

04

CHAPTER

Environmental Analysis, Consequences, and Mitigation

This chapter of the Final Environmental Impact Statement (EIS) discusses the environmental analysis, consequences, and mitigation for the No Build Alternative and the Airport Alternative (Project). The analysis is based on Federal and Hawai'i regulatory requirements as well as Federal and State guidelines. The *National Environmental Policy Act* (NEPA) and Hawai'i Revised Statutes (HRS) Chapter 343 require the evaluation of potential effects of proposed government actions on the environment. The U.S. Department of Transportation (USDOT), through the Federal Highway Administration (FHWA) and the Federal Transit Administration (FTA), has adopted regulations to implement NEPA. This Final EIS identifies the Airport Alternative as the Preferred Alternative [23 CFR 771.125(a)(1)].

The Project is described in Chapter 2, Alternatives Considered. The No Build Alternative assumes that this project would not be built. All other projects in the *O'ahu Regional Transportation Plan 2030* (ORTP) will be implemented. In this document, the No Build Alternative serves as an environmental baseline to which the impacts of the Project are compared.

Chapter 3, Transportation, includes a discussion of potential parking effects, including those to neighborhoods and businesses, and mitigation commitments during operation (Section 3.4.7) and construction (Section 3.5.7).

Section 4.1, Changes to this Chapter since the Draft Environmental Impact Statement, summarizes the changes made to this chapter since publication of the Draft EIS. Sections 4.2 through 4.16 address the regulatory context and methodology by which each resource is studied, the affected environment, and the long-term effects on individual aspects of the environment of the Project. Measures that will be incorporated into the Project to mitigate long-term adverse effects are also identified. These sections are as follows:

- 4.2 Land Use
- 4.3 Economic Activity
- 4.4 Acquisitions, Displacements, and Relocations
- 4.5 Community Services and Facilities
- 4.6 Neighborhoods
- 4.7 Environmental Justice
- 4.8 Visual and Aesthetic Conditions
- 4.9 Air Quality

- 4.10 Noise and Vibration
- 4.11 Energy and Electric and Magnetic Fields
- 4.12 Hazardous Waste and Materials
- 4.13 Ecosystems
- 4.14 Water
- 4.15 Street Trees
- 4.16 Archaeological, Cultural, and Historic Resources

Section 4.17, Maintenance and Storage Facility, describes the environmental consequences of the preferred site near Leeward Community College and the alternative site near the future Ho’opili master planned community. Section 4.18, Construction Phase Effects, addresses the construction-phase effects and mitigation that will be considered and the relationship between short-term uses of the environment and long-term productivity. Section 4.19, Indirect and Cumulative Effects, presents the indirect and cumulative effects of the Project, including the effects of prior actions to the future planned extensions and other planned projects. Section 4.20, Irreversible and Irrecoverable Commitments of Resources, describes resources that will be used by the Project. Section 4.21, Anticipated Permits, Approvals, and Agreements, includes a list of environmental permits required for the Project and their status as of the date of this Final EIS.

The following technical reports include analyses of the individual environmental topics that have been evaluated for the Project:

- *Honolulu High-Capacity Transit Corridor Project Land Use Technical Report* (RTD 2008b)
- *Honolulu High-Capacity Transit Corridor Project Economics Technical Report* (RTD 2008c)
- *Honolulu High-Capacity Transit Corridor Project Neighborhoods and Communities Technical Report* (RTD 2008d)
- *Honolulu High-Capacity Transit Corridor Project Visual and Aesthetics Resources Technical Report* (RTD 2008e)
- *Honolulu High-Capacity Transit Corridor Project Noise and Vibration Technical Report* (RTD 2008f)
- *Honolulu High-Capacity Transit Corridor Project Air Quality and Energy Technical Report* (RTD 2008g)
- *Honolulu High-Capacity Transit Corridor Project Electric and Magnetic Fields Technical Report* (RTD 2008h)
- *Honolulu High-Capacity Transit Corridor Project Hazardous Materials Technical Report* (RTD 2008i)
- *Honolulu High-Capacity Transit Corridor Project Ecosystems and Natural Resources Technical Report* (RTD 2008j)
- *Honolulu High-Capacity Transit Corridor Project Water Resources Technical Report* (RTD 2008k)
- *Honolulu High-Capacity Transit Corridor Project Street Trees Technical Report* (RTD 2008l)
- *Honolulu High-Capacity Transit Corridor Project Geology, Soils, Farmlands, and Natural Hazards Technical Report* (RTD 2008m)
- *Honolulu High-Capacity Transit Corridor Project Archaeological Resources Technical Report* (RTD 2008n)
- *Honolulu High-Capacity Transit Corridor Project Historic Resources Technical Report* (RTD 2008o)
- *Honolulu High-Capacity Transit Corridor Project Cultural Resources Technical Report* (RTD 2008p)
- *Honolulu High-Capacity Transit Corridor Project Wetland and Waters of the U.S. Study* (RTD 2009b)
- *Honolulu High-Capacity Transit Corridor Project Addendum 01 to the Historic Resources Technical Report* (RTD 2009c)
- *Honolulu High-Capacity Transit Corridor Project Historic Effects Report* (RTD 2009d)

- *Honolulu High-Capacity Transit Corridor Project Addendum 01 to the Cultural Resources Technical Report* (RTD 2009e)
- *Honolulu High-Capacity Transit Corridor Project Ecosystem Function and Values of Wetland and Waters of the U.S.* (RTD 2009h)
- *Honolulu High-Capacity Transit Corridor Project Addendum 01 to the Noise and Vibration Technical Report* (RTD 2010b)

The analyses demonstrated that the Project will not have an adverse effect upon geology, soils, or natural hazards; therefore, they are not addressed in this chapter. The Project will be designed to meet seismic and other design standards related to natural hazards, such as wind forces from tropical storms. The project alignment is outside the tsunami evacuation zones.

The traction power substations were evaluated as part of the analysis of the Project. Most of these facilities will be located in the right-of-way or on properties acquired for stations. Impacts related to traction power substations are discussed in the land use, noise, visual and aesthetic conditions, and hazardous materials sections of this chapter. Geographic areas are discussed in four categories, as appropriate to the resource:

- **Project Region**—the entire Island of O‘ahu (Figure 1-1 in Chapter 1, Background)
- **Study Corridor**—the southern coast of O‘ahu where the Project is located (Figure 4-1)
- **Project Station Area**—areas within one-half mile of a project station (Figure 4-1); one-half mile is generally considered an acceptable walking distance
- **Project Alignment**—the route of the fixed guideway (Figure 4-1); discussions involving the project alignment include those properties adjacent to the alignment (i.e., properties fronting the roadway along which the guideway will be built)

Table 4-1 summarizes the environmental effects of the Project; mitigation measures to avoid, minimize, or reduce the effects; and probable unavoidable adverse effects that are detailed in this chapter.

The City and County of Honolulu (City) will incorporate mitigation measures required by permits, approvals, and agreements into the Project during final design and construction. During construction, the City will employ an environmental compliance manager to oversee and enforce mitigation commitments.

While the Project will be environmentally preferable regarding effects on air quality, energy use, and water quality, the No Build Alternative is the environmentally preferable alternative based on overall consideration of the criteria listed in 40 CFR 1505.2(b). The No Build Alternative would affect fewer historic and cultural resources and waters of the U.S., have no visual impact, and cause no displacements. However, the No Build Alternative does not meet the Purpose and Need for the Project.

4.1 Changes to this Chapter since the Draft Environmental Impact Statement

This chapter has been updated to include analyses of the effects of the Project on the natural and built environments as compared to the No Build Alternative. Table 4-1 includes updated mitigation commitments for the Project and identifies unavoidable adverse environmental effects (see Appendix I, Mitigation and Commitments).

This chapter has been revised to reflect identification of the Airport Alternative as the Preferred Alternative. The Project refers to the Fixed Guideway Transit Alternative via the Airport that was evaluated in the Draft Environmental Impact Statement (EIS). The alignment was refined to transition from Aolele Street to Ualena Street

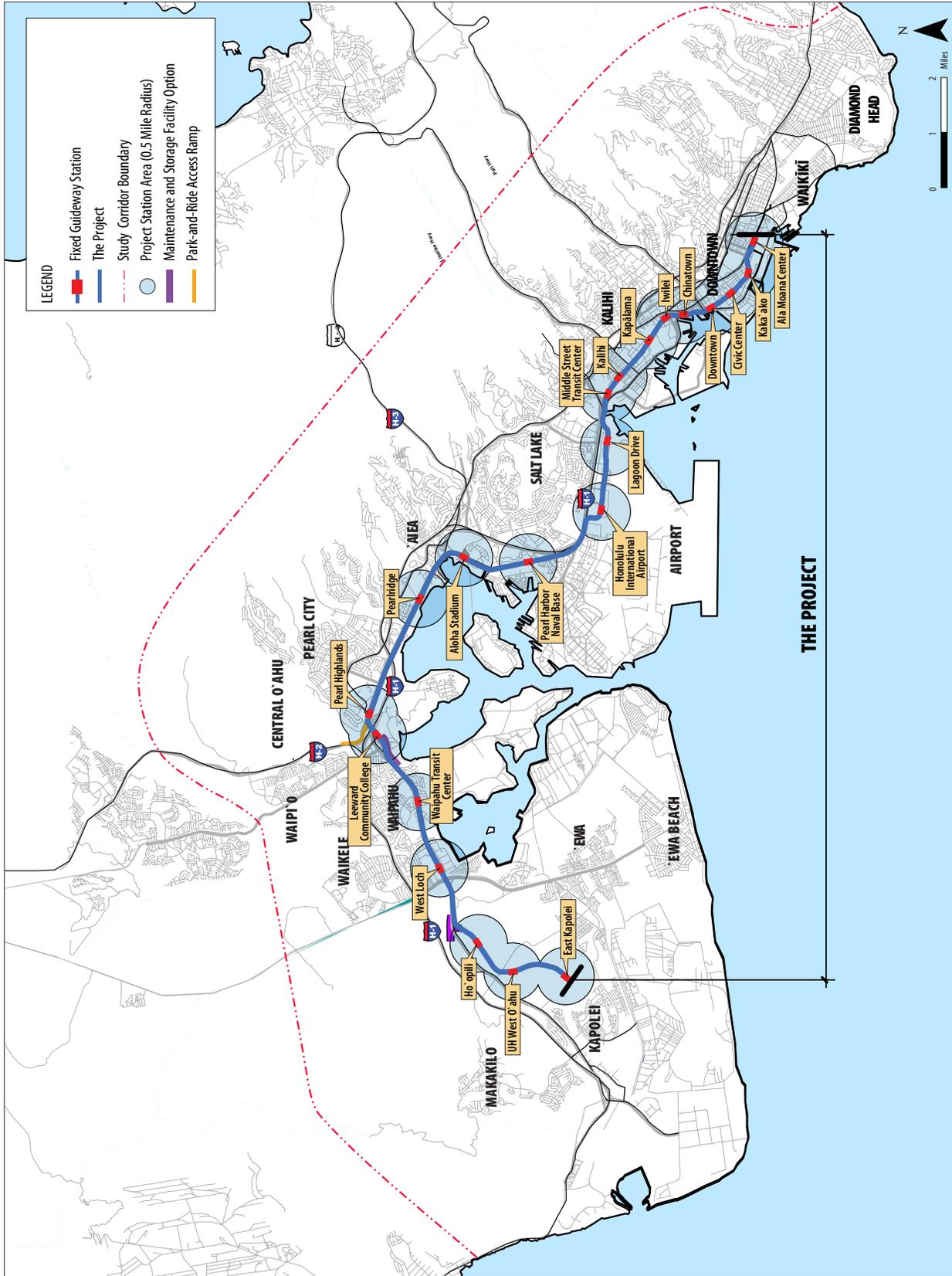


Figure 4-1 Project Overview

Table 4-1 Summary of Direct Environmental Effects and Mitigation Measures to Avoid, Minimize, or Reduce Impacts
(continued on next page)

Land Use, Section 4.2	
Environmental Effects	<p>Approximately 160 acres of existing land use will be converted to transportation use. Included are 88 acres of prime and statewide-important farmlands. This is less than one-tenth of one percent of available agricultural land on O`ahu. The Project is consistent with future land use plans and policies.</p> <p>The land needed for the Project represents approximately 1 percent of the total acreage within the study corridor. The land uses being converted are agricultural (42 percent), public (35 percent), and commercial (18 percent) with about 5 percent of the land conversions from residential use.</p>
Mitigation Measures	Since the Project is consistent with adopted land use plans and policies, no mitigation is required.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Economic Activity, Section 4.3	
Environmental Effects	For the Project, property will be acquired from private owners and converted to a transportation use that will be owned by the City. This will result in a direct reduction in annual property tax revenues. These reductions are estimated to be \$1.2 million annually. The Project is not expected to result in substantial long-term adverse effects on property tax revenues.
Mitigation Measures	No mitigation is required.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Acquisitions, Displacements, and Relocations, Section 4.4	
Environmental Effects	<p>Acquisitions: 40 full, 159 partial Displacements: 20 residences, 67 businesses, 1 church</p>
Mitigation Measures	Where acquisition of property will occur, compensation will be provided to affected property owners, businesses, or residents in compliance with all applicable Federal and State laws and will follow the Federal <i>Uniform Relocation Assistance and Real Property Acquisition Policies Act</i> .
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Community Services and Facilities, Section 4.5	
Environmental Effects	<p>There will be impacts to schools, libraries, churches, parks, and recreational facilities adjacent to the alignment that are detailed below. There will be partial acquisition or use of land at 14 community facilities and displacement of 1 church. The Project will not affect the operation of the community facilities where partial acquisition is required, and the church will receive relocation assistance.</p> <p>A number of properties owned by utility providers will be affected by partial acquisitions, and some utilities will be relocated and/or modified to accommodate the Project.</p>
Mitigation Measures	<p>Buildings, parking, lighting, fencing, and other features will be replaced or compensation will be provided.</p> <p>Where acquisition of property will occur, compensation will be provided to affected property owners in accordance with all applicable Federal and State laws and will follow the Federal <i>Uniform Relocation Assistance and Real Property Acquisition Policies Act</i>.</p>
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.

Table 4-1 Summary of Direct Environmental Effects and Mitigation Measures to Avoid, Minimize, or Reduce Impacts
(continued on next page)

Neighborhoods, Section 4.6	
Environmental Effects	<p>The Project will provide people living and working in neighborhoods within the study corridor with increased mobility. The Project will provide an alternative to traveling by personal vehicle or bus within the existing transportation corridors. Passengers using the new transit system will experience reduced travel times to other neighborhoods and growth centers along the project alignment and near transit stations.</p> <p>The transit facility is not expected to be a physical barrier in neighborhoods and will not affect community identity or cohesion. Potential new development and redevelopment along the project alignment, as well as the scale of the transit system, will not substantially affect community character.</p> <p>Ongoing coordination efforts with the public will help develop design measures that will enhance the interface between the transit system and the surrounding community.</p>
Mitigation Measures	Since there will be no adverse effects to neighborhoods, no mitigation is required.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Environmental Justice, Section 4.7	
Environmental Effects	<p>There will be no disproportionately high and adverse effects on residents and businesses in O`ahuMPO Environmental Justice Areas.</p> <p>The Banana Patch community was not identified as an Environmental Justice Area using the O`ahuMPO method. However, following public outreach, the area has been identified as an Environmental Justice area of concern. The community is 100 percent minority and will be relocated as part of the Project.</p> <p>A meeting was held in the Banana Patch community during the Draft EIS public comment period. All concerns expressed by residents were related to acquisition and relocation assistance and schedule.</p> <p>Where relocations will occur in O`ahuMPO Environmental Justice Areas and the Banana Patch community, compensation will be provided to affected property owners, businesses, or residents in compliance with all applicable Federal and State laws and will follow the Federal <i>Uniform Relocation Assistance and Real Property Acquisition Policies Act</i>.</p>
Mitigation Measures	The Project will not result in disproportionately high and adverse impacts within O`ahuMPO Environmental Justice Areas or to the Banana Patch community. Therefore, no specific mitigation measures to reduce impacts are required.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Visual and Aesthetic Conditions, Section 4.8	
Environmental Effects	<p>The fixed guideway and stations will be elevated structures. They will change views where project elements are near existing views or in the foreground of these views. This change will also occur for motorists traveling on roadways along and under the guideway. Stations will be dominant visual elements in their settings and will noticeably change views.</p> <p>The Project will block views in several areas of the corridor, including protected mauka-makai views.</p> <p>The Project will introduce a new linear visual element to the corridor, and changes to views will be low to significant (or, a high level of visual impact) and unavoidable. Appendix J provides a summary of the Project's relationship to State of Hawai`i and City and County land use plans, polices, and controls for the project study corridor. The summary includes the relevant provisions of policy documents related to visual and aesthetic conditions. These policy documents include the <i>ʻEwa Development Plan, Central O`ahu Sustainable Communities Plan, and Primary Urban Center Development Plan</i>. The Project is supportive of the land use objectives included in these plans.</p>
Mitigation Measures	As part of the final design process, DTS has developed specifications and design criteria to address the City's requirements for the Project. Guideway materials and surface textures will be selected in accordance with generally accepted architectural principles to achieve integration between the guideway and the surrounding environment. Landscape and streetscape improvements will mitigate potential visual impacts, primarily for street-level views.

Table 4-1 Summary of Direct Environmental Effects and Mitigation Measures to Avoid, Minimize, or Reduce Impacts
(continued on next page)

Probable Unavoidable Adverse Environmental Effects	Although mitigation measures will minimize many adverse visual effects by providing visual buffers and reducing visual contrasts between the project elements and their surroundings, the Final EIS acknowledges, as concluded in the Draft EIS, that unavoidable adverse effects, such as view blockage, cannot be mitigated and will be significant (noted as a “high” level of visual impact in the Draft EIS) in some areas.
Air Quality, Section 4.9	
Environmental Effects	The Project will reduce regional pollutant emissions between 3.9 to 4.6 percent. The study area is in attainment for all national ambient air-quality standards. The Project will reduce emissions of greenhouse gases.
Mitigation Measures	Because no substantial air quality impacts are anticipated, no mitigation will be required.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Noise and Vibration, Section 4.10	
Environmental Effects	Without mitigation, the Project would have moderate noise impacts at eight locations. The Project will have no vibration impacts.
Mitigation Measures	The elevated guideway will include a parapet wall on both sides of the guideway that extends 3 feet above the top of the rail. The design specification for the rail vehicles will require wheel skirts that block noise coming from the undercarriage. At three locations where the noise analysis shows that moderate noise impacts will occur even with the parapet wall and wheel skirts, the guideway structure will be lined with a material designed to absorb noise. The design specification for the traction power substations will require that the substations be designed to meet the standards in HAR Chapter 11-46. Automatic track lubrication devices will be installed on tight-radius curves in the maintenance and storage facility to eliminate wheel squeal on those curves.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Energy and Electric and Magnetic Fields, Section 4.11	
Environmental Effects	The Project will reduce daily transportation energy demand by 3 percent. Motor vehicle consumption islandwide: 90,760 MBTUs. Fixed guideway energy consumption: 1,690 MBTUs.
Mitigation Measures	None required.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Hazardous Waste and Materials, Section 4.12	
Environmental Effects	Sites of concern near the Project could be contaminated. Sites where hazardous materials are or have been used or stored will be acquired. The City will perform a Phase I Environmental Site Assessment for properties that will be acquired for the Project. Depending on the outcome, a Phase II Environmental Site Assessment may be appropriate. The City will decide the necessity of the Environmental Site Assessment for each property acquisition.
Mitigation Measures	Properties identified as contaminated will be remediated in accordance with regulations.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.

Table 4-1 Summary of Direct Environmental Effects and Mitigation Measures to Avoid, Minimize, or Reduce Impacts (continued from previous page)

Ecosystems, Section 4.13	
Environmental Effects	There will be “no effect” to threatened, endangered, or protected species or designated critical habitats.
Mitigation Measures	The City will secure a Certificate of Inclusion for the Habitat Conservation Plan from the Hawai‘i Department of Transportation for Ko‘oloa‘ula (<i>Abutilon menziesii</i>), if needed, and will comply with the measures identified by USFWS in the current and/or amended Habitat Conservation Plan. The City will survey all large canopy trees to be pruned prior to construction to ensure that no trees have white tern chicks.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Water, Section 4.14	
Environmental Effects	There will be effects to five streams from construction of guideway support columns below the ordinary high-water mark, which will affect approximately 0.02 acre of waters of the U.S. (linear transportation features) and 0.06 acre of other project features. Effects to wetlands will include shading from the guideway. As a result of rainfall collecting on impervious surfaces where infiltration currently occurs, there will be increases in stormwater runoff, which will be managed with best management practices. There will be no adverse effects to marine waters, groundwater, or floodplains.
Mitigation Measures	Permanent mitigation features to Waiawa Stream include enhancement, establishment of water quality basin, ecological restoration with native Hawaiian plantings, extension of existing culvert, and enhancement of floodway capacity conveyance to achieve zero rise in flood zone. Where the Project crosses an estuary reach and placement of columns cannot be avoided, the columns will align with existing columns. best management practices will be used to control the quality of stormwater runoff.
Probable Unavoidable Adverse Environmental Effects	No unavoidable adverse environmental effects are anticipated.
Street Trees, Section 4.15	
Environmental Effects	Tree removal will be minimized to the greatest extent possible, but pruning is likely next to the guideway. Twenty-eight “Notable” true kamani trees along Dillingham Boulevard will be removed. Approximately 100 street trees will be pruned, 550 will be removed, and 300 will be transplanted.
Mitigation Measures	Mitigation measures will consist of transplanting existing trees or planting new ones. Pruning will be in compliance with City and County ordinances and require supervision by a certified arborist. The City will coordinate with the State of Hawai‘i Department of Transportation landscape architect.
Probable Unavoidable Adverse Environmental Effects	Street trees will be removed in areas where they are not compatible with the Project.
Archaeological, Cultural, and Historic Resources, Section 4.16	
Environmental Effects	There will be adverse effects to 33 historic properties and effects to 4 cultural resources.
Mitigation Measures	The draft Section 106 Programmatic Agreement (PA) was developed in consultation among the consulting parties. The Section 106 process identified historic properties potentially affected by the Project, assessed effects, and sought ways to avoid, minimize, or mitigate any adverse effects for properties included in, or eligible for inclusion in, the National Register of Historic Places. The draft PA records the terms and conditions agreed upon to resolve potential adverse effects and is attached to this Final EIS in Appendix H. The Section 106 signatories (FTA, SHPO, and ACHP) clarified the language in the draft PA and, in May 2010, FTA distributed the draft PA to the Section 106 consulting parties for informational purposes. FTA, SHPO, and ACHP, in coordination with the invited signatories, will finalize this draft PA prior to the ROD. FTA will distribute the executed PA to the Section 106 consulting parties and invite their signatures as concurring parties to the PA.
Probable Unavoidable Adverse Environmental Effects	While mitigation will be provided for all adverse effects, the Project will still require demolition of three historic buildings.

about 2,000 feet ‘Ewa of the Lagoon Drive Station to avoid the central portion of the runway protection zone at Honolulu International Airport. This design refinement has been evaluated using the same criteria and methodology as all sections in this chapter and will not create any significant effects to the natural and built environment. Extensive coordination with the Federal Aviation Administration (FAA) and the State of Hawai‘i Department of Transportation (HDOT) has been conducted as part of this design refinement.

Since publication of the Draft EIS, design has been advanced, further analysis has been completed, and information has been added in response to comments on the Draft EIS and agency coordination. The sections in Chapter 4 have been renumbered and are listed below using the new Final EIS section number. The changes are summarized below.

Section 4.2, Land Use—acreage of land converted from existing use to transportation use was updated based on design refinement. The *Honolulu International Airport Layout Plan (ALP)* (HDOT 1995b) was added to this section.

Section 4.3, Economic Activity—no changes.

Section 4.4, Acquisitions, Displacements, and Relocations—the number of partial and full acquisitions and displacements was updated based on design refinement and coordination with property owners. Appendix B, Conceptual Right-of-Way Plans (in the Draft EIS), has been updated and is now Appendix C, Preliminary Right-of-Way Plans, for this Final EIS. Appendix C reflects design revisions since the Draft EIS and includes acquisitions, displacements, and general land use type. This was added to Appendix C to provide additional information to affected property owners.

Section 4.5, Community Services and Facilities—minor updates were made to this section to confirm community facilities adjacent to the

alignment. Impacts and mitigation commitments were updated to reflect design refinements.

Section 4.6, Neighborhoods—discussion of the neighborhoods along the Salt Lake Alternative alignment was removed from this section.

Section 4.7, Environmental Justice—public outreach coordination with the O‘ahu Metropolitan Planning Organization (O‘ahuMPO) Environmental Justice populations and the Banana Patch community during the Draft EIS comment period is described, and an Environmental Justice determination was added.

Section 4.8, Visual and Aesthetic Conditions—viewer group responses on the Draft EIS resulted in the refinement of the visual impact rating for several key views. Several additional simulations were added to illustrate project effects discussed in the Draft EIS. Mitigation commitments were updated and include measures to integrate project elements with surroundings. Also, discussion of unavoidable adverse environmental effects was added.

Section 4.9, Air Quality—air quality emission values were updated based on updated vehicle-miles-traveled data. An analysis of greenhouse gas emissions for the Project was added.

Section 4.10, Noise and Vibration—additional noise analysis was completed along the Airport Alternative alignment, for the maintenance and storage facility site options, and at high-rise buildings; mitigation commitments were further detailed. Additional noise analysis was also completed at the Honolulu International Airport when the Airport Alternative became the Preferred Alternative. At the request of the National Park Service, additional noise analysis was completed at three locations at the Arizona Memorial; after mitigation, no impact is expected from the Project.

Section 4.11, Energy and Electric and Magnetic Fields—energy demand was updated based on new vehicle-miles-traveled data.

Section 4.12, Hazardous Waste and Materials—additional information about probable contaminated sites and mitigation commitments was expanded in case hazardous materials are found prior to acquisition of properties.

Section 4.13, Ecosystems—changes were made to reflect agency coordination regarding inclusion in the HDOT Habitat Conservation Plan for koʻoluaʻula (*Abutilon menziesii*) (HDOT 2004) and informal consultation with the U.S. Fish and Wildlife Service (USFWS) on “no effect” to threatened and endangered species or designated critical habitats related to the Project.

Section 4.14, Water—this section was revised to include U.S. Coast Guard (USCG) and U.S. Army Corps of Engineers (USACE) input on navigable waters and waters under the jurisdiction of the USACE. Impacts and mitigation to waters of the U.S. were added based on design refinements and agency coordination since the Draft EIS.

Section 4.15, Street Trees—mitigation was refined to include coordination between the City and HDOT’s highway landscape architect and gives further transplant mitigation details.

Section 4.16, Archaeological, Cultural, and Historic Resources—historic resources in the Area of Potential Effects (APE) were reevaluated following publication of the Draft EIS as a result of ongoing Section 106 consultation. The Historic Effects Report (RTD 2009d) was completed, and an effects determination recommended by the State Historic Preservation Officer (SHPO) was accepted by the FTA for the Project and the properties in the vicinity of the airport that were evaluated based on the refined design. The effects determination of the 81 historic resources are

presented; the discussion of Section 106 consultation has been updated; and mitigation was added in accordance with the draft Programmatic Agreement (PA). Note: In the State of Hawai‘i, the governor appoints the SHPO. The SHPO is the Chairperson of the Department of Land and Natural Resources (DLNR). The State Historic Preservation Division (SHPD) is a division within DLNR, and it is also where the deputy SHPO is located. In fulfilling Federal and State historic preservation requirements, the Project consulted with the SHPO through the SHPD. SHPD and SHPO are used interchangeably throughout this chapter unless otherwise indicated.

Section 4.17, Maintenance and Storage Facility—the site near Leeward Community College is identified as the preferred site for the maintenance and storage facility. A second site in Hoʻopili remains an option. Impacts and mitigation were revised to reflect design refinement of the preferred option.

Section 4.18, Construction Phase Effects—the section was revised to update effects and mitigation based on design refinements, agency coordination, and comments raised during the Draft EIS public comment period. A new section on invasive species was added as a result of agency comments and coordination. An updated schedule and cost estimates was used to estimate the annual employment impacts from construction.

Section 4.19, Indirect and Cumulative Effects—the section was updated to reflect adoption of the new City Transit-Oriented Development Ordinance 09-4 (ROH 2009). Additional detail is included on planned and foreseeable development. The indirect effect of the Project on growth and development and cumulative effects was expanded in the Final EIS.

Section 4.20, Irreversible and Irrecoverable Commitments of Resources—irreversible and

irretrievable commitments of natural and cultural resources was added.

Section 4.21, Anticipated Permits, Approvals, and Agreements—this section was revised to include permits, approvals, and agreements needed and notes the status of each permit as of the date of this Final EIS. The table also identifies the party responsible for submitting the permit, approval, or agreement.

4.2 Land Use

This section describes the existing land uses, including farmlands, development trends, and long-term plans for the study corridor. It also evaluates the Project’s consistency with the long-term plans for the study corridor. An assessment of potential changes in land use that could result from the improved mobility that will be provided by the long-term operation of the Project is presented in Section 4.19. For additional information and references, see the *Honolulu High-Capacity Transit Corridor Project Land Use Technical Report* (RTD 2008b), the *Honolulu High-Capacity Transit Corridor Project Neighborhoods and Communities Technical Report* (RTD 2008d), and Appendix J, Relationship to Land Use Plans, Policies, and Controls. Farmlands are described in detail in the *Honolulu High-Capacity Transit Corridor Project Geology, Soils, Farmlands, and Natural Hazards Technical Report* (RTD 2008m).

4.2.1 Background and Methodology

A variety of data sources, including field surveys, were used to record existing land uses on properties adjacent to and within close proximity of the study corridor.

For farmlands, this investigation documented the location of existing properties that are actively cultivated and also checked information published by the U.S. Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS), to determine if properties in the study

corridor have been designated as prime, unique, or of statewide importance.

Additionally, government documents related to planned transportation improvements and land development were reviewed to assess the future context of the Project in the urban environment. The Project was also evaluated to determine consistency with adopted coastal zone management and development plans and policies.

4.2.2 Affected Environment

Existing Land Use

Table 4-2 provides an overview of existing land use within the study corridor in the planning areas delineated by the *City and County of Honolulu General Plan (as amended)* (DPP 2002a). Figure 4-2 illustrates the location of these planning areas and shows the future planned land uses. The corridor traverses through three major planning areas—‘Ewa, Central O‘ahu, and the Primary Urban Center (PUC).

The ‘Ewa Development Plan (DPP 2000) was the first of the conceptual development plans to be adopted by the City. Significant growth in population and employment are projected for the ‘Ewa area by 2030.

The ‘Ewa region is a rural and agricultural area that is undergoing urbanization and includes Kapolei, which is developing as O‘ahu’s “second city.” The Wai‘anae terminal station for the Project is at East Kapolei. The Wai‘anae end of the Project will serve the area where both population and employment are forecasted to grow by approximately 400 and 300 percent, respectively. Some of the new developments in this area include the University of Hawai‘i (UH) at West O‘ahu campus, the Salvation Army Kroc Center, and the Ho‘opili master planned development.

Commercial space in ‘Ewa is anticipated to increase to 7.1 million square feet (compared

Table 4-2 Existing Land Use Overview by Planning Area

Planning Area	Land Use Overview ¹
`Ewa—includes Kapolei-`Ewa and Makakilo	`Ewa, previously a predominantly agricultural area, is now being developed rapidly into single-family and garden-style apartment residential uses, as well as some light industrial and commercial uses. A number of State and Local government offices, as well as some light industry, have moved to Kapolei.
Central O`ahu—includes Waipahu-Waikele and Waiawa ²	Waipahu, the portion of the Central O`ahu planning region nearest the Project, is comprised of moderate-density residential, commercial, and light industrial uses. Waipahu's commercial and light industrial uses are mostly clustered along Farrington Highway. Other portions of the Central O`ahu planning region within the study corridor include lower-density residential developments and some commercial and light industrial areas in Waikele and Kunia. The Waiawa and Koa Ridge areas remain largely undeveloped at this time.
Primary Urban Center—includes Pearl City-`Aiea, Salt Lake-`Aliamanu, Airport-Pearl Harbor, Kalihi-Iwilei, Palama-Liliha, Downtown, Kaka`ako, Makiki-Mānoa, Mō`ili`ili-Ala Moana	<p>The Primary Urban Center is a wide-ranging development region stretching from Pearl City through Salt Lake, Honolulu International Airport, Downtown, and Kaka`ako to the Koko Head end of the study corridor. The uplands in this area are dominated by single-family residential uses while the coastal plain has a broader range of uses. Land uses in the Pearl Highlands and Pearlridge Station areas include big-box retail, a regional shopping center, health services, smaller commercial and industrial uses, and apartments.</p> <p>The Aloha Stadium Station area is dominated by the stadium and nearby military uses, but some civilian residential development and neighborhood shopping centers are also present. All the station areas along the Airport Alignment are dominated by military, military housing, airport, or light industrial uses.</p> <p>As the corridor approaches Downtown, moderate- to high-density uses become more prominent. The four station areas in Kalihi and Iwilei are dominated by residential and commercial uses with commercial uses generally increasing closer to Downtown. The Chinatown and Downtown areas are comprised of high-density uses, including major office buildings, retail, and high-density condominiums. Federal, State, and Local government offices are also located near the Downtown and Civic Center Stations. Adjacent to Downtown, Kaka`ako contains a mix of large retail uses, industrial uses, restaurants, and theaters. Ala Moana Center has 1.8 million square feet of retail space; this area is dominated by this shopping center. Big-box retailers, medical, smaller commercial development, hotel, and residential uses are also in this area.</p>

¹ Land uses described include current uses within the study corridor.

² Planning area extends beyond the study corridor.

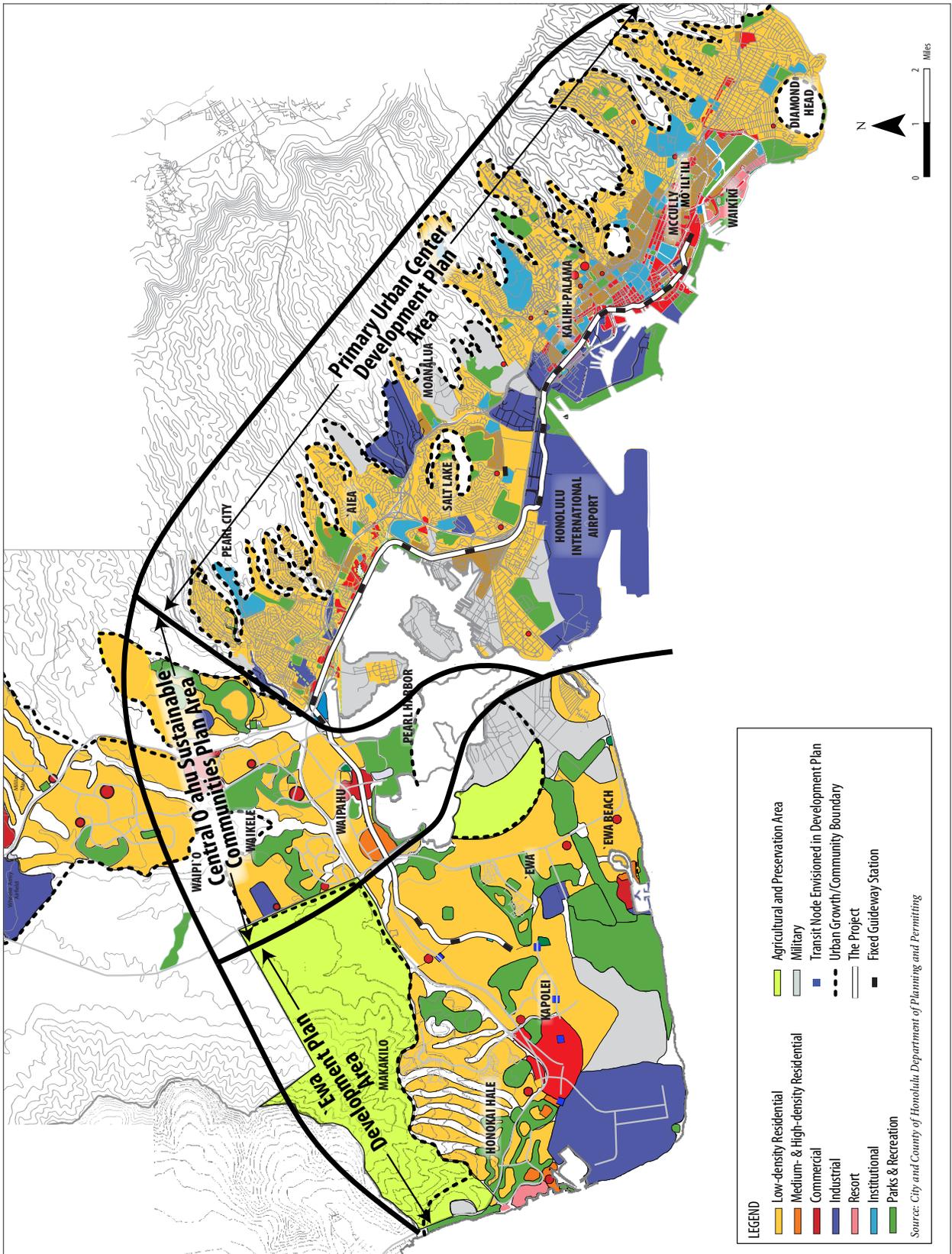


Figure 4-2 Planning Regions and Planned Land Use

to 8.4 million square feet existing in Honolulu today). The new UH West O‘ahu campus will support pedestrian access to and from a major transit node on North-South Road. The campus is projected to have 7,600 students and 800 staff and faculty by 2020. Central O‘ahu has a suburban development pattern encompassing smaller cities and community centers. Only part of the Central O‘ahu planning area is within the study corridor. The *Central O‘ahu Sustainable Communities Plan* (DPP 2003) establishes a Central O‘ahu Urban Community Boundary (UCB) that protects agricultural lands and open space and focuses planned urban development within its boundaries. This plan calls for moderate density/

Prime farmland is land that has the best combination of physical and chemical characteristics for producing agricultural crops.

Unique farmland is land other than prime farmland with a special combination of qualities to produce specific high-value crops.

Farmland of statewide importance is land other than prime or unique farmland, important for the production of agricultural crops as determined by the State.

mid-rise housing and commercial development within walking distance of two major nodes and transit stations in Waipahu.

The PUC Development Plan (DPP 2004a) area encompasses the most urbanized part of the island, including Downtown Honolulu. Figures 4-3 through 4-6 show existing land uses within one-half mile of the project alignment. The *‘Aiea-Pearl City Livable Communities Plan* (DPP 2004b) and the *Kaiāulu ‘o Kaka‘ako Master Plan* (HCDA 2008) are two of the special community plans within the PUC.

Farmlands

Much of the study corridor is currently developed, and only a small portion of the

corridor—primarily in the ‘Ewa Development Plan area—consists of land that is currently used for agriculture.

The ‘Ewa Plain, which is contained within the ‘Ewa Development Plan area and includes properties surrounding the Project, was once a major agricultural area. Prior to 1995, the primary crop had been sugar cane. Despite recent rapid urbanization, much of the ‘Ewa Plain is still classified or zoned for agricultural use by either the State of Hawai‘i or the City. Much of ‘Ewa that is not developed is also classified as “prime agricultural land.” The *‘Ewa Development Plan* (DPP 2000) includes an agricultural preservation area as illustrated on Figure 4-7. A small amount of agricultural land located near Pearl Highlands Station is illustrated in Figure 4-8.

Future Land Use Plans and Policies

State, regional, and community plans and policies affecting future land use are currently in place and enforced through zoning and other requirements at State and Local levels. Proactive neighborhood-based plans establish a comprehensive framework for implementing long-range land use policies and goals for O‘ahu’s future. The plans that are relevant to the goals and objectives of providing improved transit services within the study corridor include the following:

- *Hawai‘i Statewide Transportation Plan* (HDOT 2002)—this plan envisions a multi-modal transportation system and promotes transit-supportive development (TSD) in activity centers along the corridor.
- *O‘ahu Regional Transportation Plan 2030* (O‘ahuMPO 2007)—this plan focuses on improving mobility with a series of strategies and programs to address future transportation needs. Within the 2030 planning horizon, this plan calls for a rail transit system that will serve the corridor between Kapolei and Honolulu.
- *City and County of Honolulu General Plan (as amended)* (DPP 2002a)—this plan establishes

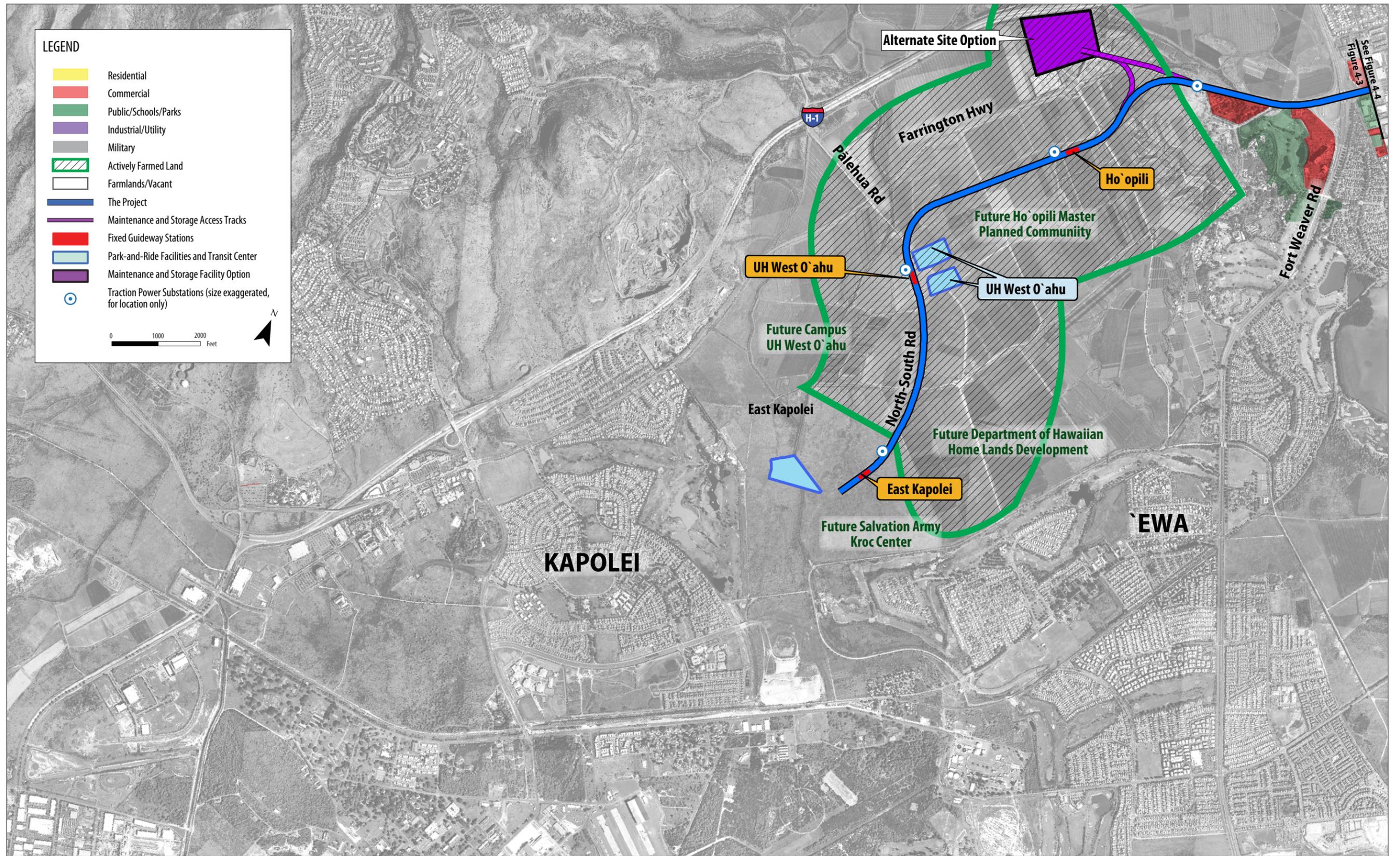


Figure 4-3 Existing Land Use (East Kapolei to Fort Weaver Road)

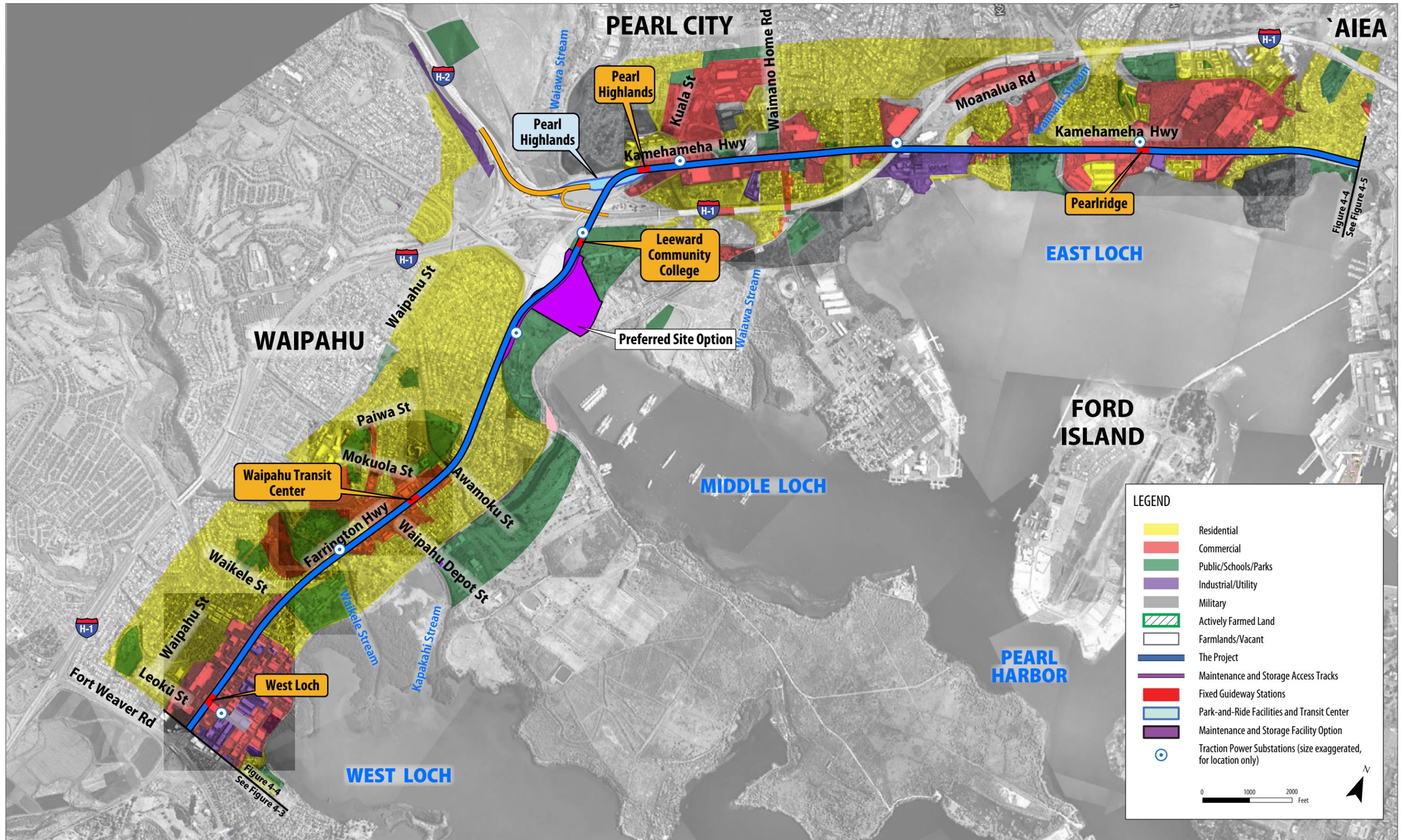


Figure 4-4 Existing Land Use (Fort Weaver Road to Aloha Stadium)

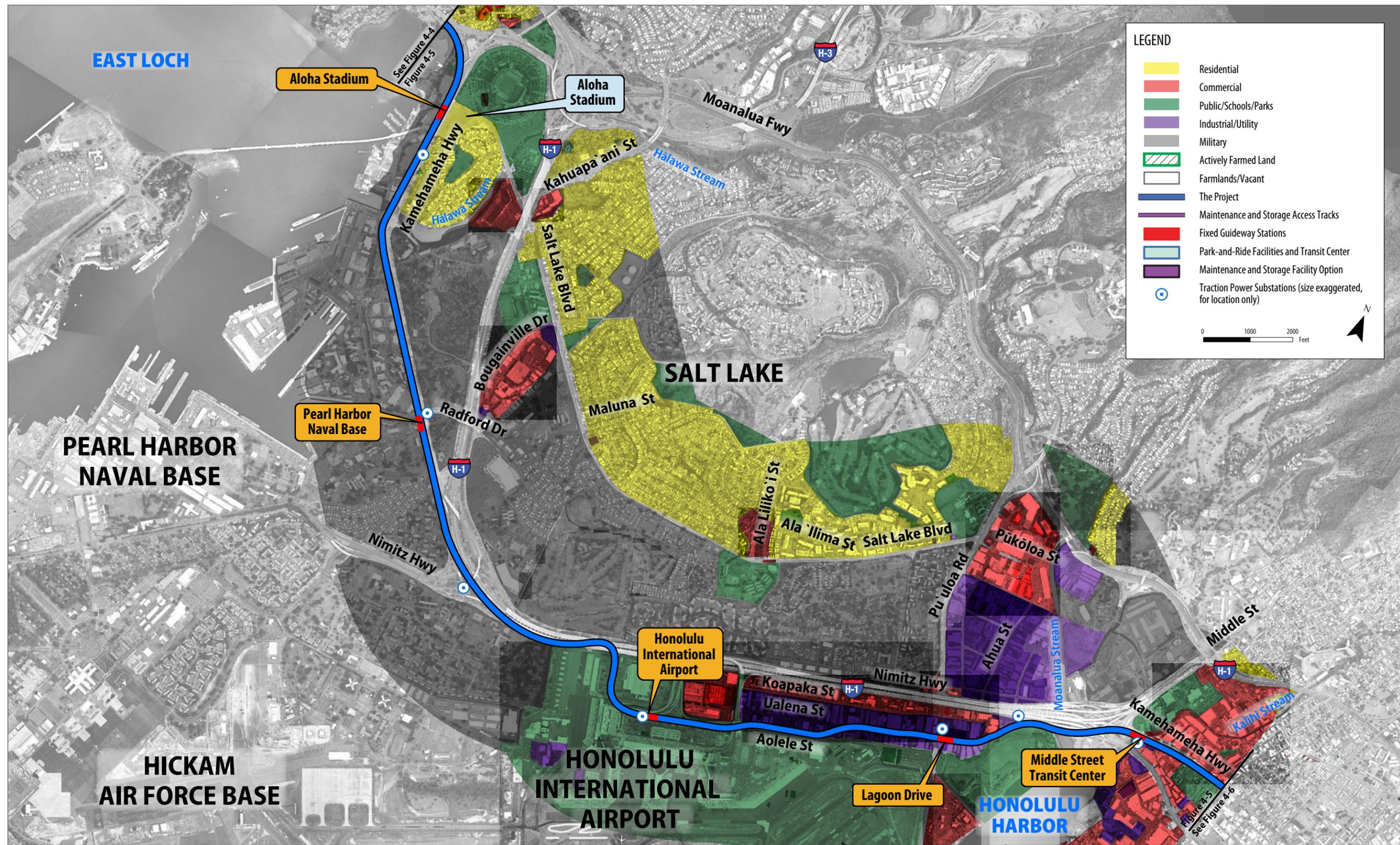


Figure 4-5 Existing Land Use (Aloha Stadium to Kalihi)

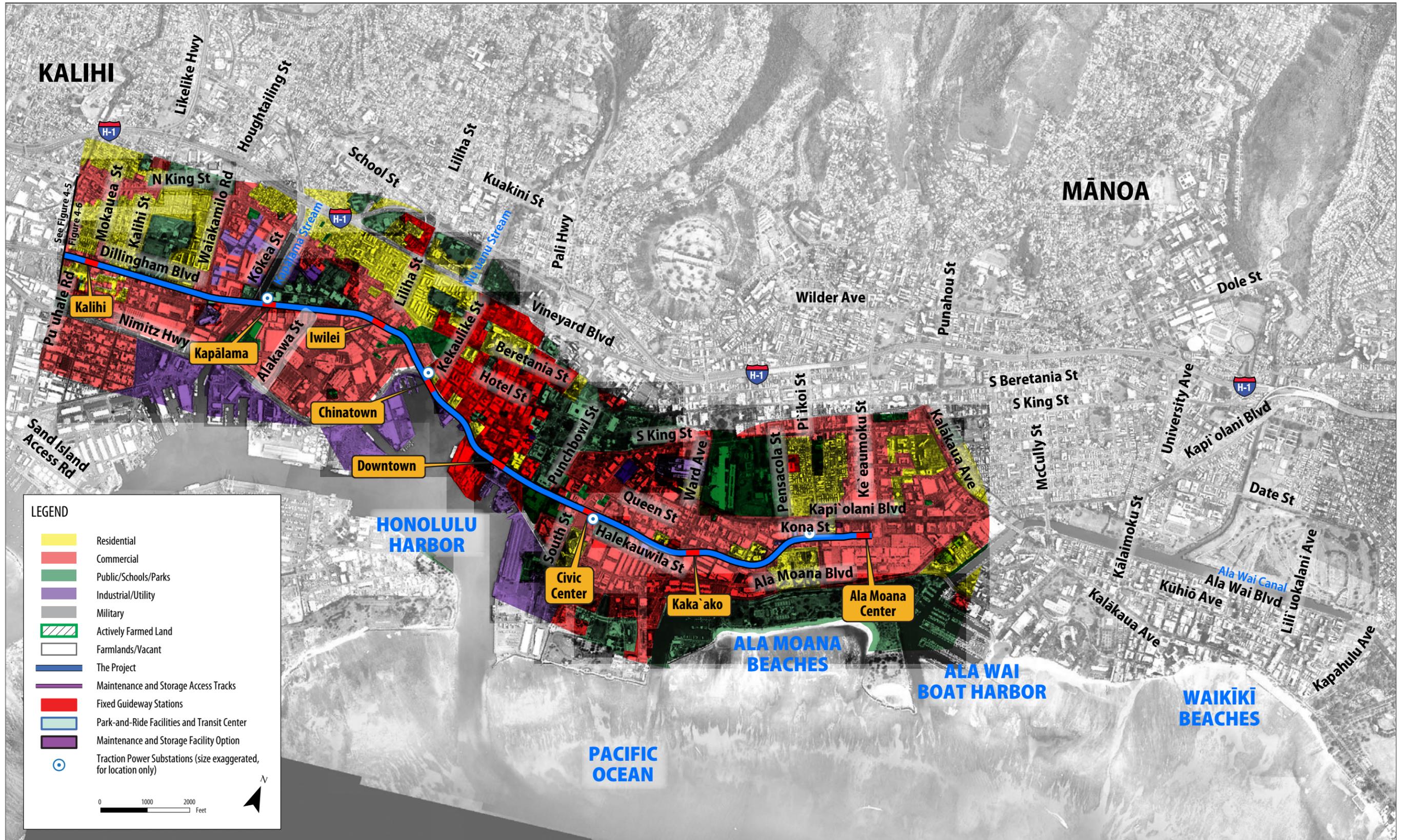


Figure 4-6 Existing Land Use (Kalihi to Ala Moana Center)

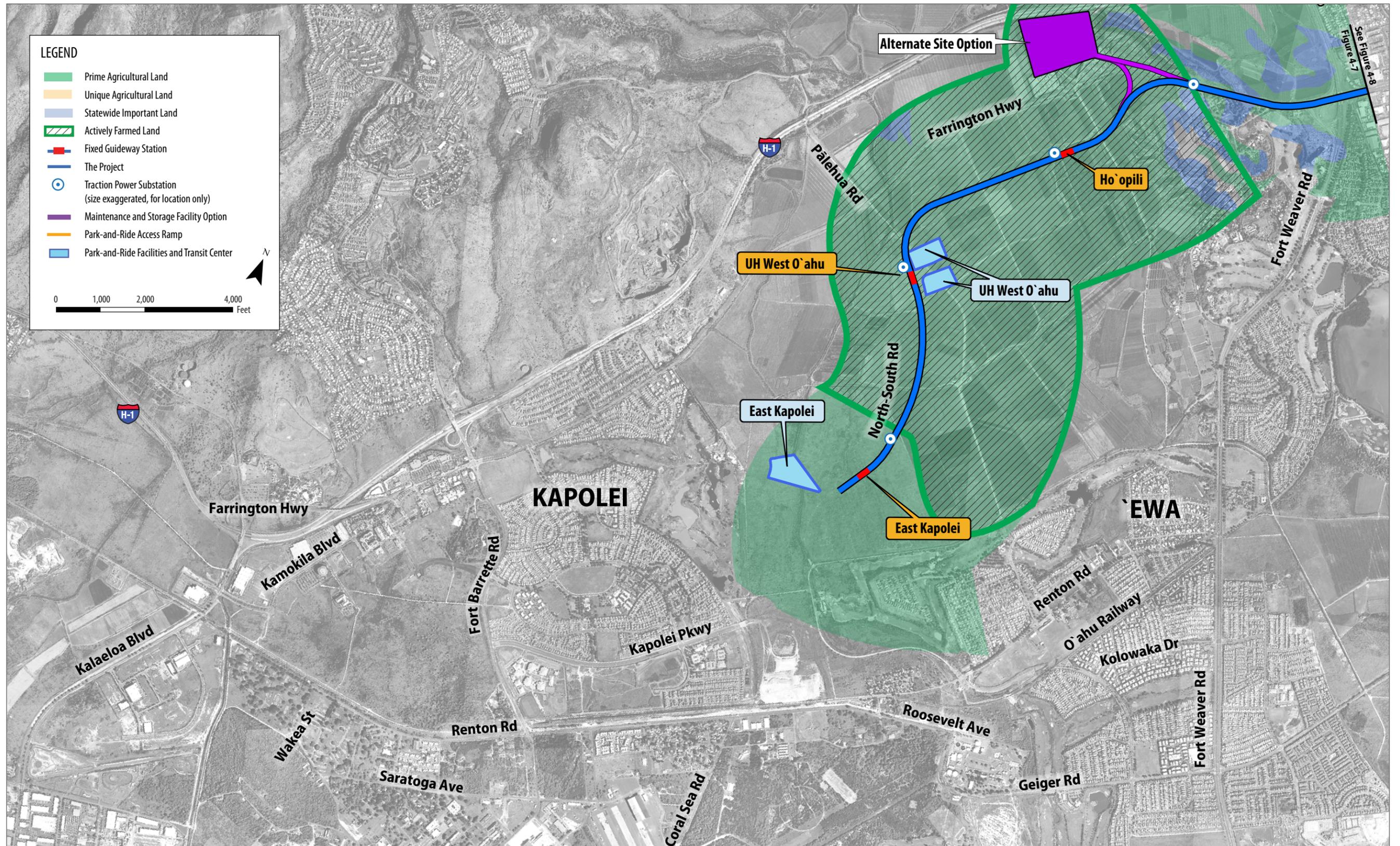


Figure 4-7 Designated Agricultural Lands (East Kapolei to Fort Weaver Road)

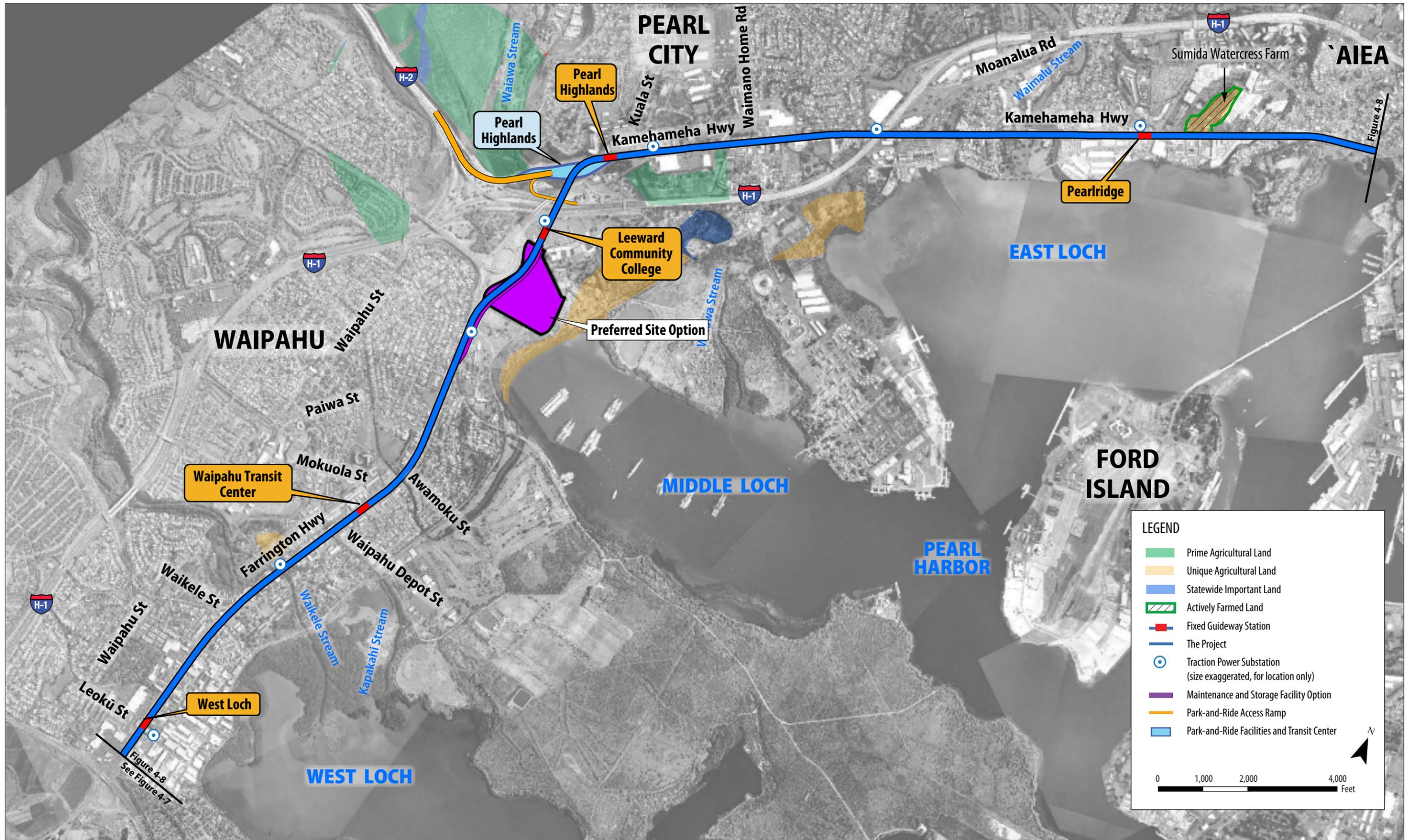


Figure 4-8 Designated Agricultural Lands (Fort Weaver Road to Aloha Stadium)

transit-supportive objectives and policies for Honolulu's future and directs future growth on O'ahu to the PUC, Central O'ahu, and 'Ewa.

