made up of mostly exposed or vegetated soil and rock. The new shotcrete wall would eliminate the

erosion of the section of the bank by the Aiea Shopping Center building, reducing sedimentation during various depths of stream flow occurring during storm events. However, although the Proposed Project will improve the overall water quality of the stream to a slight extent, in the context of Aiea Stream's 834 acre watershed, the reduction in the amount of the watershed's erosion and sedimentation is not expected to be a significant amount.

In addition to the existing condition, the hydraulic analysis was applied to Aiea Stream under the Proposed Project by simulating in the hydraulic model a shotcrete wall along the Ewa bank. The shotcrete wall would result in a different friction factor on flood water flows as compared to the existing irregularly-shaped Ewa bank. However, the proposed wall would be designed and constructed with a roughened, textured surface. Therefore, the model predicts that that the flow velocity by the new Ewa bank shotcrete wall would be approximately five feet per second faster than what the hydraulic model calculates under existing conditions. Near the Diamond Head bank, the model predicts about the same flow velocities under both scenarios. Therefore, the conditions along the Diamond Head bank would remain about the same regardless of the alternative selected.

The change in storm water velocity near the Ewa bank would have no significant effect on flood heights (see Table 2-2). At 25 of the 37 cross sections, the predicted elevations under the Proposed Project would be about the same (within 0.02 feet) as those under existing conditions. At the remaining 12 stations, all of which are within the project site, the predicted flood water surface elevations are slightly lower under the Proposed Project in comparison to existing conditions.

Table 2-2
Flood Conditions under Proposed Project, 100-Year Storm Flow

Cross Section Station	Existing Condition (feet)	Proposed Project (feet)	Predicted Change
311+19	73.03	73.04	0.01
310+87	72.61	72.62	0.01
310+57	72.04	72.06	0.02
310+25	72.06	72.04	-0.02
309+97	72.07	72.07	0
Ulune St. Culvert	--	--	--
309+49	69.78	69.78	0
309+32	68.28	68.28	0
309+08	66.01	66.01	0
308+89	64.17	64.17	0
308+69	61.79	61.79	0
308+54	57.85	57.85	0
308+42	50.34	50.34	0
H-1 Fwy. Culvert	--	--	--
306+62	56.78	56.25	-0.53
306+46	56.31	55.87	-0.44
306+29	56.21	55.74	-0.47
306+09	54.93	54.38	-0.55
305+79	54.36	53.81	-0.55

Table 2-2
Flood Conditions under Proposed Project, 100-Year Storm Flow
(continued)

305+51	52.01	51.80	-0.21
305+23	50.42	50.27	-0.15
304+92	49.41	49.29	-0.12
304+84	49.47	49.11	-0.36
304+64	48.14	47.84	-0.30
304+44	47.47	47.42	-0.05
304+21	46.58	46.39	-0.19
303+93	46.15	46.15	0
303+59	45.40	45.40	0
303+19	44.47	44.47	0
302+92	43.20	43.20	0
302+50	41.87	41.87	0
302+10	40.40	40.40	0
301+78	40.05	40.05	0
301+49	39.89	39.89	0
301+22	39.61	39.61	0
300+95	39.36	39.36	0
300+68	39.29	39.29	0
300+42	39.27	39.27	0
300+16	38.89	38.89	0

Source: PB Americas, Inc.

In summary, the 100-year flood conditions described under existing conditions would remain about the same under both the No Build alternative and the Proposed Project.

2.1.2.3 Mitigation Measures

In compliance with NPDES and construction contract requirements, the construction contractor would be required to provide effective erosion control measures for his construction activities. The contractor would be required to prepare an erosion control or construction BMP plan, which would be included in the WQC application to the SDOH. Generally accepted BMPs applicable to the Proposed Project include:

- Silt curtains and fences;
- Sand bags;
- Fiber rolls and wattles;
- Minimizing areas of disturbance;
- Covering stockpiles; and
- Immediate planting of vegetation and/or mulching on highly erodible or critical areas.

In addition, to the BMPs, the contractor would be required to conduct water quality monitoring in accordance with SDOH requirements.