Development plans for the PUC and 'Ewa direct new growth and its supporting transit facilities and TOD to these areas. Sustainable community plans for East Honolulu, Central O'ahu, and other parts of the island focus on supporting the character of these communities and preserving their natural and cultural resources.

The City passed a TOD special district amendment to a land use ordinance (ROH 2009) in March 2009. TOD special districts will restrict development in agricultural and open-space areas and encourage mixed-use, high-density, walkable communities around transit stations. The special districts also encourage public input into the design of TOD neighborhood plans to reflect unique community identities. TOD planning is underway and will occur before the fixed guideway stations are constructed. Developers who desire to build in TOD special districts will be subject to applicable Local, State, and Federal land use laws, which may include compliance with environmental impact statement laws.

4.2.3 Environmental Consequences and Mitigation

Environmental Consequences

Land Use

No Build Alternative

Under the No Build Alternative, the Project would not be built and would not have any impacts to existing land use. It is assumed that the projects in the ORTP will be built and their environmental impacts will be studied in separate documents. The No Build Alternative is not consistent with local and regional long-range plans.

Project

Approximately 160 acres will be affected by the Project where existing land use will be converted to a transportation use. Only those parcels that will be completely acquired (full acquisition) will result in changes in land use resulting directly from the Project. For some properties, only a small portion of the parcel will be required (partial acquisition), and existing land uses will remain unchanged by the Project. The preferred maintenance and storage facility site option near Leeward Community College is vacant, previously industrial land. The largest potential effect would be displacement of Aloun Farms mauka of Farrington Highway for the proposed 41-acre maintenance and storage facility Ho'opili site option. Traction power substations will be located approximately every mile along the project alignment. A description of the substations is provided in Section 2.5.9. The substations have been placed in roadway rights-of-way, vacant lots, or in rights-of-way that will be acquired for stations and station features. Acquisitions and displacements are discussed in Section 4.4 and included in Appendix C. General land use categories for land that will be acquired or obtained by easement are included in Appendix C.

The acquired acreage for the Project will be approximately 160 acres, which represents approximately 1 percent of the total acreage within the study corridor. A majority of the land uses being converted to a transportation use represent agriculture (42 percent), public (35 percent), and commercial (18 percent). The remaining land conversions (about 5 percent) will be from residential land uses.

Farmlands

No Build Alternative

Under the No Build Alternative, the Project would not be built and would not have any impacts to farmlands designated prime, unique, or agricultural lands of statewide importance. Although the projects in the ORTP are assumed to be built,

their environmental impacts will be studied and reported in separate documents. The adopted *‘Ewa Development Plan* (DPP 2000), however, has recognized that agricultural lands adjacent to the project alignment will be developed in the future.

Project

The only farmlands that will be acquired for the Project are in the ‘Ewa Plain. Because the properties are relatively large, only a small portion of each agricultural parcel will be acquired (Figures 4-7 and 4-8). These figures show the agricultural lands currently in cultivation, as well as agricultural lands that have been designated by USDA, NRCS, or the State of Hawai‘i as prime, unique, or of statewide importance. Some of the designated lands are not currently in active cultivation. Approximately 80 acres of prime farmland and 8 acres of statewide-important farmlands will be acquired by the Project, of which 70 acres are actively cultivated. This acreage is designated for agriculture by County zoning.

All of the affected properties designated as prime, unique, or of statewide importance and/or actively being farmed are owned by individuals, corporations, or agencies that plan to develop them in conformance with the *‘Ewa Development Plan* (DPP 2000). About half of the agricultural property needed would be for the Ho‘opili maintenance and storage facility. The preferred site for the maintenance and storage facility is, however, the former Navy fuel storage and delivery facility near Leeward Community College. If the Project can acquire this site, about 47 acres of agricultural land designated prime or of statewide importance will be acquired for the Project.

The City coordinated with the Hawai‘i State Office of the NRCS, pursuant to the *Farmland Protection Policy Act* (USC 1981). As shown on the NRCS-CPA-106 Form for the Project, the total of points is below the established threshold

(Appendix F, Record of Agency Correspondence and Coordination).

The *2002 Census of Agriculture* (USDA 2004) reported that there are more than 70,000 acres of agricultural land in cultivation on O‘ahu, including those designated as prime, unique, or of statewide importance. The displacement of agricultural lands as a result of the Project represents less than one-tenth of one percent of available agricultural land. Considering that the amount of affected farmland is such a small proportion of all agricultural lands on O‘ahu, including those designated as prime, unique, or of statewide importance, the effect will not be substantial and no mitigation will be required.

Future Land Use Plans and Policies

No Build Alternative

Under the No Build Alternative, a transit system would not be constructed. However, this is not consistent with transportation and land use components in planning documents that support the development of a central transit system within the study corridor. Future projects on the ORTP are assumed to be constructed, and separate environmental documents will be prepared for those projects.

Project

The Project is consistent with the transportation and land use elements of adopted State and Local government plans (see Appendix J, Relationship to Land Use Plans, Policies, and Controls, for more information). The transit system will link Honolulu with outlying developing areas and activity centers that have been designated to receive increasing amounts of future residential and employment growth. The system will provide reliable rapid transit within the study corridor that will serve all population groups, improve transit links, and offer an alternative to the use of private automobiles.

Coastal Zone Management Program

The Federal *Coastal Zone Management Act of 1972* (CZMA) was enacted to encourage states to preserve, protect, develop, and, where possible, restore or enhance valuable natural coastal resources. Pursuant to 15 CFR 930.32, federally permitted, licensed, or assisted activities undertaken in or affecting Hawai‘i’s coastal zone must be consistent with the CZMA objectives and policies.

The Hawai‘i Coastal Zone Management (CZM) program was enacted in 1977 and codified in HRS Chapter 205A and is administered by the State of Hawai‘i Department of Business, Economic Development and Tourism (DBEDT) Office of Planning. The Hawai‘i CZM area encompasses the entire state, including all marine waters.

Other important elements of the Hawai‘i CZM program include a permit system to control development within the Special Management Area (SMA), a relatively narrow zone along the coastline. The SMA permit is administered by the counties of Hawai‘i.

The goals of the Hawai‘i CZM program are to

- Protect valuable resources
- Preserve management options
- Ensure public access to beaches, recreational areas, and natural reserves

A full CZM consistency assessment will be reviewed by the DBEDT Office of Planning, the agency administering the State’s CZM program, when the City applies for Federal grants and Federal permits to allow construction.

The Project

The Project is consistent with the objectives and policies of the State’s CZM program, as described in the following text.

Recreational Resources

The Project will not affect the existing coastal recreational resources or their uses by the public. Overall, the Project will improve the availability of access to existing and future parks and recreational facilities along the alignment.

Historic Resources

Section 4.16 provides the regulatory context that governs archaeological, cultural, and historic resources and identifies the historic properties eligible for the National Register of Historic Places (NRHP). The City will comply with Federal and State archaeological, cultural, and historic preservation laws and regulations. There are 33 adverse effects on historic properties. A draft PA was prepared in coordination with the SHPO and the Section 106 consulting parties to outline measures to minimize and mitigate Project effects on these resources.

Scenic and Open Space Resources

Section 4.8 identifies the protected mauka and makai views in the study corridor and identifies impacts and mitigation to those views. The Project will introduce a new linear visual element to the corridor and, as a result, changes to some views will be unavoidable. Depending on the degree of view obstruction or blockage, some changes in view will be significant. The View changes will be less notable in wider vista or panoramic views where the project elements are smaller components of the larger landscape. Generally, the project elements will not be dominant features in these views that include the shoreline.

The *Coastal View Study* (DLU 1987) also considers the creation of new views along with the preservation of existing views. Transit users on the elevated guideway will have expansive panoramic views of the shoreline except where disrupted by trains traveling in the opposite direction, station structures, and multi-story buildings. These views will be similar to those from the street below, but

better due to the elevated perspective (as described in Section 4.8).

Coastal Ecosystems

Portions of the Project are in the SMA. An SMA permit will be obtained from DPP for four areas as described in Section 4.21. The only project element in the Shoreline Setback Area will be the stormwater outfall from the maintenance and storage facility preferred site option near Leeward Community College that will drain into Pearl Harbor.

Stormwater discharge into Pearl Harbor will meet water quality requirement for the estuary. Permanent impacts are discussed in Section 4.14.3, and temporary impacts during construction that could affect coastal water quality will be mitigated as described in Section 4.18.

Economic Uses

To accomplish the economic development objectives for O‘ahu’s urban corridor, suitable infrastructure must be developed as described in Section 4.3.

Coastal Hazards

The Project is not located in a tsunami evacuation zone and is being designed to applicable standards and specifications regarding storm weather, seismic events, and associated risks. The Project will not affect coastal erosion (RTD 2008m).

Managing Development

The Project will require Federal, State, and City permits and approvals that include provisions for public participation and ensure protection of coastal resources (see Section 4.21). The Project will also provide necessary infrastructure to accommodate existing and planned future travel demand. The Project is consistent with the transportation and land use elements of adopted State and Local government plans.

Public Participation

Agencies, non-governmental groups, and the public have been engaged throughout the Project’s planning process, as required by Federal and State law. For more details on public participation opportunities, see Chapter 8, Comments and Coordination.

Beach Protection

The Project will not have a direct impact on O‘ahu’s beaches and will not affect coastal erosion.

Marine Resources

The Project does not affect the sustainability of marine and coastal resources.

Airport Layout Plan

The ALP shows the existing airport layout and proposed future development at the airport. The refined alignment was identified by HDOT-Airport Division in an updated ALP and submitted to the FAA for review of airport design standards. The FAA accepted the ALP on April 28, 2010, indicating the ALP shows an acceptable alignment at the airport. The Project will not conflict with airport uses. A preliminary airspace review also indicates that, based on the DTS-submitted rail heights, there are no conflicts with airspace at the airport. An ALP review also indicates the guideway is compatible with airport-related uses.

Mitigation

Based on the relatively small number of parcels affected by full acquisitions, the effects on different types of land uses in the study corridor will be minimal. No mitigation measures will be needed.

4.3 Economic Activity

This section describes the effect of the Project on regional economics in the study corridor. Existing and future employment and growth in the study corridor were considered in the analysis. In addition, the anticipated changes to property tax revenues that will result from acquisition of

property for the Project were evaluated. Economic effects related to construction are discussed in Section 4.18, and the Project’s financial analysis is presented in Chapter 6, Cost and Financial Analysis. For additional information and references, see the *Honolulu High-Capacity Transit Corridor Project Economics Technical Report* (RTD 2008c).

4.3.1 Background and Methodology

Regulatory Context

Regulations applicable to this analysis are as follows:

- Definition of Real Property Tax Rates—Real Property Tax Rate Tables, City of Honolulu, Department of Budget and Fiscal Services, Real Property Assessment Division
- Definitions of Real Property Tax Classifications—Revised Ordinances of Honolulu, Chapter 8

Methodology

Employment trends and forecasted growth were reviewed for the three development and sustainable plan areas in the study corridor—PUC, ‘Ewa, and Central O‘ahu. The data were obtained from the O‘ahu Regional Transportation Plan data and DBEDT.

Based on land acquisition information identified in Section 4.4, changes in tax revenue were estimated using the City’s 2008 tax rates.

4.3.2 Affected Environment

Employment

The PUC has more jobs than any area on O‘ahu or in the State, accounting for 74 percent of the State’s total non-farm employment. Employment is primarily dependent on the tourism industry, although the professional and business services sectors are growing and currently account for 14 percent of total non-farm employment.

In general, employment in O‘ahu and in the study corridor is expected to increase at a

Table 4-3 Forecast Employment for the Project Region and Study Corridor

	2000	2030	2000-2030 Compound Annual Growth Rate
O‘ahu	501,100	630,700	0.8%
Study corridor	399,300	524,200	0.9%

Source: O‘ahu Regional Transportation Plan Data, Department of Business, Economic Development and Tourism.

compound annual growth rate of approximately 1 percent per year between 2000 and 2030 (Table 4-3). In particular, growth in high-tech jobs in the sectors of biotechnology, research and development, and professional and business services is expected. According to DBEDT’s second-quarter 2008 forecasts, visitor arrivals will decrease in 2008 and stabilize in 2009. However, tourism will continue to be the largest industry and job generator on O‘ahu.

As O‘ahu’s emerging “second city,” the ‘Ewa and Kapolei areas are expected to experience the most growth in the study corridor (DPP 2000). This is due in large part to several major residential, governmental, and education projects currently under development. In particular, residential growth in West O‘ahu is expected to result in the need for additional population-serving employment, such as retail and service jobs.

Real Property Tax

For the fiscal year ending June 30, 2007, real property tax revenues totaled \$685,868,000. This comprised approximately 70 percent of total revenues for the General Fund, which is the primary funding source for the City’s operating budget, and accounts for more than 60 percent of all City revenues. Other budget funds, including the Highway Fund, Sewer Fund, and Liquor Commission Fund, have different sources of revenue and collectively comprise less than 40 percent of the total budget.

4.3.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

Under the No Build Alternative, the Project would not be constructed. There would not be a conversion of property and associated reduction in tax base. This alternative would result in increased traffic congestion and delays with an associated loss in productivity.

Project

Employment

The Project will require the acquisition of some commercial and industrial properties. This will displace the businesses using the properties as well as their employees. However, it is anticipated that these businesses will be relocated to new sites.

Once constructed, the Project will employ workers for maintenance and operation of the system. It is anticipated that workers will be hired from the existing local labor force and trained to meet job requirements. The number of new workers will be small compared to the total labor force on O'ahu and is included in the operating and maintenance costs for the Project. Workforce costs are included in the operating and maintenance cost estimates discussed in Section 6.4.1. Employment related to construction of the Project is discussed in Section 4.18.

Real Property Tax

For the Project, property will be acquired from private owners and converted to a transportation use that is owned by the City. This will result in a direct reduction in annual property tax revenues. These reductions are estimated to be \$1.2 million as a result of the Project. A more detailed table of results is included in the Economics Technical Report (RTD 2008c). Section 4.19 discusses the potential indirect economic effects of new development and redevelopment near the project align-

ment and around the stations, which could have a beneficial effect on the regional economy.

Mitigation

The Project is not expected to result in long-term adverse effects on the economy or property tax revenues. No mitigation measures will be needed.

4.4 Acquisitions, Displacements, and Relocations

This section documents the effects on properties from required right-of-way acquisition for the Project. For additional information and references, see the *Honolulu High-Capacity Transit Corridor Project Land Use Technical Report* (RTD 2008b) and the *Honolulu High-Capacity Transit Corridor Project Neighborhoods and Communities Technical Report* (RTD 2008d).

4.4.1 Background and Methodology

Regulatory Context

Federal and State laws govern the acquisition of property for transportation projects. The Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970*, as amended (49 CFR 24), requires all Federal agencies to meet certain standards for the fair and equitable treatment of persons displaced by federally supported actions. The USDOT's regulations implementing this act require that relocation and advisory assistance be provided to all individuals and businesses displaced and that it be done in accordance with the provisions set forth in 49 CFR 24. Comparable housing that is decent, safe, and sanitary must be available and affordable for displaced persons, and commercial space must be available for displaced businesses. It also prohibits discrimination with regard to appraisals and acquisitions of properties. HRS Chapter 101, *Eminent Domain*, and HRS Chapter 113, *Land Acquisition Policies for Federally Assisted Programs*, encompass these Federal regulations.

Methodology

The parcels that could be affected by the Project were identified based on preliminary engineering drawings prepared for the Project. Generally, if only a portion of the property will be required and remain usable, then it is considered a partial acquisition. However, if a substantial amount of the land or the primary structure is located within the portion of the parcel to be acquired, then the entire property will be purchased. This is referred to as a full acquisition. For residential properties, if the right-of-way line comes within approximately 5 feet of a residential structure, it is considered a full acquisition. If the right-of-way line is more than 5 feet away, it is generally considered a partial acquisition. For commercial properties, including situations where the commercial property could lose its function, full acquisition will be considered. Once it is determined that a parcel will be acquired, the displacement and relocation of residences, businesses, and uses will be analyzed. Lands needed for the guideway columns and other project features are considered property acquisitions and will be processed within the limits of the Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970*. DTS will coordinate with property owners with regard to acquisition, easement, or lease of land. Information regarding the amount of acreage needed for the Project, the number of parcels to be acquired, the type of acquisition (partial or full), the type of uses affected, and the number of dwelling units and businesses that will be relocated were included in the analysis.

Most of the information used to assess the types of land uses that will be affected by displacements and relocations was based on property tax assessment records. This information was used to determine land use type, including residential structures and units, commercial-type structures, and square footage. In addition to reviewing real property tax records, a windshield survey was conducted in May 2009 to determine the number

of businesses and, in some cases, residential units that will be acquired.

4.4.2 Affected Environment

The project alignment traverses a variety of different land uses and different urban, suburban, rural, and agricultural environments as described in Section 4.2.

Some land within the study corridor has been designated as ceded land. Ceded lands are those crown, public, and government lands that were once held by the Kingdom of Hawai'i. With the annexation of Hawai'i in 1896, 1.8 million acres were ceded to the Federal government. In 1959, the Federal government granted absolute title to approximately 1.2 million acres of ceded lands to the State. These lands are held by the State as a public trust.

4.4.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

Under the No Build Alternative, the Project would not be built and would not have any impacts to residential or commercial properties. Although the projects in the ORTP will be built, their environmental impacts will be studied in separate documents.

Project

Table 4-4 summarizes the number of partial and full parcel acquisitions required for the Project. Appendix C provides information on a parcel-by-parcel basis for partial and full acquisitions anticipated for the Project.

A partial acquisition typically is either a narrow strip of land or a more substantial portion of a large parcel. It is assumed that for the properties that will be partially acquired, existing land uses will not change.

Table 4-4 Acquisitions and Displacements Summary

	Parcel Acquisitions			Access Easements	Displacements by Land Use			
	Total*	Partial	Full		Residential Units	Commercial and Industrial Businesses	Churches	Total
Project	199	159	40	12	20	67	1	88

*Total parcel acquisitions includes full and partial acquisitions.

Partial Acquisition = acquisition of only land and possibly minor buildings on a property. The existing owners will continue to be able to own and use the property in the future.

Full Acquisition = acquisition of the entire property—land and all buildings on the property. The existing owner and existing land uses will be displaced by project improvements.

Full acquisition of land will result in displacements and relocations. *Displacement* means that the land, including any structures, will be acquired and converted to transportation use and the user of that property will be relocated.

Table 4-4 also shows the number of residential units, commercial and industrial businesses, and a church located on the parcels that will be displaced as a result of the anticipated full acquisitions.

Considering that there are approximately 780 parcels adjacent to the alignment, the full acquisitions and displacements from the Project will be a small change to the commercial and residential elements along the alignment. While displacements of residential and commercial properties may be difficult for the individuals involved, the number of displacements for a project of this length and magnitude will not have a substantial effect.

For land designated as ceded lands within the project right-of-way, ownership of these lands will not change. The City will obtain the appropriate permissions from the State for any ceded lands needed for the Project.

Mitigation

Where relocations will occur, compensation will be provided to affected property owners, businesses, or residents in compliance with all applicable

Federal and State laws and will follow the Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act* (49 CFR 24). The following measures will be implemented for relocations:

- The City will assist all affected persons in locating suitable replacement housing and business sites within an individual’s or business’s financial means.
- A minimum 90-day written notice will be provided before any business or resident will be required to move.
- Relocation services will be provided to all affected business and residential property owners and tenants without discrimination; persons, businesses, or organizations that are displaced as a result of the Project will be treated fairly and equitably.
- Where landscaping, sidewalks, and driveway access will be affected by the Project, coordination will occur with the landowner, and these property features will be replaced and/or the property owner will be compensated in accordance with the Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act*.

4.5 Community Services and Facilities

This section describes the community services and facilities, public services, and utilities in the study corridor and the potential effects on these resources for the Project as compared to the

No Build Alternative. Community facilities are schools, libraries, religious institutions, cemeteries, government institutions, and military installations. Public and private parks and recreational facilities include pedestrian trails, golf courses, regional recreational complexes, community and neighborhood parks, memorial parks, and a major sports stadium. Public services include police, fire, hospitals and emergency medical services, and transit (bus). Utilities include electricity, natural gas, telecommunications, and surface water management. For additional information and references, see the *Honolulu High-Capacity Transit Corridor Project Neighborhoods and Communities Technical Report* (RTD 2008d).

4.5.1 Background and Methodology

Regulatory Context

Section 6(f) of the *Land and Water Conservation Fund Act of 1965* (16 USC 4601 et seq.) was created to preserve, develop, and increase accessibility of outdoor recreational resources. In the case of a transportation project, Section 6(f) protects recreational properties that were constructed with Land and Water Conservation Fund (LWCF) funds from being converted to transportation use. Section 4(f), as amended, of the USDOT Act of 1966 (49 USC 303) protects public parks and recreational lands, wildlife refuges, and historic sites of National, State, or Local significance.

The National Park Service's Federal Lands to Parks program conveys surplus Federal land to communities under Section 203(k)(2) of Public Law 91-485, as amended (40 USC 484). The program helps ensure continued public access and stewardship of resources and, for public park and recreational purposes, is usually done at no cost.

Methodology

Community services and facilities within one-half mile of the project alignment were identified via Geographic Information System (GIS) information

provided by the City, Internet sources, and field verification. Parks and recreational facilities within one-half mile of the alignment were identified based on information from the City General Plan (DPP 2002a), the Department of Planning and Permitting (DPP), the Department of Parks and Recreation (DPR), land use and zoning plans, DLNR, and field visits. Public services within one-half mile of the project alignment also were identified from the information above. These included fire stations, police stations, and hospitals.

Right-of-way acquisition and displacement impacts were analyzed to assess if community services and facilities, public service buildings, and/or public services would be disrupted or changed as a result of long-term operation of the Project. If right-of-way would be required, it was then determined whether full or partial acquisition would be required and the types of facilities and amenities that would be displaced by property acquisition (see Section 4.4 for information on acquisitions).

4.5.2 Affected Environment

The following sections describe existing community facilities, parks and recreational facilities, public services, and utilities within one-half mile of and along the project alignment. Figures 4-9 through 4-12 illustrate the general location of existing religious institutions, police and fire services, hospitals and medical facilities, libraries, schools, parks, and recreational facilities within one-half mile of the project alignment. These figures identify, by name, facilities affected by the Project.

Community Facilities

Many community facilities are within one-half mile of the project alignment and station areas. Some are on large parcels with associated recreational amenities or large parking facilities. Others are buildings or structures located on small parcels. Only a few community facilities are located in the 'Ewa area because of its rural,

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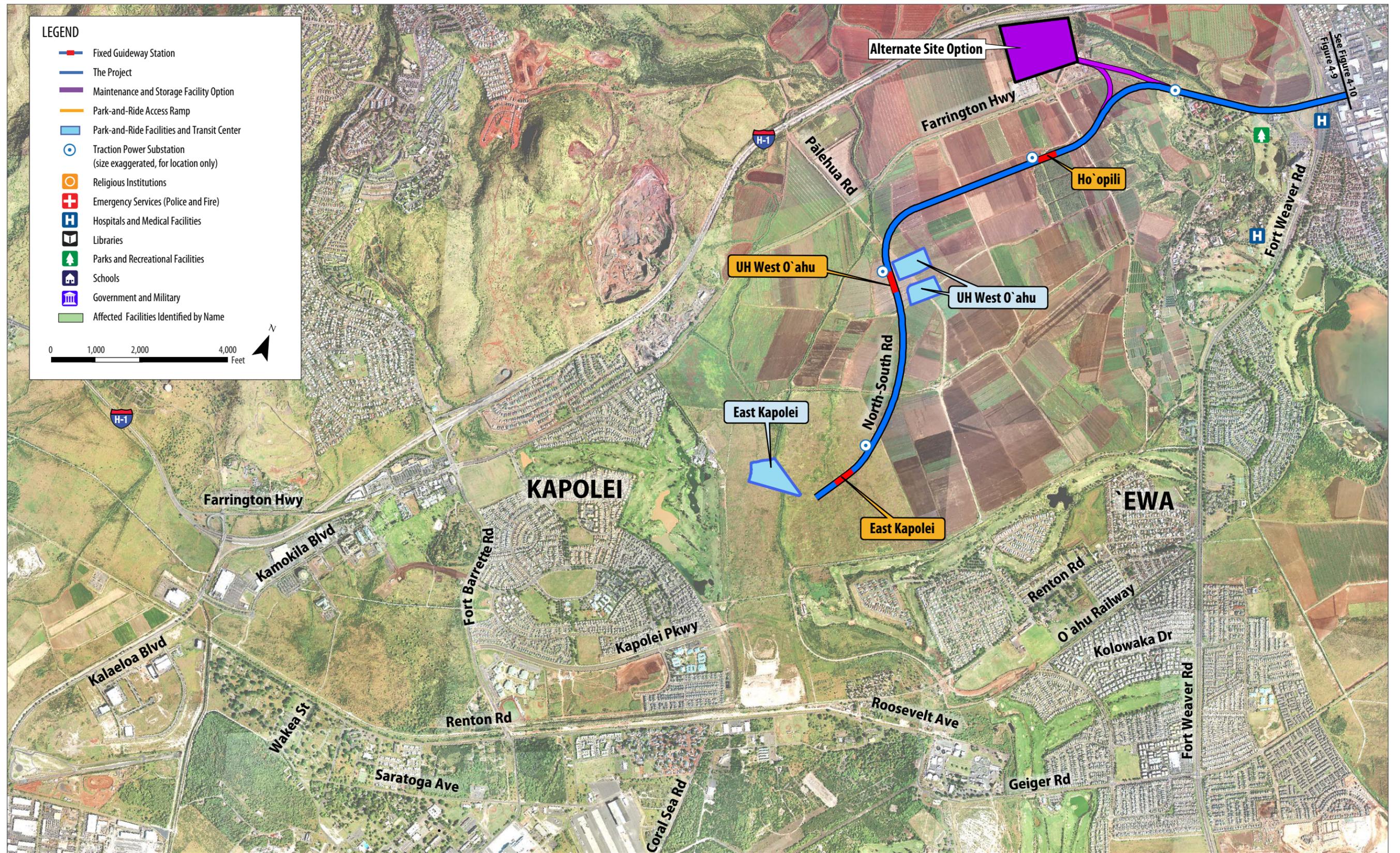


Figure 4-9 Community Resources and Facilities within One-half Mile (East Kapolei to Fort Weaver Road)



Figure 4-10 Community Resources and Facilities within One-half Mile (Fort Weaver Road to Aloha Stadium)

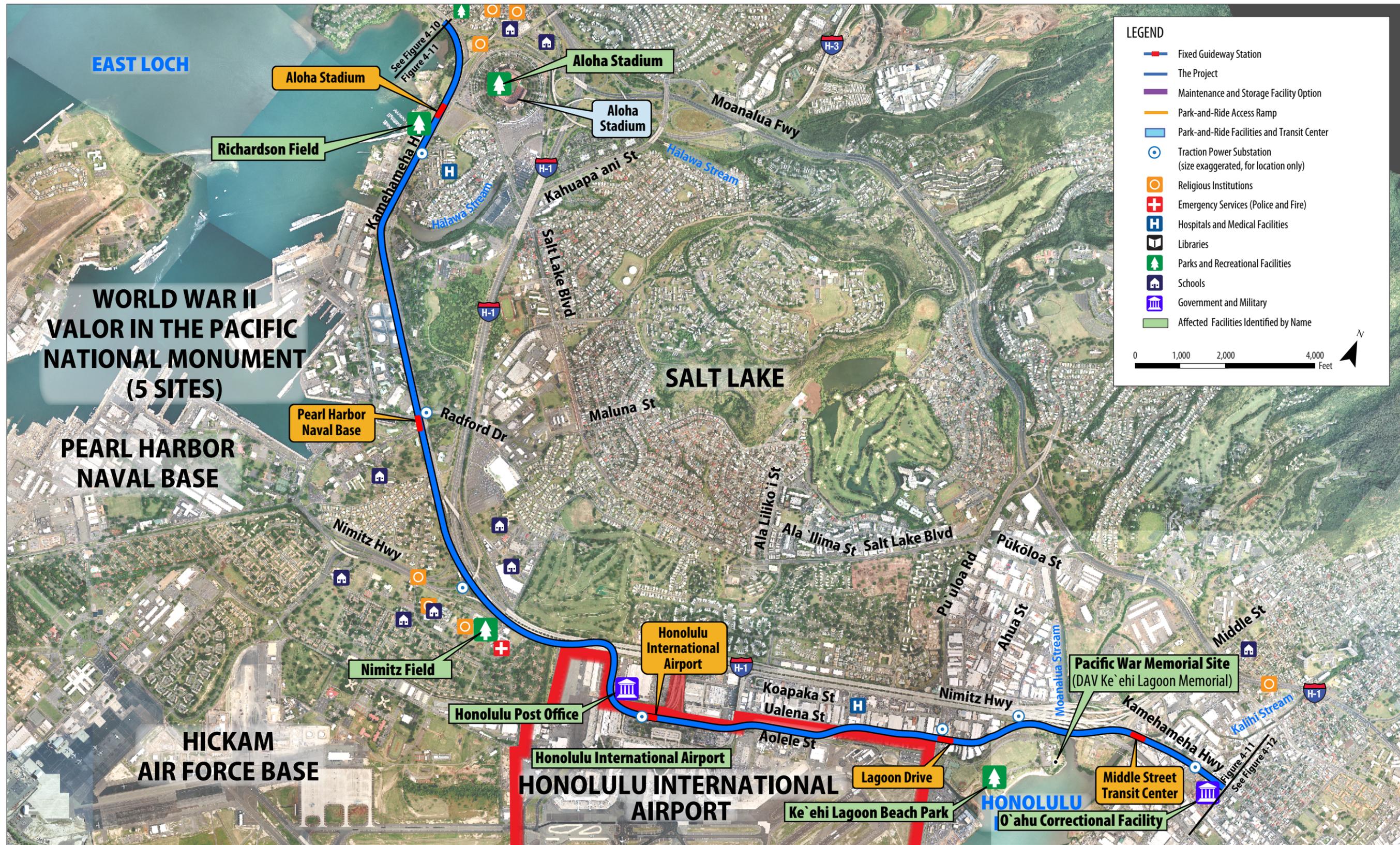


Figure 4-11 Community Resources and Facilities within One-half Mile (Aloha Stadium to Kalihi)

agricultural environment. In contrast, substantial numbers of community facilities are clustered in Central O‘ahu and the PUC, including the dense urban environment of Downtown Honolulu.

Many different types of community facilities are within one-half mile of the project alignment. These include schools, libraries, churches, hospitals, parks and recreational areas, and cemeteries. Each is noted below.

Schools

There are 46 schools within one-half mile of the project alignment. The following 11 schools are adjacent to the alignment:

- Waipahu Intermediate
- St. Joseph Elementary (private)
- Waipahu High School
- Leeward Community College
- UH Mānoa Urban Garden Research Center
- Pearl City Elementary
- Joy of Christ Preschool (private)
- Holy Family Catholic Academy (private)
- Kalihi Kai Elementary
- Kalākaua Middle School
- Honolulu Community College

Public schools also typically have recreational amenities, including baseball diamonds, soccer fields, and gymnasiums. However, these types of recreational resources are considered a community facility, not a park, because their primary use is public education, not recreation.

Libraries

Five libraries are within one-half mile of the project alignment. There are no libraries adjacent to the Project.

Religious Institutions

Approximately 82 religious institutions are within one-half mile of the project alignment. Fifteen of these are adjacent to the project alignment. They are listed in Table 4-5 with addresses.

Table 4-5 Religious Institutions Adjacent to Project Alignment

Name	Address
New Hope Leeward	94-050 Farrington Highway
Koinonia Christian Center	94-216 Farrington Highway #A2
West O‘ahu Christian Church	94-420 Farrington Highway
Iglesia Ni Cristo	94-592 Farrington Highway
St. Joseph Waipahu	94-675 Farrington Highway
Bible Baptist Church	94-210 Hanawai Circle
Hawai‘i Fellowship	94-810 Moloalo Street
Church of Jesus Christ of Latter Day Saints	94-210 Kahualii Street
Waipahu Church of Christ	94-289 Kahualena Street
Alpha Omega Christian Fellowship Church	96-171 Kamehameha Highway
Bethesda Temple Apostolic Church	941 Kamehameha Highway #202
Joy of Christ Lutheran Church	784 Kamehameha Highway
La Luz Del Mundo	719 Kamehameha Highway #A206
Child Evangelical Fellowship	1190 Dillingham Boulevard
Ola Nui	760 Halekauwila Street

Cemeteries

Five cemeteries are located within one-half mile of the project alignment. One cemetery near Aloha Stadium and one near Waimano Home Road are adjacent to the project alignment.

Government and Military Facilities

For many decades, a sizable Federal government presence has been located on O‘ahu. The project alignment is adjacent to Pearl Harbor Naval Station, Hickam Air Force Base, and Fort Shafter Military Reservation. Land uses within these installations nearest the project alignment are primarily for housing, offices, or recreation.

There are both Local government and Federal office buildings adjacent to the project alignment, as well as Honolulu International Airport (a State facility). In addition, a correctional facility, a post office, and several public housing complexes are in the study corridor.

In addition to military facilities, the following government-owned facilities are adjacent to the project alignment:

- Pearl City Post Office
- Honolulu Post Office
- Honolulu International Airport
- Ke‘ehi Transfer Station
- O‘ahu Community Correctional Facility
- Prince Jonah Kūhiō Kalaniana‘ole Federal Building

Parks and Recreational Facilities

There are approximately 53 parks and recreational facilities within one-half mile of the project alignment, including two future parks. These parks and recreational resources are scattered throughout the area and include large regional or community facilities exceeding 100 acres, as well as smaller neighborhood resources less than one-half acre in size. They include pedestrian trails, golf courses, regional recreational complexes, community and neighborhood parks, memorial parks, national monuments, and a major sports stadium. These facilities include publicly owned resources, some of which are on military bases where public access is restricted, as well as resources that are privately owned. Of these 53 facilities, 14 are directly adjacent to the project alignment right-of-way:

- West Loch Golf Course (public)
- Pearl Harbor Bike Path
- Future Middle Loch Park
- Neal S. Blaisdell Park (public)
- ‘Aiea Bay State Recreation Area (public)
- Walker Park (public)
- Irwin Memorial Park (public)
- Mother Waldron Neighborhood Park (public)
- Aloha Stadium (public)
- Ke‘ehi Lagoon Beach Park (public)
- Pacific War Memorial Site (DAV Ke‘ehi Lagoon Memorial)
- Future Queen Street Park (public)
- Richardson Field (military)
- Pearl Harbor historic sites (public and private)

- Nimitz Field (military)

The Pearl Harbor historic sites (USS Bowfin Submarine Museum and Park, Pacific Aviation Museum, Battleship Missouri Memorial, and World War II Valor in the Pacific National Monument [formerly the USS Arizona Memorial]) receive more than 1.5 million visitors a year, making them among the most visited destinations in the Pacific. These resources are adjacent to the Project.

Section 6(f) Resources

The Division of State Parks under DLNR and DPR were contacted in September 2008. Two parks adjacent to the alignment have received LWCF funding and are, therefore, Section 6(f) resources. They are the Neal S. Blaisdell Park and ‘Aiea Bay State Recreation Area. No Section 6(f) lands will be converted to a project use. For this reason, they are not considered in Section 4.5.3.

Aloha Stadium

Aloha Stadium, owned and maintained by the State, comprises 97 acres. Approximately 56 acres of this property was originally owned by the U.S. Department of the Interior and was transferred to the City on June 30, 1967. The Quitclaim Deed for that transfer contains use conditions and covenants that require the land to be used and maintained for public recreational purposes. The Quitclaim Deed also states that “the property shall not be sold, leased, assigned, or otherwise disposed of except to another local governmental agency that the Secretary of the Interior is satisfied can ensure the continued use and maintenance of the property for the aforesaid purposes.” The Quitclaim Deed further states that if any condition or covenant is breached, regardless of cause, the property is to revert to the United States upon demand in writing by the Secretary of the Interior.

In October 1970, with the approval of the Department of the Interior, the property was transferred to the State with similar provisions as the

Quitclaim Deed. Aloha Stadium was then developed on the property, along with other parcels of land the City had obtained from private sources, and transferred to the State (DTS 1992).

Emergency Services

The Island of O‘ahu is governed by the City, which provides a number of public services to both residents and businesses. The City has 18 emergency management centers that are typically located at either fire stations or hospitals and provide advanced life support, ambulance, and paramedic services. In addition, the Honolulu Department of Emergency Services has responsibility over Homeland Security and natural disasters caused by thunder and lightning, hurricanes, tropical storms, tsunamis, high surf conditions, floods, and earthquakes.

Police

The Honolulu Police Department provides public safety to residents and businesses via eight patrol districts. The project alignment traverses District 1 Downtown, District 3 Pearl City, District 5 Kalihi, District 7 East Honolulu, and District 8 Kapolei.

The police stations listed below are within one-half mile of the alignment, but none of them are adjacent to the alignment.

- Waipahu Police Department
- Pearl City Police Station
- Central Honolulu City Police Department
- Honolulu City Police Department Alapa‘i Headquarters

Fire

The Honolulu Fire Department has 5 battalions, or districts, on O‘ahu and 42 individual fire stations; 11 of these are within one-half mile of the alignment. Two are adjacent to the alignment:

- Waterfront Fire Station
- No. 8 Mokulele Fire Station

Hospitals and Medical Facilities

There are 21 hospitals and medical facilities within one-half mile of the alignment. Five of these are adjacent to the project alignment:

- Kahi Mohala Behavioral Health
- St. Francis Medical Center West
- Waipahu Medical Center
- Y. Makalapa Branch Medical Clinic
- Dillingham Medical Building

Buses

O‘ahu Transit operates the bus system in the project region. The company works closely with the Honolulu Police Department. Individual bus operators are provided with two-way communication equipment and can call for assistance should there be a problem on a bus. In addition, the company participates with the Honolulu Police Department in the Mobile Watch Program. This program provides assistance to anyone in need of help. Anyone can board a bus and inform the bus operator of his or her need for either public safety or emergency medical assistance.

Utilities

Both public and private utilities operate within or adjacent to the study corridor and within the project alignment. The City provides many urban services. The Honolulu Board of Water Supply provides drinking water. The Department of Environmental Services (DES) provides solid waste, wastewater, and stormwater services. The Hawaiian Electric Company (HECO), an investor-owned utility regulated by the Hawai‘i Public Utilities Commission, provides electricity to residential, commercial, and industrial customers. The Gas Company is also an investor-owned utility regulated by the Hawai‘i Public Utilities Commission and provides synthetic natural gas manufactured at Campbell Industrial Park to mostly commercial and industrial customers on O‘ahu. Telecommunications services are provided by Hawaiian Telecom. Cable services are provided by Oceanic Time Warner Cable.

Much of the project alignment is along heavily urbanized roadways. Many utilities and associated infrastructure are located in the study corridor. Typically, overhead utility lines and buried conduits and pipelines are installed in the right-of-way for those roadways. At-grade utility facilities, such as substations, pumping stations, pressurizing stations, and gas odorizing stations, are on parcels adjacent to the right-of-way.

4.5.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

Under the No Build Alternative, the Project would not be built and, therefore, would not have any impacts to community services and facilities, parks and recreational facilities, public services, or utilities. However, continued congestion within the project alignment would impact emergency

response times. Although the projects in the ORTP are assumed to be built, their environmental impacts will be studied and reported in separate documents.

Project

Community Facilities

Section 4.5.2 lists schools, libraries, churches, parks and recreational facilities, and cemeteries adjacent to the alignment. Of these, one church will be displaced by the Project. Land from 14 community facilities will be partially acquired by the City. Table 4-6 lists community, government, and military facilities that will be affected by the Project. No cemeteries or known burial sites will be affected by the Project.

The schools that will be affected by partial acquisitions from the Project are Honolulu Community College, Waipahu High School, Leeward

Table 4-6 Affected Community, Government, and Military Facilities (continued on next page)

Community Facility	Effect ¹	Mitigation
Schools		
Honolulu Community College	Partial acquisition of land (0.3 acre); 7 light posts will be removed and impacts a lawn area.	Light posts will be replaced. Property use agreement or acquisition will be negotiated with the University of Hawai`i System.
Waipahu High School	Partial acquisition of land (1.4 acres); relocation of portable classroom buildings and area near the football field.	The affected portable buildings will be replaced or relocated on school property. A retaining wall and a new access road to the football field will be provided.
Leeward Community College	Partial acquisition of land (2.5 acres); affected area includes portable administration buildings and parking lot; 180 parking spaces will be removed.	The portable administration buildings and parking spaces will be relocated. There will be no net loss of parking. Property use agreement or acquisition will be negotiated with the University of Hawai`i System.
UH Mānoa Urban Garden Research Center	Partial acquisition of land (0.2 acre); an urban agricultural research garden owned and operated by UH Mānoa.	Property use agreement or acquisition will be negotiated with the University of Hawai`i System.
Religious Institutions		
Alpha Omega Christian Fellowship Church	Displacement of community church located in the area being acquired for the Pearl Highlands Station.	Property will be acquired in accordance with the Federal <i>Uniform Relocation Assistance and Real Property Acquisition Policies Act</i> .
Parks and Recreational Facilities		
Pearl Harbor Bike Path	Temporary impact to construct a 280-foot-long underground stormwater outfall that will drain into Pearl Harbor from the maintenance and storage facility.	The City will provide a temporary crossing over the trench to maintain bikeway access during construction. The bicycle path will be repaved in the affected area, and surrounding plantings disturbed by construction will be restored.

Table 4-6 Affected Community, Government, and Military Facilities (continued from previous page)

Community Facility	Effect ¹	Mitigation
Future Middle Loch Park	Temporary impact to construct a 280-foot-long underground stormwater outfall that will drain into Pearl Harbor from the maintenance and storage facility.	The area will be restored when outfall construction is complete, and surrounding plantings disturbed by construction will be restored.
Nimitz Field	0.7 acre needed adjacent to the H-1 Freeway.	Property use agreement or acquisition will be negotiated with the Federal government.
Ke`ehi Lagoon Beach Park ²	1 acre affected either directly or by overhead guideway; affects parking and tennis courts near the H-1 Freeway.	The City will provide lighting and associated resurfacing for four of the tennis courts near the park entrance prior to construction so that nighttime tennis court use will be maintained during construction. After construction, the four tennis courts closed during construction will be restored in original location.
Pacific War Memorial Site (DAV Ke`ehi Lagoon Memorial)	Partial acquisition or use of land (0.5 acre).	Property use agreement or acquisition will be negotiated with the State.
Aloha Stadium ²	2 acres affected at `Ewa edge of property for guideway and station.	Transit will provide additional access to the stadium. Kamehameha lot will be paved as a shared-use parking area. The shared park-and-ride will be used for stadium events.
Government and Military	Effect ¹	Mitigation
Pearl City Post Office	Partial acquisition or use of land (0.1 acre) adjacent to Kamehameha Highway.	Property use agreement or acquisition will be negotiated with the Federal government.
Honolulu International Airport	Access easement.	Property use agreement will be negotiated with the State (additional mitigation included in Chapter 3 and Appendix I).
Honolulu Post Office	Partial acquisition or use of land (0.2 acre).	Property use agreement or acquisition will be negotiated with the Federal government.
Prince Kūhiō Kalaniana`ole Federal Building/Courthouse	Partial acquisition or use of land (0.3 acre).	Property use agreement or acquisition will be negotiated with the Federal government.
O`ahu Correctional Facility	Partial acquisition of land (0.2 acre); 13 off-street parking spaces will be displaced.	Property use agreement or acquisition will be negotiated with the State.
Pearl Harbor Complex	Partial acquisition or use of land (0.3 acre).	Property use agreement will be negotiated with the Federal government.

¹ Acres of land acquisition are estimated based on Preliminary Design Plans and indicate the area of land underneath the elevated guideway. For many resources, the acquisition of land will be from support columns, and the actual acreage of impact will be less than shown in this table.

² Section 4(f) uses are discussed in Chapter 5, Section 4(f) Evaluation.

Community College, and the UH Mānoa Urban Garden Research Center. The Alpha Omega Christian Fellowship will be displaced as part of full acquisition of the building where this facility is located.

Government and Military Facilities

Additional community facilities affected by partial property acquisition will involve various parcels owned by the State and Federal governments. The Project will require partial

acquisition or use of land from parcels associated with government or military facilities. These are the Pearl City Post Office (0.1 acre), Honolulu Post Office (0.1 acre), the Prince Kūhiō Kalaniana`ole Federal Building/Courthouse (0.3 acre), and the O`ahu Correctional Facility (0.2 acre). Partial acquisitions will be required from the Pearl Harbor Naval Reservation and Hickam Air Force Base. The military properties include lands used for military opera-

tions as well as residential accommodations for enlisted personnel and their families.

Parks and Recreational Facilities

The Project will affect Ke‘ehi Lagoon Beach Park and Nimitz Field.

The City-owned Ke‘ehi Lagoon Beach Park is a 70-acre park located at Lagoon Drive near Honolulu International Airport. It contains 12 tennis courts, a baseball diamond, walking trails, picnic areas, and restrooms. The project guideway will cross over approximately 1 acre of the park at its mauka edge and have no direct effect on the tennis courts nearby. Approximately 10 guideway support columns will be placed in the park at 120-foot intervals in the vicinity of the access road. The guideway will cross above the park, just makai of the four lighted mauka tennis courts near Nimitz Highway. Given their proximity to the guideway, these tennis courts will be closed during construction and re-opened once this portion of the Project is completed. To mitigate temporary impacts to these lighted mauka tennis courts, DTS will coordinate with DPR during Final Design to provide lighting and associated resurfacing for four of the tennis courts near the park entrance prior to construction so that nighttime tennis court use will be maintained during construction and after project completion. The lighting will be designed and constructed in accordance with regulatory requirements. During construction, there will be a temporary loss of approximately 10 percent of the parking spaces. During construction, DTS will temporarily provide additional bus service from existing City transit centers or parking lots for major events. After construction, the parking area will be restored and there will be no net loss of parking.

Nimitz Field consists of five baseball diamonds on 10 acres on a larger military-owned property. Use or partial acquisitions of the grass fields near

the fence line along Kamehameha Highway will be required for guideway supports.

Aloha Stadium

Aloha Stadium will be affected by the Project by construction of an elevated guideway and rail transit station through a portion of the Aloha Stadium parking area along the ‘Ewa edge of the property parallel to Kamehameha Highway. The Project will affect approximately 2.0 acres of land that is either under the guideway or station and the existing unpaved stadium event overflow parking area Koko Head of Salt Lake Boulevard.

The elevated guideway will be about 35 to 40 feet above the ground through this area and 28 to 30 feet wide. It will be supported by columns that are about 6 to 8 feet in diameter, placed about 120 feet apart. The base of each of the columns will impact approximately 100 square feet of area. The elevated guideway will pass over a small portion of the main parking lot, next to Kamehameha Highway. Approximately four columns will be placed in the main parking lot to support the guideway, requiring removal of approximately four parking spaces. The guideway will cross over Salt Lake Boulevard at Kamehameha Highway, continuing above the existing gravel overflow parking lot, supported by approximately six columns. In the overflow lot, the City will construct a rail station and bus transit center to serve the stadium and will pave and stripe the existing gravel lot. Approximately 600 paved parking spaces will be for use by stadium patrons during stadium events. Currently, the gravel overflow lot is not used for stadium parking except during events, when attendants are required to help guide cars and collect parking fees.

Approximately six additional guideway support columns will be located on the strip of Aloha Stadium property south of the overflow parking lot next to Kamehameha Highway. At the request of the State of Hawai‘i Department of Accounting and General Services (DAGS), a third track on the

elevated guideway will be constructed for trains to park in this area to provide more frequent service before and after stadium events. This will benefit stadium patrons by providing additional transit service during stadium events to accommodate the anticipated demand.

This Project will provide transportation benefits to Aloha Stadium that will enhance its ability to provide recreational opportunities to users, offering additional transit choices, greater transit capacity, and improved service. The recreation use of the site will not change as a result of the Project. The Stadium will be 1 of 21 station stops on the 20-mile system that will be used by more than 100,000 riders on an average weekday. Trains will arrive every few minutes, and extra trains can be coordinated to accommodate peak demand during Aloha Stadium events. Normally, the system will provide capacity for more than 6,000 riders per hour in each direction, but this could be greatly increased to meet demand during Stadium events or other peak periods. In addition to providing train service, the City will also improve automobile access by transforming the existing gravel overflow parking area into a paved, striped parking lot and bus transit center. This will enhance the existing auto access to the overflow parking lot. In addition, buses, shuttles, and taxis will be able to pull off-street to serve the station and Aloha Stadium, providing a multi-modal transit center that will provide access from all directions. The lot will continue to be set aside for the exclusive use of stadium patrons during events, but at other times would be available for commuters. The project will provide additional transportation options and increase overall accessibility for stadium property users.

The Aloha Stadium Authority, Aloha Stadium Manager, and DAGS have participated in the planning of the Project through the Aloha Stadium property, including the elevated guideway, parking area, and station elements, to minimize impact to the stadium property. In the context of the original

land transfer, DAGS requested Federal Lands to Parks program concurrence that this Project is an acceptable transportation improvement and provides value in supporting the recreational use of Aloha Stadium. The effects on Section 4(f) recreational resources are discussed in more detail in Chapter 5, Section 4(f) Evaluation.

Public Services

For all public services, response time during emergencies is critical and, for most of them, access to the sites of emergencies requires the use of public roadways. The Project will improve the operation of the roadway network as compared to the No Build Alternative by reducing congestion and will improve emergency response times. The Project will not affect police, fire, or emergency medical facilities adjacent to the alignment. A Maintenance of Traffic (MOT) Plan will also be developed during final design to manage traffic and emergency services during construction (see Chapter 3 for more information about the MOT Plan).

Section 4.5.2 lists two fire stations and six hospitals and medical facilities adjacent to the alignment. There will be no effect on these facilities.

Utilities

A number of properties owned by utility providers will be affected by partial acquisitions. This includes two properties owned by HECO and one owned by HDOT. A narrow strip of land will be acquired from each. Coordination will occur to further assess these effects during preliminary and final engineering.

In addition to the direct effects on utilities from project right-of-way acquisitions, the construction of a new fixed guideway transit system will involve relocation and modification of existing utilities. These construction effects are discussed in more detail in Section 4.18.

Mitigation

Measures to mitigate effects to community, government, and military facilities are summarized in Table 4-6.

Community Facilities

Mitigation efforts will involve coordination with individual property owners as necessary to appropriately address effects to community facilities. Effects on access, signage, or parking will be replaced or compensation will be provided. In addition, all property will be acquired following the Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act* and applicable State regulations.

The City will coordinate and consult with other agencies and stakeholders on the final design of the streetscape affected by the Project.

Parks and Recreational Facilities

Effects to parks and recreational resources from partial acquisitions will be mitigated in coordination with parkland property owners. Table 4-6 lists mitigation measures for each affected resource. A separate evaluation has also been conducted for each publicly owned parkland property that meets Federal criteria as a Section 4(f) resource (see Chapter 5).

Public Safety and Security

As described in Section 2.5.4, the Project includes safety and security measures to protect public services and facilities. Additional mitigation measures will include:

- Design and architectural details to enhance safety
- Use of closed-circuit television cameras and lighting included as a specific design measure
- Security patrols of transit property and vehicles, ongoing train safety awareness education, and ongoing public security awareness education

4.6 Neighborhoods

This section describes the neighborhoods adjacent to the project alignment and the anticipated effects on these neighborhoods from the long-term operation of the Project. Effects on neighborhoods include adverse and beneficial effects on neighborhood character, quality of life, and cohesion. For additional information and references, see the *Honolulu High-Capacity Transit Corridor Project Neighborhoods and Communities Technical Report* (RTD 2008d).