2.1.3 Biological Resources

2.1.3.1 Existing Conditions

As noted in Section 2.1.2, Aiea Stream is normally dry with small interspersed pools of water. The mauka to the middle section of the project site support several large to moderately large trees along the top of the banks, forming small canopies. A few of the trees nearest to the stream have exposed tree roots along the banks. The trees are less dense on the makai end of the project site in the vicinity of the Aiea Hongwanji Mission (see Section 2.2.1). The banks and bed of the stream also contains overgrown weedy vegetation.

Due to the normally dry condition of Aiea Stream within the project site, any aquatic life would include the possible presence of insects and certain invertebrate species, such as snails, in the small pools of water. Prior to agricultural, industrial, commercial and residential development of Aiea, including the area surrounding the project site, which occurred throughout the 19th and 20th centuries, the stream probably supported fish species. In an environmental impact statement (EIS) prepared in 1977 by the then City and County of Honolulu Department of Public Works, it was reported that "tilapia (*Tilapia mossambica*) were encountered in fairly large concentrations" at a location 500 to 600 feet upstream from Kamehameha Highway, which is downstream from the project site. The EIS also reported that the section of Aiea Stream subject to the Proposed Project (the project site) "contained no fish or other macro-organisms", other than guppies (family *Poeciliidae*), which were more numerous on the lower part of Aiea Stream. The lack of aquatic species, according to the EIS, was due to discharges from a sugar cane refinery, which was located mauka of the H-1 Freeway but has been closed for several years. The water discharges from the refinery caused the temperature in the stream water to rise to about 106°F at the discharge point. The temperature dropped to 103°F at Moanalua Road, which crosses Aiea Stream a short distance downstream from the project site. The water temperature was too high for the tilapia and native stream species, but according to the EIS, guppies can survive in water temperatures of up to 104°F.

2.1.3.2 Potential Impacts

As noted in Section 1.4, one of the first construction activities of the Proposed Project is the removal of vegetation and trees along the Ewa bank so that shotcrete and soil nailing can then be applied. The loss of several trees, which are on the private property containing Aiea Shopping Center, would not be considered detrimental to the botanical ecosystem of the site or region, and would not be replaced by the Proposed Project.

The Proposed Project would not affect the intermittent water flow condition of the stream. Therefore, aquatic life would remain limited to insects and certain invertebrate species living in small pools of water, which often remain after storm events.

2.1.4 Air Quality and Noise

2.1.4.1 Existing Conditions

Air quality throughout Oahu, including the project site, is generally good due to prevalent northeast trade winds and on-shore breezes that help disperse most urban air pollutants. Data

collected by HDOH at ten monitoring stations located throughout the island indicate that air quality on Oahu meets National and State Ambient Air Quality Standards.

The general ambient noise conditions in the general vicinity of the project site are mostly affected by traffic movements along the H-1 Freeway. Vehicles traveling in excess of 55 miles per hour (the posted speed limit) can cause ambient noise levels near the roadway to be in excess of 70dBA. The land uses near the project site do not support industrial businesses or other activities that produce high noise levels (see Section 2.2.1).

2.1.4.2 Potential Impacts

Most air quality impacts during construction generally consist of fugitive dust emissions. Fugitive dust, which refers to airborne particulate matter (PM) of larger particle sizes, would occur during construction, especially activities and situations that include construction vehicles operating around the construction site, excavation activities, material blown from uncovered haul trucks, stockpiles, and exposed areas. The rate of dust emissions from excavation activities varies greatly depending upon the type of soil, the amount and type of earthmoving activity, the moisture content of exposed soil, and wind speed. Most fugitive dust, however, is made up of relatively large particles, which tend to settle within 20 to 30 feet of their source.

Construction activities would involve the use of heavy machinery and vehicles that produce high noise levels. However, construction would be limited to normal daylight hours when loud noises are more tolerable.

2.1.4.3 Mitigation Measures

To prevent fugitive dust from excavation activities and demolition from affecting areas beyond the construction site, HDOT Highway would require the construction contractor to use methods to suppress dust emissions, such as watering during dry conditions, and if necessary, erecting windscreens surrounding the construction site. To prevent haul trucks from tracking dirt onto paved streets, stabilized construction entrances would be installed.