4.6.1 Background and Methodology

Neighborhood board boundaries were used to define neighborhood divisions. Neighborhood boards were created by City Charter to facilitate citizen participation on the island and in regional planning activities. Only those neighborhoods adjacent to the project alignment are discussed in this section. Figure 4-13 illustrates the neighborhood boundaries. The discussion of local neighborhoods is focused on their individual demographics and character.

4.6.2 Affected Environment Neighborhoods

The Project transects eight city-designated neighborhoods (Figure 4-13). In 2000, the population within the study corridor was about 552,100. The area had experienced moderate growth over the previous decade with less than 1 percent average annual growth per year.

Residents in the neighborhoods of the study corridor are very diverse with 60 to 80 percent of Asian ancestry. However, based on the 2000 census, the Airport and Waikiki neighborhoods are more than 50 percent White, including military personnel and their dependents, as well as people who have moved from the mainland. In general, there is a wide diversity of household sizes throughout the study corridor, ranging from studio apartments to larger multi-family households.

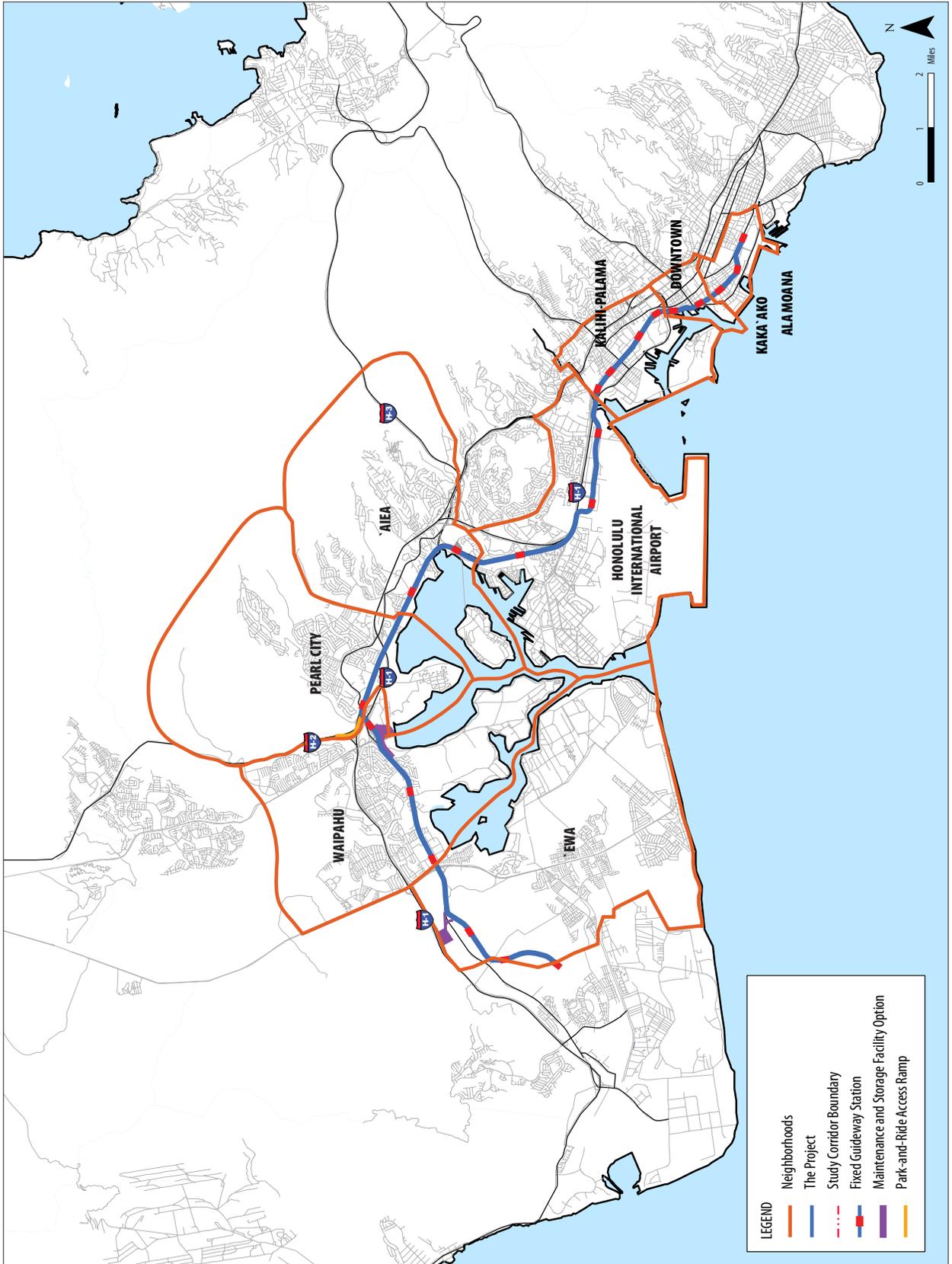


Figure 4-13 Corridor Neighborhoods

Due to their location in the urban core, the Kalihi-Palama, Downtown, Ala Moana-Kaka‘ako, Waikiki, and McCully-Mō‘ili‘ili neighborhoods are distinct from the ‘Ewa O‘ahu neighborhoods, which are predominantly comprised of single-family residences. Households in these urban core neighborhoods tend to be smaller with more than 40 percent of individuals living alone.

The following paragraphs describe the general land use, character, and unique physical or social attributes of the study corridor neighborhoods.

‘Ewa

‘Ewa is one of O‘ahu’s suburban growth centers and is experiencing rapid change. It encompasses the communities of Kapolei (the “second city”), ‘Ewa Villages, ‘Ewa by Gentry, Honouliuli, ‘Ewa Beach, Ocean Pointe, and Iroquois Point. Between 1990 and 2000, the population of this neighborhood doubled as sugar cane lands were developed into housing and commercial uses. Despite ongoing development, some former sugar cane land is being used for diversified agriculture.

Waipahu

Historically, the Waipahu community makai of Interstate Route H-1 (H-1 Freeway) was a sugar plantation town, and the community retains strong identity to this historic economic activity. Newer apartment buildings and strip retail plazas are generally limited to the fringes of the commercial district along Farrington Highway. Waipahu has a recreational center, health clinics, churches, and social services offices. Many residents travel outside of the community for employment.

Pearl City

The Pearl City area consists of residential development, mixed-commercial uses, and military housing and facilities. The community was originally developed by Benjamin Dillingham in the 1890s as Hawai‘i’s first planned city and suburban

development for affluent and independent farmers. Retail and commercial venues include the Pearl City Shopping Center and the Pearl Highlands Center. Neal S. Blaisdell Park at the edge of Pearl Harbor (East Loch) is a regional recreational amenity that is popular for outdoor community activities. A small area known as the Banana Patch lies within the Pearl City neighborhood boundary. This neighborhood is unique in that, while it is in an urban region, residents are able to maintain an agricultural, subsistence lifestyle. The community, which is discussed in more detail in Section 4.7, has a high concentration of Filipinos.

‘Aiea

This community consists of residential development, mixed-commercial uses, and military housing and facilities. Most of the residential subdivisions are mauka of Kamehameha Highway. The makai areas tend to be commercial, light industrial, and military. Pearlridge Center is a major employment center and tourist destination. Many ‘Aiea residents work at nearby Pearl Harbor Naval Base, Hickam Air Force Base, and Marine Corps Base Camp Smith.

Airport

The Airport neighborhood is characterized by non-residential land uses. The Airport Commercial District, located makai of the Nimitz Viaduct, is primarily an industrial, commercial, service-oriented district. The Māpunapuna Light Industrial District, between the Moanalua Freeway, Moanalua Stream, Nimitz Highway, and Pu‘uloa Road, includes primarily light industrial businesses with some retail and commercial businesses and offices. The Fort Shafter Military Reservation, mauka of the H-1 Freeway in Moanalua, is an active military base. The Pearl Harbor Naval Base residential housing area (known as Catlin Park Housing) is bounded by Salt Lake Boulevard, Pu‘uloa Road, Nimitz Highway, and Namur Road/Valkenburgh Street.

Kalihi-Palama

The Kalihi-Palama neighborhood contains a wide variety of land uses with unique community identities, such as Kalihi Kai, Kapālama, and Iwilei. The Kalihi-Palama communities makai of the H-1 Freeway are a mix of residential, business, retail, and industrial-commercial land uses. Residential housing is generally more prevalent in the mauka areas, and commercial and industrial businesses are more prevalent in the makai areas. Businesses vary in size from “mom-and-pop” stores to big box retail establishments, such as Costco and Best Buy, as well as Dole Cannery Mall. The Bishop Museum (mauka of the H-1 Freeway) is a popular tourist attraction that houses an extensive collection of Hawaiian artifacts and royal family heirlooms.

Downtown

Downtown Honolulu is a vibrant city center and one of the State’s largest employment centers. It is experiencing substantial redevelopment to higher-density land uses. It is the State’s principal government office and business center, as well as the location of many tourist attractions. It continues to have a substantial residential population. The Hawai‘i Capital District is the seat of City and County, State, and Federal government offices and includes a number of historic mid-19th century buildings. The historic Chinatown District is a popular attraction for O‘ahu residents and tourists. High-rise condominiums and apartments are interspersed throughout Downtown. Fort Street Mall is a major gathering place for Hawai‘i Pacific University students, downtown workers, and residents.

Ala Moana-Kaka‘ako

The Kaka‘ako community encompasses the 614-acre Kaka‘ako Community Development District from the shoreline makai of South King Street and between Pi‘ikoi and Punchbowl Streets. Redevelopment is replacing old one- and two-story

warehouses and light industrial uses with new urban mixed-use development. The area between Ke‘eaumoku and Pensacola Streets mauka of Kapi‘olani Boulevard is characterized by two- and three-story walk-up apartments in a quieter residential environment. The neighborhood’s shopping and retail centers, especially the Ala Moana and Ward Centers, are popular with residents as well as tourists staying in nearby Waikiki. These centers are being expanded and redeveloped. Other activity centers include a number of popular parks, the Neal S. Blaisdell Center and Concert Hall, and the Hawai‘i Convention Center.

Demographic Characteristics

Table 4-7 presents economic and racial characteristics for each neighborhood based on the 2000 census data. It illustrates considerable variation in neighborhood population size and median household income. Racial characteristics vary less widely. Military housing areas in the Airport neighborhood have higher percentages of White and Black residents in comparison to the racial composition of O‘ahu.

4.6.3 Environmental Consequences and Mitigation

Environmental Consequences

This section evaluates potential effects on neighborhoods adjacent to the project alignment. A discussion of neighborhood safety and security issues is found in Section 4.5. Aesthetic issues and their effect on adjacent land uses are discussed in Section 4.8.

No Build Alternative

Under the No Build Alternative, the Project would not be built and would not have any impacts to neighborhoods. The quality of life, however, would be reduced by increased congestion, increased travel time, and reduced mobility affecting single-occupancy vehicles, high-occupancy vehicles, and bus transit passengers.

Table 4-7 Year 2000 Demographic Characteristics of Neighborhoods

Neighborhood	Household Median Income	White	Black	American Indian & Alaska Native	Asian	Native Hawaiian & Pacific Islander	Other	Two or More Races
ʻEwa	\$58,230	17%	2%	0.2%	50%	7%	1%	23%
Waipahu	\$60,270	9%	2%	0.2%	62%	9%	1%	18%
Pearl City	\$66,500	16%	2%	0.2%	56%	6%	1%	18%
ʻAiea	\$55,240	18%	2%	0.3%	49%	9%	1%	21%
Airport	\$41,000	61%	12%	1.0%	11%	1%	4%	9%
Kalihi-Palama	\$31,630	4%	1%	0.1%	66%	14%	1%	14%
Downtown	\$29,950	22%	1%	0.2%	58%	6%	1%	12%
Ala Moana-Kakaʻako	\$30,620	19%	1%	0.2%	62%	4%	1%	12%
Total Oʻahu	\$52,280	21%	2%	0.2%	46%	9%	1%	20%

Source: Department of Planning and Permitting, City and County of Honolulu, 2006. Selected Economic Characteristics: 2000 by Neighborhood Area.

Project

The Project will provide people living and working in the neighborhoods within the study corridor with increased mobility. The Project will provide an alternative to traveling by personal vehicle or bus transit within the existing transportation corridors. Passengers using the new transit system will experience reduced travel time to other neighborhoods and growth centers along the project alignment and near transit stations. The Project will provide a reliable and efficient travel mode for accessing the region’s current and future jobs, shopping, and social resources, particularly those in Kapolei and Downtown—the major urban centers of the study corridor in the future. This increase in mobility for neighborhood residents will generally improve the quality of life, especially for those with limited financial resources and those who may be transit-dependent.

The transit agency could experience three types of crimes—crimes against persons, crimes involving transit property, and other crimes committed on transit property. To reduce the potential for crime, the FTA requires the development and implementation of a Safety and Security Management

Plan (SSMP) for new fixed guideway projects (49 CFR 633). The SSMP addresses the technical and management strategies for analyzing safety or determining security risks throughout the life of the Project. The SSMP commits that the highest practical level of operational safety and security will be used. In addition, it lays the foundation for future safety and security once the Project is operating. The Honolulu Police Department, the Honolulu Fire Department, the Department of Emergency Management, the Honolulu Emergency Services Department, and other State and Federal agencies, as appropriate, will be involved in preparing and implementing the SSMP. The SSMP is reviewed and updated regularly throughout the life of the Project.

Potential new development and redevelopment along the project alignment, as well as the scale of the transit system itself, may affect the character of development along the alignment. This change in character will not have a substantial effect on the existing development patterns or community character within the surrounding neighborhoods. Currently, most of the residential housing is more prevalent within the mauka areas, and commercial

and industrial businesses are primarily within the makai areas. The Project will not substantially change this development pattern. Since the transit system will be elevated, it will not create a physical barrier to pedestrian or other forms of travel within the study corridor. It also will not pose a barrier to the social network of the community since it will be located within an existing transportation corridor or in the 'Ewa area, along a planned future transportation system.

The following paragraphs describe the Project's effects on individual neighborhoods.

'Ewa

The three transit stations in 'Ewa—East Kapolei, UH West O'ahu, and Ho'opili—as well as the project alignment will not affect community character and cohesion in 'Ewa because the affected area is undeveloped and primarily used for agriculture (see Section 4.2 for more information on farmlands). The area is planned to be developed into urban land uses, and the Project will support these development plans.

Waipahu

The project alignment follows Farrington Highway through the Waipahu neighborhood. The area is urbanized, with land uses along the highway consisting primarily of commercial uses, strip retail plazas, and both mid-rise and medium-density apartments. The Koko Head end of Farrington Highway in Waipahu consists mostly of single-family housing but also includes Waipahu High School. Most of the residential communities are oriented away from this heavily traveled roadway. Because Farrington Highway functions as both a major arterial and collector road, and varies in width from four to six lanes with a landscaped median, the transit facility will not create an access or transportation barrier between the makai and mauka sides of the road. As an elevated structure, which will span all intersections, it will not prevent pedestrians and motorists from

conducting their normal travel patterns within the community. Potential redevelopment along the project alignment, and in particular at the station locations, may represent an asset to the neighborhood by providing new resources and an accessible transit option.

Pearl City

The project alignment extends through the Pearl City neighborhood, along the median of Kamehameha Highway, a heavily traveled roadway with adjacent multi-story commercial uses near the Pearl Highlands Station. The surrounding residential uses will not be affected by property acquisitions and, being located within the highway median, the Project will not form a barrier to adjacent residential communities as residences are oriented away from the highway. In addition, being an elevated structure, the transit system will not create a physical barrier to pedestrians or other forms of travel within the community. The Project will not affect community identity or cohesion as the transit system will be compatible with the existing community character along the alignment. The Project will impact the Banana Patch community, which is discussed in Section 4.7.

'Aiea

The route through the 'Aiea neighborhood continues to follow Kamehameha Highway, and the effects will be very similar to those described for the Pearl City and Waipahu neighborhoods. Most of the residential areas are mauka of Kamehameha Highway with land uses makai of the highway being primarily commercial or military. As such, the Pearlridge Station will not create a barrier to adjacent communities nor will it limit pedestrian or other travel modes within these communities. As the transit route passes Aloha Stadium, there are very few buildings adjacent to the alignment due to the expanse of the stadium parking. Few residential communities are located nearby.

Airport

The Project will travel along busy, heavily traveled Kamehameha Highway and enter the Airport on Aolele Street. The neighborhood is primarily characterized by military and industrial uses and Honolulu International Airport. Most of the residential land uses are mauka of the Nimitz Viaduct. The Project will require acquisition of some businesses on Ualena Street and Waiwai Loop and no changes in current land uses. The guideway is not expected to be a visual or physical barrier in the neighborhood and will not affect community identity or cohesion.

Kalihi-Palama

The Project through the Kalihi-Palama neighborhood follows Dillingham Boulevard. The boulevard is a major arterial that travels through smaller, well-established residential communities, but also functions as a major collector for neighborhood circulation. Small-scale commercial businesses and a few historic land uses line the boulevard. Dillingham Boulevard is a much narrower roadway than either the Farrington or Kamehameha Highways. As a result, the Project will require widening the roadway to maintain the same number of travel lanes while accommodating the guideway's support columns. Several true kamani trees will also be removed by the Project. Impacts will occur to historic properties, as discussed in Section 4.16.

Downtown

The Project will continue through the Downtown neighborhood within the median of Nimitz Highway. This highway is similar to Farrington and Kamehameha Highways as it is a heavily traveled roadway with limited cross traffic. As such, the highway already represents a physical barrier to the neighborhoods on each side. The Project will not create a new barrier or affect the physical character of adjacent communities. Within the Downtown area, the Project will pass the historic districts of Chinatown and Merchant Street. Nimitz Highway is located along the perimeter of

these two districts between the Downtown uses and Honolulu Harbor; therefore, the transit system will have little effect on their uses. However, it will contrast with their historic character. As the alignment transitions to Halekauwila Street, a relatively narrow city street, the adjacent buildings become primarily mid-rise government office buildings with little or no open space between them. Views of the alignment will be limited to short segments as the guideway crosses city streets since high-rise buildings and tall trees already obstruct views. The transit system will be elevated so it will not affect the flow of traffic, bicyclists, or pedestrians within the Downtown neighborhood.

Ala Moana and Kaka'ako

The Project will extend to Ala Moana Center traveling mostly along Halekauwila and Kona Streets. The transition between these streets will require property acquisitions and displacements. Land uses adjacent to the alignment include two- and three-story walk-up apartments and commercial uses within the Kaka'ako area and newer urban mixed-use development within the Ala Moana area. In general, land uses are less dense than in the Downtown neighborhood. Kaka'ako has been designated a redevelopment area, which may result in a change in character along the Project alignment. However, substantial development has recently occurred in the neighborhood; several high-rise condominium developments have been built, and additional residential and commercial developments are planned. The elevated transit structure will not create a barrier to pedestrian or other modes of travel.

Mitigation

Since there will be no adverse effects to these neighborhoods, no mitigation is required. Ongoing coordination efforts with the public will help develop design measures that will enhance the interface between the transit system and the surrounding community.

4.7 Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (USEO 1994) was signed by President Clinton on February 11, 1994. This Executive Order directs Federal agencies to take appropriate and necessary steps to identify and address disproportionately high and adverse effects of their projects on the health or environment of minority and low-income populations to the greatest extent practicable and permitted by law. The order directs Federal actions, including transportation projects, to use existing law to avoid discrimination on the basis of race, color, or national origin and to avoid disproportionately high and adverse impacts on minority and low-income populations. These are often referred to as environmental justice (EJ) populations.

There are three fundamental EJ principles:

- To avoid, minimize, or mitigate disproportionately high and adverse human health or environmental effects, including social and economic effects, on minority populations and low-income populations
- To ensure the full and fair participation by all potentially affected communities in the transportation decision-making process
- To prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority populations and low-income populations

Executive Order 12898 requires all Federal agencies to incorporate EJ into their missions by identifying and addressing disproportionately high and adverse human health or environmental effects of their programs and policies on minorities and low-income populations and communities. A “disproportionately high and adverse effect” is defined as follows:

Disproportionately High and Adverse Effect on Minority and Low-Income Populations means an adverse effect that:

- (1) is predominately borne by a minority population and/or a low-income population; or
- (2) will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population. (USDOT Order 5610.2).

The EJ analysis for the Project identifies O‘ahu Metropolitan Planning Organization (O‘ahuMPO) EJ Areas within the study corridor and presents the impact determinations regarding the likelihood that disproportionately high and adverse impacts will be experienced in those areas. This section discusses potential measures to avoid, minimize, and/or mitigate those impacts to EJ populations and documents the Project’s public outreach efforts to EJ communities. For more detailed information and references, see the *Honolulu High-Capacity Transit Corridor Project Neighborhoods and Communities Technical Report* (RTD 2008d).

4.7.1 Background and Methodology Regulatory Context

The principles of EJ are rooted in Title VI of the *Civil Rights Act of 1964*, which prohibits discrimination on the basis of race, color, and national origin in programs and activities receiving Federal financial assistance. Additional laws, statutes, guidelines, and regulations that relate to EJ issues include the following:

- Title 49 of the United States Code Section 5332 (49 USC 5332), *Mass Transportation* (USC 1994)
- Title 49 of the Code of Federal Regulations Part 21 (49 CFR 21), *Nondiscrimination in Federally Assisted Programs of the Department of Transportation—Effectuation of Title VI of the Civil Rights Act of 1964* (CFR 1996d)
- Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority*

Populations and Low-Income Populations (USEO 1994)

- *Environmental Justice Guidance Under the National Environmental Policy Act* (CEQ 1997b)
- *USDOT Order to Address Environmental Justice in Minority Populations and Low-Income Populations* (USDOT 1997)
- *FHWA Actions to Address Environmental Justice in Minority Populations and Low-income Populations* (FHWA 1998)
- *Hawai‘i Revised Statutes (HRS) Chapter 368, Hawai‘i Civil Rights Commission (HRS 1989)*
- *Executive Order 13166, Improving Access to Services for Persons with Limited English Proficiency* (USEO 2000)
- *Americans with Disabilities Act of 1990* (ADA 1990)
- *Hawai‘i Environmental Justice Initiative Report* (HEC 2008)

Methodology

This analysis identifies potential effects on minority and low-income populations that reside within the study corridor. The effects of the Project on identified O‘ahuMPO EJ Areas were analyzed as follows:

- How well the Project will serve the transportation needs of the identified EJ populations and communities of concern in comparison to all other population groups within the study corridor
- Whether the effects of the Project (e.g., construction, visual, noise) will have disproportionately high and adverse effects on the social, cultural, health, and well-being of the identified EJ populations and communities of concern as compared to other population groups within the study corridor

Defining Environmental Justice Areas

USDOT Order 5610.2 and subsequent agency guidance defines the term “minority” to include any individual who is Black, Hispanic, Asian-American

(Asian), American Indian or Alaska Native, or Native Hawaiian or Other Pacific Islander. Based on guidance from the Federal Council on Environmental Quality (CEQ), “minority populations should be identified where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than the minority population percentage in the general population or other appropriate unit of geographic analysis” (CEQ 1997b).

The term “low-income,” in accordance with USDOT Order 5610.2 and agency guidance, is defined as a person with a household income at or below the U.S. Department of Health and Human Services (USHHS) poverty guidelines. These poverty guidelines are a simplified version of the Federal poverty thresholds used for administrative purposes (e.g., for determining financial eligibility for certain Federal programs). The U.S. Census Bureau has developed poverty thresholds, which are used for calculating all official poverty population statistics. The Census Bureau applies these thresholds to a family’s income to determine its poverty status.

O‘ahu, however, has unique demographic characteristics because minorities make up the majority of the population. Because of this racial and ethnic diversity, the O‘ahuMPO developed a method to define O‘ahuMPO EJ Areas that are more meaningful to the demographics of the island. O‘ahuMPO EJ Areas are defined as areas where the minority or low-income population concentration is meaningfully greater than the surrounding population.

Using 2000 Census data, O‘ahuMPO’s analysis uses the Federal definition of minority as well as the “poverty thresholds” as defined by the Census Bureau. Rather than relying on EJ definitions that are less meaningful to O‘ahu’s unique demographic composition, O‘ahuMPO’s method normalizes census block group data so that basic statistical

measures can be applied. The method relates the relative concentration of a minority group or low-income households within a census block group to the total population within the census block group. A block group qualifies as EJ if the relative frequency of one or more minority groups or low-income households was in the highest 16 percent (greater than one standard deviation) of frequencies across the island. Block groups were then assembled into the O'ahuMPO EJ Areas (O'ahuMPO 2004) (Figure 4-14). These data are presented in Section 4.7.2.

Coordination with the City and County of Honolulu Department of Transportation Services (DTS), DPP, HDOT, FTA, and the U.S. Environmental Protection Agency (EPA) resulted in the determination that the O'ahuMPO method for determining O'ahuMPO EJ Areas was appropriate for the Project. Therefore, EJ populations for this Project consist of low-income and/or minority populations that are within the O'ahuMPO EJ Areas.

Communities of Concern

In addition to minority and income status, other data were used as additional indicators of communities of concern, including linguistically isolated households, transit-dependent populations, and areas with public housing and community services. The U.S. Census Bureau defines a *linguistically isolated household* as a household in which all members age 14 or over speak English less than "very well." Block groups with 25 percent or more of households with no vehicle or with 21 percent or more linguistically isolated households are included in the areas designated as communities of concern and are illustrated on Figure 4-15. These criteria serve to further identify potentially transit-dependent populations but are not included in the definition of EJ populations. Data on communities of concern also serve to direct public outreach efforts. In addition to the census data, field surveys, data gathered for other projects within the study corridor, and on-going public involvement

activities were used to assist in identification of communities of concern.

4.7.2 Affected Environment

Figure 4-14 shows the areas that have met the O'ahuMPO EJ threshold that are within one-half mile of the project alignment. Figure 4-15 shows areas identified as containing communities of concern. As described in Section 4.6, the physical, social, and economic characteristics across and within each neighborhood vary, including the racial, ethnic, and economic composition of the population. The demographics of the neighborhood areas are also described in Section 4.6.

Table 4-8 lists each of the O'ahuMPO EJ Areas illustrated in Figure 4-14, with the demographic data from the 2000 census. It shows there is considerable ethnic and racial diversity along the project alignment.

Banana Patch Community

Through public involvement activities, a previously unidentified minority EJ area was identified. The Banana Patch community is not an O'ahuMPO EJ Area. The Banana Patch, or lower Waiawa, is located along the border of the Pearl City and Waipahu neighborhoods. It is bounded by Kamehameha Highway mauka, Farrington Highway makai, and the H-1 Freeway 'Ewa. Neither the Pearl City nor the Waipahu neighborhoods were identified as EJ Areas using the O'ahuMPO method. However, the Banana Patch area was identified as a minority EJ area after outreach in July 2008 revealed that all residents who will be relocated as a result of the Project belong to a minority group. No other previously identified EJ Areas were identified.

The Banana Patch community is located in Census Tract 80.01 Block Group 2, Block 2001, and Census Tract 87.01 Block Group 2, Block 2001. Some of the land in Census Tract 87.01 is used for construction equipment storage. There are no residences in this

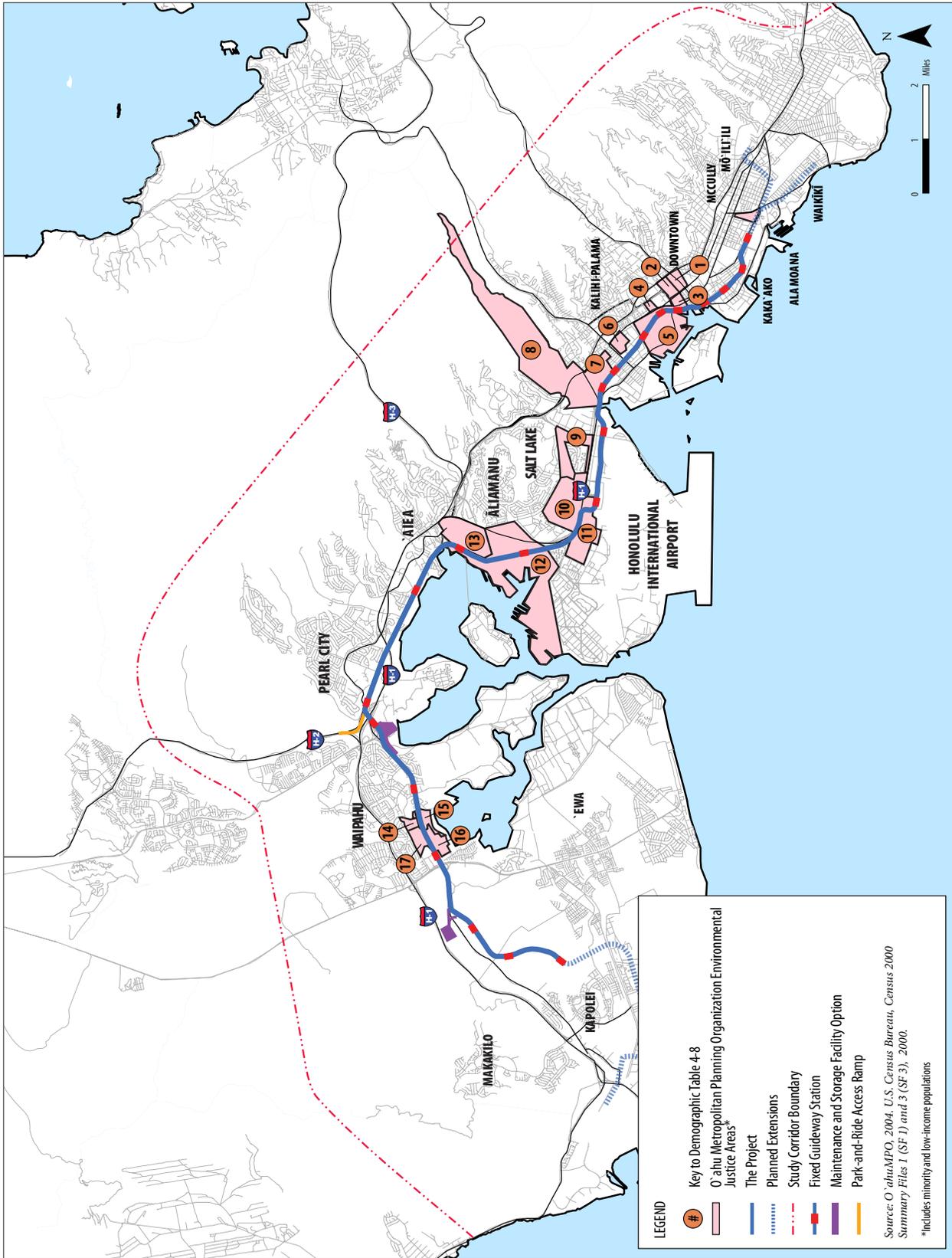


Figure 4-14 Environmental Justice Populations within the Study Corridor

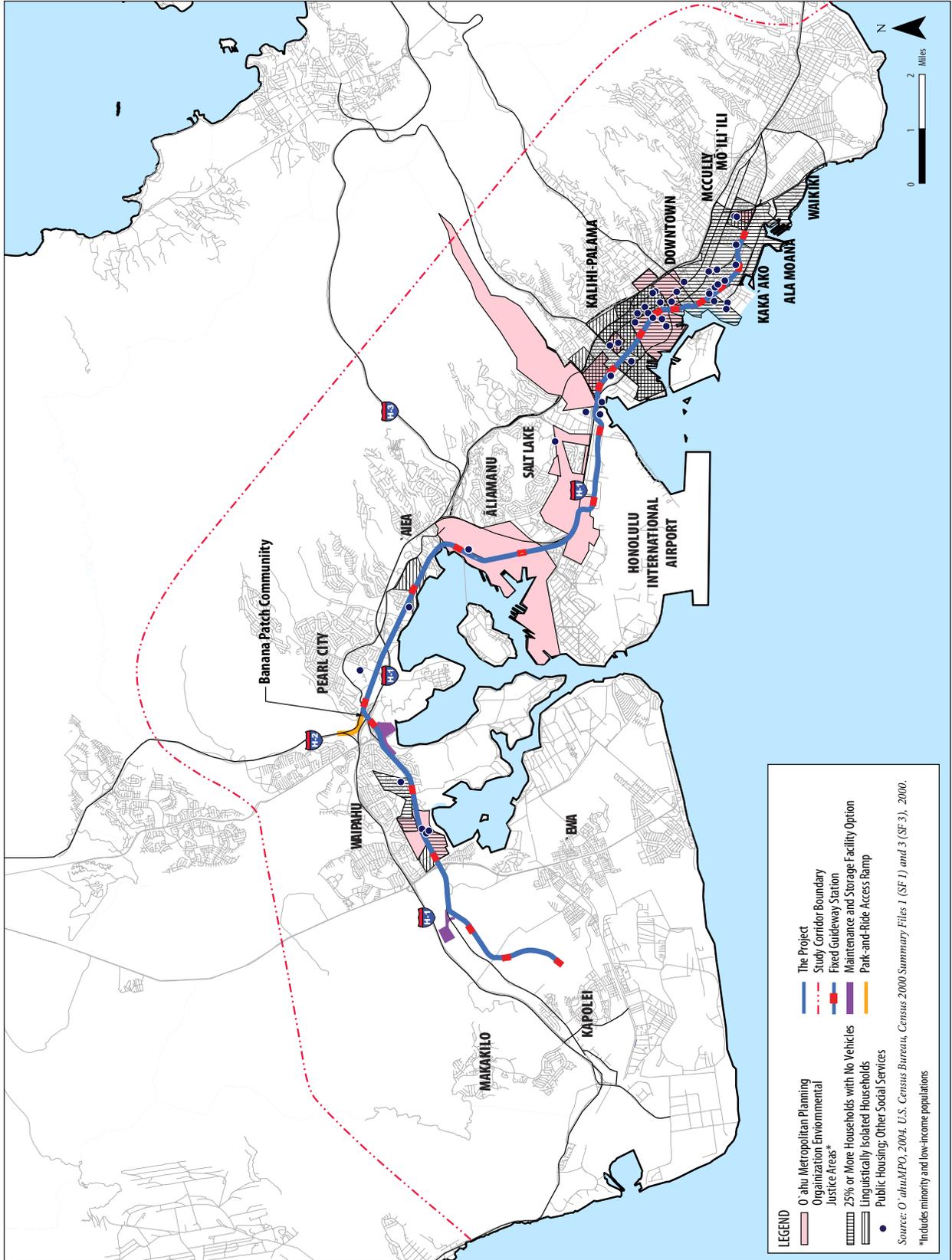


Figure 4-15 Communities of Concern within the Study Corridor

Table 4-8 Demographic Characteristics of O`ahuMPO Environmental Justice Areas

O`ahuMPO EJ Area (illustrated on Figure 4-14)	% White	% Black	% American Indian or Alaska Native	% Asian	% Native Hawaiian or Pacific Islander	% Hispanic	Low Income?
1	23	1	0	57	4	3	Yes
2	14	0	1	75	2	3	Yes
3	11	2	0	69	6	5	Yes
4	1	1	0	53	23	5	Yes
5	17	5	0	43	16	7	Yes
6	4	1	0	46	18	14	Yes
7	6	1	0	62	13	6	No
8	60	20	1	6	2	11	No
9	62	11	1	13	1	11	No
10	60	10	1	14	1	7	No
11	58	15	1	9	3	11	No
12	63	16	1	11	1	6	No
13	7	1	0	33	27	13	Yes
14	3	1	0	25	49	5	No
15	5	2	0	19	50	8	Yes
16	4	1	0	23	43	11	No
17	7	2	0	54	18	10	No

Source: O`ahuMPO, 2004. U.S. Census Bureau, Census 2000 Summary Files 1 (SF 1) and 3 (SF 3), 2000.

portion of the Banana Patch. However, approximately 10 residential structures and the Alpha Omega Christian Fellowship Church are located within Census Tract 80.01. According to the 2000 Census, approximately 55 persons who identified themselves as Asian reside in this area. As such, the census block that encompasses the Banana Patch residential community is 100 percent minority. Because income data are not available at the census block level, income determinations cannot be made.

Other characteristics of the community stand out. Several parcels within the Banana Patch area have multi-generational families living in one or more dwelling units on the property. In some instances, the structures have been substantially altered to provide the multi-generational housing.

The residents do not have access to public water and sewer services. In addition, the community is unique in that it is located in an urban region but some residents maintain an agricultural lifestyle. While farming does not appear to be the primary source of employment or income for community residents, it is a part of household income for some of the families.

4.7.3 Environmental Consequences *No Build Alternative*

Under the No Build Alternative, the Project would not be built and would not have any impacts to O`ahuMPO EJ Areas or populations. However, some populations, such as transit-dependent and low-income, may continue to be underserved. Although the projects in the ORTP will be built,

their environmental impacts will be studied in separate documents.

Project

As a result of public outreach efforts, this EJ analysis, and the analyses presented throughout Chapter 4, the following have been identified as areas of particular concern for EJ populations:

- Impacts from right-of-way acquisition
- Impacts to community cohesion
- Impacts to social and cultural resources
- Visual quality impacts
- Noise and air quality impacts
- Traffic and transportation impacts
- Short-term construction impacts

Section 4.4 discusses right-of-way acquisitions. There are approximately 780 parcels adjacent to the project alignment. The City will acquire partial or full right-of-way from 24 percent of the parcels adjacent to the alignment. Of this 24 percent, 22 percent lie within O'ahuMPO EJ Areas. This demonstrates that the relative proportion of the right-of-way acquisitions inside the O'ahuMPO EJ Areas is less than the Project as a whole. Therefore, there are no disproportionately high and adverse effects on O'ahuMPO EJ Areas for the Project.

Sections 4.5 and 4.6 discuss potential effects on social and community cohesion and community facilities. Because the Project will be constructed primarily within an existing transportation corridor in developed areas, it will not physically divide or bisect any communities beyond existing conditions or the No Build Alternative. Therefore, there will be no adverse effect on community cohesion in O'ahuMPO EJ Areas. Unlike freeways with restricted access, vehicular and pedestrian access to areas along the project alignment will not be restricted by the Project.

Section 4.8 discusses visual impacts from the Project. Examples of visual impacts include loss of trees, altered 'Ewa-Koko Head and mauka-makai

views, and inconsistent scale and context of setting. The Project is set in an urban context where visual change is expected and differences in scales of structures are typical. Moderate to high visual impacts will occur throughout most of the study corridor. There will not be any disproportionately high and adverse effects in O'ahuMPO EJ Areas.

The air quality analysis described in Section 4.9 indicates a net improvement in air quality by 2030. O'ahuMPO EJ Areas will not experience any disproportionately high and adverse impacts to air quality.

Section 4.10 discusses potential noise impacts that could occur along the project alignment. The noise analysis indicates there will be no severe noise impacts caused by the Project, although moderate impacts will occur in three areas. These noise impacts will occur outside of O'ahuMPO EJ Areas.

Section 4.16 indicates the Project will result in 33 adverse effects on historical resources. None of these occur in O'ahuMPO EJ Areas. Overall, the Project will have few effects on social or community facilities within O'ahuMPO EJ Areas. While there will be partial acquisition of some community facilities, there will not be any disproportionately high and adverse effects to resources of special importance to EJ populations within O'ahuMPO EJ Areas.

The effects of construction within the study corridor are discussed in Chapters 3 and 4. Section 3.5, Construction-related Effects on Transportation, discusses traffic-related impacts during construction, including road closures and rerouting, sidewalk and bike lane closures and rerouting, and bus stop closures. Section 4.18 discusses construction impacts, including those related to relocations; noise and dust generated by construction vehicles and activities; and visual disruption associated with large equipment use and storage, work-site screening, and removal of vegetation or structures.

These construction effects will be temporary, and measures to mitigate or minimize temporary construction impacts will be implemented. Construction activities will occur throughout the study corridor and will affect both O'ahuMPO EJ and non-EJ Areas alike. Therefore, there will be no disproportionately high and adverse impacts on O'ahuMPO EJ Areas.

Effects of the Project also will result in benefits to transit users. These benefits include increased transit options, improved mobility, proximity to transit links, and access to expanding employment opportunities. As Chapter 3 illustrates, traffic and transit performance will improve within the study corridor, and these benefits can be realized by all populations. There are 21 stations proposed for the Project. Nine are in, or adjacent to, O'ahuMPO EJ Areas. Therefore, people living in O'ahuMPO EJ Areas will have the same opportunity to access the transit and mobility improvements.

Based on the demographics within the study corridor, the need for public transit appears to be greatest within the project alignment. Transit service is meant to serve where the demand is greatest, and these areas are often within neighborhoods that have O'ahuMPO EJ Areas and communities of concern. Although populations adjacent to the alignment will be affected the most by operational and construction-related impacts, these groups include O'ahuMPO EJ and non-EJ Areas, and they will also receive improved transit access. Effects will be the same for all population groups and will not represent a high or disproportionate impact to residents in O'ahuMPO EJ Areas or communities of concern.

Public Outreach

During the public outreach effort for the Project, particular attention has been paid to identifying and reaching low-income and minority populations that are traditionally underserved and underrepresented in the public involvement process.

This is in accordance with Executive Order 12898 and the O'ahuMPO Public Participation Plan (O'ahuMPO 2004). Materials have been prepared in the major languages of O'ahu, and translators have been available upon request at meetings. Information has been distributed through cultural organizations, ethnic associations, housing associations, community development groups, and similar organizations. Community issues brought forth in community meetings, stakeholder interviews, and at public workshops were addressed as part of evaluating the Project.

To reach populations that do not speak or read English, information on how to obtain reading materials in native languages has been provided. Project flyers containing information about the scoping meetings and Draft EIS public hearings were printed in 11 languages (English, Chinese, Japanese, Korean, Vietnamese, Tagalog, Ilocano, Samoan, Spanish, Hawaiian, and Chuukese) and placed at several local churches, health centers, and local civic and ethnic organizations. The project website was updated as new project information became available. Information concerning upcoming public meetings regarding the Project was distributed periodically by "walkers" in several of the O'ahuMPO EJ Areas. Important project notifications were placed in local ethnic and cultural newspapers, including the following:

- *Hawai'i Hochi*
- *Korean Times*
- *Filipino Chronicle*
- *Korean Times*
- *Ka Nūpepa*
- *Fil-Am Courier*
- *Ka Wai Ola*

In addition to sending flyers to all addresses on the project mailing list, an effort was made to distribute information to non-native English speakers in their appropriate languages. This action consisted of sending information to local churches and com-

munity service organizations that may have access to EJ populations and communities of concern.

An effort was made to reach out to local churches, elderly care, and community organizations through the efforts of the Speakers Bureau. Thirty-nine Speakers Bureau presentations were given to senior care facilities and local ethnic organizations, as well as organizations that serve the disabled and low-income communities.

Community updates were held in or near communities of concern, including at Waipahu Elementary School, Alvah Scott Elementary School, Radford High School, and Farrington High School. Community updates were conducted at major project milestones. Presentations were given at senior living facilities throughout the study corridor.

Communications with Native Hawaiian groups have also identified potential concerns regarding impacts to burials, native Hawaiian landscapes, and indigenous flora and fauna. Communications with Hawaiian civic groups, recognized community leaders, and community organizations have increased as project information has become available, and this will continue throughout the process.

Public involvement efforts to work with EJ populations, the elderly, and communities of concern will continue throughout the design and construction of the Project.

Strategic Outreach during the Draft EIS

Comment Period

Outreach activities were performed to promote the maximum participation by, and awareness of, the Project and the availability of the Draft EIS to stakeholders in O'ahu MPO EJ Areas and communities of concern.

A project information postcard was developed and mailed within three days of release of the Draft EIS to social services, public housing units, and

churches within one-half mile of the project alignment. Some of the social service providers included the Pacific Gateway Center, Kalihi-Palama Center, Mayor Wright Housing, Hale Pauahi, Chinatown Gateway residences, Kūhiō Park Terrace, Kamehameha IV Housing, and Federated States of Micronesia Consulate. The postcard alerted readers to the release of the Draft EIS and presented information about how to comment on the document.

Public Hearings

Draft EIS public hearings were held at the following locations in or adjacent to communities of concern:

- Downtown—transit-dependent, December 8, 2008, 777 Ward Avenue, Blaisdell Center
- Waipahu—adjacent to transit-dependent and linguistically isolated, December 10, 2008, 94-428 Mokuola Street, Waipahu
- Kalihi—linguistically isolated, December 11, 2008, 1525 Bernice Street

Multi-language Outreach

Information about the Project, the Draft EIS, and the beginning of the comment period was translated into 11 languages common to cultural groups that had been identified as EJ populations in the project corridor (English, Chinese, Japanese, Korean, Vietnamese, Tagalog, Ilocano, Samoan, Spanish, Hawaiian, and Chuukese) in the form of flyers, ads, and other mediums. The translations provided a short summary of project highlights, a summary of the purpose and topics included in the Draft EIS, and information on how to comment on the Draft EIS. The translated material also included a listing of all public hearing dates, times, and locations in English.

Distribution of the translated material was a critical element of the outreach in EJ Areas and to communities of concern. Efforts included distribution of flyers to the Chinese Chamber of Commerce and businesses in Chinatown, Kalihi, and along the Dillingham Boulevard corridor and dissemination

through business networks and to customers. To effectively reach the Vietnamese community, flyers were given to church leaders at St. Theresa's Catholic Church to distribute to their communities. The owner of Duc's Bistro, a Vietnamese restaurant in Chinatown, facilitated the distribution of 150 flyers in Vietnamese to the community through his business contacts.

For communities with radio media, paid radio advertisements were aired during peak commute and listening hours in the morning and afternoon. Three ethnic radio stations aired the advertisements: KZOO, a Japanese station; Radio Korea, a Korean station; and KNDI, which broadcasts in many languages, such as Filipino dialects (Tagalog and Ilocano), Chinese dialects (Cantonese and Mandarin), Vietnamese, and Spanish.

Bus Advertisements

An advertisement was placed in TheBus for two months that notified the transit-dependent community regarding release of the Draft EIS and how to comment on it. The advertisement included a map of the project alignment, encouragement to provide comments, and information on how to make comments. The advertisement was posted in the entire active bus fleet of 528 vehicles during the comment period through December 2008 and January 2009.

Military

Military communities are within the O'ahuMPO EJ Areas. To ensure these communities were engaged with the Draft EIS process and aware of the comment period, paid advertisements were placed with local military specialty newspapers—*The Hawaii Army Weekly*, *Navy News*, and *Hickam Kukini*. A special press release requesting Draft EIS comments from members of the military community was released to these same newspapers.

Mitigation

While the Project will not result in disproportionately high and adverse impacts within O'ahuMPO EJ Areas, the Banana Patch community will be affected, and residents and the church will be relocated in compliance with the Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act*.

4.7.4 Environmental Justice Determination

The EJ analysis below examines both the O'ahuMPO EJ Areas, as well as one specific EJ area of concern—the Banana Patch community.

Environmental Justice Finding with Respect to O'ahuMPO EJ Areas

No minority or low-income communities consistent with the O'ahuMPO EJ Areas were identified to have potential disproportionately high and adverse effects in either the analysis of the Project or as a finding of the public outreach activities. As a result, no additional special measures were required by the USDOT Order on Environmental Justice (USDOT 1997).

Environmental Justice Finding with Respect to the Banana Patch Community

The Pearl Highlands Station will be located immediately Koko Head of the Banana Patch. The parking facility and approach roads will be located in the Banana Patch. The Project will displace this small community. In total, the Project will displace 14 residences, 1 business, and 1 church. Because the Banana Patch community was identified as an EJ area of concern, special strategic outreach was conducted to involve the community in the public decision-making process and to better understand the community's views of the potential impacts and mitigation measures.

Strategic Outreach for the Banana Patch during the Draft EIS Comment Period

The City has been coordinating with residents of the Banana Patch community since October 2008.

Every household has been visited by City staff, right-of-way staff, and engineering staff to discuss the Project, as well as special needs and relocation assistance for residents who will be displaced.

A special community meeting was held at the Alpha Omega Christian Fellowship Church on January 24, 2009. Invitations were sent to each Banana Patch community household. At this meeting, a brief presentation was given on the Project and public testimony was recorded by a court reporter. A complete transcript is included in Appendix A, Comments Received on the Draft Environmental Impact Statement and Responses, of this Final EIS.

Several key comments were raised at this community meeting. Mostly, residents were interested in learning more about the right-of-way acquisition process. Residents asked when acquisition might occur, how their property would be appraised, and how soon they might receive compensation, since it appeared that housing prices were currently declining in the area. As such, residents of the community did not object to being relocated to decent, safe, and sanitary housing in compliance with the Federal *Uniform Relocation Assistance and Real Property Acquisition Policies Act*. Nor was there concern expressed about keeping the community intact for relocation purposes.

At the time the Draft EIS was published, community cohesion was assumed to be a concern of the residents of the Banana Patch. After meeting with the residents of this community, the City learned that the residents were primarily interested in the right-of-way acquisition process and relocation issues. Therefore, community cohesion as an issue for the Banana Patch community was removed from this Final EIS as a concern.

Environmental Justice Finding

Because the Banana Patch community is made up of people of Asian descent, it was identified as an

EJ area of concern. Because the Pearl Highlands Station will displace this community, the location of the station and associated facilities was examined under the USDOT Order on Environmental Justice (USDOT 1997).

First, the need for the station was examined. Analysis showed that the Pearl Highlands Station is projected to have the second highest passenger volume of all of the project stations. It will serve as the transfer point for all users in Central O'ahu, whether they drive to the station or transfer from TheBus. The transit center and park-and-ride facility will provide easy access to the fixed guideway transit system from the H-1 and H-2 Freeways, Kamehameha Highway, and Farrington Highway. The station location will provide the most convenient access to the transit system for residents of Central O'ahu. As such, there is a substantial need for the Pearl Highlands Station.

Second, two alternatives to the guideway and highway ramp alignments, station locations, and park-and-ride locations for the Pearl Highlands Station were evaluated to assess feasibility. One alternative would move the park-and-ride to Leeward Community College. This modification of the station layout would require a number of changes. The H-2 Freeway access ramp would need to be redesigned from a one-way ramp to a two-way ramp. The access road for Leeward Community College would require improvement. In addition, the guideway's crossing of the H-1 Freeway would need to be realigned. Additional right-of-way would need to be required from the Hawai'i Laborers Training Program site Koko Head and makai of the ramp connecting Farrington Highway to Kamehameha Highway. The existing parking for the college would need to be replaced. The net increase in cost for this alternative would be approximately \$90 million.

The second alternative considered moving the park-and-ride to the Hawai'i Laborers Training

program site. This change would prevent the placement of a track switch to access the maintenance and storage facility site near Leeward Community College in the Koko Head direction, which would make this maintenance and storage facility site impractical. Both directions of the H-1 Freeway would need to be spanned with a single guideway approximately 300 feet in length. A longer access ramp from the H-2 Freeway would be required, and access roads would be needed. There would be additional land improvement, right-of-way, relocation, and park-and-ride structure costs. The net increase in cost for this alternative would be more than \$63 million.

In conclusion, relocating the park-and-ride facilities under either of the two alternatives would provide less efficient transportation access and circulation to the park-and-ride. Moreover, displaced residents of the Banana Patch community did not voice opposition to the Project, did not express concern about the adverse effects, and appeared satisfied with mitigation measures with regard to relocation. As such, the Project will not result in disproportionately high and adverse impacts to the Banana Patch community.

4.8 Visual and Aesthetic Conditions

This section describes the existing landscape's character and quality and discusses the Project's potential visual effects. It discusses potential mitigation measures, including ways to avoid or minimize effects on visual quality and restore or enhance visual quality.

The Project's potential effects include removing trees, altering 'Ewa-Koko Head and mauka-makai views, blocking some views, and introducing project components that are out of scale or character with their setting. Potential effects consider viewer response to project changes, new light and shadow sources in sensitive areas, and effects on views designated in policy documents. The viewpoints

and view direction are identified in Figure 4-16. For additional information and references, see the *Honolulu High-Capacity Transit Corridor Project Visual and Aesthetics Resources Technical Report* (RTD 2008e).

4.8.1 Background and Methodology

City policy documents and ordinances include provisions for protecting, enhancing, and developing resources related to the visual integrity and quality of communities and areas covered by these plans. The following plans include objectives related to the visual environment and identify key views within their plan areas:

- *City and County of Honolulu General Plan* (as amended) (DPP 2002a)
- *'Ewa Development Plan* (DPP 2000)
- *Central O'ahu Sustainable Communities Plan* (DPP 2002b)
- *Primary Urban Center Development Plan* (DPP 2004a)
- *'Aiea-Pearl City Livable Communities Plan* (DPP 2004b)
- *Waipahu Livable Communities Initiative* (DPP 1998a)
- *Waipahu Town Plan* (DPP 1998b)
- *Coastal View Study* (DLU 1987)

Special District Regulations in Chapter 21 of the Revised Ordinances of Honolulu (ROH) (ROH 1978a) include policies that safeguard special features and characteristics of particular districts to allow for their preservation and enhancement. Special districts that may be affected by the Project include Hawai'i Capitol (Section 21-9.30), Punchbowl (Section 21-9.50), and Chinatown (Section 21-9.60). The *Coastal View Study* (DLU 1987) supports the goals and objectives of SMA regulations, which include shaping development along the scenic coastal highways throughout Wai'anae, North Shore, Windward, and Koko Head areas.

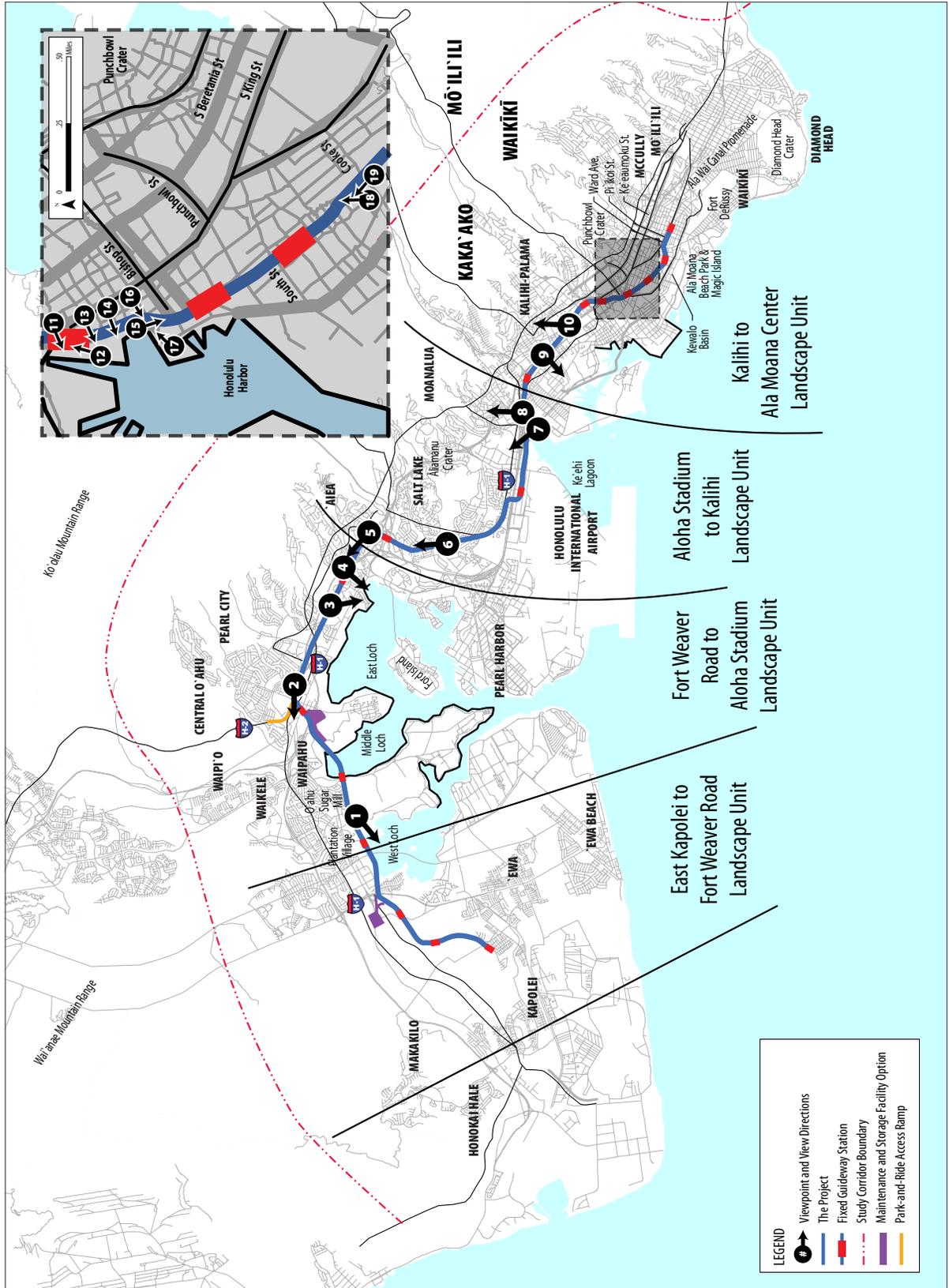


Figure 4-16 Visually Sensitive Resources and Representative Viewpoints within the Project Corridor

Visual assessment for the Project follows USDOT guidance. Although this guidance was developed for highway projects, it was used because the Project is a linear transportation facility and the FTA has not issued guidance specific to transit projects. DPP and other interested groups (e.g., the Outdoor Circle, Scenic Hawai‘i, Inc., the Honolulu Chapter of the American Institute of Architects) also provided data or input. The major components of the visual assessment process included the following tasks:

- Establishing the affected environment—this includes identifying visually sensitive resources, such as landmarks, significant views and vistas, and view corridors
- Describing and assessing the affected environment’s character and quality
- Determining major viewer groups that have views to and from the project alignment
- Evaluating views that will be interrupted by the facility and views from the facility, including viewer group response
- Describing visual effects that will occur—this includes the change in visual character and view plane changes plus the viewer group response
- Developing measures to mitigate the Project’s significant impacts

4.8.2 Affected Environment

The visual environment that will be affected by the Project includes areas that will have a view of the Project, areas visible from the corridor, and views that the Project could affect or create.

The Wai‘anae and Ko‘olau Mountain Ranges and the coastline are visible from most of the project corridor along Farrington Highway, Kamehameha Highway, and the H-1 Freeway. The integrity of these landforms and the condition of public open spaces are important factors in determining visual character and quality.

Within coastal areas, the most scenic views are often captured when looking laterally along the coastline. These views capture the contrast between ocean and land form, usually in a distinctive visual pattern. Views at a strict 90-degree angle from the shoreline (e.g., along roadway corridors) are generally flat and uniform.

Viewer Groups

Major viewer groups within the project corridor include residents, commuters, business owners, recreationists, and visitors. *Residents* are people who observe the visual environment daily and for extended periods. *Commuters* are those who frequently travel through an area and, therefore, are familiar with the existing visual environment. However, this group may not have the same sense of ownership as residential viewer groups because they do not reside within that environment but only pass through it. *Business owners* have a vested interest in the visual environment surrounding their operations. Most business owners are familiar with their surrounding environment and may have a sense of ownership. *Recreationists* include people who frequent local parks, hiking trails, bikeways, and watercourses. They have definite expectations about the visual environment’s condition. Visitors consist of both first-time and repeat visitors to the area. *Visitors* may consist of tourists, delivery or service personnel, or business employees and customers. This viewer group is less familiar with the existing visual environment’s specific details, but they tend to have some sensitivity to and expectation of the surrounding environment.

Visually Sensitive Resources

Visually sensitive resources in the study corridor include landmarks, significant views and vistas, historic and cultural sites, and Exceptional Trees. These resources are important because of their scenic quality, scale, and prominence within the visual environment and have been identified as such. Cultural and historic sites are discussed in

Section 4.16, and Exceptional Trees are discussed in Section 4.15.

Landmarks, such as parks or open spaces, represent unique characteristics of a place or provide great value to local residents and visitors. Landmarks are also places or structures that have a unique style based on their architectural period, artistic merit, and the intrinsic qualities of Hawai‘i. Landmarks represent the heart of a community and the people affected by events that occurred. Pearl Harbor is considered a historical landmark because of the part it played in the island’s history.

Protected views and vistas are identified in policy documents that govern the project corridor and include protected mauka and makai views, as well as views of prominent landmarks. These policy documents include the following:

- *‘Ewa Development Plan*
- *Central O‘ahu Sustainable Communities Plan*
- *Primary Urban Center Development Plan*

The protected views and vistas are identified in Figures 4-17 to 4-19. These figures are included in the Visual and Aesthetics Resources Technical Report (RTD 2008e) and were used in the preparation of the Draft EIS. They were included in the Final EIS based on comments received on the Draft EIS.

Landscape Units are geographic areas where views of the Project would have a similar context or character.

The Project’s visual environment changes from rural in the Wai‘anae end of the corridor to dense high-rise development at the Koko Head end. The visual analysis considers the corridor in the following four landscape units, each of which is incrementally more urbanized (Figure 4-16).

East Kapolei to Fort Weaver Road Landscape Unit

This landscape unit extends from East Kapolei to Fort Weaver Road and includes the communities

of Kapolei and ‘Ewa. Much of O‘ahu’s current and future population growth is expected to take place in this area, but it is still relatively rural and most of the area currently consists of agricultural cultivation and open space. Views across the ‘Ewa Plain are still relatively open, allowing for mountain and ocean vistas as well as distant views of Downtown high-rises. Protected views and vistas (Figure 4-17) in this landscape unit are identified in the *‘Ewa Development Plan* (DPP 2000) and include the following:

- Views of central Honolulu and Diamond Head from the ‘Ewa Plain (see View and Vista A)
- Views of na pu‘u at Kapolei, Pālailai, and Makakilo (see View and Vista B)
- Distant views of the shoreline from the H-1 Freeway above the ‘Ewa Plain (see View and Vista C)
- Views of the Wai‘anae Mountain Range from the H-1 Freeway between Kunia Road and Kalo‘i Gulch and from Kunia Road (see View and Vista D)

Fort Weaver Road to Aloha Stadium Landscape Unit

This landscape unit extends from Fort Weaver Road to Aloha Stadium. This area contains the wide fertile plateau that connects the Wai‘anae and Ko‘olau Mountain Ranges and was previously in extensive agricultural use. It is now a growing suburban area, with access facilitated by the H-1 Freeway, Kamehameha Highway, and Moanalua Road. The demands of growth and development within the Central O‘ahu area have affected the natural environment, reducing some of its natural assets and replacing them with a built environment. This landscape unit is characterized by residential neighborhoods with one- and two-story residences. Clustered one- and two-story businesses are located along the Farrington Highway and Kamehameha Highway corridors. Most businesses are surrounded by parking lots that include large paved areas. Some of the paved areas include pockets of mature trees and shrubs that make the

pavement appear less dominant. Utility poles and overhead utility lines are prevalent along both highway corridors. Significant protected views and vistas (Figures 4-17 and 4-18) in this landscape unit are identified in the *Central O’ahu Sustainable Communities Plan* (DPP 2002b) and the *Primary Urban Center Development Plan* (DPP 2004a) and include the following:

- Views of the Wai’anae Mountain Range from the Waipahu Cultural Garden (see View and Vista E)
- Views of the O’ahu Sugar Mill from Waipahu Depot Road (see View and Vista F)
- Views of Pearl Harbor from Farrington Highway near Waipahu High School (see View and Vista G)

- Waimano Home Road/Kamehameha Highway Intersection (see View and Vista H)
- Ka’ahumanu Street/Kamehameha Highway Intersection (see View and Vista I)
- Kaonohi Street/Kamehameha Highway Intersection (see View and Vista J)
- Honomanu Street/Kamehameha Highway Intersection (see View and Vista K)

Aloha Stadium to Kalihi Landscape Unit

The landscape unit from Aloha Stadium to Kalihi includes the Salt Lake portion of the PUC Development Plan Area, which comprises the communities of Salt Lake, Moanalua, and the Airport Area. These consist primarily of residential neighborhoods of one- and two-story residences and supporting commercial uses. The Airport

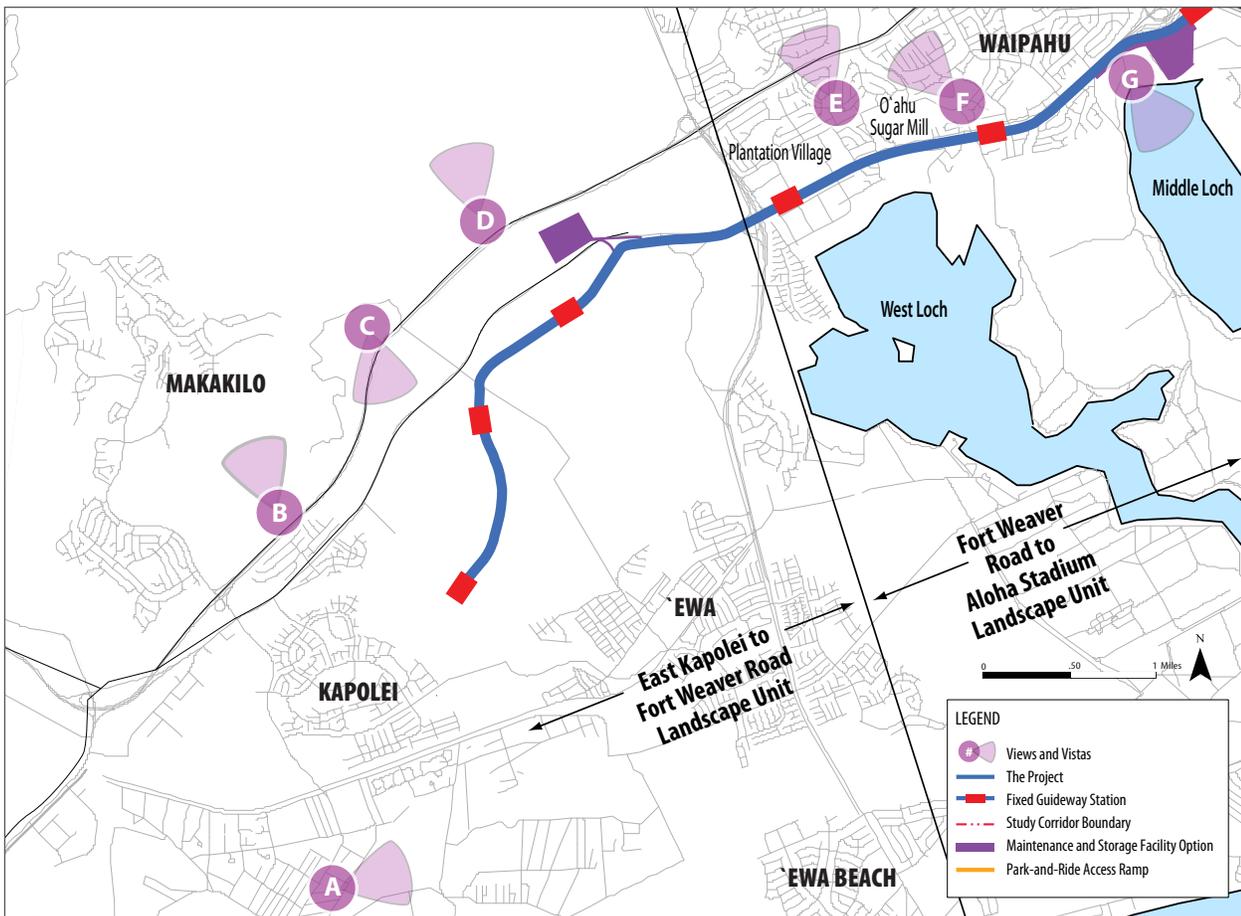


Figure 4-17 Protected Views and Vistas (East Kapolei to Fort Weaver Road)

Area encompasses industrial and commercial service-oriented buildings surrounded by large paved areas. Honolulu International Airport, Pearl Harbor Naval Base, and Hickam Air Force Base are located within this landscape unit. Views within this landscape unit are somewhat limited to the immediate surroundings because of dense development and the large scale of the many commercial and industrial buildings. The mountains can be viewed periodically from elevated locations and transportation corridors, such as Salt Lake Boulevard and Kamehameha Highway. Protected views and vistas (Figure 4-18) in this landscape unit are identified in the *Primary Urban Center Development Plan* (DPP 2004a) and include the following:

- Bougainville Drive—mauka/makai (see View and Vista L)
- Maluna—mauka/makai (see View and Vista M)
- Wanaka Street—mauka/makai (see View and Vista N)
- Ala Liliko‘i Street—mauka/makai (see View and Vista O)

Kalihi to Ala Moana Center Landscape Unit

The Kalihi to Ala Moana Center landscape unit comprises a continuous urban corridor and the highest densities of the PUC. Kalihi to Iwilei includes the neighborhood community of Kalihi-Palama, which contains waterfront properties that house extensive maritime operations. Business

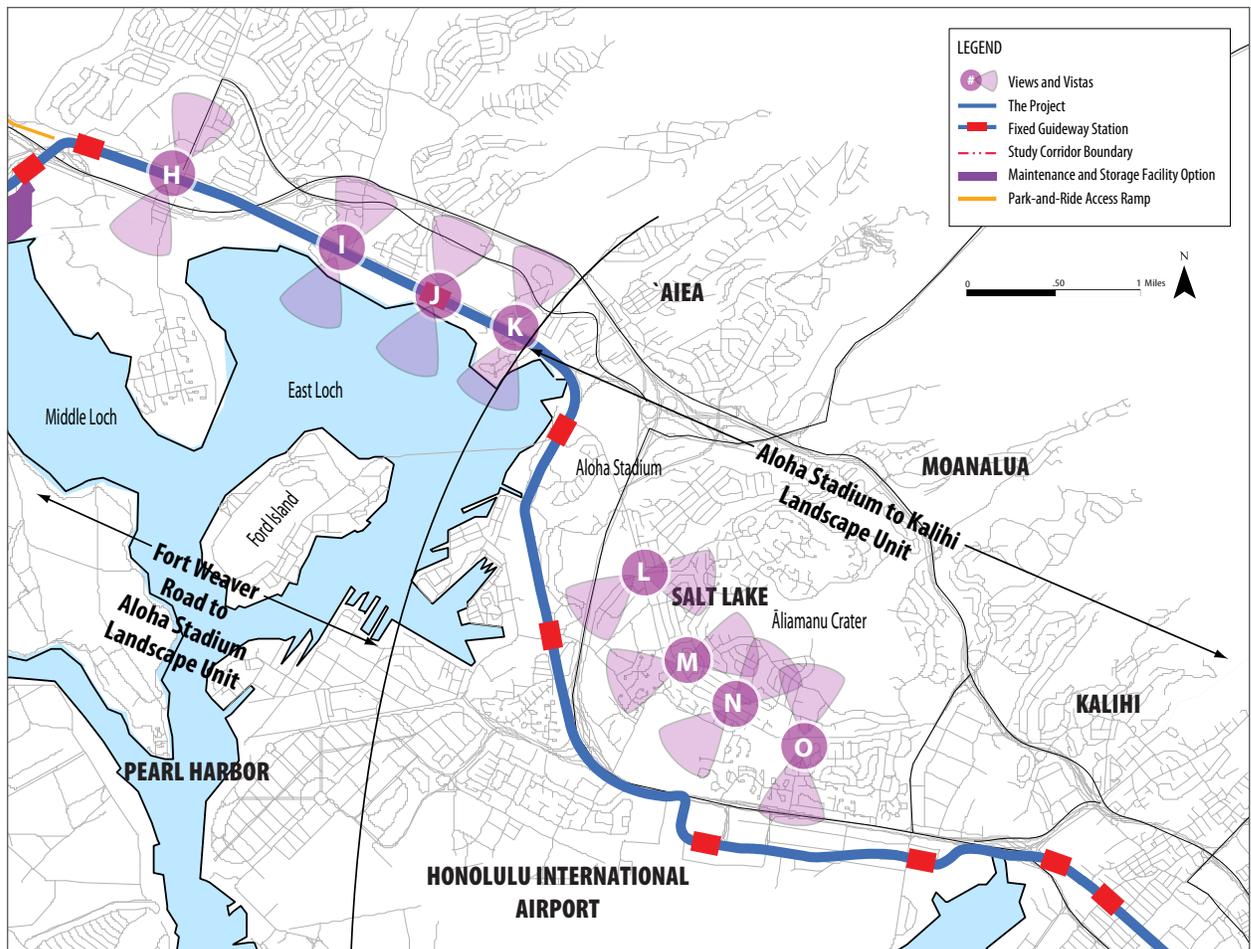


Figure 4-18 Protected Views and Vistas (Fort Weaver Road to Aloha Stadium)

districts with major wholesale and distribution facilities line King Street and Nimitz Highway. Farther Koko Head, this landscape unit encompasses Downtown, Kaka’ako, and Ala Moana. The mountains and shoreline that define the mauka and makai edges of this landscape unit are dominant elements of the landscape. Within the corridor, open space consists of volcanic craters, streams, and other water bodies, as well as larger parks and campuses. The mauka edge includes the Ko’olau Mountain Range and its undeveloped foothills and slopes. The makai edge includes the shorelines and waters of the Pacific Ocean and such landmarks as Honolulu Harbor, Kewalo Basin, and Ala Wai Harbor. Direct views of the mountains and ocean are not common, but the Downtown skyline is visible from several areas. Significant protected views and vistas (Figure 4-19)

in this landscape unit are identified in the *Primary Urban Center Development Plan (DPP 2004a)* and include the following:

- Bishop Street—mauka/makai (see View and Vista P)
- Panoramic views—Punchbowl Lookout toward Diamond Head (see View and Vista Q)
- Panoramic views—Kaka’ako Waterfront Park toward Punchbowl and the Ko’olau Mountain Range (see View and Vista R)
- Cooke Street—mauka/makai (see View and Vista S)
- Ward Avenue—mauka/makai (see View and Vista T)
- Panoramic views—Kewalo Basin toward the Ko’olau Mountain Range and Punchbowl (see View and Vista U)

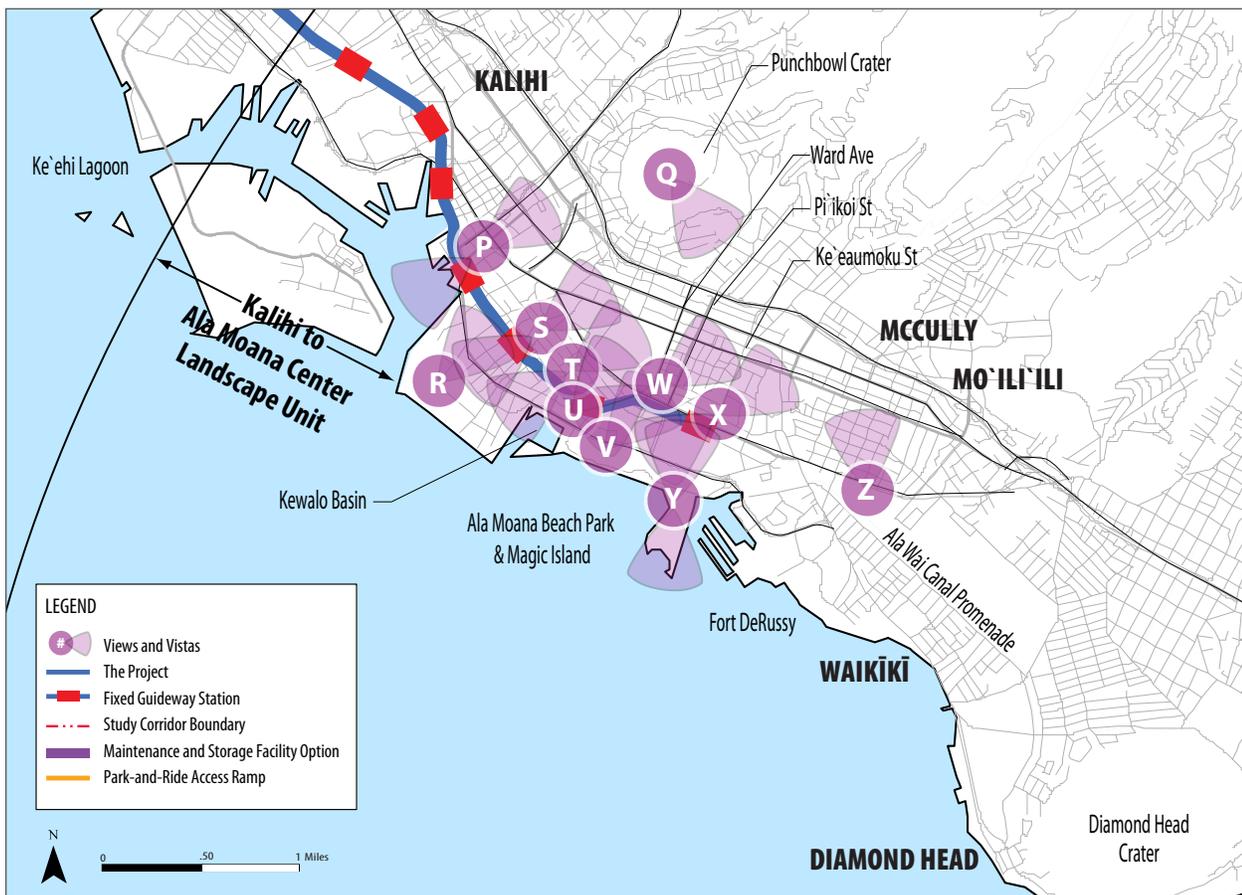


Figure 4-19 Protected Views and Vistas (Kalihi to Ala Moana Center)

- Panoramic views—Ala Moana Beach Park toward the Ko‘olau Mountain Range (see View and Vista V)
- Pi‘ikoi Street—mauka/makai (see View and Vista W)
- Ke‘eaumoku Street—mauka/makai (see View and Vista X)
- ‘Āina Moana Park (Magic Island)—mauka/makai (see View and Vista Y)
- Panoramic views—Ala Wai Canal Promenade toward the Ko‘olau Mountain Range (see View and Vista Z)

4.8.3 Environmental Consequences and Mitigation

Throughout the Draft EIS review and comment period, many commented that visual changes associated with the project elements will result in substantial visual effects. Many comments received expressed concern that the elevated fixed guideway transit system will adversely affect O‘ahu’s unique visual character by creating blight and degrading views. In addition, commenters requested more information on how the project elements will be integrated with their communities, especially in the areas around stations.

These commenters on view effects are representative of the various viewer groups that have been considered in the visual and aesthetic conditions analysis presented in the Draft EIS and this Final EIS. In response to the viewer group responses, received during the Draft EIS comment period, further analysis of views and vistas has been done and the visual effects of several key views have been reevaluated. The refinement resulted in revised ratings from moderate to significant for Views 12, 14, and 15 in the Downtown area. In addition, the discussion of protected views and vistas provided in this Final EIS includes new summary tables and new visual simulations that were not part of the Draft EIS. The analysis of protected views and vistas was provided in earlier technical

documents; however, this Final EIS more clearly describes the visual effects on these resources.

The overall conclusions of the Draft EIS have not changed, but, through these refinements, the following clarifications have been made:

- Viewpoint 12—visual impact rating refined to reflect that some views will be blocked and to expressly point out the contrast of project elements with Chinatown’s historic character
- Viewpoint 14—visual impact rating refined to reflect the bulk and scale of the guideway and columns being out of character with the pedestrian-oriented environment at this viewpoint
- Viewpoint 15—visual impact rating refined to reflect the bulk and scale of the station as well as the other elements noted in the Draft EIS.

Viewpoint 7 was changed to reflect the Aolele Street to Ualena Street transition through Ke‘ehi Lagoon Beach Park. The overall conclusions of the Draft EIS have not changed with regard to visual impact in the park.

The Draft EIS described several types of visual effects, and the refinements reflect the same type of visual effects identified in the Draft EIS and shown in these viewpoints in the Draft EIS. The Draft EIS concluded that changes to some views, including protected views and vistas, would be unavoidable. The refinements confirmed this conclusion.

Protected views and vistas, including mauka and makai views and views of prominent landmarks in the study corridor are identified in City development plans, including the *‘Ewa Development Plan*, *Central O‘ahu Sustainable Communities Plan*, and the *Primary Urban Center Development Plan*. Protected views and vistas are view planes that the City has determined are important to protect because of their scenic quality, scale, and prominence within the visual environment. These

views are developed through the City’s general, development, and community plans. These plans guide the adoption of zoning ordinances, which regulate the use of land within demarcated zones, and set detailed standards for the height, bulk, size, and location of buildings. The Project is supportive of the land use objectives included in these plans, as summarized in Appendix J. Appendix J provides a summary of the Project’s relationship to State of Hawai‘i and City and County land use plans, polices, and controls for the project study corridor. The summary includes the relevant provisions of policy documents related to visual and aesthetic conditions. The City’s general urban design principles protect public views based on the type of view and are applicable to both public streets and public and private structures. Some protected views and vistas will change as a result of the Project, including public views along streets and highways, mauka-makai view corridors, panoramic and significant landmark views from public places, views of natural features, heritage resources and other landmarks, and view corridors between significant landmarks. The guideway and some stations will partially block mauka-makai public views from streets that intersect with the alignment.

The Project will introduce a new linear visual element to the corridor and, as a result, changes to some views will be unavoidable. Depending on the degree of view obstruction or blockage, some changes in view will be significant. Viewer responses to these changes will vary with their exposure and sensitivity and depend on the alignment orientation, guideway and station height, and height of surrounding trees and buildings. View changes will be less notable in wider vista or panoramic views where the project elements are smaller components of the larger landscape. Generally, the project elements will not be dominant features in these views.

The mitigation section of this Final EIS has also been expanded to include detailed mitigation measures. Although mitigation measures will minimize many adverse visual effects by providing visual buffers and reducing visual contrasts between the project elements and their surroundings, the Final EIS acknowledges, as concluded in the Draft EIS, that unavoidable adverse effects, such as view blockage, cannot be mitigated and will be significant (noted as a “High” level of visual impact in the Draft EIS) in some areas.

Environmental Consequences

Visual and aesthetic consequences are changes to the visual landscape and viewer response to those changes. The Project’s visual consequences have been categorized as low, moderate, or significant.

- *Low* visual effects generally occur when transportation elements (such as roadways) are already part of the view, when the view has few or no visually sensitive resources, and when the Project will introduce few (if any) noticeable changes. Viewer groups will not likely notice a visual change or expect a scenic viewpoint. Minor changes in light and glare may occur.
- *Moderate* visual effects occur when changes to the existing view will be noticeable but not substantial and/or when visually sensitive resources will undergo a noticeable change in view. Viewer groups will be somewhat aware and sensitive to visual change. Noticeable changes in light and glare may occur.
- *Significant* visual effects occur when substantial changes to existing views will be made and will result in a greatly changed view or when visually sensitive resources will undergo a substantial change in view. Viewer groups will be sensitive to visual change because they will expect attractive views or surroundings. Substantial changes in light or glare will occur.

View obstructions and changes to views will be most noticeable where the guideway and stations are nearby or in the foreground of views, and some viewers may consider this an adverse visual effect. Viewpoints that are not located near these project elements will generally be less affected. For example, view changes are not likely to be obtrusive in wider vistas or regional panoramic views where the project elements serve as smaller components of the larger landscape. The guideway and stations will not be dominant elements in these views.

Viewer response to view changes may vary with exposure and sensitivity and depend on the alignment orientation and the height of the guideway, stations, and surrounding trees and buildings. Overall, the Project will be set in an urban context where visual change is expected and differences in scales of structures are typical. The Project will also provide users with expansive views from several portions of the corridor by elevating riders above highway traffic, street trees, and low structures adjacent to the alignment.

The visual effects of the Project are summarized in Table 4-9.

No Build Alternative

Under the No Build Alternative, the Project will not be built and there will be no impact to the visual and aesthetic conditions. Although the projects in the ORTP will be built, their environmental impacts will be studied in separate documents.

The Project

The Project will be set in an urban context where visual change is expected and differences in scales of structures are typical. However, during the Draft EIS review process, many viewers have commented that visual changes associated with the Project will be substantial. As described in the Draft EIS, significant visual effects will result, particularly when considered at a single location. Residents living in high-rise buildings adjacent to the project alignment

will experience varied visual changes as a result of the Project.

Visual simulations of the Project were developed for 19 representative viewpoints that will be affected by the Project to illustrate commonly experienced visual effects. The locations of these viewpoints are shown on Figure 4-16. The simulations (Figures 4-20 through 4-38) depict the guideway and other project elements to illustrate the facilities' sizes and positions but do not include detailed design features. For stations, they show a typical prototype without design detail because station configurations and finishes have yet to be developed, and input will be considered from communities surrounding each station through the Final EIS and design processes.

The fixed guideway and stations will be elevated structures. They will result in noticeable changes to views where project elements will be near existing views or in the foreground of these views. This change will also occur for motorists traveling on the roadways along and under the guideway. Some adverse visual effects, such as view blockage, cannot be mitigated and will result in unavoidable adverse environmental effects.

The stations will be dominant visual elements in their settings and will noticeably change views. Stations are shown in the visual simulations in Figures 4-25, 4-29, 4-31, and 4-34. Support facilities, such as traction power substations, will also noticeably change existing views. However, most will be located adjacent to roadways where utilities are already part of the view, so the change will not be dramatic or substantial.

There will be additional lighting associated with park-and-ride facilities, stations, maintenance and storage facility, and trains, which includes interior and safety lighting for the stations and interior lighting and headlights on the trains. For most of the alignment, light and glare associated with the

Table 4-9 Visual Effects of the Project (continued on next page)

Viewpoint (illustrated on Figure 4-16)	Location/View Direction	Existing Visual Quality	Visual Impact	Assessment
East Kapolei to Fort Weaver Road Landscape Unit				
n/a	Views assessed are in the general context of planned development	Moderate to High	Low to Moderate	The guideway and stations will noticeably contrast with the smaller scale buildings nearby, such as the U.S. Navy housing. They will also contrast with the open, undeveloped character that is predominant in this area. However, these areas are expected to be developed or redeveloped under the City's land use plans and zoning and become more urban in character. This is expected to occur in a similar time frame as the transit improvements. As a result, the contrast will become less noticeable.
Fort Weaver Road to Aloha Stadium Landscape Unit				
1	Farrington Highway near Waikele Road, looking `Ewa	Moderate	Moderate	The guideway will not substantially affect most panoramic and distant views of the mountains and will have a limited effect on the area's scenic quality. Farrington Highway is a major transportation corridor, and project elements will be in character with the surrounding area.
2	Kamehameha Highway Near Acacia Road, looking `Ewa	Moderate	Moderate	The guideway will affect mauka views by partially blocking existing distant views of the sky and mountains. The scale and height of the guideway are in character with the adjacent buildings.
3	Kamehameha Highway at Ka`ahumanu Street, looking makai	Moderate	Significant	The bulk and scale of the guideway and columns will be dominant features, obstructing views of the tree canopies in Neal S. Blaisdell Park and substantially changing makai views toward the park.
4	Kamehameha Highway at Kaonohi Street, looking makai	Low	Moderate	Although changes to the existing view will be noticeable, the project elements will blend with the existing visual environment. The utility lines will be less prominent against the guideway in the background.
Aloha Stadium to Kalihi Landscape Unit				
5	Aloha Stadium, looking `Ewa	High	Moderate	The project elements will change the composition of panoramic views with the high visibility of the guideway. However, these more distant views, which include the mountains and urban skyline, take in a wider view and will not be substantially affected.
6	Kamehameha Highway near Radford Drive and the Pearl Harbor Naval Base Station Area, looking mauka	Low	Moderate	The Pearl Harbor Naval Base Station and guideway will dominate the linear view corridor above Kamehameha Highway. However, the highway is a major transportation corridor, and visual effects will not be substantial.
7	Ke`ehi Lagoon Beach Park, looking mauka and `Ewa	High	Moderate	The guideway and columns will be located along the mauka perimeter of the park. They will be prominent elements in the background of mauka views from the park. The guideway's bulk and scale will contrast with the open character of park facilities as it traverses the perimeter of tennis courts near the mauka side and the open field. Farther Koko Head, it will run parallel with the H-1 Freeway viaduct, where it will be less noticeable (viewpoint revised since Draft EIS).
8	Ke`ehi Lagoon Beach Park, looking mauka	High	Low	The guideway will be slightly more visible than the highway in the background. However, it will not noticeably conflict with the view's character.
Kalihi to Ala Moana Center Landscape Unit				
9	Dillingham Boulevard at Kalihi, looking makai	Low	Moderate	The bulk of the guideway and columns will be out of scale with existing buildings. However, overhead utility lines are prevalent along Dillingham Boulevard, and the project elements will not contrast substantially with the setting's character.

Table 4-9 Visual Effects of the Project (continued from previous page)

Viewpoint (illustrated on Figure 4-16)	Location/View Direction	Existing Visual Quality	Visual Impact	Assessment
10	Dillingham Boulevard near Honolulu Community College and Kapālama Station Area, looking `Ewa	Moderate	Moderate	The Kapālama Station and guideway will be dominant features in views along Dillingham Boulevard. The remaining trees will soften this effect.
11	Nimitz Highway Bridge and Chinatown Station Area, looking makai	Moderate	Significant	The Chinatown Station and guideway will be dominant features in views along Nimitz Highway. Distant makai views over Nu`uanu Stream and Honolulu Harbor will be partially blocked. The project elements will contrast substantially with Chinatown's historic character.
12	Nimitz Highway, makai of Nimitz Highway/ Maunakea Street Intersection, looking `Ewa and mauka	Low	Significant	The Chinatown Station and guideway will dominate features in views along Nimitz Highway, and mauka views of the Ko`olau Mountain Range will be blocked. These project elements will also contrast with Chinatown's historic character. (Viewpoint added since Draft EIS.)
13	Maunakea Street, looking makai	High	Moderate	The guideway and columns will be prominent features in makai views of Honolulu Harbor, partially blocking views of the sky.
14	O`ahu Market at King Street, looking makai	High	Significant	The guideway and columns will be prominent features in views down Kekaulike Street in Chinatown's O`ahu Market. The bulk and scale of these project elements will be out of character with the pedestrian-oriented environment created by the O`ahu Market's architecture and streetscape.
15	Nimitz Highway/Fort Street Intersection mauka of Irwin Park and Aloha Tower Marketplace, looking Koko Head	Moderate	Significant	The Downtown Station and guideway will be dominant features in views along Nimitz Highway. These project elements will contrast substantially with Irwin Park street trees along the highway and the nearby smaller-scale office buildings.
16	Fort Street Mall at Merchant Street, looking makai	High	Low	Just visible through the trees, the guideway structure will partially block a view of the Aloha Tower. Visual effects will be more noticeable for viewers closer to Nimitz Highway.
17	Aloha Tower Drive at Irwin Park and Aloha Tower Marketplace, looking mauka	High	Moderate	The guideway and columns will only be slightly visible beyond the trees. However, the bulk and scale of the guideway will contrast with the more pedestrian-scale character of the streetscape.
18	Halekauwila Street/Cooke Street Intersection, looking mauka past Mother Waldron Neighborhood Park	Moderate	Significant	The bulk and scale of the straddle bent guideway and columns will contrast significantly with the scale and character of Mother Waldron Neighborhood Park and the four-story residential building mauka of Halekauwila Street.
19	Mother Waldron Neighborhood Park near Halekauwila Street/ Cooke Street Intersection, looking `Ewa	High	Significant	The straddle bent guideway and columns will create a sense of enclosure for drivers on Halekauwila Street and pedestrians on adjacent sidewalks. These project elements will also contrast significantly with the scale and character of Mother Waldron Neighborhood Park and the adjacent four-story residential building. Makai views from these upper-story residences will also be blocked.

The information in this table has been summarized from the Visual and Aesthetics Resources Technical Report (RTD 2008e).



Figure 4-20 Viewpoint 1—Farrington Highway near Waikele Road, looking `Ewa

The guideway will not substantially affect most panoramic and distant views of the mountains and will have a limited effect on the area’s scenic quality. Farrington Highway is a major transportation corridor, and project elements will be in character with the surrounding area.



Figure 4-21 Viewpoint 2—Kamehameha Highway near Acacia Road, looking `Ewa

The guideway will affect mauka views by partially blocking existing distant views of the sky and mountains. The scale and height of the guideway are in character with the adjacent buildings.



Figure 4-22 Viewpoint 3—Kamehameha Highway at Ka'ahumanu Street, looking Makai

The bulk and scale of the guideway and columns will be dominant features, obstructing views of the tree canopies in Neal S. Blaisdell Park and significantly changing makai views toward the park.



EXISTING



SIMULATION

Figure 4-23 Viewpoint 4—Kamehameha Highway at Kaonohi Street, looking Makai

Although changes to the existing view will be noticeable, the project elements will blend with the existing visual environment. The utility lines will be less prominent against the guideway in the background.



Figure 4-24 Viewpoint 5—Aloha Stadium, looking `Ewa

The project elements will change the composition of panoramic views with the high visibility of the guideway. However, these more distant views, which include the mountains and urban skyline, take in a wider view and will not be substantially affected.



Figure 4-25 Viewpoint 6—Kamehameha Highway near Radford Drive and the Pearl Harbor Naval Base Station Area, looking Mauka

The Pearl Harbor Naval Base Station and guideway will dominate the linear view corridor above Kamehameha Highway. However, the highway is a major transportation corridor, and visual effects will not be substantial.



Figure 4-26 Viewpoint 7—Ke'ehi Lagoon Beach Park, looking Mauka and `Ewa

The guideway and columns will be located along the mauka perimeter of the park. They will be prominent elements in the background of mauka views from the park. The guideway's bulk and scale will contrast with the open character of park facilities as it traverses the perimeter of tennis courts near the mauka side and the open field. Farther Koko Head, it will run parallel with the H-1 Freeway viaduct, where it will be less noticeable.



Figure 4-27 Viewpoint 8—Ke'ehi Lagoon Beach Park, looking Mauka

The guideway will be slightly more visible than the highway in the background. However, it will not noticeably conflict with the view's character.



Figure 4-28 Viewpoint 9— Dillingham Boulevard at Kalihi, looking Makai

The bulk of the guideway and columns will be out of scale with existing buildings. However, overhead utility lines are prevalent along Dillingham Boulevard, and the project elements will not contrast substantially with the setting's character.



Figure 4-29 Viewpoint 10—Dillingham Boulevard near Honolulu Community College and Kapālama Station Area, looking `Ewa

The Kapālama Station and guideway will be dominant features in views along Dillingham Boulevard. The remaining trees will soften this effect.



Figure 4-30 Viewpoint 11—Nimitz Highway Bridge and Chinatown Station Area, looking Makai

The Chinatown Station and guideway will be dominant features in views along Nimitz Highway. Distant makai views over Nu'uuanu Stream and Honolulu Harbor will be partially blocked. The project elements will contrast substantially with Chinatown's historic character.



Figure 4-31 Viewpoint 12—Nimitz Highway, makai of Nimitz Highway/Maunakea Street Intersection, looking `Ewa and Mauka
The Chinatown Station and guideway will be the dominate features in views along Nimitz Highway and mauka views of the Kōʻolau Mountain Range will be blocked. These project elements will also contrast with Chinatown’s historic character.



Figure 4-32 Viewpoint 13—Maunakea Street, looking Makai

The guideway and columns will be prominent features in makai views of Honolulu Harbor, partially blocking views of the sky.



Figure 4-33 Viewpoint 14—O'ahu Market at King Street, looking Makai

The guideway and columns will be prominent features in views down Kekaulike Street in Chinatown's O'ahu Market. The bulk and scale of these project elements will be out of character with the pedestrian-oriented environment created by the O'ahu Market's architecture and streetscape.



Figure 4-34 Viewpoint 15—Nimitz Highway/Fort Street Intersection Mauka of Irwin Park and Aloha Tower Marketplace, looking Koko Head

The Downtown Station and guideway will be dominant features in views along Nimitz Highway. These project elements will contrast substantially with Irwin Park street trees along the highway and the nearby smaller-scale office buildings.



Figure 4-35 Viewpoint 16—Fort Street Mall at Merchant Street, looking Makai
Just visible through the trees, the guideway structure will partially block a view of the Aloha Tower. Visual effects will be more noticeable for viewers closer to Nimitz Highway.



Figure 4-36 Viewpoint 17—Aloha Tower Drive at Irwin Park and Aloha Tower Marketplace, looking Mauka
The guideway and columns will only be slightly visible beyond the trees. However, the bulk and scale of the guideway will contrast with the more pedestrian-scale character of the streetscape.



Figure 4-37 Viewpoint 18—Halekauwila Street/Cooke Street Intersection, looking Mauka past Mother Waldron Neighborhood Park

The bulk and scale of the straddle bent guideway and columns will contrast significantly with the scale and character of Mother Waldron Neighborhood Park and the four-story residential building mauka of Halekauwila Street.



Figure 4-38 Viewpoint 19—Mother Waldron Neighborhood Park near Halekauwila Street/Cooke Street Intersection, looking `Ewa
The straddle bent guideway and columns will create a sense of enclosure for drivers on Halekauwila Street and pedestrians on adjacent sidewalks. These project elements will also contrast significantly with the scale and character of Mother Waldron Neighborhood Park and the adjacent four-story residential building. Makai views from these upper-story residences will also be blocked.

guideway and trains are not anticipated to have an effect because the guideway will generally be located in existing roadway rights-of-way, which currently produce transportation-related light and glare. Furthermore, the light intensity from trains is expected to be comparable to or less than existing buildings and vehicles along the alignment.

The shadow pattern created by the elevated stations and guideway will change throughout the day and seasonally, depending on the alignment's direction, time of day, and time of year. Shadow impacts along the alignment will vary with orientation, height of the stations and guideway, and the height of surrounding trees and local development.

Viewpoints not located near the alignment will generally be less affected by changes in the visual environment because they will take in a longer, more expansive landscape. Project elements will be noticeable but not dominant features in these views, and visual effects to significant views and vistas will be low to moderate. Passengers on trains will have enhanced views of these areas compared to passengers in vehicles, whose views are often obstructed by buildings, vehicles, and commercial signage. Public views include views along streets and highways, mauka-makai view corridors, panoramic and significant landmark views from public places, views of natural features, heritage resources and other landmarks, and view corridors between significant landmarks (ROH 1978b). The guideway and some stations will partially block mauka-makai public views from streets that intersect with the alignment.

DTS will coordinate with DPP regarding the particular needs of each view. The Project will introduce a new linear visual element to the corridor, and changes to some views will be significant and unavoidable. Depending on the degree of view obstruction or blockage, some view changes will be substantial. Viewer response to these changes will vary with exposure and sensitivity and depend

on the alignment orientation, guideway and station height, and height of surrounding trees and buildings. View changes will be less noticeable in wider vista or panoramic views where the project elements serve as smaller components of the larger landscape. Generally, the project elements will not be dominant features in these views.

Significant views and vistas and an assessment of expected changes in visual quality for viewpoints and views along the project alignment are presented below for each landscape unit.

The Project will provide users with expansive views from several portions of the corridor by elevating riders above highway traffic, street trees, and low structures adjacent to the alignment.

East Kapolei to Fort Weaver Road Landscape Unit

The surrounding visual environment consists mostly of scattered residential development and open agricultural land. The area is planned for future development, which will substantially alter the visual environment independent of the Project. The Project will change the visual environment in this area, but these changes are expected to occur in a similar time frame as the planned development.

The potential for the guideway and stations to block mauka-makai views and vistas of features and landmarks will vary throughout this landscape unit. Viewpoints that are not close to the alignment will generally be less sensitive to changes in the visual environment because they take in a longer, more expansive landscape. Protected views and vistas identified in the East Kapolei to Fort Weaver Road Landscape Unit are listed in Table 4-10. This analysis is included in the Visual and Aesthetics Resources Technical Report (RTD 2008e). Visual effects in the Draft EIS were based on this analysis, and it has been added as a table into the Final EIS, based on comments on the Draft EIS, to expand and clarify the information. This table also describes the Project's effect

Table 4-10 Visual Effects on Protected Views and Vistas—East Kapolei to Fort Weaver Road

Views/Vistas	Description	Visual Effects
A	Views of Central Honolulu and Diamond Head from `Ewa Plain	Project elements will not be dominant features in these views—low visual effect
B	Views of na pu`u at Kapolei, Pālai, and Makakilo	Mauka of study area—no visual effect
C	Distant views of the shoreline from the H-1 Freeway above the `Ewa Plain	Project elements will not be dominant features in these views—low visual effect
D	Views of the Wai`anae Mountain Range from the H-1 Freeway between Kunia Road and Kaloi Gulch and from Kunia Road	Mauka of study area—no visual effect

on these views. The locations are identified on Figure 4-17.

The guideway will introduce an elevated linear structure and urban elements (e.g., transit stations, park-and-ride lots, traction power substations, and a maintenance and storage facility) to what is currently an open, rural, and country-like setting. The guideway will range from 30 to 45 feet in height. The top of the stations with a concourse will be about 15 feet higher than the guideway where it enters the station. The guideway and stations will noticeably contrast with the smaller scale buildings nearby, such as the U.S. Navy housing. They will also contrast with the open, undeveloped character that is predominant in this area. However, these areas are expected to be developed or redeveloped under the City's land use plans and zoning and become more urban in character. This is expected to occur in a similar time frame as the transit improvements. As a result, the contrast will become less noticeable.

Panoramas and distant views of the shoreline, Downtown, and Diamond Head will change to include views of the guideway, support columns, and stations. However, panoramic views take in a wider, more expansive landscape and are usually less sensitive to change. Generally, the project elements will not be dominant features in these views. However, the open character of large expanses of pavement will be noticeable at the proposed East

Kapolei and UH West O`ahu park-and-ride lots. Views of the `Ewa Plain from the elevated trains and stations will be enhanced. Overall visual effects, including viewer response to change, will be moderate.

Fort Weaver Road to Aloha Stadium Landscape Unit

Farrington Highway is a major transportation corridor through this area. The West Loch Station and respective transit center will blend well with the bulk and scale of Waipahu Town Center's commercial character. However, the guideway and columns along the alignment will be prominent visual features due in part to the long, straight view down Farrington Highway and because the guideway's height of about 40 feet will be greater than many of the one- and two-story surrounding buildings.

Although the guideway at 30 to 45 feet in height will obstruct some makai and mauka views across the highway, views of businesses from vehicles traveling on Farrington Highway will not be greatly reduced. Panoramic views near the alignment and from Waipahu Cultural Garden Park, Hawai'i's Plantation Village, and Waipahu District Park comprise a wider panoramic scene and, therefore, will not be substantially affected. Mature trees in the Farrington Highway median will be removed to accommodate the guideway, reducing the visual interest and memorability of views.

Visual effects in this area will range from moderate to significant.

The Waipahu Transit Center Station will be farther Koko Head along the alignment. Similar to the West Loch Station, it will blend well with the bulk and scale of the commercial setting that has developed around this section of the Farrington Highway corridor. As the guideway continues Koko Head toward Leeward Community College, it will be a more dominant feature and dramatically contrast with the suburban residential character makai and mauka of the highway. The mass and height of the guideway and columns will block some residents' views over Middle Loch to Pearl Harbor. However, many views in this area comprise a wider panoramic scene and, therefore, will not be substantially affected. Visual effects in this area will range from moderate to significant.

The guideway will shift makai of Farrington Highway at Waipahu High School, which is near the preferred site of a maintenance and storage facility near Leeward Community College. This area is a flat knoll makai of the H-1 Freeway/Farrington Highway Interchange. The Leeward Community College Station will be adjacent to a parking lot on the college campus and will be at ground level. The maintenance and storage facility would be makai of the interchange. These project elements will be highly visible from Waipahu High School, Leeward Community College, low-lying areas along Pearl Harbor, and from residences on the foothills mauka of the interchange. However, most views in these areas comprise a wider panoramic scene and, therefore, will not be substantially affected. Visual effects in this area will be moderate. Visual effects of the maintenance and storage facility are discussed in Section 4.17.

The guideway will cross over the H-1 Freeway Interchange and merge with Kamehameha Highway at Pearl City. The Pearl Highlands Station and park-and-ride structure will be 'Ewa of

the Pearlridge Center and will blend well with the bulk and scale of its commercial character. However, these project elements will be highly visible and dominant features. The guideway will pass by Pacheco Neighborhood Park at Waimano Home Road, where nearby residents mauka and makai of the guideway will experience noticeable changes in their views. Makai views of East Loch and Pearl Harbor from the park and residences near the mauka side of the Waimano Home Road and Kamehameha Highway Intersection will include the guideway and columns, and some views beyond the intersection will be blocked. Visual effects will range from low in the area around the H-1 Freeway Interchange to moderate in the rest of this area.

Koko Head of Pu'u Poni Street, the guideway will cross over the H-1 Freeway and continue above the Kamehameha Highway median to the vicinity of Aloha Stadium. The H-1 Freeway cross-over will be a dominant feature, visible at great distance. However, this change will be in context with the freeway setting and likely will not be perceived as substantial. Farther Koko Head, the guideway will continue above the Kamehameha Highway median through residential neighborhoods and mauka of Neal S. Blaisdell Park before crossing over Waimalu Stream. The bulk and scale of the guideway and columns will substantially change mauka and makai views from residences, such as panoramic views through the park toward Pearl Harbor and Downtown. Panoramic views will be less sensitive to change because they take in a wider, more expansive landscape. Visual effects will range from moderate to significant in this area.

Continuing to the Pearlridge Station and Transit Center, three historic sites, including Sumida Farm, will be mauka of the guideway and station. The elevated station of about 40 feet above Kamehameha Highway will be a noticeable change, altering views and contrasting with the scale of these resources and the surrounding

environment. Some ‘Ewa and makai views of the skyline from the Sumida Farm will be blocked by the guideway. However, because the farm is already at a much lower elevation than the highway, these views are already somewhat confined by the surrounding embankments. Overall visual effects near the station will be moderate because the project elements will blend with the surrounding commercial character, which is a heavily used transportation corridor with one- and two-story businesses and warehouses.

From residences on the hillside above Pearlridge, Kamehameha Highway is already a prominent feature in makai views toward the ‘Ewa Plain, East Loch, and Downtown. However, the guideway will be a noticeable change. These project elements will also change panoramic views over the ‘Aiea Bay State Recreation Area where the guideway will be about 30 feet above the Kamehameha Highway and Honomanu Street Intersection. Most scenic views from this recreational area are makai and will not be affected. Overall visual effects from Pearlridge to the Aloha Stadium area will range from moderate to significant.

Throughout this landscape unit, the potential for the guideway and stations to block protected mauka-makai views and vistas of features and landmarks will vary.

Protected views and vistas identified in the Fort Weaver Road to Aloha Stadium Landscape Unit are listed in Table 4-11. This analysis is included in the Visual and Aesthetics Resources Technical Report (RTD 2008e). Visual effects in the Draft EIS were based on this analysis, and it has been added as a table into the Final EIS, based on comments on the Draft EIS, to expand and clarify the information. This table also describes the Project’s effect on these views. The locations are identified on Figures 4-17 and 4-18. View and Vista H is shown on Figures 4-39 and 4-40. View and Vista K is shown on Figure 4-41.

Viewpoints 1 through 5 illustrate views of the Project within this landscape unit (Figures 4-20 through 4-24). Viewpoints that are not close to the alignment will generally be less sensitive to changes in the visual environment because they will take in a longer, more expansive landscape. The project elements will be noticeable, but not dominant, features in these views, and visual effects to significant protected views and vistas will range from moderate to significant, depending on the viewer’s position and location.

Aloha Stadium to Kalihi Landscape Unit

The guideway will continue Koko Head of Kamehameha Highway makai past Aloha Stadium and over Hālawa Stream. Pearl Harbor National Historic Landmark (NHL) is makai of the project alignment. Aloha Stadium is at a major freeway interchange and surrounded by parking lots. Views of East Loch and the NHL from residences near Kohomua Street will be partially obstructed by the guideway and columns. However, the Project will not adversely affect the NHL’s visual integrity and will barely be visible in mauka views from the harbor (Figure 4-42). The project elements will be dominant visual elements along the mauka edge of the World War II Valor in the Pacific National Monument Visitor Center parking lot (Figure 4-43). The visual effects on the NHL were included in the Draft EIS and the Visual and Aesthetics Resources Technical Report (RTD 2008e). The visual simulations from the Arizona Memorial and the World War II Valor in the Pacific National Monument Visitor Center were prepared based on comments received on the Draft EIS and added to the Final EIS to clarify the analysis.

The Kamehameha Highway Bridge over the Hālawa Stream is historic, and its appearance will be changed by the guideway and support columns. The contrast in the scale and character of the guideway and columns with the existing

Table 4-11 Potential Visual Effects on Protected Views and Vistas—Fort Weaver Road to Aloha Stadium

Views/Vistas	Description	Visual Effects
E	View of the Wai`anae Mountain Range from the Waipahu Cultural Garden	Mauka of study area—no visual effect
F	View of the Waipahu Sugar Mill from Waipahu Depot Road	Mauka of study area—no visual effect
G	Views of Pearl Harbor from Farrington Highway in the vicinity of Waipahu High School	Guideway columns will occasionally disrupt line of sight from highway—low visual effect
H	Waimano Home Road/Kamehameha Highway Intersection	Guideway columns will block some views across the intersection, and views of the horizon will be partially blocked, depending on the viewer's position and location (Figures 4-39 and 4-40)—moderate visual effect
I	Ka'ahumanu Street/Kamehameha Highway Intersection	Guideway and columns will obstruct views of the tree canopies in Neal S. Blaisdell Park and substantially change makai views toward the park—significant visual effect (Figure 4-22)
J	Kaonohi Street/Kamehameha Highway Intersection	Guideway and columns will noticeably change views—moderate visual effect (Figure 4-23)
K	Honomanu Street/Kamehameha Highway Intersection	Guideway and columns will noticeably change views, and views of the horizon will be partially blocked, depending on the viewer's position and location (Figure 4-41)—moderate visual effect



Figure 4-39 Visual Simulation from Waimano Home Road at Fourth Street, looking Mauka



Figure 4-40 Visual Simulation from Waimano Home Road near Pearl City Elementary School, looking Makai



Figure 4-41 Visual Simulation from Honomanu Street near Nalopaka Place, looking Makai



Figure 4-42 Visual Simulation from Arizona Memorial, looking Mauka



Figure 4-43 Visual Simulation from World War II Valor in the Pacific National Monument Visitor Center Parking Lot, looking Mauka

environment will be a noticeable change. Visual effects in this area are expected to range from moderate to significant.

Between Hālawā Stream and the H-1 Freeway, the guideway will be above the median of Kamehameha Highway. Six historic sites, including the Makalapa U.S. Navy housing and other U.S. Navy facilities, lie along this section of the alignment. The visual effects on these resources are expected to be moderate. Although ‘Ewa views of Pearl Harbor from the U.S. Navy housing will change, the project elements will fit within the context of the highway as a transportation corridor, so overall visual effects will be moderate.

The Pearl Harbor Naval Base Station will fit with the scale and character of structures at the intersection of Kamehameha Highway and Radford Drive. However, the guideway and columns will be noticeable changes in the visual environment makai of the H-1 Freeway as it intersects with Nimitz Highway. This area is a major interchange that includes wide paved areas and several elevated ramps. Visual effects will vary from low to moderate.

Project elements, including the Honolulu International Airport Station and Lagoon Drive Station, will fit with the bulk and scale of other structures near the airport, which is surrounded by other transportation elements and industrial buildings. Although the guideway and columns will reduce the open character of parking lots and the streetscape and mature trees will be removed makai of the H-1 Freeway and ‘Ewa of the Honolulu International Airport Station, the overall visual effect will be low.

The guideway will connect with Kamehameha Highway and the Middle Street Transit Center after passing over a portion of Ke‘ehi Lagoon Beach Park and Nimitz Highway. The open spatial quality of the park will be altered by the guideway and columns. This change will be noticeable but not

substantial to park users because the alignment will be along the periphery of the park and closely follow Nimitz Highway and the H-1 Freeway. Views of Honolulu Harbor and the park are already obstructed by the interchange and will not be substantially affected by the Project. Although the Middle Street Transit Center will be a dominant element, it will fit with the large scale of the interchange and the surrounding developed urban character of the mostly industrial and commercial uses. The overall visual effects will be moderate.

View obstructions and changes to views will be most noticeable where the guideway and stations are nearby or in the foreground of views, and some viewers may consider this a significant adverse visual effect. Viewpoints that are not located near these project elements will generally be less affected. For example, view changes are not likely to be obtrusive in wider vistas or regional panoramic views where the project elements serve as smaller components of the larger landscape. The guideway and stations will not be dominant elements in views of regional scenic features, such as Pearl Harbor, the Wai‘ānae Mountain Range, Diamond Head, and the Ko‘olau Mountain Range.

Protected views and vistas and visual effects on these views are listed in Table 4-12. This analysis is included in the Visual and Aesthetics Resources Technical Report (RTD 2008e). Visual effects in the Draft EIS were based on this analysis, and it has been added as a table into the Final EIS, based on comments on the Draft EIS, to expand and clarify the information. The locations are identified on Figure 4-18.

Viewpoints 5 through 8 illustrate views of the Project within this landscape unit (Figures 4-24 through 4-27).

Viewpoints that are not close to the alignment will generally be less sensitive to changes in the visual environment because they will take in a longer,

Table 4-12 Potential Visual Effects on Protected Views and Vistas—Aloha Stadium to Kalihi

Views/Vistas	Description	Visual Effects
L	Bougainville Drive—mauka/makai	Mauka of study area—no visual effect
M	Maluna Street—mauka/makai	Mauka of study area—no visual effect
N	Wanaka Street—mauka/makai	Mauka of study area—no visual effect
O	Ala Liliko'i Street—mauka/makai	Mauka of study area—no visual effect

more expansive landscape. The project elements will be noticeable, but not dominant, features in these views, and visual effects will range from low to moderate, depending on the viewer's position and location.

Kalihi to Ala Moana Center Landscape Unit

From Kalihi Koko Head, the guideway will follow Dillingham Boulevard to the vicinity of Ka'aahi Street. The canopies of several mature trees along Dillingham Boulevard will be trimmed to accommodate the guideway, and additional trees will be removed at the Kapālama and Iwilei Station areas. The guideway and columns will be prominent visual features due in part to the long, straight view down the boulevard and because the guideway's height of about 30 to 42 feet above Dillingham Boulevard will be slightly greater than many of the one- and two-story surrounding buildings. Mauka and makai views will be obstructed from various points. Makai-view obstructions will be greatest from residences on the mauka side of Dillingham Boulevard. Overall visual effects in this area will be moderate.