The contractor would be required to comply with the State's Community Noise Control regulations that apply to construction activities.

2.1.5 Visual and Aesthetic Resources

2.1.5.1 Existing Conditions

Within the project site, Aiea Stream is not featured prominently from the perspective of the surrounding private properties and is largely hidden from views available to the general public. For example, the layout of Aiea Shopping Center is such that clientele are not offered views of the stream. The area of the shopping center nearest to the stream is used for truck deliveries. This strongly suggests that the private land owners do not consider Aiea Stream to be a valuable or noteworthy visual resource, but nevertheless the stream may provide them with an open space resource. Up close, the Ewa bank shows evidence of erosion from previous storm events. At these erosion locations, bare dirt, rock and tree roots are exposed and in some areas vegetative cover is minimal or non-existent.

2.1.5.2 Potential Impacts

Under the No Build alternative, the appearance of Aiea Stream would remain the same. Under the Proposed Project, Aiea Stream would not be more conspicuous than it is today. The stream would remain largely hidden from the surrounding properties and from public vantage points. The shotcrete wall would be inconspicuous from most viewpoints outside of Aiea Stream. However, from viewpoints where the Ewa bank is visible, the appearance of the new bank would be different. Figure 2-4 shows a photo of an eroded section of the Ewa stream bank in the area of the Proposed Project. Although many architectural options are available for the shotcrete wall, the finished wall (the visible part of the shotcrete wall) would have a textured surface facing, simulating a natural façade. In addition, the new stream bank would maintain the natural alignment of the stream. A visual simulation of how the shotcrete wall may appear from the same vantage point of the existing photo is also provided on Figure 2-4.

2.2 Social and Built Environment

2.2.1 Land Use

2.2.1.1 Existing Conditions

The land uses surrounding the project site include the Aiea Shopping Center, the Aiea Hongwanji Mission, and approximately half-a-dozen single-family dwellings (see Figure 2-5). Aiea Shopping Center is a small neighborhood-type commercial mall containing approximately 20 businesses, which includes a super market, a bowling alley, restaurants, salons and dental and insurance offices. Aiea Hongwanji Mission is a Jodo Shinshu Buddhist Temple affiliated with the Honpa Hongwanji Mission of Hawaii. The mission was established in 1902. In addition to religious services, the activities at the mission include Buddhism, martial arts and other educational classes, a pre-school and day care services for seniors.

2.2.1.2 Potential Impacts

The Aiea Shopping Center and the Aiea Hongwanji Mission are the only land uses shown on Figure 2-5 located immediately adjacent to or in the vicinity of the project site.

As described in Section 1.3, erosion along the Ewa bank is undermining perimeter fence foundations and concrete slabs of the shopping center. Under the No Build alternative, further erosion could affect the structural integrity of the shopping center, which might require the shopping center owner to take action to protect its building (see Section 2.1.1). Where constructed, the Proposed Project would stabilize the Ewa bank by the Aiea Shopping Center from further erosion.

The Aiea Hongwanji Mission is already protected by a retaining wall along the stream's Diamond Head bank. One of the mission's buildings is just a few feet from the top of the retaining wall. Under the Proposed Project and the No Build alternative, the retaining wall would remain.

Existing Aiea Stream Ewa Bank and How it May Appear Under Proposed Action
Figure 2-4

Aiea Stream Erosion Control in the Vicinity of the Interstate H-1 Freeway
Environmental Assessment

Land Uses in the Vicinity of the Project Site
Figure 2-5

The Proposed Project is unlikely to affect land use development decisions by adjacent landowners because Aiea Stream would remain relatively inconspicuous.

2.2.2 Roadways and Traffic

2.2.2.1 Existing Conditions

Figure 1-2 shows the existing street network in the general vicinity of the project site. The major roadways surrounding the project site are the H-1 Freeway, Moanalua Road and Aiea Heights Drive. None of these roadways provide vehicular access to the project site.