The guideway could come within 10 feet of some facades along Dillingham Boulevard, depending on the setback, and will block views from the upper stories of mixed-use buildings Koko Head of Kalihi Street. The upper-story residences along Dillingham Boulevard will be affected by light and glare from trains traveling on the guideway and from station lighting. Due to the close proximity of the guideway and Kalihi and Kapālama Stations, the visual setting of several nearby historic sites will change and views of their facades will

be partially obscured. The visual effects on these resources are expected to be significant. However, the Project will require acquisition of three historic resources—Afuso House, Higa Four-plex, and Teixeira House.

As the guideway turns farther Koko Head to connect to Nimitz Highway near Iwilei Road, it will blend with the bulk and scale of the surrounding one- and two-story commercial buildings, including light industrial warehouses and distribution centers. The Iwilei Station will be a noticeable visual change, and some views of building facades will be blocked. However, many viewers will not notice a blockage of views since the surrounding land is used mostly for light industry and offices or is under-used. Visual effects in this area will be moderate.

The alignment will follow Nimitz Highway Koko Head to Halekauwila Street. This area of Downtown includes several historic districts and other sensitive visual resources, including view corridors. Although the Chinatown Station will generally be centered approximately 30 feet above Nimitz Highway, it will be a dominant visual element, contrasting in scale with the pedestrian environment and substantially changing makai views of Honolulu Harbor. However, the Downtown Station will not block views of Honolulu Harbor. The guideway and columns will reduce the open character of the streetscape, create shade and shadows, and block portions of makai views along the following perpendicular streets: Kekaulike, Maunakea, Nu'uanu, Bethel, Fort, Bishop, and Richards. Views from the fourth- and fifth-story windows of adjacent offices and

residences will also be blocked. In addition, trains traveling on the guideway will create light and glare, and the Chinatown and Downtown Stations will increase this effect. The addition of the guideway and columns will change the visual character of the streetscape and substantially affect the visual setting of the Dillingham Transportation Building. Overall visual effects in this area will be significant.

The alignment will leave Downtown Koko Head along Halekauwila Street where it will begin on the makai side of the street and transition to the center near Punchbowl Street. The canopies of several mature monkeypod trees along Halekauwila Street will be trimmed. The guideway and columns will also block views from the fourth- and fifth-story windows of adjacent offices and residences and create additional shade and shadows. Trains traveling on the guideway will increase light and glare at upper-story residences. Overall visual effects in this area will be significant.

The Civic Center Station area is currently in transition from scattered one- and two-story businesses to higher-density taller structures. The guideway and columns will block views from the fourth- and fifth-story windows of adjacent offices and residences and create additional shade and shadows. Trains traveling on the guideway will increase light and glare. Mother Waldron Neighborhood Park is Koko Head at Cooke Street. The proposed station will substantially change views and contrast with the scale and character of the surrounding environment. Overall visual effects will be significant.

Past Ward Avenue and the Kaka'ako Station, the alignment will transition to Queen Street. Kaka'ako Station will be noticeable, but it will blend with the character of nearby big-box stores and smaller industrial and residential buildings. Views from the fourth- and fifth-story windows of adjacent offices and residences will be blocked. Property on the mauka side of Waimanu Street

will be acquired to allow the alignment to cross over to Kona Street. Although buildings will be removed to allow the crossover, visual effects will be moderate.

The guideway will run above Kona Street through Ala Moana Center. Mature trees will be removed from Pi'ikoi Street through the Ala Moana Center Station area, substantially changing the character of the streetscape. With the exception of the mature trees near Pi'ikoi Street, visually sensitive resources will not be affected, and most views of the mountains, Koko Head, and skyline will not be blocked. The Ala Moana Center Station will be at the end of the Project. The station and the guideway will be located between the Ala Moana Center and mid- to high-rise buildings and will not substantially change the view from adjacent offices and residences.

Throughout this landscape unit, the potential will vary for the guideway and stations to block protected mauka-makai views of features and landmarks that are identified in policy documents.

Protected views and vistas identified in the Kalihi to Ala Moana Center Landscape Unit are listed in Table 4-13. This analysis is included in the Visual and Aesthetics Resources Technical Report (RTD 2008e). Visual effects in the Draft EIS were based on this analysis, and it has been added as a table into the Final EIS, based on comments on the Draft EIS, to expand and clarify the information. This table also describes the Project's effect on these views. The locations are identified on Figure 4-19.

Viewpoints that are not close to the alignment will generally be less sensitive to changes in the visual environment because they will take in a longer, more expansive landscape. The project elements will be noticeable, but not dominant, features in these views, and visual effects to significant protected views and vistas will range from moderate

Table 4-13 Potential Visual Effects on Protected Views and Vistas—Kalihi to Ala Moana Center

Views/Vistas	Description	Visual Effects
P	Bishop Street—mauka/makai	The guideway and columns will be dominant elements in mauka-makai views, and views of the horizon will be partially blocked, depending on the viewer's position and location (Figures 4-44 and 4-45)—variable moderate to significant visual effect
Q	Panoramic views—Punchbowl Lookout toward Diamond Head	Mauka of study area—no visual effect
R	Panoramic views—Kaka'ako Waterfront Park toward Punchbowl and the Ko'olau Mountain Range	Makai of study area; the project setting includes mid- to high-rise buildings that already obstruct some panoramic views—no visual effect
S	Cooke Street—mauka/makai	The guideway and columns will be dominant elements in mauka-makai views, and views of the horizon will be partially blocked, depending on the viewer's position and location (Figures 4-37 and 4-46)—variable moderate to significant visual effect
T	Ward Avenue—mauka/makai	The guideway and columns will be dominant elements in mauka-makai views, and views of the horizon will be partially blocked, depending on the viewer's position and location (Figures 4-47 and 4-48)—variable moderate to significant visual effect
U	Panoramic views—Kewalo Basin toward the Ko'olau Mountain Range and Punchbowl	Makai of study area—no visual effect
V	Panoramic views—Ala Moana Beach Park toward the Ko'olau Mountain Range	Makai of study area; the project setting includes mid- to high-rise buildings that already obstruct some panoramic views—no visual effect
W	Pi'ikoi Street—mauka/makai	The guideway and columns will be dominant elements in mauka-makai views, and views of the horizon will be partially blocked, depending on the viewer's position and location (Figures 4-49 and 4-50)—variable moderate to significant visual effect
X	Ke'eumoku Street—mauka/makai	Koko Head of study area—no visual effect
Y	ʻĀina Moana Park (Magic Island)—mauka/makai	The Project will not be visible behind the Ala Moana Center—no visual effect
Z	Panoramic views—Ala Wai Canal Promenade toward the Ko'olau Mountain Range	Koko Head of study area—no visual effect

to significant depending on the viewer's position and location.

The Project will cross, but not block, views along the following protected mauka-to-makai street view corridors:

- Bishop Street—the guideway and columns will be dominant elements in makai views between Nimitz Highway and Queen Street, and views of the horizon will be partially blocked. The bulk and scale of the guideway and columns will be compatible with Nimitz Highway, which functions as a major transportation corridor. Mauka of Queen Street,

these elements will likely appear less dominant because the vista will take in a longer view and be more expansive (Figures 4-44 and 4-45).

- Cooke Street—the guideway and columns will be dominant elements in mauka-makai views, respectively, between Pohukaina Street and Queen Street. Views of the horizon will be partially blocked from viewpoints near the alignment, including mauka views from the park at Halekauwila Street and Cooke Street. The guideway, as viewed from Kaka'ako Park, will serve as a small component of the larger landscape and will not be a dominant feature



Figure 4-44 Visual Simulation from Bishop Street at Aloha Tower Drive, looking Mauka



Figure 4-45 Visual Simulation from Bishop Street at Queen Street, looking Makai

in these views. The bulk and scale of the guideway and columns will conflict with the pedestrian-oriented streetscape (Figure 4-46).

- Ward Avenue—the guideway and columns will be dominant elements in mauka-makai views, respectively, between Auahi Street and Queen Street. Views of the horizon will be partially blocked from viewpoints near the alignment. The bulk and scale of the guideway and columns will conflict with the pedestrian-oriented streetscape. For mauka views from Ala Moana Boulevard and makai views mauka of Queen Street, these elements will likely appear less dominant because the vista will take in a longer view and be more expansive (Figures 4-47 and 4-48).
- Pi‘ikoi Street—the guideway and columns will be dominant elements in mauka-makai views, respectively, between Waimanu Street and Kapi‘olani Boulevard. Views of the horizon will be partially blocked from viewpoints near the alignment. Although the bulk and scale of the guideway and columns will conflict with the pedestrian-oriented streetscape, the view includes rows of mature trees, which will reduce this effect (Figures 4-49 and 4-50).
- Ke‘eaumoku Street—the guideway and columns will run along the mauka side of Ala Moana Center behind surrounding buildings.
- ‘Āina Moana Park (Magic Island)—the guideway will not be visible behind Ala Moana Center in mauka views from Magic Island.

Viewpoints 9 through 19 illustrate views of the Project within this landscape unit (Figures 4-28 through 4-38).

Evaluation of Special Management Area Coastal Views

Hawai‘i’s SMA law provides special controls on developments within the SMA. The SMA is determined by the counties and is generally an area along the shoreline extending mauka to the first major highway. Portions of the Project within

the SMA are discussed in Appendix J. The SMA permits are administered by DPP and granted by the City Council. Developments within the SMA must address certain criteria under HRS Chapter 205A, which are also codified under the City’s ordinances in ROH Chapter 25. This section of the Final EIS discusses the SMA permit criteria related to coastal view effects within the SMA. Other SMA criteria are discussed throughout the Final EIS and specifically addressed in Appendix J. In particular to this discussion, HRS Section 205A-25(3) provides that the Project “shall seek to minimize, where reasonable . . . (D) Any development which would substantially interfere with or detract from the line of sight toward the sea from the state highway nearest the coast [.]”

The intent of the regulation is to minimize, where possible, development that would substantially interfere with or detract from the line of sight toward the sea from the state highway nearest the coast [ROH Section 25-3-2(4)].

The *Coastal View Study* (DLU 1987) supports the goals and objectives of the SMA regulations, which include shaping development along the scenic coastal highways throughout Wai‘anae, North Shore, Windward, and Koko Head areas. The study’s guidelines for building orientation and massing, setbacks, parking lot siting, and landscaping may be applicable to some of the structural components of the Project, such as the guideway and stations. The study also provides an inventory of significant coastal views and coastal land forms from public viewpoints and coastal roadways within the SMA.

The Project will pass along coastal roadways identified in the *Coastal View Study* with intermittent and continuous views along parts of Farrington Highway, Kamehameha Highway, and Nimitz Highway. For motorist and passengers traveling along Farrington and Kamehameha Highways, the guideway support columns will intermittently block



Figure 4-46 Visual Simulation from Cooke Street at Ilaniwai Street, looking Makai



Figure 4-47 Visual Simulation from Ward Avenue near Auahi Street, looking Mauka



Figure 4-48 Visual Simulation from Ward Avenue at Queen Street, looking Makai



Figure 4-49 Visual Simulation from Pi'ikoi Street at Ala Moana Center Entrance, looking Mauka



Figure 4-50 Visual Simulation from Pi'ikoi Street at Kapi'olani Boulevard, looking Makai

distant views of the shoreline. However, the roadways are in existing transportation corridors where overhead utilities are already part of the view.

The quality of makai views from Farrington Highway in the vicinity of Waipahu High School vary from low to moderate, with the campus and occasional groupings of shrubs and small trees obstructing most of these views. However, the multistory maintenance and storage facility buildings sited on the slope between Waipahu High School and Leeward Community College (preferred site) will be highly visible and dominant elements of makai views from the highway. Views of Pearl Harbor are of relatively short duration and intermittent while traveling along this section of Farrington Highway, so changes in views of the shoreline and harbor are not expected to be dramatic. Near Aloha Stadium on Kamehameha Highway, makai views from the highway will be intermittently blocked by the guideway support columns. Changes in makai views are not expected

to be dramatic or substantial; therefore, impacts on Richardson Field (Figure 4-11) will be low because it is makai of the guideway.

Figure 4-22 shows a view from Kamehameha Highway at Ka'ahumanu Street looking makai. Although the change in views of the Neal S. Blaisdell Park shown in the middleground of this view will be significant from this viewpoint, distant views of the shoreline from the roadways are less affected. Changes in views of the shoreline are not expected to be dramatic.

The portion of the guideway that will run along the makai side of Nimitz Highway and the mauka side of the SMA boundary is between Lagoon Drive near Honolulu International Airport and Kalihi. In this area, the alignment will be along the mauka edge of Ke'ehi Lagoon Beach Park and closely follow Nimitz Highway and the H-1 Freeway. Figure 4-27 illustrates where the guideway will be in relationship to the roadway. There will be

moderate impacts on makai views of the shoreline from these state highways.

Although they are mauka of the SMA, stationary makai views of the shoreline from Waipahu High School, Leeward Community College, Blaisdell Park, Richardson Park, and Ke'ehi Lagoon are also identified in the *Coastal View Study* as important to preserve. Because the guideway will be mauka of these viewpoints and the preferred maintenance and storage facility site is between Waipahu High School and Leeward Community College campuses, no makai view effects are expected. For the view of Honolulu Harbor from Sand Island, the guideway will pass in between existing buildings along Dillingham Boulevard and no effects to views will occur.

The *Coastal View Study* also considers the creation of new views along with the preservation of existing views. Transit users on the elevated guideway will have expansive panoramic views of the shoreline except where disrupted by trains traveling in the opposite direction, station structures, and multi-story buildings. These views will be similar to those from the street below, but better due to the elevated perspective. As discussed in Appendix J, the City will minimize, where reasonable, portions of the Project that will substantially interfere with or detract from the line of sight toward the sea from the state highway nearest the coast.

Mitigation

As part of the design process, DTS has developed specifications and design criteria to address the City's requirements for the Project. Guideway materials and surface textures will be selected in accordance with generally accepted architectural principles to achieve integration between the guideway and its surrounding environment. Landscape and streetscape improvements will mitigate potential visual impacts, primarily for street-level views.

Other measures to address visual impacts of the Project are being developed through the station design and planning process. The initial station area plans and design guidelines were first developed with coordination between DTS and DPP. The next level of transit station design focuses on integrating individual neighborhood characteristics of the communities served by stations.

The following mitigation framework will be included with the Project to minimize negative visual effects and enhance the visual and aesthetic opportunities that it creates:

- Develop and apply design guidelines that will establish a consistent design framework for the Project with consideration of local context.
- Coordinate the project design with City TOD planning and DPP.
- Consult with the communities surrounding each station for input on station design elements.
- Consider specific sites for landscaping and trees during the final design phase when plans for new plantings will be prepared by a landscape architect. Landscape and streetscape improvements will serve to mitigate potential visual impacts.

Design Principals and Mitigation

The following design principles are identified in the *Honolulu High-Capacity Transit Corridor Project Compendium of Design Criteria* (RTD 2009o) and will be implemented in final design and mitigation measures to minimize visual effects.

Environmental Design Criteria: Aesthetics/Visual (Section 3.15)

- Stations and park-and-ride facilities will be designed in a manner that is compatible with the surroundings.
- Area and guideway lighting fixtures and standards will incorporate directional shielding where needed to avoid the intrusion

of unwanted light and glare into adjacent sensitive land uses.

- Landscaping will be used to screen the traction power substations from sensitive adjacent land uses, such as residential areas.
- Lighting and security equipment will be located so as not to be visible from adjacent sensitive land uses.
- Local ordinances for screening, signage, and materials will be followed.
- Where possible, every effort will be made to integrate a traction power substation into a larger structure in the central business districts.
- Where there is an opportunity, the design will incorporate signage, materials, street furniture, landscaping, etc., to enhance the visual environment.

Architecture Design Criteria: Station Site Design (Section 10.2.2)

- Station sites will be designed to ensure that each station satisfies operational demands and is well integrated into the existing urban fabric and the communities the station serves.

Architecture Design Criteria: Stations (Section 10.3)

- The physical form of the project stations and support facilities will embody Honolulu and Hawai‘i’s rich cultural heritage.
- Station designs will be context-sensitive, functionally integrated, and culturally expressive of their specific locations.

Architecture Design Criteria: Materials and Finishes (Section 10.8.2)

- Materials used in station construction will be consistent with the cultural and historic guidance and recommendations set forth in the Design Language Pattern Book.

Architecture Design Criteria: Lighting (Sections 10.12.1 and 10.12.3)

- The quality of the lighting design will greatly influence the appearance and attractiveness of stations and will play an important role in enabling the public’s acceptance of the system and the stations.
- Glare from transit station lights or reflective surfaces will be reduced to an absolute minimum such that it does not affect the vision of motorists.
- Light spill will be prevented from the stations onto roadways and areas adjacent to stations and station sites.
- Brightness and glare will be reduced to an absolute minimum by:
 - Locating light sources to avoid direct reflection or by selecting anti-reflective finishes.
 - Minimizing or eliminating undesirable reflections in glazed and polished surfaces, glass, walls, and other similar elements.
 - Minimizing or eliminating light spillage onto adjacent properties and eliminating night sky pollution. This will be done using full cut-off luminaries (fixture and lamp design) and low-reflective surfaces.
- Light sources in parking structures will not be visible from outside the structure, particularly those on the upper decks.

Landscape Architecture Design Criteria: General (Section 11.1.1)

- The transit system’s place in Hawai‘i will be defined by creating an inspired ground plane with landscape planting, paving, and furniture.
- The landscape architectural design components will unify the miles of guideway and stations.
- Design elements will be repeated in all stations while material sections will be varied based on community context.

***Landscape Architecture Design Criteria: Design Intent
(Sections 11.2.1 and 11.2.2)***

- Use of limited shrubs and groundcover palette will unify the stations and approaches and create variation primarily in the paving colors and tree selections. Consistent application of these principals will result in a unified system
- High quality materials will be used in limited amounts to emphasize the station approaches and other important features. The natural shape and character of materials will be the focus.
- Specialty stations will be treated with historic context and careful design to reinforce the uniqueness of context or use (e.g., the Kapālama Station might have a special planting of true kamani trees).
- The mauka-makai relationship of streams and perpendicular crossings will be accentuated to add character, variety, and scale to the alignment.
- Trees displaced by the guideway during construction will be transplanted to other areas of the corridor as feasible. Wood from any trees that are not able to be saved or salvaged and transplanted will be repurposed.

***Landscape Architecture Design Criteria: Streetscape
(Section 11.3.1)***

- Street tree planting or transplanting will occur adjacent to the station area and along the alignment where the existing streetscape is affected. Trees will be placed every 50 feet when adjacent to residential areas and every 40 feet when adjacent to commercial areas. Tree species, sizes, and detail will conform to City standards.
- Trees will be planted a minimum of 3 feet away from curbs and a minimum of 2 feet away from the edge of the walkways.

***Landscape Architecture Design Criteria: Station Areas
(Section 11.3.2)***

- Planting and paving design will play a pivotal role in increasing station visibility and identity, as well as directing patrons to the station entrance. In some locations, planters will be added to soften the station architecture.
- Design of station approaches will link entry plaza to busy drop-off lanes and public walkways in creative ways that allow for pedestrian circulation and seating.
- Low shrubs and ground covers will be used in station areas to increase visibility near bicycle or vehicle traffic.

***Landscape Architecture Design Criteria: Traction Power Substations
(Section 11.3.5)***

- Tall vertical plantings for vines will be used to screen or minimize the impact of the traction power substation structures. Plants or vines will be a minimum of 6 feet high in secure areas while maintaining visibility to the entrances.
- Maintain a minimum access width of 5 feet around all sides of the structure.

***Landscape Architecture Design Criteria: Under Guideway
(Section 11.3.6)***

- Where the guideway columns fall within curbed areas, vines will be trained onto columns to reduce the likelihood of graffiti and to soften the appearance of the structures. Surface texture of the column design may be enhanced to facilitate vine attachment and growth.

***Landscape Architecture Design Criteria: Planting Design
(Sections 11.5.2 and 11.5.4)***

- Plant material will be used to provide human scale elements and soften the elevated fixed-guideway and platform and help integrate the appearance of transit facilities.
- Site-specific designs will be created that provide station identity and respond to site

conditions, including views, trees, sun and wind patterns, and soils that still relate to the design family of other station areas.

- Station designers will make provisions for specific tree relocations in their plans. A certified arborist will be consulted to determine the likelihood of survival for each tree being considered for transplanting.
- Wherever feasible (as determined by a certified arborist), existing trees will be protected in place.
- During construction, the City will maintain all landscaped areas within the construction limits to HDOT standards utilizing HDOT maintenance specifications, including mowing, edging and trimming, weeding, pruning and care of shrubs and trees, fertilizing, pesticide and herbicides, clearing gutters, swales and ditches, invasive plant removal, and rubbish and debris removal and disposal.

Even with mitigation measures, some obstruction and changes to views will result in significant unavoidable adverse effects. These effects will be most noticeable where the guideway and stations are nearby or in the foreground of views. The degree of visual effect will vary with the alignment orientation and the height of the guideway, stations, and surrounding buildings and trees, along with the viewer's expectations of view quality. Although changes in visual resources or view planes and the viewer response will be significant in some areas, view changes are not likely to be obtrusive in wider vistas or regional panoramic views where the project elements serve as smaller components of the larger landscape.

4.9 Air Quality

This section evaluates the quantity of air pollutant emissions that will occur with the Project. *Air pollution* is a general term that refers to one or more chemical substances that degrade the quality of the atmosphere. *Air quality* describes the amount

of pollution in the air. Individual air pollutants degrade the atmosphere by reducing visibility, damaging property, reducing the productivity or vigor of crops or natural vegetation, or reducing human or animal health. For more information and references, see the *Honolulu High-Capacity Transit Corridor Project Air Quality and Energy Technical Report* (RTD 2008g).

4.9.1 Background and Methodology Regulatory Requirements

The Clean Air Act Amendments of 1990 (40 CFR 51) and the Final Transportation Conformity Rule (40 CFR 93) direct the EPA to implement environmental policies and regulations that will ensure acceptable air quality levels.

As required by the Clean Air Act, National Ambient Air Quality Standards (NAAQS) have been established for six major air pollutants. Known as *criteria pollutants*, these are carbon monoxide (CO), nitrogen dioxide (NO₂), ozone (O₃), particulate matter (PM₁₀ and PM_{2.5}), sulfur dioxide (SO₂) and lead (Pb). The State of Hawai'i has also established ambient air quality standards that are either the same or more stringent than the corresponding Federal standards. State and Federal standards are summarized in Table 4-14.

In addition to the criteria pollutants addressed in the NAAQS, the EPA regulates air toxics. Toxic air pollutants are those known or suspected to cause cancer or other serious health effects. In 2001, the EPA identified 21 Mobile Source Air Toxics (MSAT) and highlighted six as priority MSATs.

In February 2007, the EPA finalized the *Control of Hazardous Air Pollutants from Mobile Sources: Final Rule to Reduce Mobile Source Air Toxics* (EPA 2007). This rule limits gasoline's benzene content and reduces toxic emissions from passenger vehicles and gas cans.

Table 4-14 National and State Ambient Air Quality Standards

Pollutant	Standards	
	Hawai'i State Standard	Federal Primary Standard (Health)
Carbon Monoxide (CO)		
1 hour	9 ppm	35 ppm
8 hour	4.5 ppm	9 ppm
Nitrogen Dioxide (NO ₂)		
Annual (arithmetic)	0.04 ppm	0.05 ppm
PM ₁₀		
24 hour	150 µg/m ³	150 µg/m ³
Annual (arithmetic)	50 µg/m ³	Revoked
PM _{2.5}		
24 hour	No standard	35 µg/m ³
Annual (arithmetic)	No standard	15 µg/m ³
Ozone (O ₃)		
8 hour	0.08 ppm	0.08 ppm
Sulfur Dioxide (SO ₂)		
3 hour	0.5 ppm	No standard
24 hour	0.14 ppm	0.14 ppm
Annual (arithmetic)	0.03 ppm	0.03 ppm
Lead (Pb)		
3 months (arithmetic)	1.5 µg/m ³	1.5 µg/m ³

µg/m³ = micrograms per cubic meter

ppm = parts per million

Sources: State of Hawai'i, Department of Health, Clean Air Branch—Hawai'i Administrative Rules, 11-59; 40 CFR Part 50.

Methodology

Air quality effects predicted to result from the Project's operation are based on the anticipated vehicle miles traveled (VMT) and average network speed. A regional mobile source pollutant burdens analysis was completed. It was based on link-by-link VMT and speed for the Project and compared to the No Build Alternative. VMT and the associated traffic simulation network speeds were used.

Emissions factors were obtained through the EPA's mobile source emission model, MOBILE6.2, in accordance with Hawai'i Department of Health Clean Air Branch's recommendation. This analysis

compares regional pollutant burdens (the total quantity of each pollutant released in the region) for the Project. Changes in regional emission levels were estimated to describe the potential effect the Project may have on regional air quality.

In 2006, the USDOT issued Interim Guidance regarding MSAT analysis in NEPA documentation. This guidance includes a three-tiered approach to determining potential project-induced MSAT impacts, depending on the nature of the project. A qualitative analysis of MSAT effects was completed because the Project has low potential for increasing MSAT emissions.

4.9.2 Affected Environment Relevant Pollutants

The Project will affect travel patterns within the study corridor, so pollutants that can be traced principally to motor vehicles are relevant in evaluating project consequences. These pollutants include CO, volatile organic compounds (VOC), nitrogen oxides (NO_x), PM₁₀ and PM_{2.5}, and MSATs.

Air pollutant levels in Hawai'i are monitored by a network of sampling stations operated under the supervision of the State of Hawai'i Department of Health (HDOH) at various locations around O'ahu. The only NAAQS for which pollution levels have been measured greater than the standard since 2004 is PM_{2.5}. PM_{2.5} concentrations exceeded the 24-hour standard on four occasions in Pearl City in 2004 as a result of fireworks.

Regional Compliance with Standards

Section 107 of the 1977 Clean Air Act Amendments requires the EPA to publish a list of all geographic areas that are in compliance with the NAAQS and areas that do not attain the NAAQS. Areas not in compliance are called non-attainment areas. Areas for which insufficient data is available to make a determination are unclassified and treated as being in compliance (attainment areas)

until proven otherwise. Designation of an area is made on a pollutant-by-pollutant basis.

The entire State of Hawai‘i is designated as an attainment area for CO, O₃, PM₁₀, and PM_{2.5}. This means that the State is in compliance with the NAAQS for these pollutants.

Projects included in Hawai‘i’s regional transportation network are found in the Transportation Improvement Plan. The Honolulu High-Capacity Transit Corridor Project is listed in the area’s Transportation Improvement Plan and complies with the goals set forth in the Statewide Transportation Plan.

4.9.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

The No Build Alternative provides a baseline to which the Project is compared. Under this alternative, the Project would not be built. It is predicted that 6,854 kilograms (kg) of VOCs, 147,464 kg of CO, 4,842 kg of NO_x, 375 kg of PM₁₀, and 174 kg of PM_{2.5} would be generated daily by transportation sources within the study corridor in 2030, including other projects in the ORTP.

Project

Regional Analysis

It is anticipated that the Project will reduce regional pollutant emissions by between 3.9 to 4.6 percent compared to the No Build Alternative (Table 4-15).

Table 4-15 shows the results of the analysis of VOC, CO, NO_x, PM₁₀, and PM_{2.5} for the Project compared to the No Build Alternative. If the electricity used to operate the Project is generated by combustion, this may produce additional emissions. However, these emissions will be offset in whole or part by the reductions generated by reduced VMT, as indicated in Table 4-15. Furthermore, power plant emissions may be more easily controlled than emissions from individual automobiles.

The Project is expected to have a small positive effect on MSAT emissions in the study corridor, compared to the No Build Alternative because of the reduction of VMT. MSAT levels could be higher in some locations in the study corridor than others, but current tools and science are not adequate to quantify these levels. However, EPA’s vehicle and fuel regulations coupled with fleet turnover will result in lower region-wide MSAT levels from current levels.

The Project is predicted to demonstrate a 4-percent reduction in VMT and no change in overall network speed compared to the No Build Alternative. This will result in predicted pollution reductions ranging from 3.9 to 4.6 percent compared to the No Build Alternative.

Greenhouse Gases

The Project will decrease greenhouse gas emissions from transportation sources on O‘ahu. Approximately 70 kg of carbon dioxide is emitted per million British thermal units (BTU) consumed when fuel oil, diesel, or gasoline is combusted

Table 4-15 2030 Mobile Source Regional Transportation Pollutant Burdens (kg/day)

Alternative	Emission Burden (kg/day)					Percent Change from No Build				
	VOC	CO	NO _x	PM ₁₀	PM _{2.5}	VOC	CO	NO _x	PM ₁₀	PM _{2.5}
No Build	6,874	147,899	4,856	376	175	n/a	n/a	n/a	n/a	n/a
Project	6,561	142,098	4,661	360	167	-4.6%	-3.9%	-4.0%	-4.3%	-4.6%

n/a = not applicable

(USDOE 2009). As detailed in Section 4.11, total daily transportation energy consumption on O‘ahu would be 94,890 million BTUs for the No Build Alternative and will be 92,450 million BTUs for the Project. Assuming all electricity is generated from combustion of oil, the daily 2,440-million-BTU energy savings will result in a daily reduction in greenhouse gas emissions of approximately 171 metric tons of carbon dioxide.

Local Effects

The study corridor is currently in attainment for CO, and monitored CO values are less than 20 percent of the applicable NAAQS. Therefore, no violations of the applicable NAAQS are likely to occur with the Project. As a result, a microscale CO analysis was not conducted.

Mitigation

Because no substantial air quality impacts are anticipated to result from operation of the Project, mitigation will not be required.

4.10 Noise and Vibration

This section describes the Project’s effects on environmental noise and vibration levels in the study corridor. For more information and references, see the *Honolulu High-Capacity Transit Corridor Project Noise and Vibration Technical Report*

(RTD 2008f) and the *Honolulu High-Capacity Transit Corridor Project Addendum 01 to the Noise and Vibration Technical Report* (RTD 2010b).

4.10.1 Background and Methodology

Background

Environmental noise is composed of many frequencies, each occurring simultaneously at its own sound pressure level. The range of magnitude, from the faintest to the loudest sound the ear can hear, is so large that sound pressure is expressed on a logarithmic scale in units called decibels (dB). The commonly used frequency weighting for environmental noise is A-weighting (dBA), which simulates how an average person hears sound.

A common noise descriptor for environmental noise is the equivalent sound level (Leq). Leq is a measure of total noise—a summation of all sounds during a period of time. Leq measured over a one-hour period is the hourly Leq [Leq(h)]. The day/night noise level (Ldn) is a descriptor of the daily noise environment, which incorporates a penalty for high noise levels at night. Lmax is the maximum noise level during an event. Ldn is used by the EPA and FTA to evaluate noise levels in residential areas.

Typical sound levels experienced in urban environments are shown in Figure 4-51.

Relative Sound Level	½ as loud	Baseline			Twice as loud		Four times as loud	
Typical Sound Environment	Indoor Office	Urban Residential			Urban Commercial			
Lmax of Common Noise Sources		Washing Machine (3 ft)	Auto (50 mph at 50 ft)	Vacuum Cleaner (3 ft)	Garbage Disposal (3 ft)	Delivery Truck (50 mph at 50 ft)	Dump Truck (50 mph at 50 ft)	Blender (3 ft)
Sound Level dBA	60	65	70	75	80	85	90	
Lmax at 50 ft of Transit Noise Source		Rail Transit with a Barrier (50 mph)			Rail Transit City Bus (50 mph)			

Sources: EPA 1971, EPA 1974, FTA 2006

Figure 4-51 Typical Sound Levels

Noise from rail transit operations is generated from the interaction of wheels on track, motive power, and the operation of traction power substations. The interaction of steel wheels on rails generates the following three different types of noise, depending on track work: (1) noise generated by pass-by trains operating on tangent track sections, (2) noise generated from wheel squeal on tightly curved track, and (3) noise generated on special trackway sections, such as at crossovers or turnouts.

Noise Criteria for the Project

Noise impacts from transit projects are evaluated using criteria established by the FTA, which are based on community reaction to environmental noise exposure (FTA 2006a). The FTA noise impact

criteria group noise-sensitive land uses into the categories shown in Table 4-16.

The FTA criteria define moderate and severe impacts. The project-generated noise level (project noise exposure) at which an impact will occur depends on the existing noise environment and the category of land use. The noise impact criteria for transit operations are shown on Figure 4-52, with residential noise impacts (measured in Ldn) shown on the left side of the graph and commercial noise impacts (measured in Leq[h]) shown on the right. Reading from the graph, if the existing noise level in a residential area is 60 dBA Ldn, then a project that generates less than 58 dBA Ldn will not have an effect. If it generates between 58 and 63 dBA Ldn, it will cause a moderate impact, and if it generates more than 63 dBA Ldn, it will cause a severe impact. Future noise exposure is the combination of existing noise exposure and the additional noise exposure caused by a project.

Severe noise impacts are usually considered significant within the context of NEPA and HRS Chapter 343. Severe noise impacts require the evaluation of alternative locations/alignments to avoid severe impacts altogether. If it is not practical to avoid severe impacts by changing the location of the Project, mitigation measures must

Noise Terminology

dBA is an A-weighted decibel, a measure that considers how people hear sound

Lmax is the maximum noise level during an event

Leq measures the average sound energy over time

Ldn is the day/night sound level, a 24-hour average with a penalty that makes sounds at night more important

Table 4-16 FTA Transit Project Noise Impact Criteria—Land Use Categories

Category	Metric	Land Use Description
1	Leq(h) (dBA)	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, land uses such as outdoor amphitheaters and concert pavilions, and National Historic Landmarks with substantial outdoor use.
2	Ldn (dBA)	Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Leq(h) (dBA)	Institutional land uses with primary daytime and evening use. This category includes schools, libraries, and churches where it is important to consider interference with such activities as speech, meditation, and concentration on reading material. Buildings with interior spaces where quiet is important, such as medical offices, conference rooms, recording studios, and concert halls, fall into this category. It also includes places for meditation or study associated with cemeteries, monuments, and museums. Certain historical sites, parks, and recreational facilities are also included.

Source: *Transit Noise and Vibration Impact Assessment, Final Report (FTA 2006a)*.

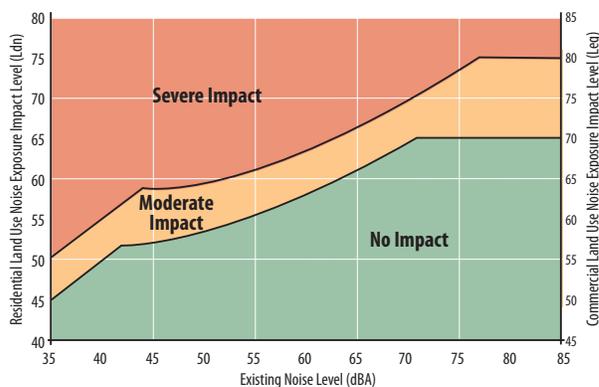


Figure 4-52 FTA Transit Project Noise Exposure Impact Criteria

be considered and incorporated into the Project unless there are truly extenuating circumstances that prevent it. Moderate noise impacts also require consideration and adoption of mitigation measures when it is reasonable. The mitigation of moderate impacts should consider the predicted increase over existing noise levels, the type and number of noise-sensitive land uses affected, existing outdoor/indoor sound insulation, community views, special protection provided by law, and the cost-effectiveness of mitigating noise to more acceptable levels.

The State of Hawai'i regulates community noise pollution through HAR Chapter 11-46. The regulations are applicable to stationary noise sources, such as traction power substations and the vehicle maintenance and storage facility.

Vibration Criteria for the Project

Vibration effects from transit operations are generated by motions/actions at the wheel/rail interface. The smoothness of these motions/actions are influenced by wheel and rail roughness, transit vehicle suspension, train speed, track construction (including types of fixation and ballast), location of switches and crossovers, and the geologic strata (layers of rock and soil) underlying the track. Vibration from a passing train has the potential to move through the geologic strata, resulting in vibration transferred through the building

foundation. The principal concern is annoyance to building occupants.

Ground-borne vibration is usually characterized in terms of vibration velocity. This is because—over the frequency range relevant to ground-borne vibration (about 1 to 200 hertz)—both human and building response tends to be more proportional to velocity than to displacement or acceleration. Vibration velocity is often reported as vibration decibels (VdB) relative to a reference velocity of 10^{-6} inches/second.

The FTA has developed criteria for acceptable levels of ground-borne vibration (FTA 2006a) as shown in Table 4-17.

Noise and Vibration Assessment Methodology

Project-related noise levels were calculated using FTA reference sound levels for rail transit. Potentially noise-sensitive land uses and vibration-sensitive buildings were identified, as well as appropriate locations for noise monitoring.

Ground-level noise levels were measured at locations along the project alignment and near proposed station locations to establish the most sensitive existing environment (i.e., existing baseline noise levels). Noise levels were also measured on the upper floors of residential buildings that have four or more floors. This is done by performing a series of measurements at representative locations. All noise measurements were made in accordance with American National Standards Institute procedures for community noise measurements.

Noise measurements were taken at 46 noise-sensitive locations along the study corridor. Eight of the noise measurements were taken at sites near the Arizona Memorial and Pearl Harbor Naval Base in response to comments received on the Draft EIS. Measurements for 24-hour periods were conducted

Table 4-17 FTA Ground-borne Vibration Impact Criteria

Land Use Category	Ground-borne Vibration Impact Levels (VdB)	
	Frequent Events ¹	Infrequent Events ²
Category 1: Buildings where low ambient vibration is essential for interior operations	65 VdB ³	65 VdB ³
Category 2: Residences and buildings where people normally sleep	72 VdB	80 VdB
Category 3: Institutional land uses with primarily daytime use	75 VdB	83 VdB

Source: *Transit Noise and Vibration Impact Assessment, Final Report (FTA 2006a)*.

¹ *Frequent Events* are defined as over 70 vibration events per day.

² *Infrequent Events* are defined as less than 70 vibration events per day. This includes most commuter rail systems.

³ This criterion is based on levels that are acceptable for most moderately sensitive equipment, such as optical microscopes. Vibration-sensitive manufacturing or research will require detailed evaluation to define acceptable vibration levels. Ensuring lower vibration levels in a building often requires special design of the HVAC system and stiffened floors.

at 25 sites that included residences and other buildings where people normally sleep (Category 2 sites). These locations were supplemented with short-term 15-minute measurement sites to determine existing noise levels at typical recreational, institutional, and commercial land uses with primarily daytime and evening activity (Category 3 sites). Eight of the 24-hour measurement sites were located on the upper floors of multi-story residential buildings with open lanais. Potential noise effects from traction powered substations, park-and-ride lots, and maintenance and storage facility operations were also identified.

Noise effects from the Project were determined by comparing the project-generated noise exposure level at each representative receptor in the corridor to the appropriate FTA criterion, given the land use and existing noise levels. If the project-generated noise is below the level for moderate impact, no impact will occur. If the noise level is between the level for moderate impact and severe impact, a moderate impact will occur. If the project noise level is equal to or above the severe impact level, a severe impact will occur.

Vibration effects from the Project were determined using the detailed vibration assessment information and procedures contained in the FTA's *Transit Noise and Vibration Impact Assessment* (FTA 2006a). FTA reference levels for a transit vehicle

and FTA reference data on ground transmission of vibration energy were used to estimate vibration levels near the fixed guideway.

4.10.2 Affected Environment

This section describes the noise survey used to establish baseline conditions. Ambient vibration levels were not measured as part of this study.

Ambient Noise Conditions in the Study Area

The measurement locations, type of measurement, and existing sound levels are shown in Figures 4-53 through 4-56. These locations represent noise-sensitive land uses along the corridor.

Ambient Vibration Conditions in the Study Area

Ambient vibration levels were not measured as part of this study but are anticipated to be below perceptible levels.

4.10.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

Under the No Build Alternative, the Project would not be built and the only source of future noise levels would be traffic movements on local streets and highways. The Project would not generate any new noise impacts. Similarly, no new vibration sources would occur in the absence of the Project. Although the projects in the ORTP will be built,

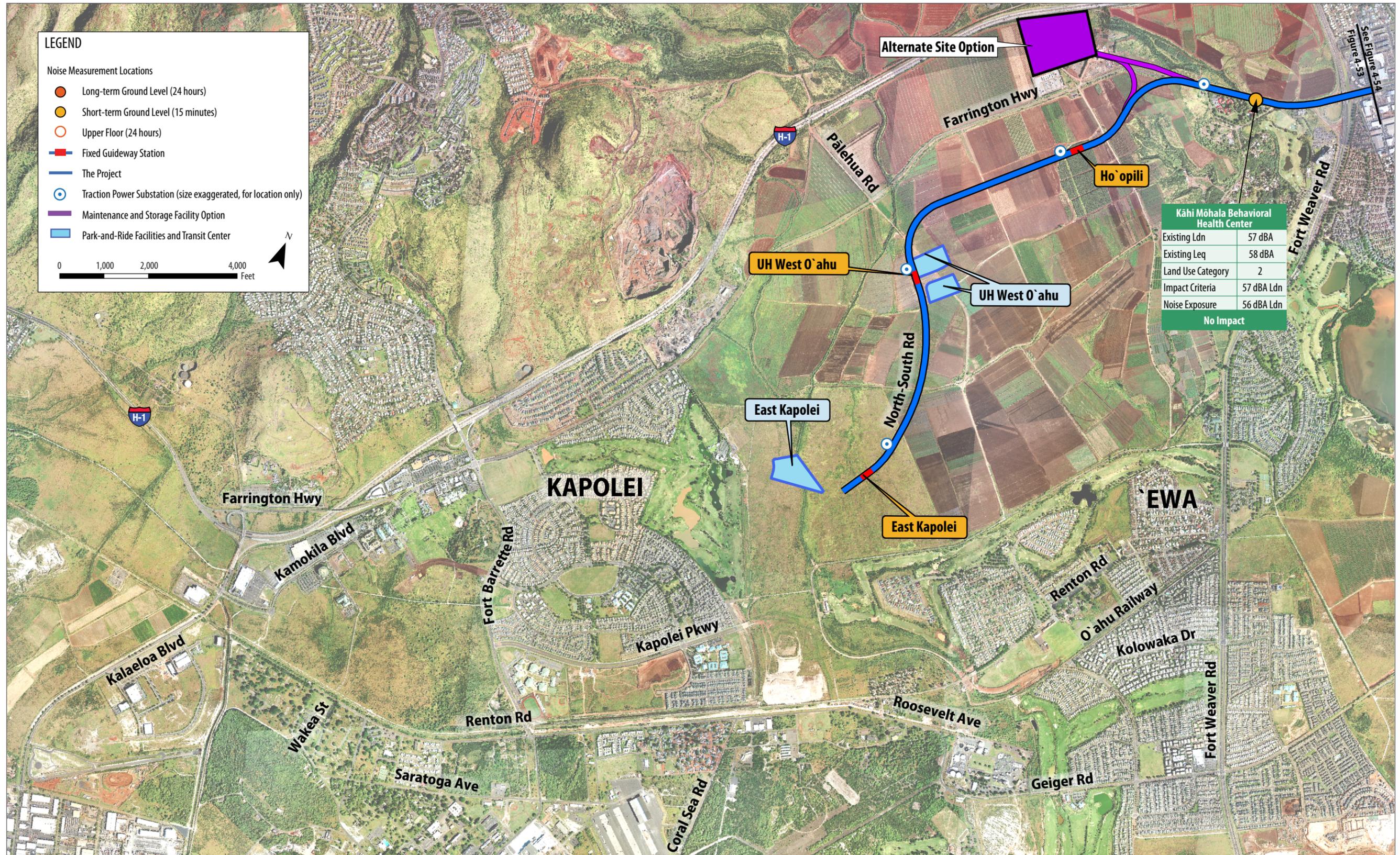


Figure 4-53 Noise Measurement Locations and Results (East Kapolei to Fort Weaver Road)

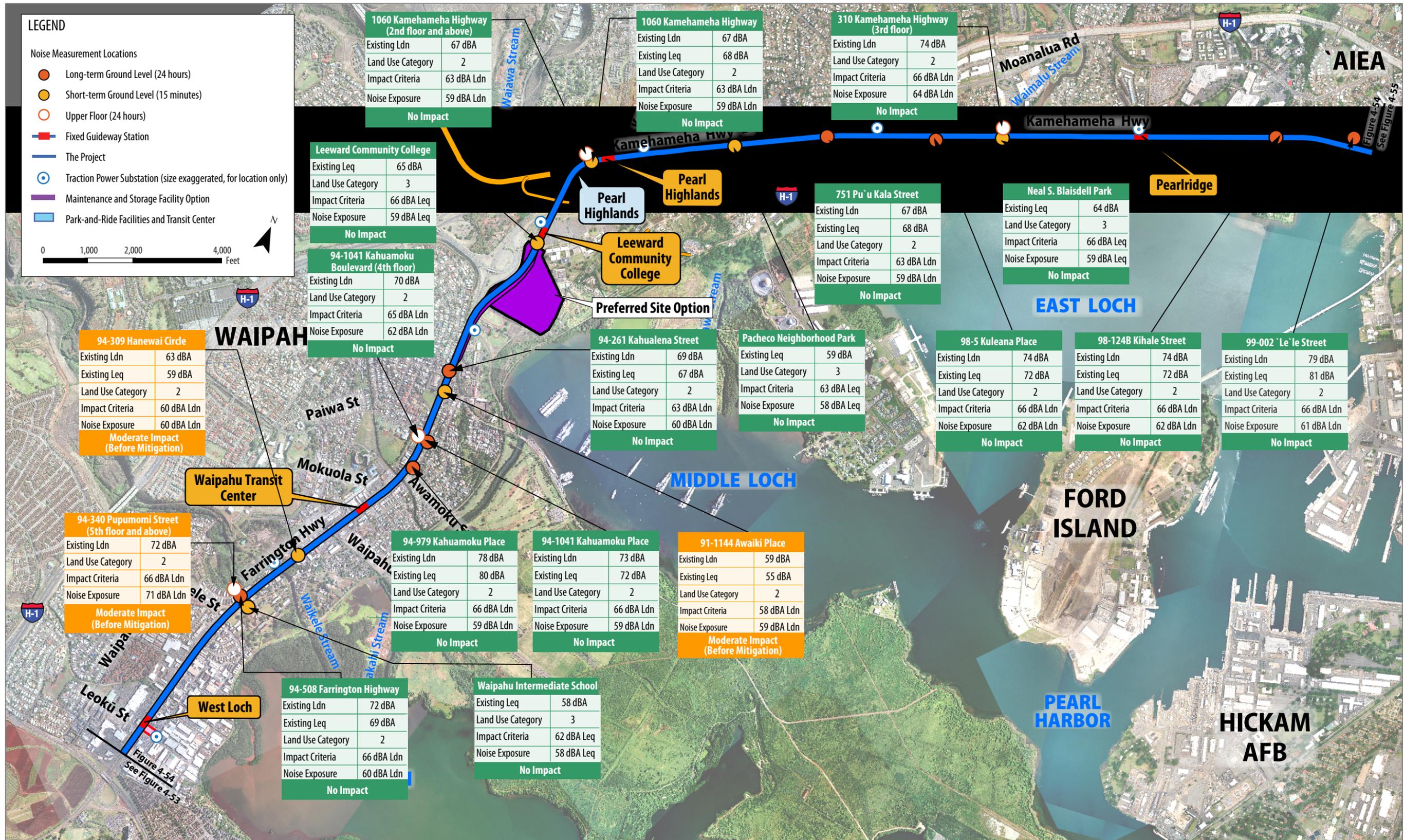


Figure 4-54 Noise Measurement Locations and Results (Fort Weaver Road to Aloha Stadium)

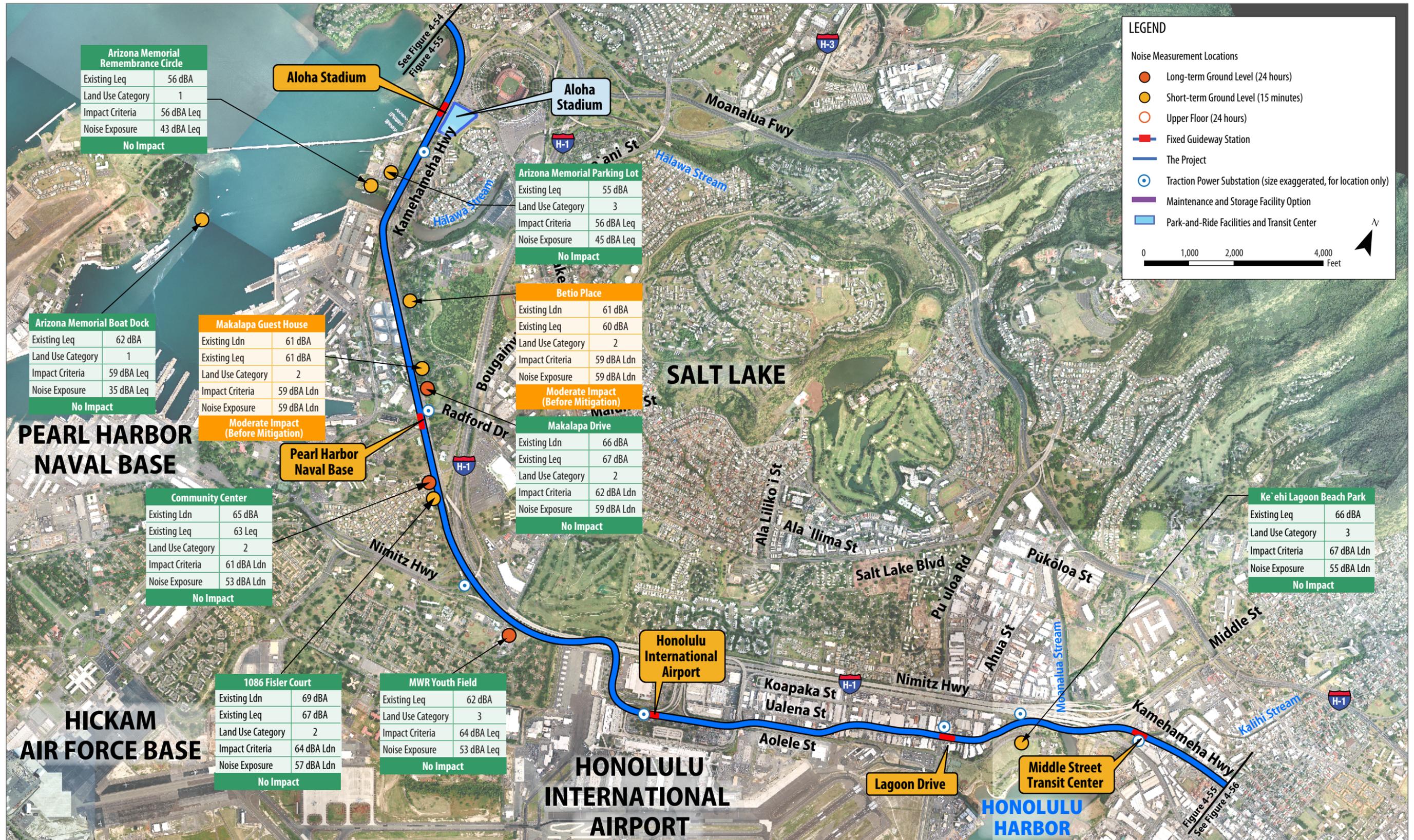


Figure 4-55 Noise Measurement Locations and Results (Aloha Stadium to Kalihi)

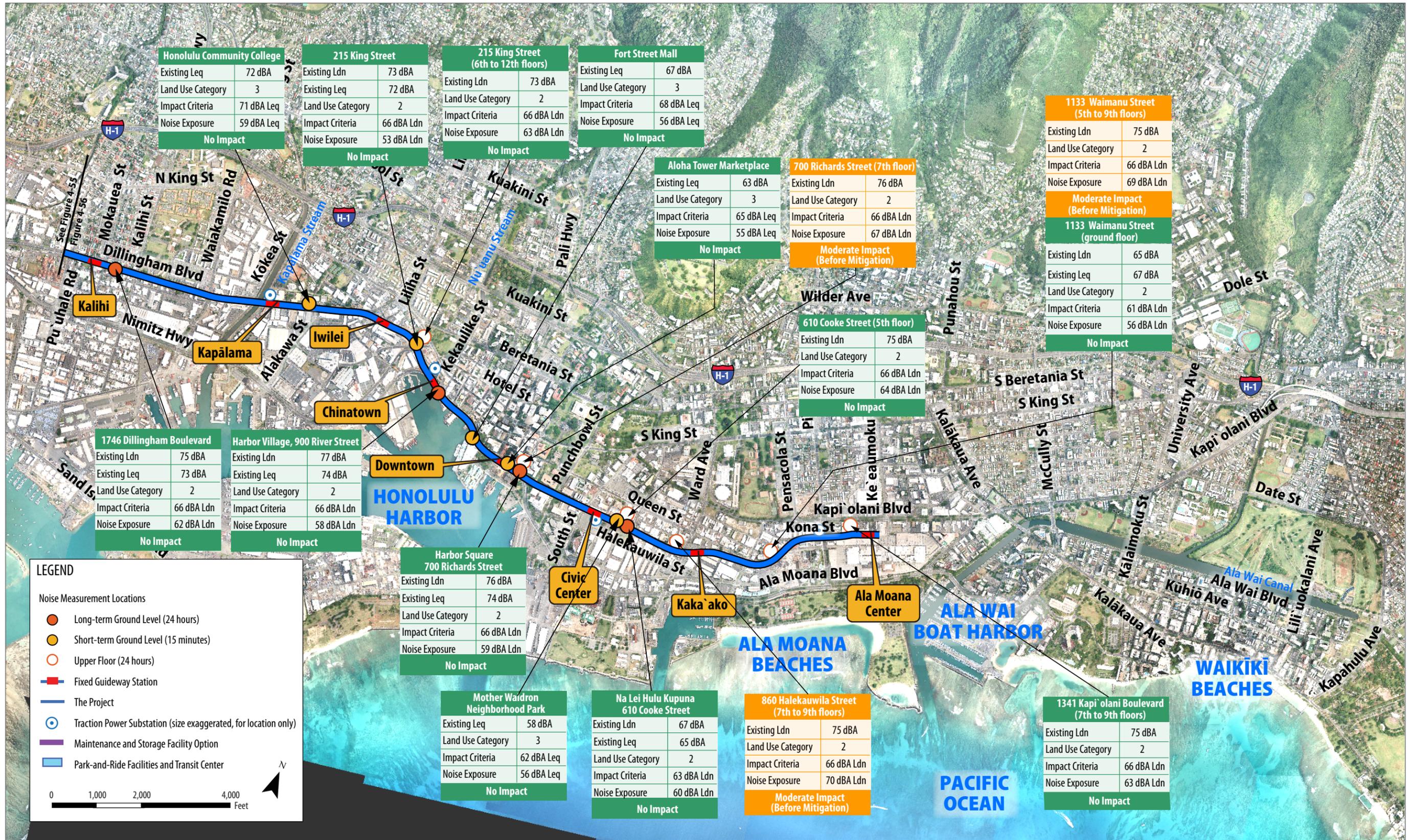


Figure 4-56 Noise Measurement Locations and Results (Kalihi to Ala Moana Center)

their environmental impacts will be studied in separate documents.

Project

Noise

The Project will include an integrated parapet wall at the edge of the guideway structure that extends 3 feet above the top of the rail.

Figures 4-53 through 4-56 show the measured existing noise level and future project noise exposure at each site. The data table included in these figures for each site is labeled “no impact” or “moderate impact” for each site. No noise impacts will occur for schools, public parks, or historic resources as a result of the Project. There will be no noise impacts at the three sites located at the Arizona Memorial (Figure 4-55).

The Project will cause no severe noise impacts. However, moderate impacts would occur at eight areas (Table 4-18). The moderate impacts to these eight areas would occur at the ground level for 50 residences and between the fifth and eleventh floors of four high-rise buildings.

The greatest noise source from the traction power substations will be air-conditioning equipment. All

traction power substations will be designed so that the noise generated by the substations measured at the nearest property line will be an hourly Leq of 45 dBA or less in areas zoned single-family residential, conservation, preservation, or similar type and 50 dBA Leq or less in areas zoned multi-family residential, business, resort, or similar type in accordance with HAR Chapter 11-46.

Project park-and-ride lots will be located in undeveloped or commercial areas. The closest proximity from a park-and-ride lot to a residential use will be approximately 300 feet to the nearest point and more than 1,000 feet to the center of the park-and-ride site at Pearl Highlands. At these distances, the park-and-ride lots will not cause noise impacts.

Noise sources at the maintenance and storage facility will include trains operating and switching within the facility and maintenance and cleaning activities. These activities will occur over a 24-hour period. The preferred site option for the maintenance and storage facility is a 44-acre vacant site in Waipahu near Leeward Community College. Noise-sensitive sites within 1,000 feet of the preferred maintenance and storage site include Leeward Community College, Waipahu High School, and the Pearl Harbor Bike Path. These sites

Table 4-18 Noise Impacts

Area	Receptor Description	Buildings Affected	Level of Impact
West Loch to Waipahu Transit Center	94-340 Pupumomi Street	One 9-floor building	Moderate impact to 5th floor and above
West Loch to Waipahu Transit Center	Hanewai Circle	20 single-family residential	Moderate impact
Waipahu Transit Center to Leeward Community College	Awaiiki Place	18 single-family residential	Moderate impact
Aloha Stadium to Pearl Harbor Naval Base	Betio Place	8 single-family residential	Moderate impact
Aloha Stadium to Pearl Harbor Naval Base	Makalapa Guest House	4 single-family residential	Moderate impact
Downtown to Civic Center	700 Richards Street	One 26-floor building	Moderate impact to 7th through 11th floors
Civic Center to Kaka'ako	860 Halekauwila	One 30-floor building	Moderate impact to 6th floor and above
Kaka'ako to Ala Moana Center	1133 Waimanu	One 28-floor building	Moderate impact to 5th through 9th floors

are Category 3 (Table 4-17). Maximum daytime operations at the site would occur when vehicles are taken in or out of service to accommodate the change in headways. The maximum noise exposure level at the Waipahu High School football field, the nearest use to the maintenance and storage site, would be 62 dBA Leq(h). That is less than the impact criterion of 67 dBA Leq(h) at that site. The maximum noise exposure level at Leeward Community College would be 55 dBA Leq(h). That is less than the impact criterion of 66 dBA Leq(h) at that site. The maximum noise exposure level at the Pearl Harbor Bike Path would be 52 dBA Leq(h). That is less than the lowest FTA impact criterion of 57 dBA Leq(h) that is applicable to quiet sites. Wheel squeal is not expected within the maintenance and storage facility but could occur, and wheel lubrication devices will be installed at tight-radius curves within the maintenance and storage facility. There are no noise-sensitive uses near the alternative Ho'opili maintenance and storage facility site option.

Vibration

Vibration levels at adjacent properties will not exceed 65 VdB for the elevated rail transit. This level is less than the FTA criterion of 72 VdB for residential buildings and other structures where people normally sleep (Category 2). No land use along the alignment is identified as having vibration-sensitive equipment that will require the use of lower vibration impact criteria; therefore, no vibration effects are anticipated. No long-term vibration impacts will occur to historic resources.

Mitigation

Noise

Without mitigation, noise exposure levels at eight areas would exceed the noise impact criteria.

For the Project, wheel skirts will reduce noise generated from the Project by 3 dBA or more. Wheel skirts have been added to the vehicle specifications. As a result, noise exposure levels from the Project

will be 3 dBA less than shown in Figures 4-53 through 4-56. Wheel skirts will reduce noise exposure levels to below the impact criteria at five of the eight locations where impacts are predicted (Table 4-19). With wheel skirts, three of these residential sites still will experience moderate noise impacts on the fifth through eleventh floors. The moderate noise impact that will occur at the high-rise buildings will only be experienced from units above track level on the fifth through ninth floors.

The use of sound-absorptive materials under the tracks in these three areas will reduce the project noise exposure at upper floors to below the moderate noise impact threshold (Table 4-19). Eight hundred feet of sound-absorptive material will be installed from Pupukahi Street to Pupupuhi Street. For the building at 860 Halekauwila Street, sound-absorptive material will be required from 200 feet 'Ewa of Kamani Street to 100 feet Koko Head of Kamani Street—a total of 300 feet. The building at 1133 Waimanu will require sound-absorptive material to be installed between Kamake'e Street and Waimanu Street for a total of 920 feet.

Once the Project is operating, field measurements for noise will be conducted at representative sites. Should the Project's noise impacts exceed the FTA noise impact levels, further mitigation may be implemented on the receivers with the authorization of the property owners.

The elevated guideway will include a parapet wall on both sides of the guideway that extends 3 feet above the top of the rail.

On the track curves between the preferred maintenance and storage facility site and the nearest Leeward Community College building, FTA and the City will commit to installing automatic track lubrication devices capable of eliminating wheel squeal on those curves.

Table 4-19 Mitigated Noise Levels

Area	Receptor Description	Impact Criteria	Noise Level without Mitigation*	Noise Level with Wheel Skirts	Noise Level with Wheel Skirts and Sound Absorptive Material
West Loch to Waipahu Transit Center	94-340 Pupumomi Street, 5th floor and above	66 dBA Ldn	71 dBA Ldn	68 dBA Ldn	65 dBA Ldn
West Loch to Waipahu Transit Center	Hanewai Circle	60 dBA Ldn	60 dBA Ldn	57 dBA Ldn	n/a
Waipahu Transit Center to Leeward Community College	Awaiki Place	58 dBA Ldn	59 dBA Ldn	56 dBA Ldn	n/a
Aloha Stadium to Pearl Harbor Naval Base	Betio Place	59 dBA Ldn	59 dBA Ldn	56 dBA Ldn	n/a
Aloha Stadium to Pearl Harbor Naval Base	Makalapa Guest House	59 dBA Ldn	59 dBA Ldn	56 dBA Ldn	n/a
Downtown to Civic Center	700 Richards Street, 7th through 11th floors	66 dBA Ldn	67 dBA Ldn	64 dBA Ldn	n/a
Civic Center to Kaka`ako	860 Halekauwila, 6th floor and above	66 dBA Ldn	70 dBA Ldn	67 dBA Ldn	64 dBA Ldn
Kaka`ako to Ala Moana Center	1133 Waimanu, 5th through 9th floors	66 dBA Ldn	69 dBA Ldn	66 dBA Ldn	63 dBA Ldn

Values in **BOLD** represent a noise impact
n/a – Not applicable, Sound Absorptive Material not proposed in this location.
*Includes 3-foot parapet wall

FTA and the City commit to requiring in the specifications for all traction power substations needed for the project that the noise generated by the substations measured at the nearest property line be an hourly Leq of 45 dBA or less in areas zoned single-family residential, conservation, preservation, or similar type and 50 dBA Leq or less in areas zoned multi-family residential, business, resort, or similar type in accordance with Hawai‘i state law (HAR Section 11-46).

Vibration

Because no vibration effects are projected, no mitigation is proposed.

4.11 Energy and Electric and Magnetic Fields

This section describes the energy required for operating the Project and analyzes electric and

magnetic fields (EMF) as related to the Project’s operation. Energy used during the Project’s operation will include fuel consumed by buses, electricity used to power transit vehicles, and a negligible amount of energy for signals, lighting, and maintenance. For more information and references, see the *Honolulu High-Capacity Transit Corridor Project Electric and Magnetic Fields Technical Report* (RTD 2008h).

EMFs are a result of the voltage or electric potential of an object. For this Project, the high-capacity transit system will be powered by electricity from a third line located next to the rail tracks. Whenever an electrical current flows, it creates a magnetic field. An analysis of EMFs is included in this Final EIS because of public concern about potential health effects and effects on equipment and machines adjacent to the corridor that may be sensitive to EMFs.

4.11.1 Background and Methodology

Energy

The analysis of operational energy consumption on O‘ahu was based on the transportation analysis prepared for the Project. Changes in overall transportation energy use for vehicles traveling on O‘ahu were assessed using daily VMT and speed values calculated from the transportation demand forecasting model.

The energy consumed by electrically powered transit operations for the high-capacity transit system was also considered. Fixed guideway high-capacity transit systems require energy for propulsion and to account for energy lost during transmission from the energy-generation site to the transit vehicles. The average energy consumption for a rail transit vehicle in the U.S. is 62,700 BTUs per vehicle-mile of service (USDOE 2007).

Electric and Magnetic Fields

EMFs are produced wherever wires distribute electric power and wherever electrical equipment is used. EMFs decrease with the square of distance away from operating equipment or away from current-carrying electric lines. Sensitive equipment that may be affected by changes to the Earth’s geomagnetic field caused by operation of the Project may be located at research, manufacturing, medical, and possibly military facilities. Available data on high-voltage power lines, medical and diagnostic facilities, institutional and research facilities, and military operations were assembled. This information was confirmed through field reconnaissance to verify site locations and identify equipment that may be sensitive to the influence of EMFs associated with the Project.

Research into the health effects of EMFs has not established a link between EMFs and any health effects. National Academy of Sciences National Research Center findings “do not support the contention that the use of electricity poses a major unrecognized public-health danger” (NRC 1999).

The International Commission on Non-Ionizing Radiation Protection also concluded that data related to cancer do not provide a basis for assessing the health risks of human exposure to power frequency fields (ICNIRP 1998), but it did establish a protective guideline of 830 milligauss magnetic field density for exposure to the general public.

4.11.2 Affected Environment

Energy

In 2006, 291 million gallons of gasoline were consumed on the Island of O‘ahu. Gasoline represents the largest segment of transportation energy consumption, closely followed by aviation fuel, then by diesel.

Transportation modeling results for 2007 show approximately 11.5 million daily VMT on O‘ahu. This results in a daily consumption of approximately 666,000 gallons of fuel with an energy content of 85,600 million BTUs (MBTU).

Electric and Magnetic Fields

Twenty locations were found during a field survey that are within 200 feet of the center line of the project alignment and which could have sensitive electronic equipment that could be affected by operation of the Project. The facility managers were contacted to determine whether sensitive electronic equipment is used, and all but one facility was eliminated (Table 4-20). Honolulu Community College has an electron microscope that is approximately 200 feet from the alignment.

4.11.3 Environmental Consequences and Mitigation

Environmental Consequences

Energy

No Build Alternative

Transportation energy consumption for the No Build Alternative would include motor vehicle fuel consumption islandwide. This is estimated to be 94,890 MBTUs in 2030 (Table 4-21).

Table 4-20 Location of Potential EMF Receptors within 200 Feet of the Project

Address	Building Name	Equipment	Category
874 Dillingham Boulevard	Honolulu Community College	Electron microscope	Institutional—university/research

Table 4-21 2030 Summary of Average Daily Transportation Energy Demand

Alternative	Highway Vehicle Energy Consumption (MBTUs)	Fixed Guideway Vehicle Energy Consumption (MBTUs)	Total Energy Consumption (MBTUs)	Percent Change from No Build
No Build	94,890	0	94,890	n/a
Project	90,760	1,690	92,450	-3%

MBTUs = million British thermal units

Project

The total transportation energy demand for transit and highway vehicles will be lower than for the No Build Alternative. Table 4-21 summarizes the anticipated average daily transportation demand in 2030 for the Project. The Project is anticipated to reduce daily transportation energy demand by approximately 3 percent compared to the No Build Alternative. The values in Table 4-21 changed since the Draft EIS as a result of revisions to travel demand model results.

The Project will consume approximately 1 to 2 percent of the total projected electricity generated on O‘ahu in 2030. According to HECO, the planned electricity generation capacity on O‘ahu will be sufficient to support the transit system, but the electricity distribution system will require various upgrades to support the system (HECO 2008).

Integration of photo-voltaic cells into stations and other project features could reduce net project electricity demand.

Electric and Magnetic Fields

No Build Alternative

There will be no features generating EMFs.

Project

The magnetic-field disturbance generated by operation of the Project will be low-frequency (0 to 10 hertz) and will occur at intervals determined by passing trains. EMFs produced by the Project will be of such low magnitude that the only potential effects will be to highly sensitive instruments that may be in use within facilities adjacent to the right-of-way. The electron microscope at Honolulu Community College is located approximately 200 feet from the alignment and will not be affected by the Project. A review of the state of the science regarding health effects associated with EMFs found no new evidence linking these fields to biological issues. Project-generated magnetic fields will be less than the International Commission on Non-Ionizing Radiation Protection guideline limit in areas where the public may be regularly exposed.

Because no negative health effects or effects on equipment related to EMFs will occur, mitigation will not be needed.

4.12 Hazardous Waste and Materials

This section analyzes potential contaminant sources that may be present in the study corridor. It also assesses the potential of encountering

hazardous waste and chemically impacted soil and/or groundwater adjacent to the project alignment, as well as the Project's potential use of hazardous materials. For more information and references, see the *Honolulu High-Capacity Transit Corridor Project Hazardous Materials Technical Report* (RTD 2008i).

4.12.1 Background and Methodology

Regulatory Background

Many Federal and State laws regulate hazardous waste and materials. The primary Federal laws are the *Resource Conservation and Recovery Act of 1976* (USC 1976) and the *Comprehensive Environmental Response, Compensation and Liability Act of 1980* (CERCLA) (USC 1980). The *National Priority List* is a listing of the most polluted sites in the nation that are eligible for cleanup funding (Superfund) under CERCLA.

Hazardous waste in the City is primarily regulated by the Solid and Hazardous Waste Branch of HDOH. The Solid and Hazardous Waste Branch is responsible for overseeing the Office of Solid Waste Management, the Underground Storage Tank Program, and the Hazardous Waste Program. The HDOH Office of Hazard Evaluation and Emergency Response is responsible for implementing the *Hawai'i Environmental Response Law* (HRS 128D), the *State Contingency Plan* (HAR 11-451), and the *Hawai'i Emergency Planning and Community Right-to-Know Act* (HRS 128E).

Methodology

An Initial Site Assessment of the study corridor was conducted to identify potential hazardous waste areas. The following steps were performed during this assessment to establish existing conditions, evaluate potential impacts, and determine whether project-related activities have the potential to disturb, generate, use, and/or dispose of hazardous materials:

- Reviewed environmental database records to evaluate potential impacts to the Project.

Environmental Database Resources, Inc., prepared a report for the Project on November 2, 2007 (EDR 2007). To generate this report, they conducted a search of all databases relevant to hazardous waste and materials operations in Hawai'i.

- Reviewed previous Honolulu transit project hazardous materials surveys.
- Coordinated with HDOH.
- Reviewed historical land uses using maps and historic aerial photos to identify any past business uses in the immediate project vicinity that could have a negative impact on the Project in terms of hazardous materials and wastes.
- Conducted field reconnaissance to identify land uses that may indicate the presence of hazardous materials or waste. Field reconnaissance was conducted from public access areas and within the study corridor, as feasible.
- Contacted owners of oil and fuel pipelines to establish pipeline locations. Preliminary information was obtained. Coordination with these owners will be ongoing throughout design and construction.

Potential mitigation measures to be employed during further design, planning, and construction of the Project were developed based on the data collected and evaluations conducted.

4.12.2 Affected Environment

The study corridor is currently dominated by commercial and residential developments, with some areas of military activity and localized industrial activity. Information from the database search, field reconnaissance, and the review of historic maps and aerial photographs indicate a more industrial past for certain areas of the study corridor.

Past and present industrial activities along the study corridor are mostly agricultural, food

processing, or warehousing. Contaminants associated with these uses are primarily petroleum hydrocarbons, such as gasoline, diesel, and oil. Other contaminants can include pesticides, herbicides, metals, and solvents, but solvents and metals are generally not used in bulk in agriculture, food processing, and warehousing.

Agricultural Uses

Specific areas of past industrial agricultural activity near the Project include the following:

- Former ‘Ewa Sugar Mill
- Former O‘ahu Sugar Mill
- Former ‘Aiea Sugar Mill
- Former Dole Pineapple Cannery

These industrial agricultural sites appear in the databases searched. However, these sites all ceased operations in the 1990s and were largely remediated and redeveloped in the late 1990s and early 2000s.

Industrial Uses

In some areas along the project alignment, current and historic land uses indicate a more industrial past than other areas, so they have a higher potential of harboring soil or groundwater contamination. These areas include the following:

- **Waipahu (West Loch)**—this neighborhood is dominated by gas stations and car dealerships along Farrington Highway, with warehouse and automobile repair businesses makai of Farrington Highway.
- **Airport Industrial Area**—this neighborhood is dominated by airport/airline support activities (tank farms and maintenance facilities), car dealerships, rental car agencies, warehouses, and light industrial activities.
- **Kapālama-Iwilei**—this area was dominated by the Dole Cannery and supporting businesses in the past but is increasingly becoming commercial. The former Kapālama Incinerator was located in the area along with a number of warehouse and light manufac-

turing businesses. Warehousing continues along Kapālama Canal.

- **Kaka‘ako**—this neighborhood was once dominated by automobile dealerships and repair shops, warehouses, and light industry. However, it is becoming increasingly commercial and residential in character.

Military Uses

Military activities are also present within the study corridor and tend to have a broader array of associated pollutants. Pollutants included in the Pearl Harbor Naval Complex Superfund Record of Decision include petroleum, solvents (perchloroethylene and others), polychlorinated biphenyls, metals (mercury and chromium), and pesticides. Military bases and activities near the Project include the following:

- **Former Naval Air Station Barbers Point**—portions of which are still under the jurisdiction of the Navy, while other portions are now under the Hawai‘i Community Development Agency’s jurisdiction
- **Pearl Harbor Naval Complex**—an active Navy base on the National Priority List (Superfund); the complex formerly included the Navy Drum Site
- **Hickam Air Force Base**—an active Air Force base, but uses near the Project are primarily housing
- **Fort Shafter Flats**—an active military base, but the area near the Project is a relatively undeveloped floodplain

Petroleum Contaminants

Petroleum handling and transportation facilities are frequently associated with releases of oil or hazardous materials to the environment through leaks, spills, maintenance, and other activities. These facilities include gas stations, tank farms, large maintenance base yards, and pipelines and are considered potential sites of contaminants wherever they appear along the project right-of-way. Petroleum contaminants (e.g., gasoline and

diesel fuels) have been shown to migrate less than 300 feet from their source once released into a subsurface environment similar to that found in the study corridor. Therefore, only petroleum releases approximately 300 feet from the Project are considered a concern.

A recent utility survey identified a number of petroleum pipelines in the study corridor. These pipelines are owned by a variety of firms, including the military, HECO, Chevron, and Tesoro. Pipeline locations include the following:

- Under Kapolei Parkway
- Along the O'ahu Railway & Land Company (OR&L) right-of-way in Kapolei, Pearl City, Waimalu, and 'Aiea
- On the mauka side of Farrington Highway through Waipahu
- Under Kamehameha Highway from Pearl City to the airport
- Throughout the airport area, primarily on the makai side of Aolele Street
- Under Nimitz Highway to the HECO's downtown power plant

The fixed guideway will cross or run parallel to these pipelines in many areas of the study corridor. These pipelines have been in place for many years, and releases from them are possible.

Sites of Concern

Individual sites of concern were first identified during environmental database review, and their presence was verified and additional sites were identified during field reconnaissance. Sites of concern were ranked "1" or "2." A "1" ranking means there is a high probability that releases at the site have affected soil or groundwater beneath the Project. A "2" ranking means there is a low probability that releases at the site have impacted soil or groundwater beneath the Project, but further evaluation is needed based on proximity to the Project. The sites ranked "1" or "2" are summarized in Table 4-22. Sites that have been remediated

or will not be of concern if the Project were built are identified in the Hazardous Materials Technical Report (RTD 2008i).

Examples of sites ranked "1" include the following:

- Pearl Harbor Naval Complex (a Superfund site)
- Leaking underground storage tank sites that have not been remediated and are within 300 feet of the project alignment

Examples of sites ranked "2" include the following:

- Sites adjacent to the Project that have been remediated (e.g., Pacific Machinery in Waipahu)
- Sites with large releases that are somewhat distant or downgradient from the Project (e.g., BHP Gas Company in Iwilei)
- Sites with institutional controls (e.g., where excavation is restricted due to the presence of contaminants) that are near the Project (e.g., Chuei Shokoh in Kaka'ako, a former dry cleaner)
- Sites observed to have limited hazardous materials issues (e.g., improper waste storage at Hi-Pace Racing in Kaka'ako)

The ground beneath any portion of the Project could be contaminated, most likely by petroleum products. Contamination is most likely to be present in the historically more industrial neighborhoods and near individual sites ranked "1" or "2." In addition, the geology and hydrogeology of the Airport Industrial Area, Māpunapuna, Kapālama-Iwilei, and Kaka'ako areas make them particularly likely to harbor residual pollutants. In these areas there will be a greater likelihood that spilled chemicals will remain in the area and not readily migrate or degrade. Therefore, soil and groundwater in these neighborhoods is frequently found to be degraded by petroleum and other contaminants. The potential for contamination was confirmed by other projects in the industrial areas.

Table 4-22 Sites of Concern near the Project that Could Be Contaminated (continued on next page)

Site Name	TMK	Reason for Listing	Rank	Property Acquisition
East Kapolei to Fort Weaver Road				
East Kapolei pesticide mixing and loading	91017088	Database	2	No
East Kapolei property	91017071, 91017088	Database	1	No
Fort Weaver Road to Leeward Community College				
Pacific Machinery	94048019	Database	2	No
Cutter Mitsubishi Dodge	94048068	Database	2	No
O'ahu Sugar Company Ltd.	94161005 & others	Database	2	No
Waipahu Auto Company	94019050	Database	2	Yes
Leeward Community College to Aloha Stadium				
Pearl Harbor Naval Station (PHNS)	94008010, 96003044, & others	Database	1	Yes
RHS Lee Baseyard (Banana Patch)	96004006	Field observations	1	Yes
Mid Pac Petroleum/ConocoPhillips	97031021	Database	1	No
HECO—Waiau Power Plant	98004003	Database	2	No
Steven's Super Service, Inc.	98018024	Database	1	No
Pearl Auto Service & Supply, Inc.	98010009	Database	1	No
Sears	98016029	Database	2	No
PHNS `Aiea Military Reservation	98019002, 99004004	Database	2	No
PHNS U.S. Navy Exchange `Aiea Laundry	99005005	Database	1	No
Aloha Stadium to Middle Street				
Pearl Harbor Naval Station (PHNS)	99001008	Database	1	No
PHNS Navy PWC—Makalapa Compound	11010011	Database	1	No
Honolulu International Airport	11003001	Database	1	Yes
U.S. Post Office	11002001	Database	1	Yes
Chevron USA Honolulu Airport Terminal	11003011	Database	1	Yes
Honolulu Fueling Corp.	11003010	Database and field observations	1	Yes
Delta Airlines	11003038	Database	1	No
Hawaiian Telecom Base Yard	11014018	Database	1	No
Airport Shell	11004001	Database	2	No
Lagoon Chevron	11016014	Database	2	Yes
Occidental Chemical Company	11016007	Database	2	Yes
ALSCO—American Linen/Young Laundry & Drycleaning	11016025	Database	1	No
Middle Street to Nu'uuanu Stream				
Middle Street Intermodal Center	12018009	Database	1	Yes
Foremost Dairies	12013006	Database	1	Yes
BHP Gasco	15012006	Database	2	No

Table 4-22 Sites of Concern near the Project that Could Be Contaminated (continued from previous page)

Site Name	TMK	Reason for Listing	Rank	Property Acquisition
Costco warehouse	15012017	Database	2	No
Costco gas station	15015002	Database	2	No
Sprint lot	15015013	Database	1	Yes
Cutter Dodge Auto Service Center	15015001	Database	1	Yes
Honolulu Gas Products Ltd.	15007016	Database	1	Yes
G. Von Hamm Textiles	15007050	Database	1	No
Ka`aahi Site	15007031	Field observations	2	No
Iwilei Project Site	15007001	Database	1	Yes
Nu`uanu Stream to Ala Moana Center				
Pier 15	21001044	Field observations	2	No
Pier 13/14	21001047	Field observations	2	No
Aloha Tower Development	21001001	Database	2	No
Hawaiian Electric Company	21014006	Database	1	Yes
Melim Building	21026014	Database	1	No
Motor Imports Service Center	21031030	Field observations	2	Yes
Hi-Pace Racing	23007054	Field observations	2	Yes
Chuei Shokoh (former Young's Laundry)	21049065	Database	2	No
420 Ward (Pacific Home)	21050061	Database	2	No
Hakuyosha Hawai`i Inc.	23014011	Database	2	No
Cutter Chevrolet-Geo-Pontiac	23039011	Database	1	No

The Navy Drum site, inactive since the early 1970s, is the preferred location for the maintenance and storage facility near Leeward Community College. In 1971, vandals started a fuel pump, which resulted in the release of motor gasoline to the ground surface. A remedial investigation was completed at the Navy Drum property by the Department of Navy in 2000 (Navy 2000). The investigation concluded that contaminants from the property have not and will not migrate to the deep freshwater aquifer or the artesian well water supply for the watercess ponds. There are no adverse human health or ecological effects that have, or will, result from the 1971 motor gasoline release. The U.S. Department of Health & Human Services and HDOH reviewed the study, concurred

with the findings, and considered the case closed. (DHHS 2005).

4.12.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

Under the No Build Alternative, the Project would not be built, and there would be no impacts associated with hazardous materials. It is assumed that the projects defined in the ORTP will be built, and environmental impacts associated with those projects will be studied in separate documents.

Project

In some locations, large or specialized hazardous wastes or materials sites may be acquired

for needed right-of-way for the Project. Large or specialized hazardous wastes and materials include underground and above-ground storage tanks (UST and AST), fuel islands, and engineered storage facilities.

In a few cases, the Project may displace hazardous materials operations. This includes relocating gas station fuel islands and USTs and ASTs. Table 4-23 lists sites from which right-of-way will be acquired where the Project will result in potential impacts to ongoing hazardous materials operations.

The operation and maintenance of a fixed guideway transit system will require using some hazardous materials and may generate hazardous waste. Likely hazardous materials include the following:

- Lubricants (both grease and oils) of various weights and viscosities
- Hydraulic fluid for transit vehicles and servicing equipment
- Cleaning products for maintaining equipment, cleaning electronic components and vehicles, and removing graffiti—cleaning solutions can range from acids to alkaline to petroleum-based solvents

Wastes (beyond standard office-type) that will require disposal or recycling could include the following:

- Used oil (not hazardous)
- Cleaning product waste (typically recycled through closed systems)
- Vehicle components that wear out or break, including fluorescent light tubes
- Sediment from vehicle washing

Most of these materials and wastes will be used or generated at the maintenance and storage facility. However, limited use of hazardous materials will be necessary to maintain the guideway, stations, and traction power substations.

Releases at sites ranked “1” or “2” (summarized in Table 4-22), petroleum pipelines, and in industrial areas may have resulted in contaminated soil and/or groundwater beneath the Project. The presence of contaminants will affect project construction. Effects during construction and related mitigation are discussed in Section 4.18.7.

Mitigation

Some properties that will be acquired to obtain required right-of-way for the Project received a rank of “1” or “2” during the Initial Site Assessment

Table 4-23 Sites Where Hazardous Materials Are Used or Stored that Will Be Acquired

Site #	Site Name	Tax Map Key	Address	Type of Right-of-Way Acquisition	Potential Long-term Consequences
1	7-11/Aloha Petroleum	97022006	897 Kamehameha Highway	Partial acquisition	Fuel island is very close to street and may need to be relocated
2	Fuji's Chevron Gas Station	98014012	98-121 Kamehameha Highway	Partial acquisition	One fuel island and USTs are close to street and may need to be relocated
3	7-11/Aloha Petroleum	12010068	1900 Dillingham Boulevard	Full acquisition	Fuel island and USTs affected
4	Motor Imports Service Center	21031030	607 South Street	Partial acquisition	Auto maintenance building and oil AST in acquisition area
5	Hi-Pace Racing	23007054	500 Pi'ikoi Place	Full acquisition	Full acquisition, including drum storage area
6	Lagoon Chevron	11016014	2604 Waiwai Loop	Full acquisition	Fuel island and USTs affected

(Table 4-22) and, therefore, may be polluted. Either a partial or complete Phase I Environmental Site Assessment (ESA) will be performed by the City prior to acquiring portions of these properties to lessen the chance that the City will acquire a degraded piece of real estate or that workers will be exposed to contaminants during construction. ESAs will also be performed for those sites listed in Table 4-23. ESAs will be conducted per the ASTM International's *Standard Practice for Environmental Site Assessments—Phase I Environmental Site Assessments Process (E1527-05)* (ASTM 2005). Site assessments have already begun, are ongoing, and will continue prior to construction of the Project. Depending on the outcome of the Phase I ESAs, a Phase II assessment (including collecting and analyzing samples) may be appropriate. The City will decide whether a partial or complete Phase I ESA is necessary for each property prior to acquisition. If contaminated materials are identified, the property will be remediated in accordance with Federal, State, and Local regulations. The City will coordinate with the HDOT Hazard Evaluation and Environmental Response Office regarding work within HDOT rights-of-way.

The use of hazardous materials for the fixed guideway system's operation and maintenance will be unavoidable. However, the volume of materials used and extent of worker exposure will be limited in the following ways:

- Comply with State and Federal health and safety regulations
- Use non-hazardous alternatives where possible
- Use closed systems designed to limit exposure
- Train employees in the safe use and management of hazardous materials
- Institute waste minimization programs to limit the volume and type of materials used and resulting wastes
- Provide appropriate waste storage locations and receptacles

- Periodically evaluate wastes to establish whether they are hazardous
- Recycle wastes to the maximum extent practicable

4.13 Ecosystems

This section describes vegetation and wildlife within the study corridor. The assessment of vegetation and wildlife was made by reviewing existing studies, consulting with resource agencies, and conducting field surveys. Emphasis was placed on the potential presence of Federal- and/or State-protected species and sensitive habitats. For more information and references, see the *Honolulu High-Capacity Transit Corridor Project Ecosystems and Natural Resources Technical Report* (RTD 2008j).

4.13.1 Background and Methodology Regulatory Context

Threatened and Endangered Species Regulations

Section 7 of the Endangered Species Act of 1973, as amended (7 USC 136; 16 USC 1531 et seq.), requires Federal agencies to consider impacts on endangered or threatened species and these species' critical habitat. It requires that Federal agencies consult with USFWS and/or the National Oceanic and Atmospheric Administration's National Marine Fisheries Service (NOAA/NMFS), depending on whether terrestrial or marine species may be affected. If effects on protected species are identified, a Biological Assessment (BA) will be required to address a project's effects on a listed or candidate species or on the destruction or adverse modification of designated critical habitat. Subsequently, the USFWS will issue a Biological Opinion (40 CFR 402).

The State of Hawai'i's counterpart law is HRS 195D, under which species are similarly protected under state law. HRS Chapter 195D stipulates that where there may be an incidental take of a listed species, a Habitat Conservation Plan (HCP) must be

“designed to result in an overall net gain in the recovery of Hawai‘i’s threatened and endangered species.”

Migratory Bird Treaty Act

The Federal Migratory Bird Treaty Act (MBTA) (16 USC 703-711) protects migratory birds listed in the MBTA by prohibiting the taking of any listed bird, or any part, nest, or egg of any such bird. *Take* is defined as an attempt to “pursue, hunt, shoot, capture, collect, or kill.” This act applies to all persons and organizations in the U.S., including Federal and State agencies. The USFWS administers the MBTA, and protection of listed migratory birds is delegated to USFWS staff handling Endangered Species Act Section 7. Regulation of unlisted migratory birds is delegated to the USFWS Migratory Bird Division.

Marine Mammal Protection Act

The Marine Mammal Protection Act of 1972 (MMPA) (16 USC 1361-1407) protects marine mammals listed in the act by prohibiting the taking of them in waters of the U.S. and by U.S. citizens on the high seas, as well as importing marine mammals and marine mammal products into the U.S. *Take*, as defined by Congress, is “to harass, hunt, capture, or kill or attempt to harass, hunt, capture, or kill any marine mammal.”

Coordination with State and Federal Agencies

Early correspondence with regulatory agencies is included in the Ecosystems and Natural Resources Technical Report (RTD 2008j). Correspondence letters and USFWS species list are included in Appendix F of this Final EIS.

Agencies consulted have indicated no designated critical habitats exist on or within one-third mile of the project alignment. However, the agencies did mention that the species listed in Table 4-24 may be present in the study corridor. The NOAA National Marine Fisheries Service was also contacted and they have indicated that no marine ESA-listed

species under their jurisdiction occur in the project area (see Appendix F). Since the publication of the Draft EIS, the City and FTA have continued to consult with USFWS. A meeting was held with the USFWS, the DLNR, and the Division of Forestry and Wildlife on January 8, 2009. At the meeting, the USFWS indicated that the Project would have no effect on federally listed species or critical habitat areas. Subsequent to that meeting, USFWS indicated no further consultation is required. FTA requested further concurrence from USFWS that the Project will have “no effect” on listed species or critical habitat (Appendix F).

Methodology

Literature Review

Previous studies, pertinent literature, and USFWS Critical Habitat maps for O‘ahu within the study corridor were reviewed prior to undertaking the field surveys. Topographic maps and aerial photographs were examined to assess terrain and habitat characteristics, access, boundaries, and reference points. The Hawai‘i Biodiversity and Mapping Program (HBMP) also provided a database of Federal- and State-protected species (plants and animals) previously observed within one-quarter mile of the project alignment.

The review affirmed that field surveys should focus on assessing the likely presence of the species listed by the agencies (Table 4-24).

Field Surveys

Field surveys were performed for flora in the undeveloped ‘Ewa Plain as well as for birds along the entire project alignment. A field survey was not performed for marine mammals and marine turtles because the Project will not approach or directly affect a marine habitat. Surveys of other aquatic environments (estuaries, streams, wetlands, and canals) were undertaken as part of the effort to define impacts on aquatic resources in Section 4.14.

Table 4-24 Threatened, Endangered, and Protected Species Evaluated along the Study Corridor

Common Name	Scientific Name	Status	Identified by	Observed during Survey
Endangered Flora				
Ko'oloa'ula or red 'ilima	<i>Abutilon menziesii</i>	Endangered (S,F)	USFWS and DLNR-DOFAW	No
`Ewa hinahina	<i>Achyranthes splendens spp. rotundata</i>	Endangered (S,F)	DLNR-DOFAW	No
Skottsberg's broomspurge	<i>Chamaesyce skottsbergii</i>	Endangered (S,F)	DLNR-DOFAW	No
`Awīwī	<i>Centaurium sebaeoides</i>	Endangered (S,F)	HBMP, Bishop Museum website	No
`Ihi`ihi	<i>Marsilea villosa</i>	Endangered (S,F)	The Recovery Plan for <i>Marsilea Villosa</i> (USFWS 1996)	No
Endangered Terrestrial Fauna				
`Ōpe`ape`a or Hawaiian hoary bat	<i>Lasiurus cinereus semotus</i>	Endangered (S,F)	USFWS	No
O`ahu `elepaio	<i>Chasiempis sandwichensis ibidis</i>	Endangered (S,F)	Vanderwerf 2001; and others	No
Hawaiian common moorhen or `alae`ula	<i>Gallinula chloropus sandvicensis</i>	Endangered (S,F)	USFWS	No
Hawaiian coot or `alae ke`oke`o	<i>Fulica americana alai</i>	Endangered (S,F)	Draft Revised Recovery Plan for Hawaiian Waterbirds, Second Draft of Second Revision (USFWS 2005b); and others	No
Hawaiian duck or koloa maoli	<i>Anas wyvilliana</i>	Endangered (S,F)	Draft Revised Recovery Plan for Hawaiian Waterbirds, Second Draft of Second Revision (USFWS 2005b); and others	No
Hawaiian stilt or ae`o	<i>Himantopus mexicanus</i>	Endangered (S,F)	Draft Revised Recovery Plan for Hawaiian Waterbirds, Second Draft of Second Revision (USFWS 2005b); and others	Yes
Protected Migratory Waterbirds				
Pacific golden-plover	<i>Pluvialis fulva</i>	MBTA Protected	Draft Revised Recovery Plan for Hawaiian Waterbirds (USFWS 2005a); and others	Yes
Black-crowned night heron	<i>Nycticorax nycticorax hoactii</i>	MBTA Protected	Draft Revised Recovery Plan for Hawaiian Waterbirds (USFWS 2005a); and others	Yes
Ruddy turnstone	<i>Arenaria interpres</i>	MBTA Protected	Draft Revised Recovery Plan for Hawaiian Waterbirds (USFWS 2005a); and others	Yes
Wandering tattler	<i>Heteroscelus incanus</i>	MBTA Protected	Draft Revised Recovery Plan for Hawaiian Waterbirds (USFWS 2005a); and others	Yes
State Threatened and Endangered Terrestrial Fauna				
Pueo	<i>Asio flammeus sandwichensis</i>	Endangered (S)	Various	No
Newell's shearwater	<i>Puffinus auricularis newelli</i>	Threatened (S)	Various	No
White tern	<i>Gygis alba</i>	Threatened (S)	Miles 1986; Vanderwerf 2003	Yes

F = Federal; S = State

MBTA = Migratory Bird Treaty Act

Flora Survey of Undeveloped 'Ewa Plain

Field surveys of the flora and vegetation present in the undeveloped 'Ewa Plain portion of the project alignment were completed in September 2007 and January 2008. In areas along the study corridor where rare or endangered species were previously reported, an intensive survey was conducted to establish whether these species populations still remained. Encountered populations were photographed and mapped.

Wildlife Survey along the Alignment

Wildlife field surveys and observations along the project alignment were conducted in September 2007, and bird point counts were conducted from December 2007 to January 2008. The point count involved identifying and recording the number of birds seen and heard at all distances from the point-count stations for a period of eight minutes. The Ecosystems and Natural Resources Technical Report (RTD 2008j) documents the results of this survey. Point counts were performed at locations approximately 1 mile apart along the project alignment, except from Kalihi to UH Mānoa and Waikīkī, where point count stations were spaced every one-half mile to improve the possibility of detecting the State-listed white tern. Counts were also performed at the following locations:

- The makai perimeter of the proposed maintenance and storage facility adjacent to Leeward Community College—this bird point-count site was selected because of the proximity of the site to waterbird habitat in and near Pearl Harbor.
- A stand of ironwoods (*Casuarina equisetifolia*) along the southern edge of Kapi'olani Park—this bird point-count site was selected because it historically was an area of known concentrations of white terns in Waikīkī and could be used as a reference site to gauge the level of nesting activity in the population on O'ahu.

4.13.2 Affected Environment

A distinctive feature of O'ahu's geomorphology is the broad coastal plain that extends from 'Ewa and Kalaeloa across Pearl Harbor to Diamond Head. It is composed of raised coralline limestone and has natural harbors, a dry leeward climate, and abundant freshwater streams with headwaters in the Ko'olau and Wai'anae Mountain Ranges. Upland perennial streams are sustained by groundwater from high-level aquifers and, on the coastal plain, perennial flow may be supplemented by springs. Where groundwater is not contributing in a drainage basin, streams exhibit intermittent flow, responding to rainfall and runoff; this pattern is particularly prevalent in the 'Ewa and Kapolei areas. Freshwater streams that enter the marine coastal waters create estuaries at stream mouths and in embayments, such as Pearl Harbor, where nutrients carried by the stream stimulate productivity.

The past century of urbanization on O'ahu, especially within the areas along much of the project alignment, has resulted in a highly altered environment, and this is reflected in the present state of the vegetation. No intact native vegetation communities remain within the study corridor, and few native plant species are extant near the alignment. The 'Ewa Plain is an area where relatively undeveloped land is present in the study corridor, and vegetation in this area was found to consist of the following:

- Ruderal (weedy) patches in undeveloped areas or abandoned properties
- Plants in abandoned agricultural areas, such as the area makai of the H-1 Freeway near Kapolei
- Plantings in areas reserved for cultivation and diversified agriculture

Beyond the open agriculture (and abandoned agriculture) fields of the 'Ewa Plain, a few relatively undeveloped properties exist where the vegetation present is non-maintained landscaping or ruderal weeds growing on highly disturbed sites. Street

trees, the most common ecological element of the maintained urban landscape, are discussed in Section 4.15. The less developed areas are illustrated on Figures 4-57 and 4-58 and include the following:

- Pearl Harbor National Wildlife Refuge, Waiawa and Honouliuli Units
- Waiawa Stream in the area of the Project's Pearl Highlands Station
- Waiiau Springs, which is currently used for subsistence farming and gardening
- Kalauao Springs, which is occupied by the Sumida Watercress Farm

Table 4-24 lists threatened, endangered, and protected species and indicates whether the species were observed during surveys performed for this Project.

Endangered Flora

Ko'oloa'ula (*Abutilon menziesii*) (Figure 4-59), an endemic plant species, was not observed during the field surveys; however, the Project is known to be in close proximity to extant plant clusters and within approximately 200 feet of the northern edge of an established contingency reserve (Figure 4-57). Ko'oloa'ula is an endangered Hawaiian hibiscus that grows in dryland forests. An HCP that addresses potential effects on the Ko'oloa'ula population near the corner of North-South Road and Kapolei Parkway is already in place (HDOT 2004).



Figure 4-59 Ko'oloa'ula

This HCP is being incrementally phased in over a 20-year period. The HCP describes impacts that assume the population will be incrementally taken as development along North-South Road is implemented.

The 'Ewa hinahina, Skottsberg's spurge,

'awīwī, and 'ihi'ihī are plants that grow in dryland areas and could be present in the study corridor. They have been reported from the 'Ewa Plain in the past, but were not observed near the project alignment. There are no HCPs related to any of these species.

- The 'Ewa hinahina (*Achyranthes splendens* spp. *rotundata*), a small shrub, is typically found on talus or rocky slopes and on coral-line plains with numerous sinkholes. The project alignment generally traverses farmed or relatively developed areas rather than talus or rocky slopes and is further inland than known populations of this plant on the 'Ewa Plain.
- Skottsberg's spurge or 'akoko (*Chamaesyce skottsbergii*), a small shrub, is generally found closer to the coast in drier and sandier areas than the project alignment.
- 'Awīwī (*Centaurium sebaeoides*), a small herb, is thought to be extinct on O'ahu. It is generally found on rocky slopes near the coast.
- 'Ihi'ihī (*Marsilea villosa*), a small fern resembling a four-leaf clover, requires periodic flooding for spore release and fertilization, followed by a decrease in water levels for the young plants to establish. It typically occurs in shallow depressions in clay soil or lithified sand dunes overlaid with alluvial clay. This plant is known to occur in areas of Kalaeloa that meet these criteria; however, it does not occur in the more developed portion of Kalaeloa where the project alignment is planned.

Endangered Terrestrial Fauna

A number of endangered terrestrial fauna species are potentially present in the study corridor (birds and fresh/brackish water dwellers). Following is a discussion of these species:

- 'Ōpe'ape'a, or the Hawaiian hoary bat (*Lasiurus cinereus semotus*), was not observed during the project survey. Bats have been observed on O'ahu according to the HBMP; however, the USFWS indicated that those

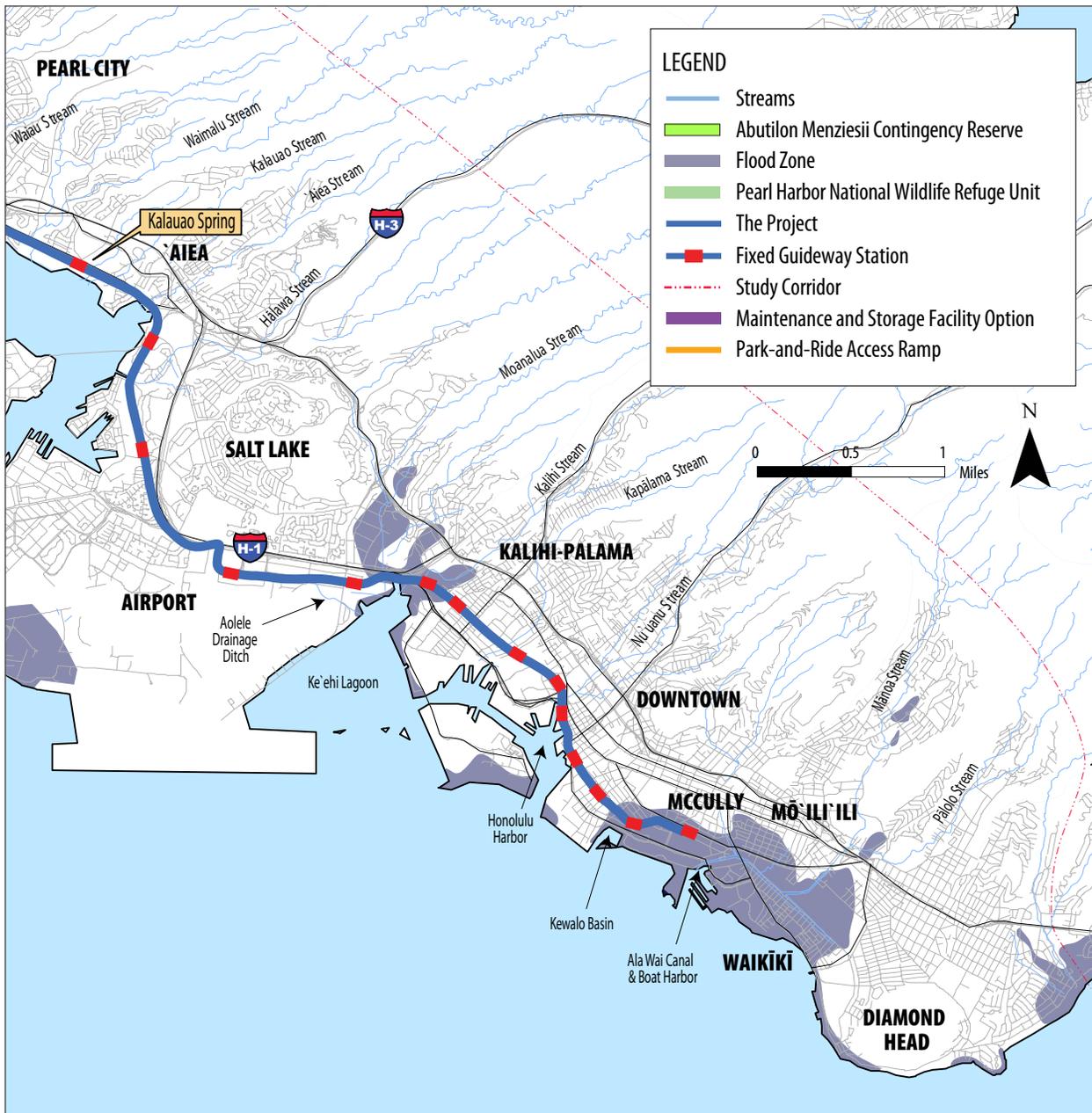


Figure 4-58 Natural Resources (Aloha Stadium to Ala Moana Center)

stilt. These four species are generally restricted to wetlands (and stream and estuarine areas in some cases) but will visit temporarily flooded areas. Environments in the study corridor where some or all of these species have been observed previously include Pearl Harbor National Wildlife Refuge, Waiolu Springs, and Kaluaeo Springs (Sumida Watercross Farm). The *Draft Revised Recovery Plan*

for *Hawaiian Waterbirds* (USFWS 2005a) provides for these four species and indicates that the only core habitat on the southern coast of O‘ahu is the Pearl Harbor National Wildlife Refuge. The plan lists no supporting habitat on the southern coast of O‘ahu. Observations of these endangered waterbirds during the project survey were limited to the following:

- A pair of ducks was observed at a distance flying over agricultural fields along North-South Road. Since wild ducks on O‘ahu are either mallards or mallard/koloa hybrids, these were not the endangered species *Anas wyvilliana*.
- Five Hawaiian stilts (*Himantopus mexicanus*) were observed at Kalauao Springs (Sumida Watercress Farm) during the survey.
- Wandering tattler (*Heteroscelus incanus*) spend summer and breed in Alaska and northwestern Canada; in winter they are found on rocky islands in the Southwest Pacific, including Hawai‘i, and on rocky Pacific coasts from California to South America and as far as Australia. They feed on aquatic invertebrates. One wandering tattler was observed at Kalauao Springs (Sumida Watercress Farm) during the survey.

Protected Migratory Waterbirds

Four protected “migratory” waterbirds were observed during the project survey. The MBTA protects these species, although they are not listed as threatened or endangered. The four species are as follows:

- The Pacific golden-plover (*Pluvialis fulva*) breeds on the Arctic tundra in the summer and spends the winter primarily in South Asia and Australia with a few in California and Hawai‘i. Twenty-seven Pacific golden-plovers were observed in count stations during the survey.
- Black-crowned night heron (*Nycticorax nycticorax hoactii*) is an indigenous species common throughout the world. Individuals were observed during the project survey at the Kalauao Springs (Sumida Watercress Farm), Moanalua Stream, and the drainage channel along Aolele Street. Local colonies are known to roost and nest in mangrove trees within Pearl Harbor and Ke‘ehi Lagoon; however, nests have not been observed in the mangroves along the east bank of Moanalua Stream.
- Ruddy turnstone (*Arenaria interpres*) is a sandpiper that breeds in the northern parts of Eurasia and North America during the summer and winters on coastlines almost worldwide, including Hawai‘i. Six individuals were observed at Kalauao Springs (Sumida Watercress Farm) during the survey.

State Threatened and Endangered Terrestrial Fauna

The following three species may be present in the study corridor that are designated as threatened or endangered by the State of Hawai‘i:

- Pueo (*Asio flammeus sandwichensis*) is a subspecies of short-eared owl endemic to Hawai‘i that nests on the ground. Its habitat includes wet and dry forests on all the Hawaiian Islands. The Pueo was observed on the ‘Ewa Plain, but it is in decline due to habitat loss and was not observed during the survey. There are no recovery plans or designated critical habitat for the Pueo.
- Newell’s shearwater (*Puffinus auricularis newelli*) is endemic to the Hawaiian Islands and nests in burrows dug in forested uplands. It is listed as threatened by USFWS. No nesting colonies have been found on O‘ahu (Ainley 1997). Small numbers of fledgling Newell’s shearwater have been recovered on O‘ahu following downing incidents and were probably individuals that were attracted to shore from elsewhere by coastal lights (Ainley 1997). No Newell’s shearwater were observed during the survey.
- White tern (*Gygis alba*) (Figure 4-60), also known as fairy tern, could only be observed with regularity in the Northwestern Hawaiian Islands prior to the 1960s. Their establishment on O‘ahu may be a result of crowded conditions elsewhere, which have forced the birds to search for other roosting and nesting locations (Miles 1986;



Figure 4-60 White Tern

Vanderwerf 2003). The white tern is Honolulu's official bird and is currently found only along the southeastern coast of O'ahu, where they breed and roost exclusively in large trees. White terns lay their eggs on bare branches in a small fork or depression, without a nest. The peak nesting period is from February through July. Nine white terns were observed during the project survey, all between Middle Street and UH Mānoa.

Threatened, Endangered, and Protected Marine Fauna

With the exception of a stormwater outfall to Pearl Harbor from the maintenance and storage facility, the nearest marine environment is approximately one-quarter mile from the Project, which is beyond the area that will be affected by the Project.

4.13.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

Under the No Build Alternative, the Project would not be constructed and would not have any impacts to natural ecosystems. Although it is assumed that the projects in the ORTP will be built, their environmental impacts will be studied and documented in separate environmental documents.

The Project

The Project will result in fewer VMT; therefore, the overall pollutant load in stormwater will be lower than it will be under the No Build Alternative and there will be less threat of surface and marine water contamination. The Project will rely on electric propulsion, which will generate minimal pollutants on the guideway compared to pollutants generated by roadway traffic. This improvement in water quality could benefit downstream environments, including nearby wetlands, streams, and the Pacific Ocean.

As summarized in Table 4-25, the Project will have no effect on any threatened, endangered, or protected species as described in the following sections.

Endangered Flora

The Project will have no effect on endangered flora. The only endangered plant known in the study corridor is ko'oloa'ula (*Abutilon menziesii*). The presence of this species has previously been documented, and HDOT addressed potential effects on the ko'oloa'ula in the study corridor in an HCP prepared for the North-South Road Project in 2004. Mitigation measures are specified in the HCP related to the construction of a variety of developments in the area. Therefore, the Project will not have an impact on the ko'oloa'ula.

Endangered Terrestrial Fauna

The Project will have no effects on endangered terrestrial fauna. The Project will not affect the hoary bat or the O'ahu 'elepaio because neither of these species occur in the study corridor.

The Project will not impact any designated critical, core, or supporting habitat for any listed terrestrial fauna species. The nearest such habitat is the Pearl Harbor National Wildlife Refuge Waiawa Unit (Figure 4-57), which is designated as core habitat for the four endangered waterbirds. The Waiawa Unit is more than 1,000 feet southeast of the preferred maintenance and storage facility option location.

Table 4-25 Summary of the Project’s Effects on Threatened, Endangered, and Protected Species

Endangered Flora	Endangered Terrestrial Fauna	Protected Migratory Waterbirds	State Threatened and Endangered Terrestrial Fauna	Threatened, Endangered, and Protected Marine Fauna
No effect, with mitigation for koʻoloaʻula	No effect	No effect	No effect	No effect

As stated in Section 4.14, the Project will not affect other wetlands where the listed waterbirds have been observed, such as Waiiau Stream and Kalauao Springs (Sumida Watercress Farm).

Based on the information provided to FTA by USFWS, coordination with USFWS staff, and field observations, there will be “no effect” to threatened and endangered species or designated critical habitat related to this Project (see Appendix F for letter from FTA to USFWS). While some of the listed waterbirds have been observed adjacent to the study corridor, over time, the waterbirds will adjust to new structures built for the Project since the wetlands will not be impacted. These waterbirds have continued to occupy the wetlands despite the construction of nearby buildings and overhead utilities and the construction or widening of adjacent roads and highways. For example, water birds continue to use Sumida Watercress Farm although the wetland is now surrounded by Pearlridge Center.

Protected Migratory Waterbirds

The Project will not result in the taking of any protected migratory birds. The black-crowned night heron is known to nest in mangrove stands in Pearl Harbor and Keʻehi Lagoon, which are generally remote from the study corridor. Mangrove stands in these areas are being removed because the mangrove is regarded as an invasive plant species.

State Threatened and Endangered Terrestrial Fauna

The Project will have no effect on state threatened or endangered terrestrial fauna. The only state threatened or endangered species that is present in the study corridor is the white tern, and none of the species have critical habitat in the area. As

explained in Section 4.15, some large street trees along the project alignment will require pruning or removal. White terns select the largest high canopy trees for roosting and nesting. The pruning and removal of these trees are not expected to affect the white tern population because there are numerous other large canopy trees in the urban area of Honolulu that will not be affected by the Project and that could be used by the white terns.

Mitigation

Although the Project will have no effect on threatened, endangered, and protected species, mitigation will be implemented for the koʻoloaʻula.

A State Incidental Take License for koʻoloaʻula was issued on March 18, 2005, to the HDOT. The City will secure a Certificate of Inclusion from the State for the Project. Mitigation measures have already been specified in an HCP for this population of koʻoloaʻula, including the establishment of an 18-acre contingency reserve for the plants. Specific measures to protect and offset losses of the koʻoloaʻula have been established by the USFWS in the existing HCP. If an HCP is needed, or if the existing HCP needs to be amended, the City will implement the measures outlined by the USFWS in the new or amended HCP. This will offset impacts to the plant, and there will be no unavoidable adverse environmental effect to the koʻoloaʻula.

4.14 Water

This section identifies water resources in the study corridor, including surface waters, wetland resources, marine waters, flood zones, stormwater, groundwater, and coastal zone management (CZM) areas. It addresses the potential effects of

implementing the Project on these resources and presents mitigation measures that will be incorporated into the Project. For more information and references, see the *Honolulu High-Capacity Transit Corridor Project Water Resources Technical Report* (RTD 2008k), the *Honolulu High-Capacity Transit Corridor Project Wetland and Waters of the U.S. Study* (RTD 2009b), the *Honolulu High-Capacity Transit Corridor Project Proposed Compensatory Mitigation Plan for Impacts to Waters of the U.S.* (RTD 2009h), and *Floodplain Evaluations at HHCTCP Stream Crossings* (RTD 2009m).

4.14.1 Background and Methodology

A number of water resources are located in the study corridor. They are regulated by a variety of Federal and State programs summarized below.

Regulatory Context

Surface Waters

The USACE is authorized to regulate certain activities in the Nation's waters pursuant to Section 404 of the Clean Water Act (CWA) (USC 1972b) and Section 10 of the Rivers and Harbors Act of 1899 (USC 1899). Section 404 of the CWA regulates the discharge of dredged or fill material into waters of the U.S., including:

- Traditional navigable waters (TNW) and their adjacent wetlands
- Relatively permanent non-navigable tributaries of traditional navigable waters (RPW) and wetlands with a continuous surface connection with such tributaries
- Intermittent or non-permanent wetlands and tributaries of waters of the U.S. that can materially impact downstream (biological, chemical, or physical) ecology.

A "traditional navigable water" includes all of the navigable waters of the United States, defined in 33 CFR 329, and by numerous decisions of the Federal courts, plus all other waters that are navigable-in-fact. Section 502(7) of the CWA defines the term

navigable waters as "the waters of the United States, including the territorial seas."

Section 10 of the Rivers and Harbors Act of 1899 requires authorization for the construction of any structure in or over a navigable water of the U.S. Structures or work that occurs outside the defined limits for navigable waters of the U.S. require a Section 10 permit if the structure or work affects the water body's course, location, or condition.

Waters subject to tidal influence and non-tidal streams that carry commercial traffic are generally defined as navigable by the USCG. The Coast Guard's authority comes from Section 9 of the Rivers and Harbors Act of 1899 (USC 1899), the Act of March 23, 1906 (USC 1906), and the General Bridge Act of 1946 (USC 1946). New bridges or causeways, and the reconstruction or modification of existing bridges and causeways, require a Coast Guard bridge permit to protect the right of navigation. Project structures that will cross navigable waterways have been identified, and consultation with the Coast Guard was undertaken.

Under Section 401 of the CWA, the need for a Section 404 permit from the USACE triggers the need for a Section 401 Water Quality Certification. The objective of Section 401 is to ensure that CWA, Section 404, and all other federally permitted activities will not adversely impact existing uses, designated uses, and applicable water quality criteria of the receiving waters. In Hawai'i, the Clean Water Branch of HDOH issues the Water Quality Certification.

The State of Hawai'i's general policy is to maintain or improve existing water quality in all State waters. Streams that are not expected to meet State water quality standards, even after application of technology-based effluent limitations, are included in the 303(d) List of Impaired Waters (HDOH 2008). HDOH has completed or is in the process of devel-

oping waste load allocations and total maximum daily loads (TMDL) for these waters.