2.2.2.2 Potential Impacts

During construction, construction vehicles would be directed to access the project site from Laka Place, a local street and cul-de-sac that runs parallel to the H-1 Freeway (see Figure 2-7). A temporary construction driveway would be established between the end of Laka Place and the stream. The small field between the cul-de-sac and the stream, which is owned by the State, would likely be used by the construction contractor for field offices and equipment and vehicle storage. Laka Place is connected to Puakala Street, another local neighborhood road. Puakala Street is connected to Moanalua Road, a major arterial roadway.

During construction, an average of about a dozen trips per day may be generated from the cul-de-sac of Laka Place. Trips would include two to three construction vehicles, such as concrete and/or trucks, with the rest being generated by workers coming in and leaving.

2.3 Consistency with Government Plans, Policies, and Controls

2.3.1 Hawaii State Plan

The *Hawaii State Plan* (June 1991), as codified in HRS Chapter 226, serves as a guide for the future long-range development of the State. It consists of comprehensive goals, objectives and policies for determining priorities and allocating resources. The State Plan promotes the growth and diversification of the State's economy, the protection of the physical environment, the provision of public facilities, and the promotion of and assistance to socio-cultural advancement.

The Proposed Project would support one of the State Plan's land, air, and water quality objectives as set forth in HRS Section §226-13: "maintenance and pursuit of improved quality in Hawaii's land, air, and water resources." (226-13(a)(1)) The Proposed Project would also support three of the policies under HRS §226-13:

- Promote the proper management of Hawaii's land and water resources (226-13(b)(2));
- Promote effective measures to achieve desired quality in Hawaii's surface, ground, and coastal waters (226-13(b)(3)); and
- Reduce the threat to life and property from erosion, flooding, tsunamis, hurricanes, earthquakes, volcanic eruptions, and other natural or man-induced hazards and disasters (226-13(b)(5)).

The Proposed Project would address the need to improve a State water resource, Aiea Stream, by eliminating a source of erosion that may adversely affect the structural integrity of a

neighborhood shopping center. In doing so, the Proposed Project would not increase the risk of flooding associated with storm water flows conveyed by Aiea Stream (see Section 2.1.2). Therefore, the Proposed Project would not threaten life and property of those living and working near the project site.

2.3.2 Coastal Zone Management Consistency

The project site is within the State's Coastal Zone Management (CZM) area. The objectives and policies of the Hawaii CZM Program are to protect and manage Hawaii's coastal resources. Activities in the CZM area that require a federal permit or license must be consistent with the CZM objectives and policies. The need for a CWA Section 404 permit (see Section 2.1.2) would trigger the Hawaii CZM program consistency requirement. The Proposed Project may qualify for the "blanket" Hawaii CZM program consistency determination if it is processed under a CWA Section 404 nationwide permit.

2.3.3 City and County of Honolulu General Plan

The *General Plan of the City and County of Honolulu* (1992) is a statement of long-range social, economic, environmental and design objectives for the island of Oahu. It also includes policies to meet these objectives.

The Proposed Project would address the General Plan objective "to protect and preserve the natural environment" (III. Natural Environment, Objective A) by restoring an environmentally damaged area (Policy 2) and designing surface drainage and flood-control systems in a manner which would help preserve their natural settings (Policy 6).

The Proposed Project would eliminate erosion problems occurring within the project site by providing a shotcrete wall. The design of the wall would generally maintain the present alignment of Aiea Stream, and a natural-looking textured finish for the shotcrete wall would be used. In addition, the stream bed would be mostly unaffected by the Proposed Project.

2.3.4 Primary Urban Center Development Plan

The project site is located in the Primary Urban Center (PUC) planning area, which extends from Pearl City in the west to Waialae-Kahala in the east. The PUC Development Plan was adopted by the City Council on June 21, 2004. The plan noted the importance of managing urban watersheds to protect coastal water quality. Flood control and erosion control projects should recognize important aesthetic and ecological factors in their design process. For example, streams should not be channelized except when absolutely necessary to protect existing urban development from flooding. As noted above in Section 2.3.3, the Proposed Project would maintain present alignment of Aiea Stream and its stream bed, and use a natural-looking textured facing.

2.4 Permits and Approvals

The following environmental permits and approvals would be required prior to the construction of the project:

- USACE – CWA Section 404 permit (includes CZM program consistency)
- SDOH – CWA Section 401 Water Quality Certification
- DPP – Grading, Grubbing, Stockpiling and Excavation permit

CHAPTER 3
COMMENTS AND COORDINATION

The following federal, State of Hawaii and City and County of Honolulu agencies were contacted by letter dated October 20, 2009 (see Appendix) and were asked if they were aware of any environmental or social issue associated with the Proposed Project, or if they had any environmental concerns. An asterisk appears next to those agencies that responded.

Federal Agencies
- U.S. Department of the Army, Corps of Engineers*

State of Hawaii Agencies
- Department of Business, Economic Development and Tourism, Office of Planning*
- Department of Defense*
- Department of Health, Environmental Health Administration* (Clean Water Branch responded)
- Department of Land and Natural Resources
  - Commission on Water Resource Management*
  - Division of Aquatic Resources
  - Division of Forestry and Wildlife
  - Land Division
  - State Historic Preservation Division*
- Office of Environmental Quality Control
- Office of Hawaiian Affairs

City and County of Honolulu Agencies
- Department of Design and Construction*
- Department of Emergency Management*
- Department of Environmental Services
- Department of Facility Maintenance*
- Department Planning and Permitting*
- Department of Transportation Services
- Honolulu Fire Department*
- Honolulu Police Department*

Copies of the responses are provided in the Appendix. A brief summary of the comments are provided below.

The Army Corps of Engineers requested that the EA identify Aiea Stream's ordinary high water mark (see Section 2.1.2) and to note whether or not the project site contains wetlands.

The State Department of Business, Economic Development and Tourism, Office of Planning expressed concern about possible pollution from the project site affecting public recreation and marine life within the coastal receiving waters.

The State Department of Health, Clean Water Branch (CWB) noted that Aiea Stream is listed as a 303(d) water body and that the EA should discuss potential impacts to the stream's pollutant

of concern (see Section 2.1.2). The CWB also stated that the Proposed Project must comply with the State water quality standards.

The State Department of Land and Natural Resources (DNLR) Commission on Water Resource Management stated that the Proposed Project does not require a Stream Channel Alteration Permit.

DNLR State Historic Preservation Division stated that the project site does not contain historic properties, meaning sites or resources on or eligible for the National or Hawaii Register of Historic Places.

The City Department of Planning and Permitting stated that project site is located in a floodway, and that a professional engineer should certify that Proposed Project would not affect the regulatory flood elevations (see Section 2.1.2).

The State Department of Defense, the City Department of Design and Construction, the City Department of Emergency Management, the City Department of Facility Maintenance, the Honolulu Fire Department and the Honolulu Police Department offered no comments.

In addition to the letters and comments received as a result of the October 20, 2009 solicitation, project staff conducted a meeting with representatives of Aiea Shopping Center on February 18, 2009. The project staff described the Proposed Project, and the shopping center representatives provided design plans of the center's buildings.

CHAPTER 4
ANTICIPATED FINDING OF NO SIGNIFICANT IMPACT

In accordance with the Hawaii Revised Statutes (HRS) Chapter 343 HRS and Hawaii Administrative Rules (HAR), Sections 11-200-9 and 11-200-11.2, HDOT Highways anticipates rendering a Finding of No Significant Impact (FONSI) for the Proposed Project. This assessment is based on an evaluation of project impacts in relation to the "Significance Criteria" specified in HAR 11-200-12(b). The Significance Criteria appear below in italics, followed by a discussion of the project in relation to the specific criterion provided. The specifics regarding the project's potential impacts are discussed in detail in Chapter 2.

Involves an irrevocable commitment to loss or destruction of any natural or cultural resource – The project site does not contain important natural resources (see Section 2.1.3). In addition, the project site is within an intermittent natural stream channel subject to periodic storm water flows and the surrounding area has been subject to substantial construction and development. The project site is highly unlikely to contain cultural or archaeological resources.