Coastal areas and embayments can be listed by the HDOH as “Water Quality-Limited Segments,” as required by the CWA Section 305(b) and defined by 40 CFR 130.8. These segments are water bodies with pollutants in excess of established water quality standards, such that they cannot reasonably be expected to attain or maintain State water quality standards without additional action to control sources of pollution.

Alterations to stream channels are regulated by the State of Hawai‘i Commission on Water Resource Management (Water Commission) through a Stream Channel Alteration Permit.

Wetlands

Under Section 404 of the CWA, the discharge of dredged or fill materials into “waters of the U.S.,” as defined by 33 CFR 328, triggers the need for a permit from the USACE. Wetlands, as defined by the USACE’s *Wetlands Delineation Manual* (USACE 1987), are considered waters of the U.S.

If mitigation is required for fill placed in wetlands, the Project must comply with *Compensatory Mitigation for Losses of Aquatic Resources Final Rule*.

Clean Water Act Section 404(b)(1)

Section 404(b)(1) requires a demonstration that there is no practicable alternative to the proposed discharge that would have less adverse impact on the aquatic ecosystem, so long as the alternative does not have other significant adverse environmental consequences. This analysis must include consideration of activities that do not involve the discharge of dredged or fill material into waters of the U.S., discharges at alternative locations, and other geographic project locations. For this Project, the proposed modal options, transit technologies, and alignments that exhibit the least overall

adverse environmental harm must be examined in the context of “practicability” prior to elimination from further consideration. An alternative with fewer impacts to aquatic resources than the Preferred Alternative may only be eliminated by demonstrating it has other overriding significant environmental impacts or is not practicable. Practicable is defined as “available and capable of being done after taking into consideration cost, existing technology, and logistics in light of overall project purposes.” Alternatives evaluation under CWA Section 404(b)(1) is sometimes referred to as the Least Environmentally Damaging Practicable Alternative analysis.

Flood Zones

Protection of floodplains and floodways is required by Presidential Executive Order 11988 (USEO 1977); USDOT Order 5650.2 (USDOT 1979); the *Federal Aid Highway Program Manual* (FHWA 1992b); and 23 CFR 650 (CFR 1999). These regulations place special importance on floodplains and floodways and require Federal agencies to avoid conducting, allowing, or supporting actions on a floodplain or within a floodway. If a project is located within a floodplain or floodway, results from sufficient analysis must be included in the project’s Final EIS, as specified in USDOT Order 5650.2.

Stormwater

The City is permitted by HDOH to discharge stormwater into State waters around O‘ahu through National Pollutant Discharge Elimination System (NPDES) permit No. HI S000002. The City controls the discharge of stormwater in compliance with this permit through ROH Chapter 14, Article 12 and Article 13. The NPDES permit requires the City to develop, implement, and enforce a Storm Water Management Plan (SWMP) designed to address the requirements of the NPDES permit. HDOH has an approved SWMP from the City, which includes the *Best Management Practices* for

Maintaining Water Quality in Hawai‘i for construction activities in Honolulu.

Groundwater

The EPA has designated the Southern O‘ahu Basal Aquifer as the sole or principal source of drinking water for southern O‘ahu. Section 1424(e) of the Safe Drinking Water Act, in accordance with the 1984 Sole Source Aquifer Memorandum of Understanding between the EPA and the USDOT (FHWA/EPA 1984), requires projects potentially affecting a sole-source aquifer to coordinate with EPA to evaluate potential impacts.

Methodology

Field investigations for waters of the U.S. were conducted along the project alignment from December 2007 through January 2008 and from January 2009 through July 2009. The study area was defined as a 500-foot-wide buffer centered along the corridor. Thirty-one sites were studied that were either streams or areas where there was the potential for wetlands. The results of this study are documented in the Wetland and Waters of the U.S. Study (RTD 2009b).

At each stream crossing, information was collected to determine whether the stream, at the location crossed, was considered “jurisdictional” (a water of the U.S.), since some types of water features are not regulated by the USACE. Data collected included watershed characteristics; tide information; elevation of ordinary high-water mark (OHWM) and stream cross-sections; some physical, biological, and chemical characteristics; and other information.

The methods used to evaluate potential wetlands along the project alignment followed the *Wetlands Delineation Manual* (USACE 1987). To establish the extent of wetlands, an initial assessment was made based upon the prevalence of wetland plants and obvious hydrology at a site. Soil pits were then dug to establish the presence or absence of hydric soils.

If all three wetland indicators (wetland vegetation, hydric soil, and hydrology) occurred, a delineation was undertaken to establish the wetland boundary facing the Project. The routine wetland determination procedures outlined in the *Wetlands Delineation Manual* (USACE 1987) were followed.

The sites surveyed (RTD 2009b) were grouped principally on the nature of the impact of the Project on water resources at each site. Five categories (I through V), ranging from lowest potential impact to greatest potential impact, were defined as follows:

- Category I—no waters of the U.S. present; therefore, no impact on water resources (4 sites).
- Categories II through IV—different types of waters of the U.S. were present, but no structural elements of the Project will be placed in those waters. Categories II through IV represent increasing potential for impacts due to increasing sensitivity of the aquatic environments present at the sites (e.g., wetlands are Category IV and are regarded as more sensitive as adjacent environments than concrete-lined culverts) (18 sites).
- Category V—waters of the U.S. are present, and project elements will require fill in these waters (9 sites)

USACE guidance permits the use of a preliminary jurisdictional determination (JD) approach to satisfy NEPA requirements. The “preliminary JD” approach is being followed for this Project. Under this approach, areas that are potentially waters of the U.S. are considered to be waters of the U.S. For the purposes of this document, all waters (including intermittent and ephemeral streams) are considered waters of the U.S. if they fit the definitions of tidal, wetland, RPW, or non-RPW waters, unless otherwise stated. The Wetland and Waters of the U.S. Study (RTD 2009b) provides additional information on areas being covered under preliminary JDs.

A “functional assessment” was also performed for each location where the Project is adjacent to or crosses a waters of the U.S., as identified in the Wetland and Waters of the U.S. Study (RTD 2009b). Once constructed, the Project will permanently encroach upon 0.02 acre of waters of the U.S. from the linear transportation project. These impacts are from placing structural elements for the guideway in Waiawa Stream and Springs, Moanalua Stream, Kapālama Canal Stream, and Nuʻuanu Stream. As discussed in Section 4.18, during construction of the linear transportation features of the Project, it is anticipated that there will also be a temporary effect of up to 0.13 acre of waters of the U.S.

At the Pearl Highlands Station, the existing stormwater culvert at Waiawa Springs will be improved and extended to reduce ponding at the outfall and avoid erosion around the guideway columns. The culvert improvements will result in 0.06 acre of permanent impacts in waters of the U.S. and no additional temporary impact during construction in waters of the U.S.

Although Kaloʻi Gulch is not under the jurisdiction of the USACE and is not listed in the tables summarizing impacts to waters of the U.S. in Sections 4.14.3 and 4.18.10, it was considered in the impacts to waters of the U.S. with the use of the preliminary JD approach. There will be approximately 0.004 acre of permanent impact from placing structural elements of the guideway in Kaloʻi Gulch and 0.07 acre of temporary impact during construction. There will be 0.39 acre of permanent impact from construction of a park and-ride lot, a non-linear feature, at Lower Kaloʻi Gulch, with an additional 0.86 acre of temporary impact during construction.

For all project elements, the Project will permanently encroach upon 0.08 acre of waters of the U.S. and temporarily upon 0.13 acre in waters of the U.S. during construction. Given this level of impact to water resources within Honolulu’s

urban core, the intent of the functional assessment was to analyze impacts of the aquatic ecosystem to develop mitigation concepts for those waters of the U.S. where impacts could not be avoided and only after impacts were minimized to the extent feasible.

Each site where the Project is adjacent to or crosses a water of the U.S. was visited and rated on a three-point scale for each of 24 function or value categories as suggested by de Groot et al. (2002), modified for this project site. The Natural Resources Conservation Service (NRCS) rapid assessment method used in Hawai‘i was also undertaken, as was a Hawai‘i Stream Visual Assessment Protocol (HSVAP). This NRCS method was developed for Hawaiian streams (NRCS 2001) and uses 10 scored elements—including water clarity, plant growth, channel conditions, native species habitats, and riparian conditions—to arrive at a composite score. This method was deemed applicable for two reasons:

- Impacts of the Project are relatively minor, calling for a straightforward approach.
- Methods developed for less urbanized streams in Hawai‘i and elsewhere are not readily applicable to the urbanized hardened estuarine reaches where project impacts are occurring.

For stream sites where an actual impact is anticipated based upon the design plans, the method and form developed by the Little Rock District of the USACE (USACE 2008b) for stream assessment was completed. The basis of selection of this method is discussed more fully in the Proposed Compensatory Mitigation Plan for Impacts to Waters of the U.S. (RTD 2009h).

Shadow impacts on wetlands were assessed using the Sun Shadow Applet by J. Giesen obtained from the website at <http://www.jgiesen.de/sunshadow/>.

Existing floodways and floodplain limits within the study corridor were identified using Federal Emergency Management Agency Flood Insurance Rate Maps and other existing data. The Hawai'i National Flood Insurance Program staff was also consulted. Hydraulic assessments for specific locations where the Project crosses flood zones were performed.

In accordance with the 1984 Sole Source Aquifer Memorandum of Understanding between the EPA and the Federal Highway Administration (FHWA/EPA 1984), a Ground Water Impact Assessment was prepared to meet the coordination requirements of Section 1424(e) of the Safe Drinking Water Act. The thickness of surficial sediments above the basalt aquifer was compared to the predicted depth of deep foundations needed to support the Project. The consequences of various construction techniques were evaluated where the foundations might penetrate the basalt. The hydraulic gradient was considered and location of drinking water wells was compared to the project alignment. The location of the HDOH's Underground Injection Control Line, an indication of the boundary between non-drinking water aquifers and underground sources of drinking water, was compared to the project alignment. Best management practices (BMP), required permits, and other controls that affect groundwater recharge and quality were evaluated, and potential mitigation measures to protect the basalt aquifer were proposed.

Agency Coordination

Coordination with Federal, State, and Local agencies with water-resource expertise and responsibilities was ongoing to provide input and guidance on the resources, design, and construction of the Project. Coordination will continue as appropriate with regulatory agencies throughout final design and construction. Since publication of the Draft EIS, several meetings have been held. On December 9, 2008, the USACE, HDOH, Hawai'i's

CZM Program, Hawai'i Commission on Water Resource Management, and EPA met with project staff to clarify water resource requirements for the Project. As materials were completed to support this section for the Final EIS, follow-up meetings with the EPA were held on March 10, 2009, and July 10, 2009. Meetings were held with the USACE on January 15, February 25, May 13, July 3, and August 10, 2009. Additional coordination between technical staff and the USACE has occurred. A meeting was also held with the USCG on December 11, 2008. Input from these agencies has directed the analysis included in this Final EIS.

Coordination will continue with Federal, State, and Local agencies to obtain the necessary permits, approvals, and agreements listed in Section 4.21.

4.14.2 Affected Environment

Surface Waters

Surface waters in the study corridor include intermittent and perennial streams, tidal estuaries, and freshwater and tidal wetlands. Descriptions of the surface water environments are discussed in general terms under the Streams, Wetlands, and Marine Waters subsections. Individual sites for which an impact was identified are discussed in more detail under the appropriate subsection.

Streams

Streams within the study corridor are listed in Table 4-26 and their locations are illustrated on Figure 4-61. Table 4-26 describes, in general terms, attributes associated with each of these streams. Twenty streams or conveyance channels are to be crossed by the guideway or other project structures. In 18 cases, where the Project crosses them, these stream channels have been modified within the study corridor, having either a realigned channel of "natural" material or a channel lined with concrete (in many cases including the bed). Natural channels occur only at Honouliuli Stream, Waiawa Stream and Springs, and Pānakauahi Gulch (Sites 4, 12, 13, and 31).

Table 4-26 Streams Crossed by the Project

Stream	Site No. ¹	Type of Water ²	Tidally Influenced	US Coast Guard Navigable Waters ³	303(d) Impaired ⁴
Kalo`i Gulch	1, 2	Non-RPW	No	No	No
Honouliuli Stream	4	RPW	No	No	Yes
Hō`ae`ae Stream	6	Non-RPW	No	No	No
Waikele Stream	7	RPW	Yes	Yes ³	Yes
Kapakahia Stream	9	RPW	No	No	Yes
Waipahu Canal Stream	10	RPW/TNW	Yes	Yes ³	No
Pānakauihi Gulch	31	Non-RPW	No	No	No
Waiawa Stream and Springs	12, 13	RPW	No	No	Yes
Pearl City Stream	14	Non-RPW	No	No	No
Waiau Springs	15	RPW	No	No	No
Waimalu Stream	16	RPW	Yes	Yes ³	Yes
Kalauao Springs	17	RPW	No	No	Yes
Kalauao Stream	18	RPW	No	No	Yes
`Aiea Stream	19	RPW	Yes	No	Yes
Hālawa Stream	22	TNW	No	No	Yes
Aolele Ditch	25	Non-RPW	No	No	No
Moanalua Stream	27	RPW	Yes	Yes ³	Yes
Kalihi Stream	28	TNW	Yes	Yes ³	Yes
Kapālāma Canal Stream	29	TNW	Yes	Yes ³	Yes
Nu`uanu Stream	30	TNW	Yes	Yes ³	Yes

¹The site numbers refer to sites studied in the *Honolulu High-Capacity Transit Corridor Project Wetland and Waters of the U.S. Study* (RTD 2009b)

²RPW = relatively permanent water; TNW = traditional navigable water

³Advanced approval received from U.S. Coast Guard, December 23, 2008

⁴303(d) Impaired Waterway as defined by HDOH (2008)

Because the guideway follows existing major roadways, the point at which it crosses a stream coincides with an existing bridge where concrete sidewalls are already in place. More importantly, the guideway traverses urban areas where streams have been realigned and otherwise modified for flood control purposes. General water quality in these urban streams tends to be poor, and many are included on the State 303(d) List of Impaired Waters (HDOH 2008).

Table 4-27 summarizes two aspects of the stream environment at each site: (1) typical vegetation

in the channel and on or immediately above the banks and (2) the nature of the aquatic fauna present. Because these mostly modified channels are subject to maintenance activities, in-channel and riparian vegetation tends to be grasses and shrubs with a ruderal character (meaning plants adapted to disturbed sites). In some cases with tidally influenced channels, mangroves occur along the margins of the bed. Only in the case of Waiawa Stream (Sites 12 and 13) is the vegetation typical of a lowland O`ahu stream with a true riparian zone. At Honouliuli Stream (Site 4), the stream is intermittent and deeply incised with concrete

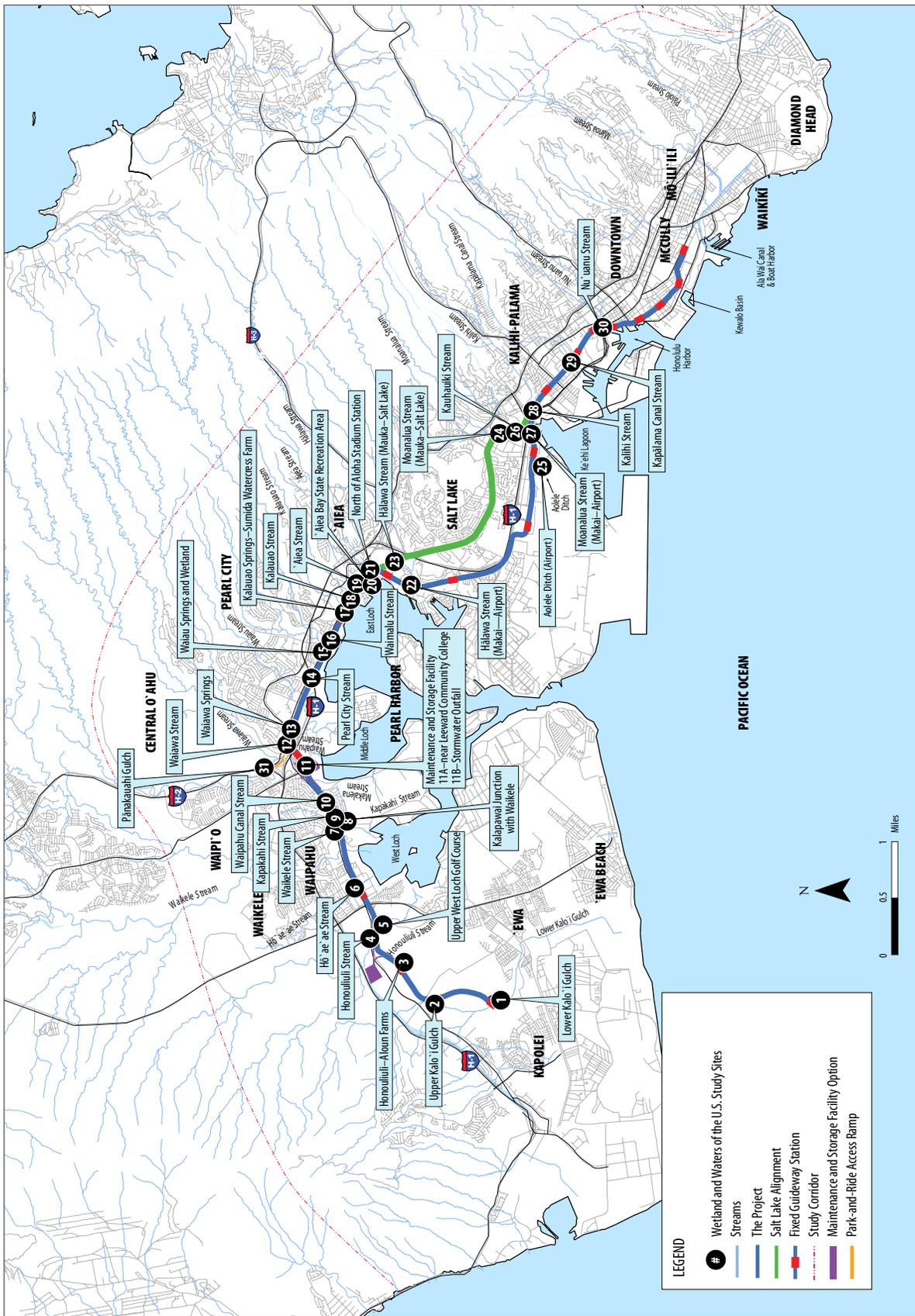


Figure 4-61 Wetland and Waters of the U.S. Study Sites

sidewalls at the crossing point. Upstream, water flow is temporally insufficient to influence much riparian growth. Downstream, the normally dry channel widens through landscaped grounds of Kāhi Mōhala.

Consideration of the kinds of aquatic fauna present at each site (see final column in Table 4-27) can be divided into waters that do not support

aquatic animals (intermittent channels, natural or concrete-lined), streams that are perennial and typically harbor introduced fishes and crustaceans (either limited or diverse depending upon habitat complexity among other factors), waters that are tidal (estuarine), and waters that connect the ocean and upland aquatic habitats that support native, amphidromous species. Amphidromous species deserve special consideration because

Table 4-27 Attributes of Streams Crossed by the Project

Stream	Site No.	Watershed	Channel Characteristics ¹	Bank Vegetation	Aquatic Biota
Kalo`i Gulch	1, 2	Kalo`i	Modified	Grasses	None
Honouliuli Stream	4	Honouliuli	Unmodified	Grasses	None
Hō`ae`ae Stream	6	Waikele	Concrete-lined	None	None
Waikele Stream	7	Waikele	Concrete-lined	None	Diverse FW, amphidromous
Kapakahi Stream	9	Kapakahi	Modified	Ruderal and wetland herbs	Limited non-native
Waipahu Canal Stream	10	Kapakahi	Concrete-lined	None	Estuarine
Pānakaui Gulch	31	Waiawa	Unmodified	Grasses and trees	None
Waiawa Stream and Springs	12, 13	Waiawa	Unmodified	Mature tree canopy with understory	Diverse FW, native amphidromous
Pearl City Stream	14	Waimalu	Concrete-lined	None	None
Waiuu Springs	15	Waimalu	Concrete-lined/modified	Trees, shrubs, understory	Diverse FW
Waimalu Stream	16	Waimalu	Concrete-lined/modified	Mangrove	Estuarine, native amphidromous
Kalauao Springs	17	Kalauao	Concrete-lined	Maintained, grasses	Diverse FW
Kalauao Stream	18	Kalauao	Modified	Trees and ruderal herbs	Diverse FW
`Aiea Stream	19	`Aiea	Concrete-lined	None	Estuarine, native amphidromous
Hālawā Stream	22	Hālawā	Modified	Some mangrove, other trees	Estuarine, native amphidromous
Aolele Ditch	25	Manuwai	Concrete-lined/modified	Maintained grasses and ruderal herbs	None
Moanalua Stream	27	Moanalua	Concrete-lined	Mangrove	Estuarine, native amphidromous
Kalihi Stream	28	Kalihi	Modified	Shrubs	Estuarine, native amphidromous
Kapālama Canal Stream	29	Kapālama	Modified	Shrubs, ruderal herbs	Diverse FW
Nu`uanu Stream	30	Nu`uanu	Concrete-lined	None	Estuarine, native amphidromous

¹ Channel characteristic at study site where Project crosses stream
FW = fresh water

they constitute the native stream macrofauna and require a connection through the lowlands to maintain a viable population in the upper reaches of the stream. These are species that reside as adults in suitable stream habitats but have a larval stage that lives in the ocean. The juveniles develop in the sea and then migrate to a suitable stream habitat to complete their life cycle. In some cases, it is possible to have a dry stream at a site that nonetheless supports an upstream amphidromous fauna where the stream has one or more perennial reaches. Such streams are classified as interrupted because flow in the lowlands occurs only when sufficient runoff feeds the system (as in the wet season). Thus, an activity that interferes with the migration pattern could have an adverse impact on an otherwise healthy upstream population. Concrete-lined channels can have an adverse impact on the migration pattern, although where the channel is tidal (estuarine; for example, Hālawā Stream at Site 22) water depth is typically sufficient and constant so as not to constitute a barrier. In Table 4-27, streams that are known to have a perennial freshwater reach are characterized under Aquatic Fauna as “native amphidromous,” although this declaration by no means claims that the stream does in fact support any native macrofauna (only that upstream habitat is potentially present). In all cases, no permanent (or temporary construction) structures are proposed that would interfere with migration by an amphidromous species through the project area. Kalo’i Gulch and Waiawa Stream are discussed in greater detail below because they are both natural streams at the project location, and project-related impacts are anticipated.

Navigability determinations for each affected waterway have been made by the USCG in their letter on December 23, 2008 (Appendix F). The USCG classified these channels as Advanced Approval Waterways because they are only navigated by rowboats, canoes, and small motorboats (Table 4-26). Recreational use of many of the navigable streams in the study corridor is minimal

because they are located in urban areas and lined with concrete. Access into concrete-lined non-RPW (intermittently flowing) channels is discouraged, as these are, in essence, storm drains. However, a number of the larger channels are used for fishing and crabbing from shore or from pedestrian accessways on bridges. Recreational and subsistence fishing and crabbing are particularly evident in the larger estuarine waters crossed by the Project. The biological resource value for each stream is largely a factor of the water type. RPW and tidal waters (TNW and tidal), even though confined to a modified channel, may support aquatic life (and therefore have the potential for recreational fishing) and may serve as a conduit through which native amphidromous fauna migrates between the ocean and suitable habitat in upland stream reaches.

Kalo’i Gulch

Kalo’i Gulch is an intermittently flowing stream that historically discharged onto the ‘Ewa Plain, lacking an outlet to the ocean owing to the permeability of the ancient reef formation forming the Plain. Water flow occurs only during significant rainfall in this normally dry area. In the project area, the flow has long been directed into man-made channels through former agricultural lands (AECOS 1992, 2005). With the advent of anticipated rapid urbanization of the area, much of the flow from Kalo’i Gulch will soon be directed into the Kalo’i Drainage Channel that parallels North-South Road (under construction; Site 2). A portion of the old channel of lower Kalo’i Gulch will continue to carry runoff from a smaller, tributary gulch named Hunehune (Site 1). USACE has determined that Kalo’i Gulch is not subject to its jurisdiction.

Waiawa Stream and Springs

Waiawa Stream flows within a natural bed and banks within the study corridor, through an area located between Kamehameha and Farrington Highways in Pearl City (Site 12; Figure 4-62).

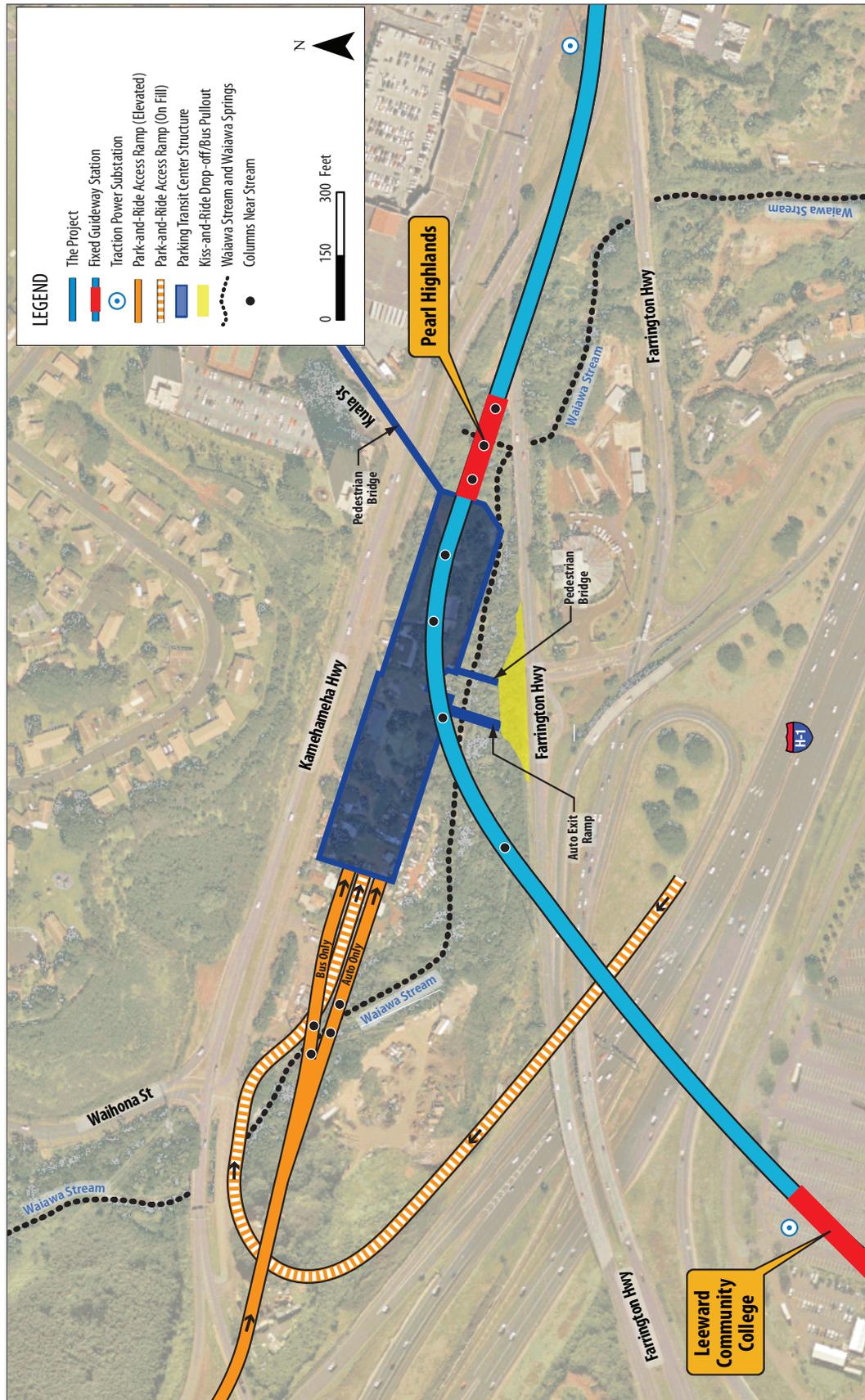


Figure 4-62 Waiawa Stream and Springs

The floodplain in this area was altered, but the stream remains in a natural state, as does most of Waiawa Stream and its tributaries with only about 5 percent of the channel modified (Timbol 1978). Waiawa Stream is classified as an interrupted perennial stream, meaning the stream and tributaries are continuously flowing in the uplands, but stream flow is absent in a lowland segment during the dry season (HCPSU 1990). Waiawa Stream is perennially flowing in the project area, fed by local springs (AECOS 1991).

A 36-inch storm drain culvert daylights at the base of the Kamehameha Highway fill bank at a point directly under the Pearl Highlands Station along the guideway (Site 13). This storm drain appears to be discharging a perennial flow that may be spring water captured from the mauka side of the highway, although the source of the apparently continuous flow has not been verified. This spring is assumed to be a waters of the U.S. and is referred to as Waiawa Springs.

Wetlands

Wetlands near the project alignment are associated with riverine, tidal, and spring-fed water systems. Land development has altered or destroyed many of the historically identified wetlands in the study corridor, leaving only scattered remnants today. In the categorization of waters and impacts developed in the Wetland and Waters of the U.S. Study (RTD 2009b), wetlands adjacent to the Project constitute Category IV. Three sites are freshwater (palustrine) wetlands (Category IVA; Sites 15, 17, and 25) adjacent to the Project (within 250 feet of the alignment or other facilities of the Project). Four sites are littoral or mangrove wetlands (Category IVB; Sites 11B, 16, 20, and 22). No wetlands will be directly affected by structural elements of the Project beyond shading effects. In the cases of Sites 16 (Waimalu Stream) and 22 (Hālawā Stream), the adjacent wetland consists only of a growth of mangrove along the margins of the estuary where the guideway crosses.

Maintenance and Storage Facility Stormwater Outfall

The maintenance and storage facility near Leeward Community College (Site 11A; Figure 4-63) is categorized as a Category I site, having no streams or wetlands present. A stormwater detention basin will be constructed on this site and stormwater will be piped through a 60-inch underground pipe through a concrete box culvert to Pearl Harbor at Middle Loch. This latter area is Site 11B, assigned to Category IVB because nearshore waters supported, until recently, a mangrove forest. The OHWM (taken herein as the mean reach of the higher high tides) at the shore constitutes the upper limit of waters of the U.S., and the outlet structure and riprap will be placed above (inland of) this line. The stormwater discharges to Middle Loch in an area that was a mangrove wetland and is being recolonized by juvenile mangrove plants.

Waiau Wetland

The Project is located along the median of Kamehameha Highway makai of Waiau Springs wetland. The boundary of this freshwater wetland was defined based upon a combination of wetland vegetation, hydric soil characteristics, and the presence of water. The southern border (closest to the Project) of the wetland lies along the base of the fill slope from Kamehameha Highway (Figure 4-64).

Land surrounding the wetland is being used by residents for subsistence vegetable gardening and, in some areas of the wetland, pondfield culture of kalo (*Colocasia esculenta*) and ung-choi (*Ipomoea aquatica*) is carried out at a subsistence level. Waiau Springs stream and wetland supports fish species such as mollies, guppies, koi, and cichlids (including tilapia). A homeowner adjacent to the wetland raises fish, including channel catfish, Asian catfish, koi, and goldfish, in tanks and cages within the wetland. Although no waterfowl were observed during site inspections, the wetland might be conducive as habitat for Hawaiian coot and Hawaiian moorhen, both of which are feder-

ally listed species. Black-crowned night heron, a protected species, are likely to visit this wetland.

Sumida Watercress Farm Wetland

Sumida Watercress Farm at Pearlridge is a historic pondfield farm operating within a wetland fed by Kaluaao Springs (Figure 4-65). This wetland is extensively developed into rectangular pondfields used for the commercial production of watercress

(*Nasturtium officinale*). The closest approach of the Project to the farm is the guideway along the median of Kamehameha Highway, the mauka edge of the highway roadbed slope, which forms a dike along the discharge channel at the lower end of the wetland. The discharge channel feeds a set of pumps used to spray the fields as a preventive against insect damage to the crop and drains via a culvert to a concrete-lined drainage channel

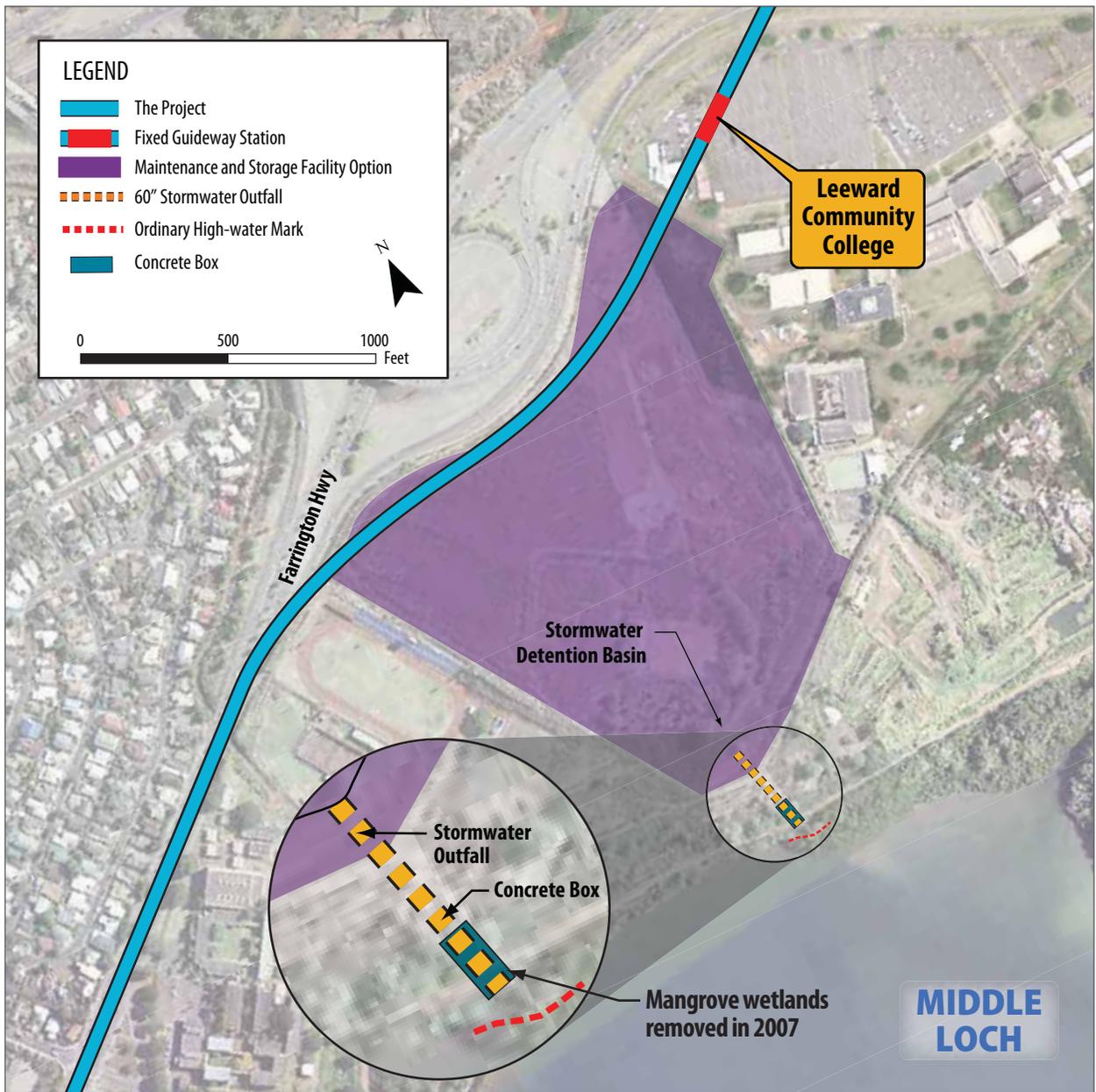


Figure 4-63 Maintenance and Storage Facility Stormwater Outfall near Leeward Community College

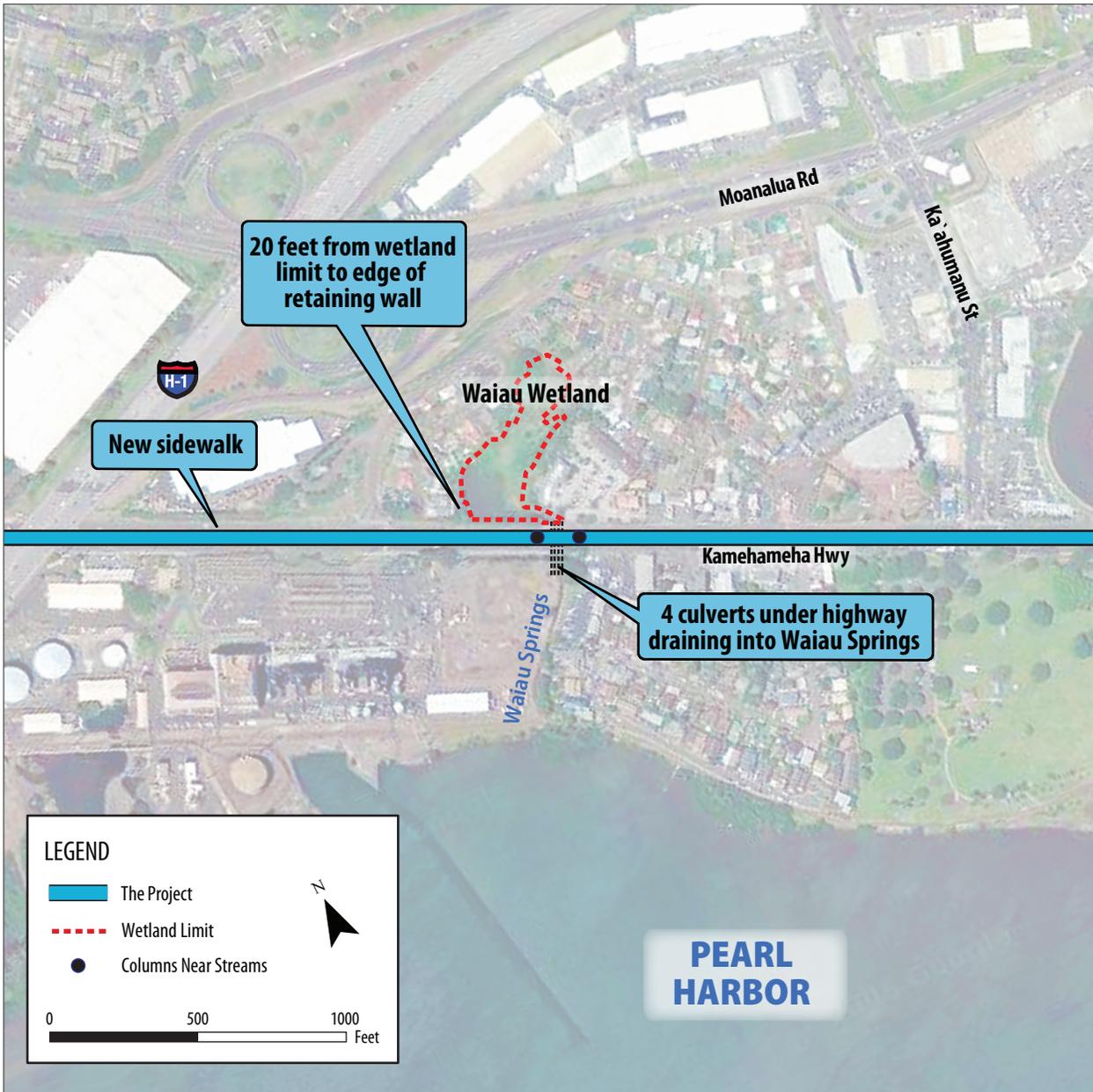


Figure 4-64 Waiau Springs and Wetland

through Pearlridge Center, discharging south into the East Loch of Pearl Harbor.

'Aiea Bay State Recreation Area Wetland

The Project guideway is approximately 200 feet mauka of the tidal wetland (formally a dense mangal forest) fringing 'Aiea Bay (Figure 4-66). 'Aiea Stream has formed a depositional delta off the

shore here, on which supports the growth of salt-tolerant plants (mangrove and pickleweed). The sediment is anaerobic. Mud flats in Pearl Harbor, such as this one, are relatively stable, whereas the narrow riparian mudflats along streams are subject to hydraulic scouring. Recovery of the mangrove removed in 2007 is well underway as juvenile mangrove plants colonize the tidal flat.

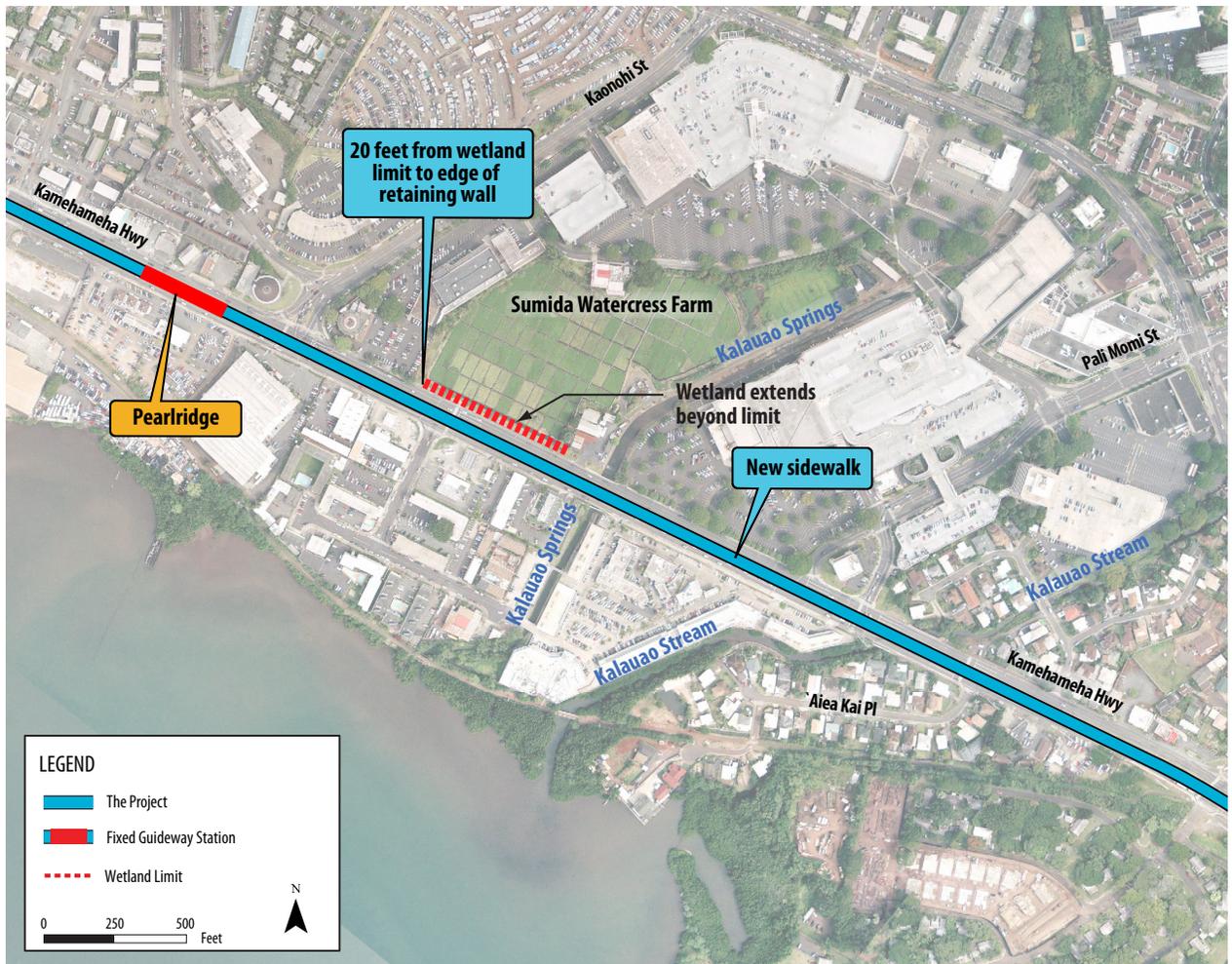


Figure 4-65 Sumida Watercress Farm Wetland

Aolele Ditch

Aolele Ditch is a man-made drainage feature constructed to drain stormwater to Ke‘ehi Lagoon from the northeastern portion of Honolulu International Airport and an adjacent light industrial area. The lower end of the ditch is tidal. However, the part of the ditch crossed by the guideway is an intermittently flowing (non-RPW), unlined, open ditch fed by several small drains from the light industrial area mauka. These drains provide sufficient freshwater to establish three small semi-permanent wet areas along the bottom of the ditch (one under the guideway). These “wetland” features support a variety of wetland plants and aquatic insects, such as dragonflies. The most downstream

of the three wetlands connects to the tidal reach of Aolele Ditch and harbors top minnows (poeciliids) and American crayfish, suggesting a permanent fresh or slightly brackish wetland that has developed on a thin layer of sediment over the concrete channel bed in this segment.

Marine Waters

The large coastal surface water bodies within or adjacent to the study corridor are listed in Table 4-28 and illustrated in Figure 4-61. These water bodies are all highly urbanized and/or altered from their natural state. Marine areas near the Project include the Middle and East Lochs of Pearl Harbor (technically an estuarine



Figure 4-66 Aiea Bay State Recreation Area Wetland

Table 4-28 Marine Waters

Water Body	Class	Associated Inlets	303(d) Impaired ²
Pearl Harbor ¹	2—Inland water/estuary	Point-source discharges; streams	Yes
Ke'ehi Lagoon	A—Marine embayment	Storm drains; streams	Yes
Honolulu Harbor	A—Marine embayment	Storm drains; streams	Yes

¹ Pearl Harbor includes West Loch, Middle Loch, and East Loch

² 303(d) Impaired Waterway as defined by State of Hawai'i Department of Health (2008).

bay), Ke‘ehi Lagoon (an open embayment), and Honolulu Harbor.

Flood Zones

Flood Insurance Rate Maps show that the project alignment will cross several floodplains and two floodways associated with Waiau and Waiawa Streams (Figures 4-57 and 4-58). Floodplains along the project alignment mostly recharge groundwater levels, convey stormwater toward the ocean, and help moderate floods when they occur (Figure 4-67). These areas also support plants and wildlife within urbanized areas, while maintaining areas for outdoor recreation and enjoyment and preserving the land’s natural beauty. The flood zones and their associated waters are listed in Table 4-29.

Stormwater

The existing drainage conditions encountered along the guideway alignment consist of the following: undeveloped or unpaved areas, areas adjacent to paved roadways, landscaped median areas of paved roadways, or a combination of these conditions. Drainage conditions for the Project area west of Ho‘opili Station (west Site 4) are generally undeveloped or unpaved. The drainage conditions for the Project within the City of Waipahu are landscaped median areas of paved roadway. The drainage conditions for the majority of the project alignment are areas adjacent to paved roadways or a combination of various conditions. The existing drainage system consists of drainage pipes/culverts, structures, swales, and outfalls to tributaries adjacent to Pearl Harbor and Honolulu Harbor.

Groundwater

The entire Project overlies the Southern O‘ahu Basal Aquifer and includes two aquifer sectors. The Pearl Harbor Aquifer Sector contains the ‘Ewa, Waipahu, Waiawa, and Waimalu Aquifer Systems, and the Honolulu Aquifer Sector contains the Moanalua, Kalihi, and Nu‘uanu Aquifer Systems.

4.14.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

Under the No Build Alternative, the Project would not be built and would not have any impacts to water resources. The projects in the ORTP are assumed to be built, and the consequences of those projects will be studied and documented in separate environmental documents.

Project

The following sections discuss possible effects to surface and marine waters, wetlands, flood zones, stormwater, and groundwater and present coordination activities and mitigation that will occur to address possible effects. Effects during construction are discussed in Section 4.18.

Surface Waters

Project encroachment into waters of the U.S. is summarized in Tables 4-30 and 4-31. The Project will, once constructed, permanently encroach upon 0.08 acre of waters of the U.S. (0.02 acre as listed on Table 4-30 and 0.06 acre as listed on Table 4-31). These impacts are from placing piers in Waiawa Springs, Moanalua Stream, Kapālama Canal Stream, and Nu‘uanu Stream and improving a culvert in Waiawa Springs. Although Kalo‘i Gulch is not under the jurisdiction of the USACE and not included in Tables 4-30 or 4-31, it was considered in the impact quantities with the use of the preliminary JD approach. The Project at Kalo‘i Gulch will add 0.009 acre of permanent impact from the guideway support columns, with 27 cubic yards of impact below OHWM and above the mudline and 1,234 cubic yards below the mudline (linear transportation features). The Project will also add 0.39 acre of permanent impact from a park-and-ride lot, with 953 cubic yards below OHWM and above the mudline and 744 cubic yards below the mudline.

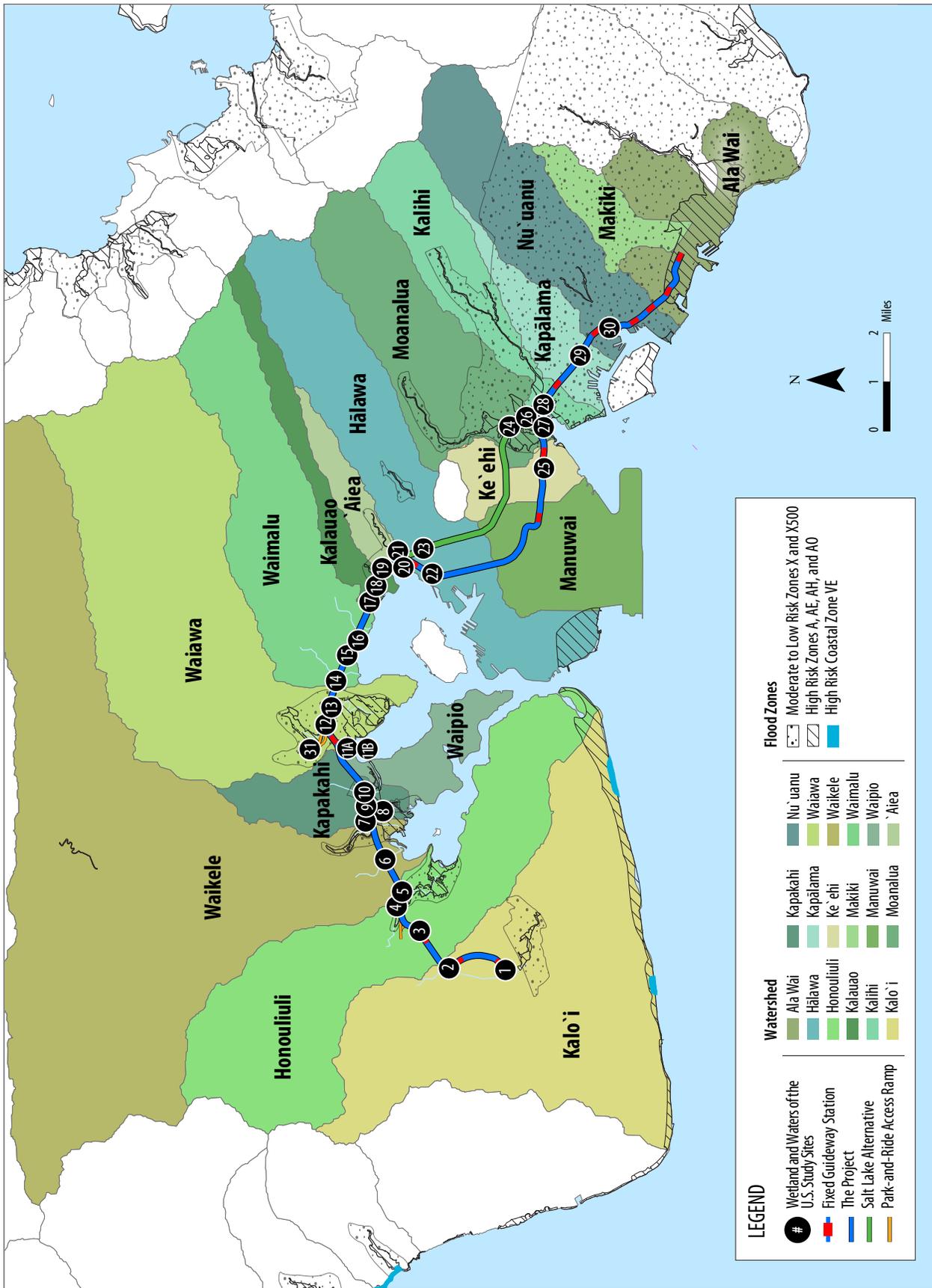


Figure 4-67 Watershed and Flood Zones

Table 4-29 Streams Having FEMA Mapped Flood Zones

Associated Water Body	Developed	Major Functions	Flood Zone(s) Traversed by Fixed Guideway
Kalo`i Gulch	Yes	Groundwater recharge; stormwater conveyance	AE
Honouliuli Stream	No	Groundwater recharge; stormwater conveyance	A
Waikele Stream	Yes	Stormwater conveyance	AEF, AE
Kapakahi Stream ¹	Yes	Stormwater conveyance	AEF, AE
Waipahu Canal Stream ²	Yes	Stormwater conveyance	AEF, AE
Waiawa Stream	Yes	Stormwater conveyance	AEF, AE
Kalauao Stream	Yes	Stormwater conveyance	AEF
Moanalua Stream	Yes	Stormwater conveyance	AEF, AE, AO
Kalihi Stream	Yes	Stormwater conveyance	AEF, AE, AO

Zone A = the flood insurance rate zone that corresponds to the 100-year floodplains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown within this zone.

Zone AE = the flood insurance rate zones that correspond to the 100-year floodplains that are determined in the Flood Insurance Study by detailed methods. In most instances, base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone AEF = the area within Zone "AE" reserved to pass the base flood.

Zone AO = the flood insurance rate zone that corresponds to the areas of 100-year shallow flooding (usually sheet flow on sloping terrain) where average depths are between 1 and 3 feet. The depth should be averaged along the cross-section and then along the direction of flow to determine the extent of the zone. Average flood depths derived from the detailed hydraulic analyses are shown within this zone. In addition, alluvial fan flood hazards are shown as Zone AO on the Flood Insurance Rate Map.

¹FEMA refers to this canal as "Kapakahi Stream #2" on their FIRM maps (Panel No. 0240F)

²FEMA refers to this canal as "Wailani Canal" on their FIRM maps (Panel No. 0240F)

Table 4-30 Permanent Impacts to Waters of the U.S. (Linear Transportation Features)

Total Impact	Waiawa Stream & Springs (Sites 12 & 13)	Moanalua Stream (Site 27)	Kapālama Canal Stream (Site 29)	Nu`uanu Stream (Site 30)	Total Impact of Project
Area (acres)	0.003	0.004	0.01	0.004	0.02
Volume (cubic yards) (below OHWM and above mudline)	10	8	61	27	105
Volume (cubic yards) (below mudline)	873	1,454	60	1,164	3,551

Table 4-31 Permanent Impacts to Waters of the U.S. (Other Project Features)

Total Impact	Waiawa Springs (Existing Stormwater Culvert Extension)
Area (acres)	0.06
Volume (cubic yards) (below OHWM and above mudline)	185
Volume (cubic yards) (below mudline)	0

As discussed in Section 4.18, during construction of the fixed guideway (linear transportation project features), it is anticipated that there will be a temporary effect of up to 0.13 acre of waters of the U.S. Although Kalo'i Gulch is not under the jurisdiction of the USACE and the impacts are not listed in the tables, temporary impacts include 0.07 acre of impact from the guideway support columns with 948 cubic yards of impact below OHWM and above the mudline. An additional 0.86 acre of temporary impact will result from construction of a park-and-ride lot at Lower Kalo'i Gulch with an additional 1,238 cubic yards below OHWM and above the mudline.

Of the 20 streams in the study corridor, most will not be directly affected because the Project's elevated guideway will clear-span these streams and there will be no pier or column construction or other construction-related activities within the stream channel below OHWM. In general, the project alignment parallels other bridge crossings of the streams and, in many cases, crosses along the median between bridges carrying opposing lanes of traffic. In these cases (Categories II through IV as outlined in Section 4.14.2), the only potential direct effect of the Project is one of shading of the stream or wetland. Because the guideway is elevated relative to the surrounding roadway crossings, the guideway will only impart minimal, additional shading onto the water as compared to the bridges already present in each location. Shading impacts are addressed in more detail for Sumida Watercress Farm, below.

The streams affected by structural elements of the Project are described below and in Tables 4-30 and 4-31. These are the Category V sites discussed above, most of which are estuarine and confined to highly modified channels with little to no riparian values. An acreage approach to quantifying impacts was followed since functional assessment methods are typically calibrated to non-urban, non-hardened areas. There are no secondary or

derivative adverse impacts resulting from the Project that would be overlooked by focusing on acreage or that don't scale to acreage. Kalo'i Gulch is not under the jurisdiction of the USACE and is, therefore, not listed in Tables 4-30 or 4-31. However, it was considered in the impact quantities with the use of the preliminary JD approach.