Curtails the beneficial uses of the environment – The Proposed Project is meant to enhance the function of Aiea Stream by addressing erosion problems.

Conflicts with the State's long-term environmental policies or goals and guidelines expressed in Chapter 344, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders - The Proposed Project is consistent with the environmental goals and objectives of the State of Hawaii (see Section 2.3.1).

Substantially affects the economic or social welfare of the community or State – By stabilizing Aiea Stream's Ewa bank within the project site, the Proposed Project would contribute to protecting Aiea Shopping Center from erosion that could eventually adversely affect the structural integrity of the building.

Substantially affects public health – The Proposed Project would not change the flooding risks associated with Aiea Stream (see Section 2.1.2).

Involves substantial secondary impacts - The Proposed Project would not cause secondary impacts because the project would not factor into the land use decisions of landowners controlling adjacent and nearby properties (see Section 2.2.1).

Involves substantial degradation of environmental quality - The Proposed Project would maintain the existing contours and shape of Aiea Stream, and maintain the capacity of the stream to convey storm water.

Is individually limited but cumulatively has considerable effect upon the environment or involves a commitment for larger actions – The Proposed Project would not commit HDOT Highways or other entities to other actions at or near the project site.

Substantially affects a rare, threatened or endangered species, or its habitat – The project site does not contain rare, threatened or endangered plant or animal species (see Section 2.1.3).

Detrimentally affects air or water quality or ambient noise levels – The Proposed Project would not affect the quality of storm water conveyed within Aiea Stream (see Section 2.1.3). Once constructed, the Proposed Project would not emit air pollutants or cause noise propagation, except for periodic stream maintenance to clear vegetation and debris, which may require handheld gasoline-powered equipment. This same type of maintenance would also occur under the No Build alternative.

Affects or is likely to suffer damage by being located in an environmentally sensitive area such as a floodplain, tsunami zone, beach, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters - The project site is not located in an environmentally sensitive area (see above).

Substantially affects scenic vistas and viewplanes identified in county or state plans or studies – Aiea Stream is relatively inconspicuous, and is not featured as a prominent visual resource by surrounding land uses. The Proposed Project would not change this condition. Up close, the appearance of the Ewa bank would change from bare rock and soils and tree roots to a shotcrete wall with textured surface facing (see Section 2.1.5). Rather than a retaining wall, the shotcrete wall would provide a natural looking façade and maintain the present alignment of the stream.

Requires substantial energy consumption – Following construction, the Proposed Project does not require the consumption of energy, except for periodic maintenance, which would also occur under the No Build alternative.

CHAPTER 5
REFERENCES

Aiea Hongwanji Mission website <http://www.webspawner.com/users/AieaHongwanji>

City and County of Honolulu, Revised Ordinances of Honolulu

City County of Honolulu, Department Planning and Permitting, Primary Urban Center Development Plan, June 21, 2004

City County of Honolulu, General Plan, 1992

Department of Geography, University of Hawaii at Hilo, Atlas of Hawaii, Third Edition, 1998

Flood Insurance Rate Map

Oceanit, Aiea Stream Field Report, November 6, 2009

PB Americas, Hydrologic and Hydraulics Report for the Proposed Aiea Stream Stabilization Project in the Vicinity of the H-1 Freeway, Aiea, Hawaii, August 31, 2009

State of Hawaii Department of Health website, http://www.hawaii.gov/health

State of Hawaii, Hawaii Administrative Rules, as amended

State of Hawaii, Hawaii Revised Statutes, as amended

U.S. Census Bureau

U.S. Geological Survey website, http://hi.water.usgs.gov

U.S. Department of Agriculture Soil Conservation Service in Cooperation with the University of Hawaii Agricultural Experiment Station, Soil Survey of Islands of Kauai, Oahu, Maui, Molokai and Lanai, Sate of Hawaii, August 1972

VTN Pacific for the City and County of Honolulu, Department of Public Works, Aiea Stream Flood Control, Revised Environmental Impact Statement, July 14, 1977

Appendix A

Agency and Stakeholder Letters

Appendix B

Hydrologic and Hydraulics Report

Appendix C

Aiea Stream Field Report