Kalo'i Gulch

The lower end of Kalo'i Gulch on the 'Ewa Plain will be impacted by structural elements of the Project in two respects—a park-and-ride lot is proposed for a parcel crossed by the man-made drainage channel (Site 1); and support columns for the guideway will be located on the banks of the Kalo'i Drainage Channel (Site 2). Although how the drainage channel at the park-and-ride lot will be designed has yet to be determined, the most likely solution will be to replace the existing man-made ditch with a buried box culvert. Another option would be to redirect the channel elsewhere, for example via a ditch or culvert more directly to the Kalo'i Drainage Canal nearby to the east. No aquatic resources are associated with this channel, which is normally dry and cut-off from most of its drainage basin by redirection of upper Kalo'i Gulch into the Kalo'i Drainage Canal. Future urban development will likely establish runoff conveyances throughout this area. As noted, the Kalo'i Drainage Canal will take over much of the stormwater runoff contributed by Kalo'i Gulch. This approximately 160-foot wide channel is presently under construction paralleling North-South Road. Neither this channel nor the existing narrow Kalo'i Gulch (Site 2) have aquatic resource value. The guideway crosses the "new" channel at a shallow angle on a turn, and the span at this point cannot avoid placing several columns within the banks of the channel. Two columns (approximately 36 square feet constructed on 10-foot drilled shafts) are located near the bottom of the banks (within the 100-year floodway).

Waiawa Stream and Springs

The Project and associated features will have one guideway support column and two station piers below OHWM. There will be some impacts to riparian areas. Moving the station location, parking structure, bus transit center, and other features is the only option to avoid impacts to this area. The Pearl Highlands Station is projected to have the second-highest passenger volume of all stations in the system and will serve as the transfer point for all users in Central O‘ahu, whether they drive to the station or transfer from TheBus. This transit center and park-and-ride facility are designed to provide easy access to the fixed guideway transit system from the H-1 and H-2 Freeways, Kamehameha Highway, and Farrington Highway. This station location provides the most convenient access to the system for residents of Central O‘ahu (i.e., locations mauka and ‘Ewa of the station). Therefore, elimination of the station and associated park-and-ride structure does not satisfy the Project’s Purpose and Need.

Alternative locations for the Pearl Highlands Station and park-and-ride lot were identified at Leeward Community College and the Hawai‘i Laborers Training Program site. Both of these sites were evaluated in Section 5.4.2 of the Draft EIS that addressed avoidance alternatives to potential impacts to the historic Solmirin House (since publication of the Draft EIS, the Solmirin House was determined to be not eligible for designation as a historic resource). Locating the park-and-ride facilities at either of the two avoidance alternative sites would cost substantially more and provide less efficient transportation circulation, as access would be less direct. For these reasons, these avoidance alternatives are not considered feasible.

The construction of the high occupancy vehicle (HOV) ramp that will connect inbound H-2 Freeway vehicles with the park-and-ride structure adjacent to the Pearl Highlands Station will result in four columns being constructed close to Waiawa

Stream, all above OHWM. These columns were moved away from the stream to avoid impacts. Waiawa Stream in this area flows in a natural bed and banks, although there are multiple existing piers in the stream associated with Farrington Highway and Kamehameha Highway bridges.

The guideway will clear-span this stream makai of the Pearl Highlands Station. The Pearl Highlands parking and transit center will be constructed on circular columns close to Waiawa Stream. In this area, the park-and-ride structure roughly parallels Waiawa Stream (Figure 4-62). This structure will require approximately six support columns (approximately 25 square feet each) to be located in the riparian area outside the OHWM but below the top-of-bank (TOB) line.

Construction of the elevated guideway at Pearl Highlands Station will result in one guideway support column (approximately 36 square feet constructed on a 10-foot drilled shaft foundation) and two station piers (approximately 25 square feet each) being placed close to the OHWM of Waiawa Springs located beneath the station structure. The impact area and fill for these columns are included in Table 4-30 because of their proximity to the springs. The location of the Pearl Highlands Station is designed to be in close proximity to the proposed park-and-ride lot as well as surrounding businesses. The piers near the Pearl Highlands Station cannot be relocated because they are supporting the guideway as it enters the station, as well as supporting a concourse, stairs, and escalators.

The springs (Site 13) in this case is at the end of a street drain passing under Kamehameha Highway. It would best be modified by constructing an extension of the existing pipe culvert to a point beyond the elevated station footprint. This new “outlet” would be located closer to Waiawa Stream where the TOB line and OHWM closely coincide along an erosion face created by the piers of the Farrington Highway bridge forcing the stream flow

to the right (thus eroding the left bank). Extending the drain's outlet would have no consequences on spring-water contribution to Waiawa Stream and would reduce potential stream contamination in an area that would be too shaded by the station structure to support plant growth. A cut in the high bank already exists where the spring flow joins Waiawa Stream.

Approximately 5 acres near Waiawa Stream between Kamehameha Highway and Farrington Highway will be shaded by structures (a park-and-ride parking structure, bus transit center, station and guideway, and various pedestrian and vehicle access ramps), roughly one-third of the area (Sites 12 and 13). Direct impacts on the stream (including shading) would be minimal; most of the structures are on the north side of the stream. Waiawa Stream supports some native amphidromous fauna, and no part of the Project is anticipated to interfere with the local population of goby observed or migration through the site required by native macrofauna that may breed upstream.

To maintain floodway hydrology, it will be necessary to remove fill material from along Waiawa Stream in this area. Approximately 100 feet of the small tributary issuing from an existing drain (Site 13) will be confined within an extension of that drain pipe.

Moanalua Stream

To avoid impacts below OHWM in Moanalua Stream (300 feet wide) substantially different bridge types would be needed to clear span this stream. This stream is beyond the practical length limit for precast concrete girders (150 feet). Long spans could add \$5 million to total project costs. For this reason, avoiding impacts below OHWM in these streams is not considered feasible.

Because of the 300-foot width of the channel where the guideway crosses Moanalua Stream, two guideway columns (approximately 36 square

feet each on 10-foot drilled shaft foundations) will need to be constructed in the estuary (Figure 4-68). This location (Site 27) is makai of the H-1 Freeway ramp to Nimitz Highway. In this area, there exists multiple bridge crossings of Moanalua Stream, including Kamehameha Highway, the H-1 Freeway, Nimitz Highway ramps, and two pedestrian bridges makai of the project guideway crossing. The guideway columns will be aligned with the upstream viaduct piers, as feasible, to minimize obstruction of stream flow. This area is tidal and near the stream mouth at Ke'ehi Lagoon. Placement of the piers is not expected to have any consequences on the Moanalua Stream estuarine environment or its fauna beyond a loss of 0.004 acre of sandy mud bottom. Because the guideway lies immediately south of the existing viaducts and will be elevated 50 feet above the water, shading on the estuary will be minimal.

Kapālama Canal Stream

The existing Dillingham Boulevard bridge over Kapālama Canal Stream will be widened makai. This will allow for construction of a new median in line with the guideway to maintain two through lanes and one dedicated left-turn lane for both directions of traffic. This will improve safety and enhance traffic flow. There will be impacts to Kapālama Canal Stream to extend the existing piers and abutments.

A design option was evaluated at this stream crossing to avoid impacts below OHWM that considered construction of the guideway on straddle bents located on each bank of the stream. The straddle bents would have been approximately 100 feet long to completely straddle Dillingham Boulevard. This option was not considered feasible for the following reasons:

- Construction of massive straddle bents would be difficult in this congested corridor
- The large straddle bents would require large and expensive drilled shaft foundations

- Overhead power lines would complicate construction
- The size of the straddle bents would have a considerable visual impact in this area

The Project crosses Kapālama Canal Stream at the Dillingham Boulevard Bridge with the guideway in the median of the Boulevard (Site 29; Figure 4-69). Although the guideway support columns will be

located outside of Kapālama Canal behind the existing bridge abutments, the Dillingham Boulevard Bridge will need to be widened approximately 20 feet makai to accommodate a new median. In-water work will involve extending the four existing bridge piers and the two existing bridge abutments makai. Pier extensions will require eight additional piles placed in the stream (approximately 1.36 square feet each). The abutment and retaining

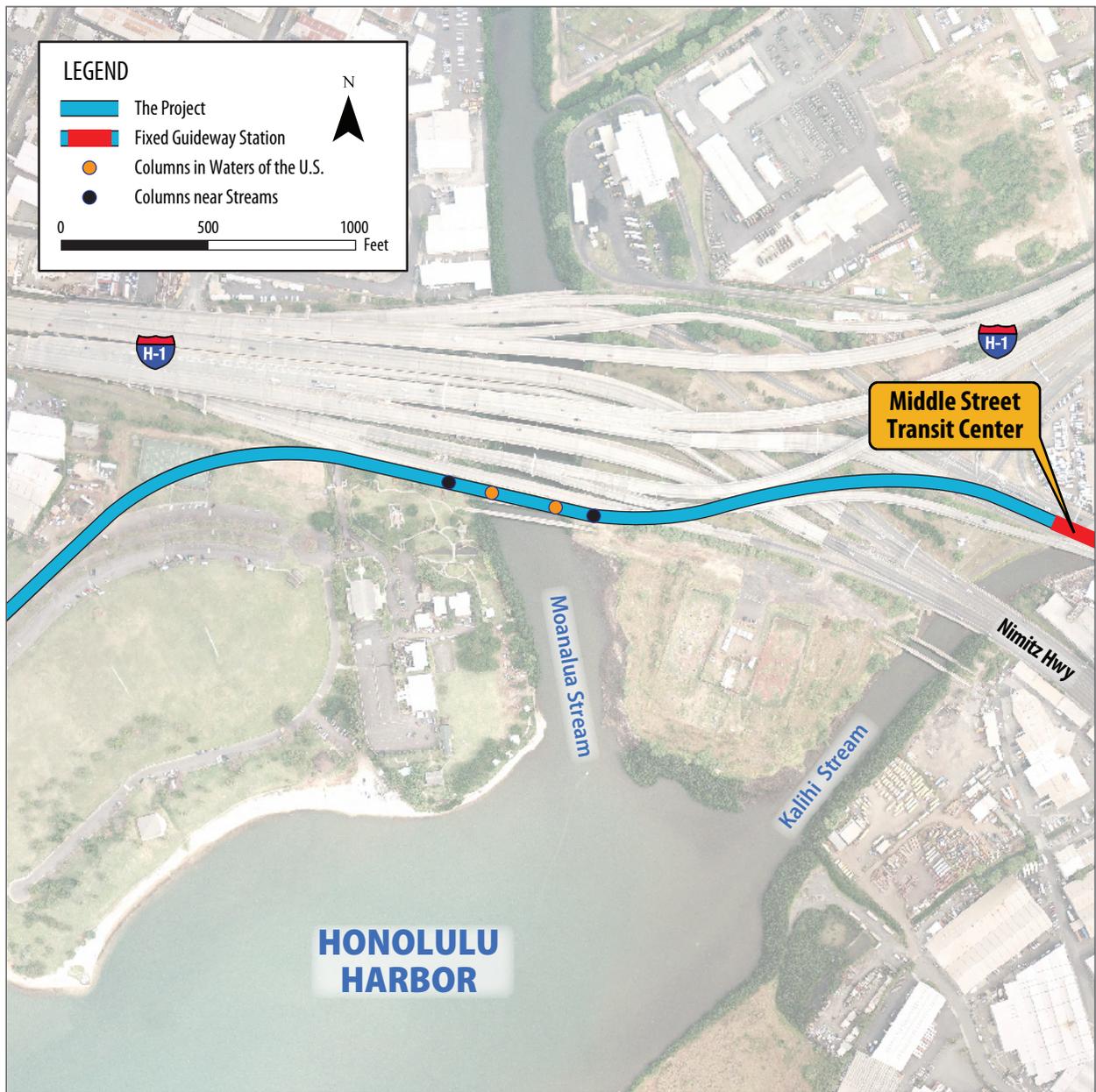


Figure 4-68 Moanalua Stream

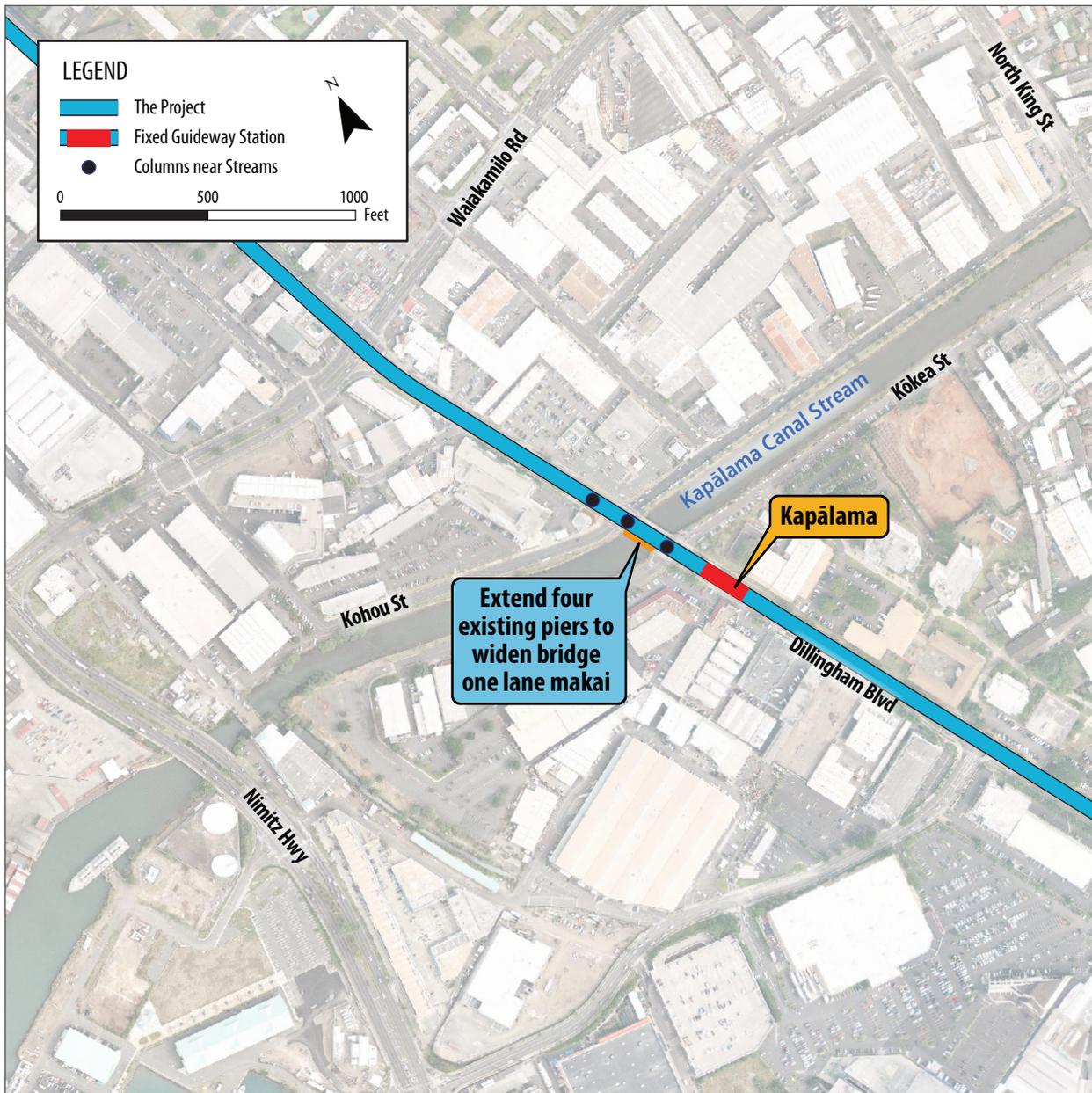


Figure 4-69 Kapālama Canal Stream

walls will require approximately 30 cubic yards of fill below OHWM on each site at the stream. The widening will allow Dillingham Boulevard Bridge to carry two through lanes, one left turn lane, and full-size sidewalks in both directions. Placement of the piers and fill is not expected to have any consequences on the Kapālama Canal Stream estuarine environment or its fauna beyond the loss of 0.01 acre of silty sand bottom. Because the guideway is located over an existing solid bridge

surface, shading effects will be minimal, although widening of the bridge makai will increase shading on this part of the canal.

Nuʻuanu Stream

The Project will cross the mouth of Nuʻuanu Stream on the ʻEwa side of the Chinatown Station between the inbound and outbound bridges of Nimitz Highway (Site 30; Figure 4-70). Two guideway support columns (approximately

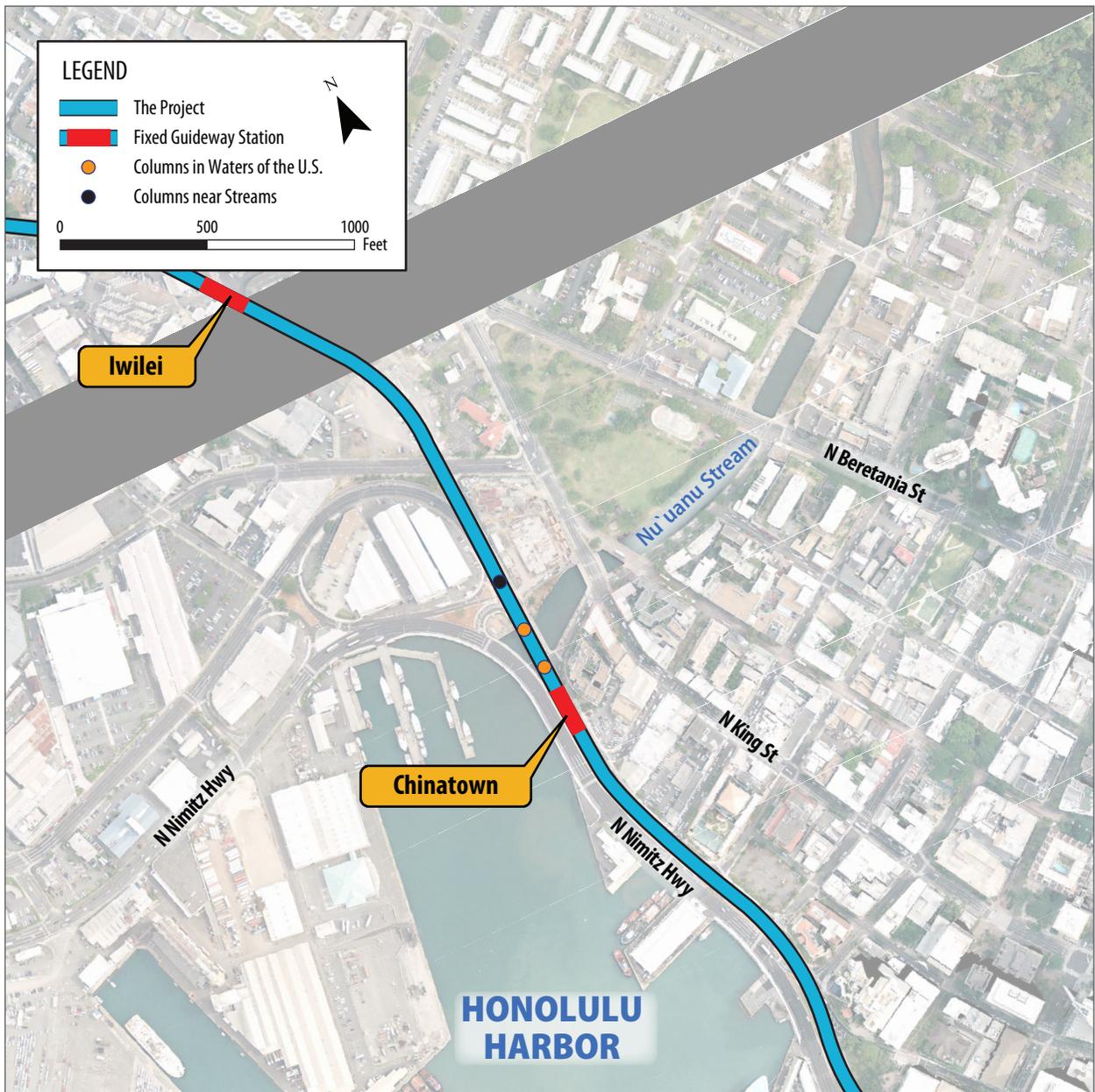


Figure 4-70 Nu'uuanu Stream

36 square feet each on 10-foot drilled shaft foundations) will be constructed in the estuary. Columns are needed in this location to span the stream. In Nu'uuanu Stream, because of the presence of the Nimitz Highway lanes and ramps and the sewage treatment plant 'Ewa of Nu'uuanu Stream, the location of guideway columns has already been optimized to avoid the existing roads and facilities in this area while still accommodating a Chinatown Station on the Koko Head side of

Nu'uuanu Stream. The columns will be designed to be in line with existing bridge piers in the stream, if feasible. Placement of the piers and fill is not expected to have any consequences on the Nu'uuanu Stream estuarine environment or its fauna beyond a loss of approximately 0.004 acre of silty sand bottom. Because the guideway is located between two existing bridges, shading effects will be minimal as the guideway shadow will be on one or the other of the bridges most of the time.

Wetlands

The project guideway will be built in the middle of Kamehameha Highway and will not place any structural elements in Waiiau Springs and Wetland (Site 15) or nearby Sumida Watercress Farm wetland (Site 17). The edge of the deck of the guideway will be approximately 50 to 60 feet from the makai edge of both of these wetlands. The edge of the roadway is approximately 20 feet from these wetlands. The guideway near 'Aiea Bay State Recreation Area (Sites 19 and 20) is approximately 200 feet from the tidal wetland there. The Project will have no impact on this wetland (Figure 4-66).

Maintenance and Storage Facility Stormwater Outfall

The preferred maintenance and storage facility site (Site 11A) will have its own on-site stormwater collection system. This system will control stormwater runoff with on-site catch basins and connecting underground pipes that will drain the stormwater to a detention basin. If there is above-normal rainfall, stormwater from the detention basin will be piped through a 60-inch underground pipe and concrete box culvert to Middle Loch of Pearl Harbor at Site 11B. To meet avoidance and minimization requirements, structural elements of the drain will not be placed in waters of the U.S. The system includes permanent oil/water/sand separators, and any discharge entering Pearl Harbor will meet water quality requirements for the estuary (Figure 4-63). Impacts will be limited to infrequent flows generated by large storms. These treated flows will contribute fresh water to the Loch. However, Pearl Harbor is considered to be an estuary because of the restricted exchange with the Pacific Ocean through a narrow mouth and the substantial freshwater flows from a number of contributing springs and streams draining southern O'ahu.

Waiiau Springs and Wetland

There will be no physical impacts on this small wetland from the nearby guideway beyond shading (Site 15). The shading effect will be similar

to the Sumida Watercress Farm Wetland as discussed below.

Sumida Watercress Farm Wetland

There will be no physical impacts on this small wetland from the nearby guideway beyond shading (Site 17). Although equations (and computer programs) exist to quantify shading from structures, the results are not easily simplified for discussion. A primary reason for the complexity is that the shadow created by the guideway in this or any other location will be slightly different each hour of the day and each day of the year. Furthermore, unlike a building or wall of comparable dimensions, the elevated guideway is open underneath. Nonetheless, a general description of the shadow path across the Sumida Wetland site can be offered and assessed on a daily and seasonal basis.

The guideway will be elevated approximately 30 feet above the highway and extend upward roughly another 10 feet. It will be this "wall" at between 30 and 40 feet above Kamehameha Highway that will cast the major shadow on surrounding areas. The horizontal distance from the guideway to the nearest Sumida Watercress pondfield is about 70 feet. Since the guideway will be a continuous structure oriented WNW-ESE, its shadow will be a band across the ground, the size and location of which is a function of the angle of the sun.

This shadow will change throughout the day—a low sun angle in the early morning and late afternoon will generate a broad shadow band distant from the guideway in a direction opposite from the sun's position in the sky. In the summer, the sun angle at all times will generate a shadow either to the south (away from the wetland) or more or less parallel with the guideway. Only in the several months before and after the winter solstice will a shadow be cast to the north, potentially falling on some pondfields. The longest shadows will be cast in the morning and afternoons because at those

times the sun is low on the horizon. The longest noon shadow will occur on the winter solstice (December 21); on that date the guideway shadow band will lie between 69 and 92 feet north from the guideway, or just reaching into the nearest pondfield 70 feet distant. Of course, on that date (as on all others), the structure's shortest shadow will occur when the sun is highest in the sky around noon, so perhaps the clearest way to quantify the shadow's extent relative to the watercress growing areas is to consider the time of day that the shadow leaves (in the morning as the sun rises) and enters (in the afternoon as the sun sets) the pondfields closest to the guideway.

Note first that between early March and mid-October of every year, the shadow does not reach the watercress growing areas (except perhaps briefly right after sunrise and just before sunset). From mid-October through late December, the shadow will move back from the pondfields progressively later in the morning and appear progressively earlier in the afternoon, a trend that will reverse after December 21. The impact of shadowing will be greatest during the months of December and January when some pondfields will remain in shadow up to about 9 a.m. and will be in shadow after 4 p.m. For the months of November and February, shadowing should end after about 8:30 a.m. and return around 4:30 p.m.

Consideration of whether such a shadow will measurably reduce primary productivity in plants subjected to shadow complicates the assessment further. A shadow does not represent an area of no light (as is the case at night in the earth's shadow), but an area of reduced light similar to a cloudy day because sunlight is scattered by the atmosphere.

Further the movement of the sun will keep the shadow moving throughout the daylight hours, so no single location or plant will experience continuous shading over an extended period (as would be the case underneath elevated building platforms

at Sites 12 and 13). When the shadows from the guideway are longest (at lowest sun angles), the nearest pond fields will receive light coming under the guideway

Flood Zones

As a linear feature, the guideway will cross several floodplains in Waipahu and Pearl Highlands. However, the Project will not cause significant floodplain encroachment as defined by USDOT Order 5650.2. The guideway and many stations will be elevated above the floodplain by piers, but some facilities, such as stairs, elevators, and traction power substations, will have to be built at ground level. These features could have minor effects on floodplains, depending on how and where they are placed within a floodplain (Figures 4-67). However, any such changes caused by the Project will be mitigated through design to comply with current flood zone regulations.

The fixed guideway will provide a safe alternative to surface transportation during storms. No likely future damage associated with floodplain encroachment is anticipated that could be substantial in cost or extent.

There will be no notable adverse impacts on natural and beneficial floodplain values. The major beneficial functions for the floodplains analyzed in the study corridor are the recharge of groundwater and drainage conveyance. There will be no impact to water levels in flood zones.

Stormwater

Pollution prevention BMPs, such as regular inspection and cleaning of the drainage system, will need to be a part of the stormwater management plan that will be developed during Final Design. Permanent BMPs will be needed for the maintenance and storage facility and the park-and-ride facilities. Permanent BMPs will also be installed for stormwater that drains from the guideway at crossings of waterbodies.

In some instances, the discharge of stormwater may increase stormwater inflow to some waters as a result of rainfall collecting on impervious surfaces where infiltration currently occurs. However, because stormwater quality is not expected to be adversely affected, no streams or downstream marine waters are expected to experience negative effects.

Stormwater runoff will be filtered through landscaped median areas and sedimentation collars where possible. Stormwater will be filtered through specially designed bioinfiltration units near water bodies, including those on the HDOH 303(d) list of water quality-limited segments (specifically Sites 4, 12, 18, and 19). In locations where space does not allow for their use, downspout filters will be installed on drains near impaired waters (Sites 7 and 30).

Permanent BMPs will be installed as part of the Project to address stormwater quality before the water is discharged to streams or existing storm drain systems. The BMPs will promote a natural, low-maintenance, sustainable approach to managing and increasing stormwater quality. At a minimum, all stormwater downspouts from the guideway will include erosion control BMPs and energy dissipation devices to prevent any scour of landscaped medians. An integral part of the permanent BMPs will be an inspection and maintenance plan to ensure that the BMPs operate as designed.

Permanent BMPs will be used to reduce typical pollutants associated with runoff from the park-and-ride and the maintenance and storage facilities before it enters State waters to the maximum extent practicable. The permanent storm water BMPs will be designed, installed, and maintained in accordance with the criteria and guidelines described in the respective authority having jurisdiction of the storm water management plan. Types and sizes of permanent storm water BMPs will depend upon

the runoff quality and water quality requirements of each receiving water body.

Permanent BMPs, such as bioretention areas, vegetated buffer strips, dry swales, water quality basin, and structural BMPs with oil/water separators, will be considered, as needed, during the park-and-ride site and the maintenance and storage facility design process. Selection of permanent BMPs will be site-specific and may be modified as a result of geotechnical data collection during final design. Proper training, maintenance, and reporting of the permanent BMPs will also be needed for the long-term success of the stormwater pollution reduction efforts.

Groundwater

The Project meets the coordination requirements of Section 1424(e) of the Safe Drinking Water Act, in accordance with the 1984 Sole Source Aquifer Memorandum of Understanding between the EPA and the USDOT (FHWA/EPA 1984). A Water Quality Impact Assessment was reviewed by EPA, and EPA concurred that contamination of the Southern O'ahu Basal Aquifer will not occur (letter dated March 27, 2009, located in Appendix F). The construction methods and BMPs employed and the presence of an upward hydraulic gradient in much of the study corridor will protect the groundwater, and there will be no adverse effect to groundwater quality.

The Project will increase impermeable surfaces at the maintenance and storage facility and park-and-ride lots and redirect runoff. By installing permanent BMPs, most of the runoff will be directed back into the ground to recharge the groundwater system, resulting in little change in the amount of infiltration. In this way, although runoff from surrounding surfaces may enter the groundwater system along a different path than previously, the groundwater recharge needed to sustain the aquifer system will continue. Therefore, the Project will not result in any long-term changes

to groundwater levels. Runoff from the guideway itself is expected to be relatively free of pollutants and will not threaten groundwater quality. Permanent BMPs, such as oil-water separators, will be used in areas where contamination is present to protect groundwater quality. Construction BMPs will be provided to prevent contamination of the aquifer during construction (Section 4.18).

Mitigation

Surface and Marine Waters

Where the Project crosses an estuary reach and placement of support columns below the OHWM cannot be avoided, the columns will align with existing columns, where feasible. As these columns are not anticipated to adversely affect flood flow, fish passage, or long-term water quality, no mitigation is planned (see Section 4.18 for mitigation during construction).

In one instance (Waiawa Stream, Site 12), a relatively natural riparian zone still exists and may be affected by the Project. These impacts include shading from five bridge structures, permanent removal of vegetation underneath raised structures, and the placement of support columns in the riparian area outside the stream channel. These impacts could reduce vegetative cover and lead to increased bank erosion in some areas. Mitigation for these impacts will include restoration of portions of the stream bank and riparian zone where previous land tenants have placed fill material, as well as natural landscaping of riparian areas along the entire stream affected by the Project.

Water resource mitigation is being proposed to compensate for the 0.02-acre permanent encroachment into waters of the U.S from the linear transportation features of the Project and 0.06 acre of impact from other Project elements (culvert improvement at Waiawa Springs). Construction phase mitigation measures are discussed in Section 4.18. The mitigation measures presented here satisfy the requirements established by 33 CFR 325

and 332, and 40 CFR 230 (Subpart J: Compensatory Mitigation for Losses of Aquatic Resources). These mitigation measures are presented only after measures to fully avoid the water feature have failed and only after all measures have been taken to minimize encroachment.

Permanent mitigation features are proposed at Waiawa Stream, within the Pearl Highlands Station (Figure 4-62). This approximately 17-acre site provides sufficient space for mitigation since only approximately 5 acres will be required for the station, leaving the remainder of the site available for mitigation. Regulations suggest, but do not require, mitigation within the same watershed. Impacts from the Project amount to several small impacts in different watersheds. Individually these would be difficult to mitigate separately (i.e., keep within the same watershed as the impact) to achieve lasting compensation. Impacted watersheds could be more broadly defined on the basis of the nearby receiving waterbody for the impacted estuary; these are Pearl and Honolulu Harbors and Ke'ehi Lagoon. Of the three, Pearl Harbor has the greatest potential for benefit from a mitigation effort directed at improving function within a contributing stream system. This is because it is the largest of the estuarine environments (i.e., of a type closer to the environments impacted) and is the most enclosed. As a result, it is more sensitive to land impacts than Ke'ehi Lagoon or Honolulu Harbor. The proposal is to consolidate mitigation to a single site (Site 12) on Waiawa Stream.

Waiawa Stream was selected over an estuary location because of the availability of land that is part of the Project where enhancement of the stream and potential establishment of a riverine wetland are possible with a high degree of long-term success. The mitigation area would become part of the Project. Although the Project will have minimal effect on the stream at Site 12, it will have a considerable effect on the riparian area at that location.

Waiawa Springs (Site 13) is under the jurisdiction of the USACE. The impact area of constructing a culvert to direct the stormwater outfall and spring flow away from under the Pearl Highlands Station is greater (0.06 acre) than all the permanent impacts from the guideway (0.02 acre). Mitigation in this location can also be used to improve the existing outfall, improve water quality, and enhance the natural setting of the station.

Mitigation for the Waiawa Stream mitigation site includes the following:

- Enhancement of the stream to restore and/or improve ecological and aquatic function
- Establishment of water quality basins
- Enhancement of floodway capacity conveyance to achieve zero rise in flood zone by removal of fill and an increase in stream area
- Extension of existing culvert to Waiawa Stream to correct existing ponding situation
- Ecological restoration with native Hawaiian plantings and use of non-invasive species

Details will be developed during the permitting phase.

Stormwater

Permanent BMPs will be installed on all stormwater outfall structures associated with the Project and incorporated into the design, as discussed in this section and Section 4.17.2 for the maintenance and storage facility. Temporary BMPs for the management of stormwater during construction are discussed in Section 4.18.

Wetlands

Since there are no significant impacts to wetlands, no mitigation is required (see Section 4.18 for mitigation during construction). Although some shading impacts to wetlands are anticipated, these are minimal and limited to increased duration of early morning and late afternoon shadows during several mid-winter months (in the case of Sites 15 and 17).

Flood Zones

As a linear feature, the guideway will cross several floodplains in Waipahu and Pearl Highlands. However, the Project will not cause significant floodplain encroachment as defined by USDOT Order 5650.2. Any changes caused by the Project will be mitigated through design to comply with current flood zone regulations.

Groundwater

Because no impacts to groundwater, artesian resources, or the Southern O'ahu Basal Aquifer are expected, no mitigation other than the BMPs discussed above and in Section 4.18 will be required.

Approach to USACE Permitting

In consideration of the level of impacts described above, the use of Nationwide Permits is proposed. Water resource impacts are small enough that this permit approach may be suitable to the level of impact requiring regulation. Current Nationwide Permits expire in 2012, so permitted work requiring construction after 2012 will either require coverage under renewed Nationwide Permits or under an individual permit to be obtained at that time. Should future discussions with the USACE indicate that an Individual Permit should be pursued, USACE requirements will be followed.

The City and County will obtain USACE permits for all phases of construction as presented in the Final EIS. Should a contractor propose work beyond the scope of those existing City and County permits, the work will only be allowed after approval from the City and County. If the City and County approves, the contractor will be required to prepare the necessary permit modifications. The City will be responsible for implementing all mitigation measures resulting from this permit modification process.

USACE permits contain legally enforceable conditions. The Record of Decision to be issued that indicates acceptance of the Final EIS also

establishes a legally enforceable mechanism to ensure that committed mitigation measures are implemented. Means are available to regulate contractor-proposed changes to issued permits.

4.14.4 404(b)(1) Analysis

The regulatory requirements of the Section 404(b)(1) analysis are stated in Section 4.14.1. For this Project, the proposed modal options, transit technologies, and alignments that exhibit the least overall adverse environmental harm must be examined in the context of “practicability” prior to elimination from further consideration. Practicable is defined as “available and capable of being done after taking into consideration cost, existing technology and logistics in light of overall project purposes.”

Chapter 2 discusses a wide range of alternatives and documents the basis of those modal options, transit technologies, and alignments that were eliminated from consideration. Many alternatives were eliminated from consideration prior to entering the Alternatives Analysis. Of those alternatives that entered the Alternatives Analysis, neither the Managed Lane Alternative nor the Transportation System Management Alternative would have met the Project’s Purpose and Need. As a result, these two alternatives would not have been practicable per Section 404(b)(1) requirements. During this process, aquatic resources were considered qualitatively as there is no substantial difference between alternatives, which all would cross waters of the U.S. throughout the corridor. In addition, their comparative severity of impact to waters of the U.S. was not a differentiating factor among them. The Alternatives Analysis concludes that the Fixed Guideway Alternative meets the Project’s Purpose and Need (Chapter 2) and is, therefore, the sole remaining practicable alternative.

Subsequent to the Alternatives Analysis, the differing transit technologies were evaluated on the basis of performance, cost, and reliability (Chapter 2).

Steel wheel on steel rail was selected as the Preferred Alternative because it is mature, proven, safe, reliable, economical, and non-proprietary. For these reasons, the other technologies are not considered practicable per the Section 404(b)(1) requirements.

Following the screening of technologies, only four alternatives were evaluated in the Draft EIS, all using steel wheel on steel rail technology. The encroachment into waters of the U.S. of each alternative is summarized below:

- No Build Alternative—no encroachment from the Project
- Fixed Guideway via Salt Lake Boulevard—encroachment during construction: 0.18 acre; permanent encroachment: 0.03 acre
- Fixed Guideway via the Airport—encroachment during construction: 0.13 acre; permanent encroachment: 0.02 acre
- Fixed Guideway via the Airport & Salt Lake—encroachment during construction: 0.19 acre; permanent encroachment: 0.03 acre

The Airport Alternative was identified as the Preferred Alternative (Chapter 2). Of the three fixed guideway alternatives addressed in the Draft EIS, the Airport Alternative encroaches the least into waters of the U.S. during both construction and operation (0.06 acre less and 0.01 acre less than both of the other alternatives, respectively). Consequently, the Airport Alternative is the LEDPA under the Section 404(b)(1) analysis.

Further discussion of the differences between the Airport Alternative and the Salt Lake Alternative with respect to impacts on water resources is provided below.

Each alternative would cross a total of 20 streams, 19 of them the same (although two are at different locations on Halawa and Moanalua Streams). Seventeen of the 19 streams would be crossed in approximately the same manner with regard to clear-span versus piers below OHWM. The Salt

Lake Alternative would have crossed Kahauiki Stream, and the Airport Alternative will cross Aolele Ditch.

Both alignments would require guideway columns in Moanalua Stream. The Airport Alternative's span over Moanalua Stream (Site 27) will be near the mouth of the stream on the downstream side of the H-1 Freeway ramp to Nimitz Highway. It will require two piers be placed in the stream. As much as feasible, these columns will be aligned with the supports for the many other viaducts supporting the H-1 Freeway and its access ramps to avoid impacts to stream flow. The Salt Lake Alternative would have crossed Moanalua Stream farther inland (Site 24), approximately 500 feet downstream of where Kikowaena Street crosses. No columns would be located in the stream. The guideway would also cross over the tributary Kahauiki Stream (Site 26), spanning it without columns in the channel.

Both alternatives would span Hālawā Stream but at different locations. The Project will cross Hālawā Stream between the Kamehameha Highway bridges (Site 22). The Salt Lake Alternative would cross at Salt Lake Boulevard (Site 23) over a concrete-lined channel. The Project site crossing at Kamehameha Highway spans a tidally influenced waterway.

Aolele Ditch will be spanned by the Project. Aolele Ditch is a man-made trapezoidal flood-control canal that parallels Aolele Street flowing Koko Head under Lagoon Drive into Ke'ehi Lagoon. It receives drainage from the commercial district up to Nimitz Highway, as well as runoff conveyed in storm drains from portions of the airport.

4.15 Street Trees

This section describes street trees within the study corridor. A street tree is considered any planting in a street or highway right-of-way that

exceeds a height of 8 feet. Street trees are prevalent along many of the corridor's roadways, starting in Waipahu and extending to UH Mānoa and Waikīkī. For more information and references, see the *Honolulu High-Capacity Transit Corridor Project Street Trees Technology Report* (RTD 2008l).

4.15.1 Background and Methodology *City and County of Honolulu Street Tree Regulations*

Exceptional street trees are regulated by ROH Chapter 41, Article 13. Coordination with the DPR Division of Urban Forestry and community groups, such as the Outdoor Circle and Sierra Club, with regard to street trees was initiated at the start of the NEPA process. This coordination has resulted in the identification of *Exceptional Trees* along the project alignment. Coordination will be ongoing as the Project progresses.

Street Tree Survey

A comprehensive survey of street trees was conducted in the project corridor to identify species, size, maturity, condition, and the Project's probable effect on each tree. Trees were also listed as *Notable* or *Excellent*, if applicable.

Notable Trees are those deemed to be important to the urban landscape character.

Excellent Trees are mature trees, without any other plantings nearby, that have been allowed to expand to their fullest possible canopy and have not been pruned or affected in such a manner to take away from their appearance.

Exceptional Trees are a single tree or grove of trees with historic or cultural value or which, by reason of their age, rarity, location, size, aesthetic quality, or endemic status, have been designated by the City Council as worthy of preservation (ROH 1990).

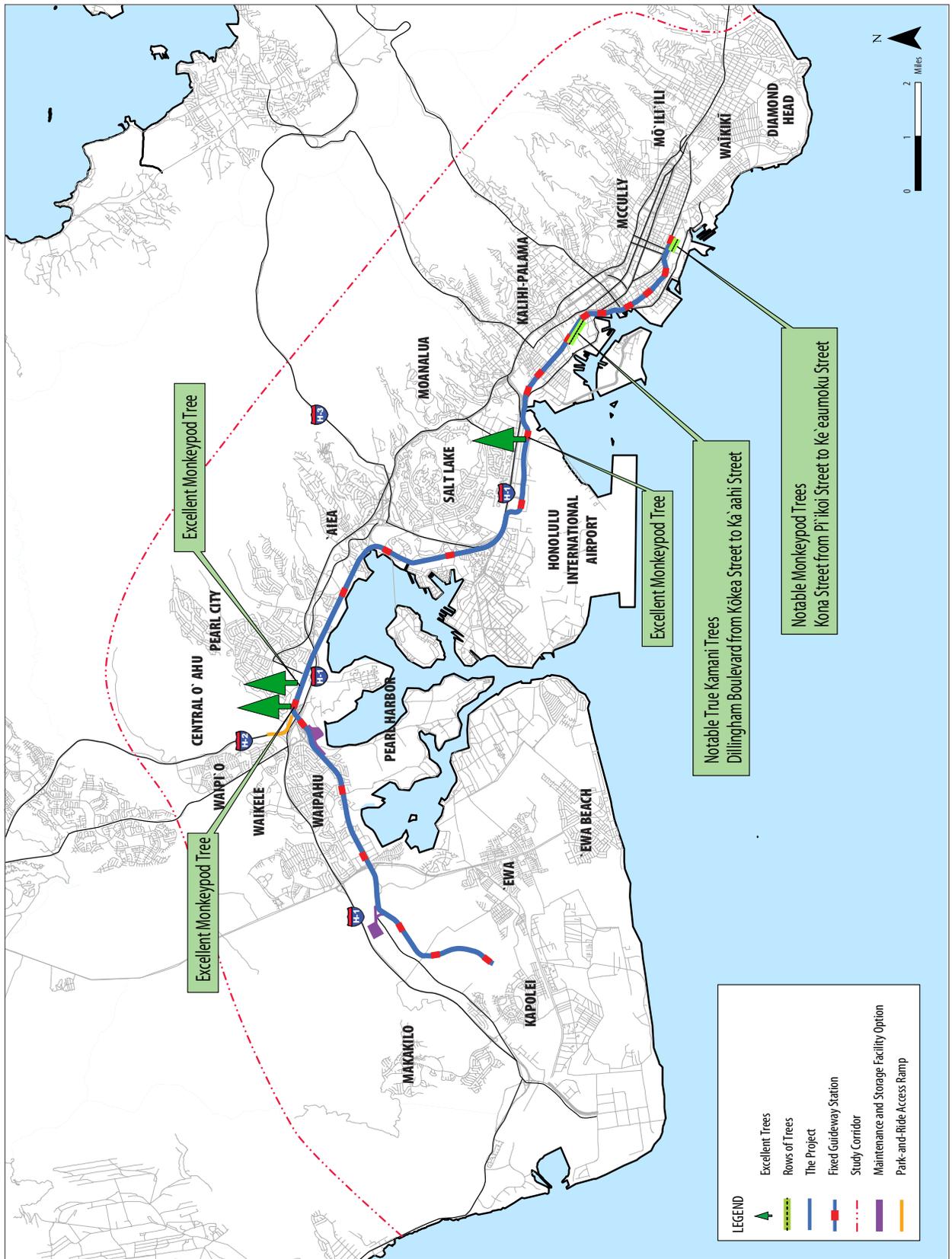


Figure 4-71 Identified Street Trees

4.15.2 Affected Environment

Nearly 50 different tree species were identified during the survey (Figure 4-71). Along most of the alignment, street trees belong to the following species: rainbow shower, be-still, monkeypod, tall fan palm, and coconut palm. Many of the other species present are relatively common in Hawai'i, but some uncommon plantings are present, such as autograph trees (*Clusia rosea*) in Ke'ehi Lagoon Beach Park.



Figure 4-72 True Kamani Trees on Dillingham Boulevard

Notable Trees along the entire route include the following clusters:

- 43 true kamani trees in rows along both sides of Dillingham Boulevard between Kōkea and Ka'aahi Streets (Figure 4-72)
- 10 privately owned monkeypod trees in the median along Kona Street within Ala Moana Center

The following trees were not identified as Exceptional or Notable, but are important to consider:

- Plantings in the median of Farrington Highway between Fort Weaver Road and Waipahu High School helped beautify this roadway approximately five years ago and were nominated for a landscaping/beautification award. These currently juvenile or semi-mature plantings of rainbow shower trees, tall fan palms, and kou trees are important to the community and the Waipahu streetscape.
- Several streets, including Dillingham Boulevard, Kapi'olani Boulevard, Kona Street, Kalākaua Avenue, and portions of Halekauwila Street, contain mature vegetation within the medians and streetscapes.
- At Honolulu International Airport, near the old interisland terminal, there are many relatively newly planted rainbow shower trees.

4.15.3 Environmental Consequences and Mitigation

Environmental Consequences

No Build Alternative

Under the No Build Alternative, the Project would not be built and would not impact street trees. Although the projects in the ORTP are assumed to be built, their environmental impacts will be studied and documented in separate environmental documents.

Project

Table 4-32 shows the approximate number of street trees that will be pruned, removed, or transplanted as a result of the Project.

The Project will require tree pruning and removal. Tree removal will be minimized to the greatest extent possible, but if a street tree is close to the guideway, it will likely require periodic pruning, if not removal.

The following effects will result from the Project. The fixed guideway will primarily affect street trees in Waipahu and Downtown. Notable effects will include the following:

Table 4-32 Summary of Street Tree Effects/Transplanting Mitigation

	Trees to Be Pruned	Trees to Be Removed	Trees that Could Be Transplanted
Project	100	550	300 (55 percent)

Note: (55 percent) = approximate percent of trees that will be removed that are transplantable.

- Two monkeypods identified as Excellent trees along Kamehameha Highway near Pearlridge Center have very large canopies that are approximately 50 feet from the center of the planned guideway. They may require minimal pruning.
- One monkeypod identified as an Excellent tree located on Lagoon Drive near Ke‘ehi Lagoon Beach Park has a 70-foot canopy. This tree may require minimal pruning.
- Twenty-eight Notable true kamani trees on the makai side of Dillingham Boulevard will be removed. Trees on the makai side of the street are already periodically pruned because of the presence of utilities. Trees on the mauka side of Dillingham Boulevard are not pruned and will be preserved.
- Most of the relatively newly planted trees along Farrington Highway in Waipahu will be removed.
- Monkeypod trees on Kona Street between Pi‘ikoi Street and Ke‘eaumoku Street will be removed.

Many of the trees that will be affected along the project alignment are relatively small and easily replaceable be-still trees and are considered transplantable. However, the Project will require the removal and possible transplant of 14 newly planted rainbow shower trees near the old interisland terminal. In addition, one Excellent monkeypod in Ke‘ehi Lagoon Beach Park may require slight pruning. Specific quantities of trees to be pruned, removed, and transplanted are included in the totals in Table 4-32.

Mitigation

Effects to street trees will be mitigated by transplanting existing trees to areas as close to their original location as feasible or planting new ones. Among the trees that require removal but could be transplanted are most of the trees along Farrington Highway. The location where street trees will be transplanted will be selected based on project-specific criteria that could include the following:

- Areas where existing landscaping will be lost along the study corridor
- Areas where opportunities exist for enhancing existing streetscapes near the study corridor
- Areas where stations and parking lots will be constructed
- Areas where shared benefits will be accomplished, such as areas adjacent to parks or historic sites

Street tree pruning, removal, and planting will comply with City ordinances and will require that a certified arborist manage the pruning of any Exceptional trees. Trees suitable for transplanting displaced by construction will be relocated to a City project nursery until they can be transplanted to another part of the project area. The City will coordinate with HDOT’s highway landscape architect. The City will coordinate with SHPD for the removal of the group of 28 true kamani trees on the makai side of Dillingham Boulevard in accordance with the draft PA (Appendix H).

In addition to transplanting existing trees, plans for new plantings will be prepared by a landscape architect during final design to further mitigate effects to street trees. To mitigate any substantial effects

in areas that require tree removal, special attention will be given to developing landscaping plans so that new plantings will provide similar advantages to the community. If new plantings will not offer equitable mitigation (e.g., older mature trees that are removed), additional younger trees could be planted that will, in time, develop similar benefits.

4.16 Archaeological, Cultural, and Historic Resources

This section provides the regulatory context that governs archaeological and cultural resources, as well as historic resources. It also discusses how the Project will affect resources and historic properties within the area of potential effects (APE) and proposed mitigation to address those effects. For more information and references, see the *Honolulu High-Capacity Transit Corridor Project Archaeological Resources Technical Report* (RTD 2008n), the *Honolulu High-Capacity Transit Corridor Project Historic Resources Technical Report* (RTD 2008o), the *Honolulu High-Capacity Transit Corridor Project Cultural Resources Technical Report* (RTD 2008p), the *Honolulu High-Capacity Transit Corridor Project Addendum 01 to the Historic Resources Technical Report* (RTD 2009c), and the *Honolulu High-Capacity Transit Corridor Project Historic Effects Report* (RTD 2009d).

The Area of Potential Effects (APE) is the geographical area or areas within which an undertaking may directly or indirectly change the character or use of historic properties.

4.16.1 Background and Methodology Regulations

The Project must comply with Federal and State archaeological, cultural, and historic preservation laws and regulations.

Federal

The Project is subject to compliance with the National Historic Preservation Act (NHPA) of 1966, as amended (16 USC 470 et seq.). According to Section 106 of the NHPA, the responsible Federal agency is required to consider the effect of its project on historic properties (consisting of any prehistoric or historic district, site, building, structure, or object) eligible for listing in the National Register of Historic Places (NRHP). The lead Federal agency, in consultation with the SHPO, is responsible for the determinations of eligibility for listing on the NRHP and for the finding of effect. The Federal Advisory Council on Historic Preservation (ACHP) is given the opportunity to participate in the Section 106 consultation process.

Section 106 requires that Federal agencies consider the effects of their actions on traditional cultural properties (TCP). TCPs are places that a community regards as important for association with cultural practices or beliefs that are rooted in a community's history and important in maintaining a community's cultural identity, as well as properties of traditional religious and cultural importance.

The Project may be subject to compliance with the *Native American Graves Protection and Repatriation Act* (NAGPRA) (25 USC 3001) where it crosses lands controlled or owned by the Federal Government. Any human remains found on lands owned or controlled by the Federal government will be addressed in accordance with NAGPRA and 43 CFR 10—the regulations that define the process and procedures of NAGPRA.

This section defines archeological, cultural, and historic (i.e., built) resources separately, although each of them are called “historic properties” when they are determined eligible for the NRHP. If the undertaking is determined to have an adverse effect on historic properties, then mitiga-

tion is developed and either a Memorandum of Agreement (MOA) or PA is executed.

Section 4(f) of the U.S. Department of Transportation Act of 1966 also applies to historic properties and is addressed separately in Chapter 5.

State

HRS Chapter 343 includes a cultural component—House Bill H.D.1, referred to as Act 50 (HHB 2000). Act 50 requires an EIS to “include the disclosure of the effects of a proposed action on the cultural practices of the community and State” and “amend(s) the definition of “significant effect” to include adverse effects on cultural practices.” The Act defines “significant effects” related to cultural practices as “the sum of effects on the quality of the environment, including actions that irrevocably commit a natural resource, curtail the range of beneficial uses of the environment, are contrary to the State’s environmental policies or long-term environmental goals as established by law, or adversely affect the economic welfare, social welfare, or cultural practices of the community and State” (HHB 2000).

The Cultural Resources Technical Report (RTD 2008p) identifies valued cultural, historic, and natural resources affected by the Project and discusses the following:

- The extent to which traditional and customary native Hawaiian rights are exercised in the Project area
- The extent to which those resources—including traditional and customary native Hawaiian rights—will be affected or impaired by the proposed Project
- The feasible action, if any, to be taken by the City to reasonably protect native Hawaiian rights where they are found to exist

The Cultural Resources Technical Report followed guidance provided by

- The Hawai‘i Supreme Court’s (HSC) ruling in *Ka Pa‘akai o Ka ‘Āina v. Land Use Commission* (Ka Pa‘akai) (HSC 2000)
- HRS Chapter 343
- OEQC *Guidelines for Assessing Cultural Impacts* (OEQC 1997)

HRS Chapter 6E promotes the preservation of significant historic resources of value to the people of Hawai‘i. HRS Section 6E-43 and HAR Chapter 13-300 establish provisions pertaining to the discovery of historic burial sites outside of established, maintained cemeteries on non-Federal lands within the State.

Process for Applying Regulations

Under the NHPA, Section 106 requires Federal agencies to consider the effects of their undertakings on historic properties. FTA delegated the authority to coordinate the Section 106 process to the City in 2005. Hawai‘i’s historic preservation review regulations [HAR Chapter 13-275] includes similar requirements to the Section 106 process. The following steps describe the Section 106 process:

- Identify consulting parties
- Initiate consultation and public involvement
- Identify the APE
- Identify and evaluate the NRHP eligibility of resources within the APE
- Assess effects on historic properties currently listed or eligible for listing in the NRHP
- Mitigate adverse effects with the SHPO and other consulting parties resulting in an MOA or PA
- Implement provisions of the MOA or PA

Area of Potential Effects

After coordination with the SHPO, the FTA and the City defined the APE for above-ground cultural and historic resources to be generally one parcel deep from the project alignment. The APE also

includes parcels immediately adjacent to all facilities associated with the fixed guideway system, such as park-and-ride lots, traction power substations, and the maintenance and storage facility. The APE is larger around transit stations and has been defined to include entire blocks (or to extend 500 feet where blocks are not discernible) around the facilities. A copy of correspondence from the SHPO dated February 4, 2008, concurring with the APE is located in Appendix F of this Final EIS. Maps illustrating the APE are attached to the draft PA in Appendix H.

The Project's APE for below-ground archaeological resources is defined as all areas of direct ground disturbance. Confining the archaeological resources' APE to the limits of ground disturbance is warranted because the surrounding built environment is largely developed and becomes progressively more urban as the Project progresses Koko Head.

Methodology

Archaeological Resources

The vast majority of previously identified archaeological resources within the APE have been investigated and recorded as a result of historic preservation and/or environmental compliance efforts of various private-, Municipal-, State-, and Federal-funded projects and undertakings since the 1970s.

To evaluate below-ground effects on archaeological resources within the study corridor, the corridor was divided into 10 different sub-areas. A qualitative rating system describing potential archaeological impacts was developed and applied to each sub-area. This rating system considered existing archaeological documentation, geological and depositional characteristics, and some field inspection within the study corridor. The 10 sub-areas are rated Low, Moderate, or High as defined below:

- A *Low* rating indicates potential effects are possible but not considered likely, or that

there is a reasonable expectation of potential effects in no more than 10 percent of a given sub-area.

- A *Moderate* rating indicates a reasonable potential for effects on between 10 and 50 percent of a given sub-area.
- A *High* rating indicates a reasonable expectation of potential effects on more than 50 percent of a given sub-area.

A *High* rating does not mean that at least 50 percent of a sub-area is expected to contain archaeological deposits. Rather, this rating only means that there is a reasonable potential to encounter archaeological deposits within at least 50 percent of the sub-area. The actual percentage of the sub-area where archaeological resources are encountered will undoubtedly be smaller.

Similarly, the rating system says nothing regarding the NRHP eligibility of potential archaeological resources. The Archaeological Resources Technical Report (RTD 2008n) describes the methodology and consultation process in detail.

The primary goal of the Project's ongoing archaeological effort is to provide additional background research and limited field investigation results for those areas that will be disturbed by the Project, as well as cultural consultation to support development of the archaeological portions of the Project's draft PA (Appendix H). The draft PA describes the archaeological historic property and resource identification and evaluation effort, as well as the mitigation procedures for identified archaeological resources.

The City will develop an archaeological inventory survey (AIS) plan for the APE for each construction phase in accordance with 36 CFR 800.4, which allows for phased identification of archaeological resources to limit disturbance of potential resources during the investigation. The City will use Preliminary Engineering plans to

focus the investigation in locations where there is the potential to affect archaeological resources by project construction. The AIS plans will follow the requirements of HAR Chapter 13-276. The City will conduct the archaeological fieldwork as presented in the AIS plan for each construction phase. The archaeological fieldwork will be completed in advance of the completion of final design so that measures to avoid and/or minimize adverse effects to the historic properties can be incorporated into the design. The City has consulted and continues to consult with SHPD and OIBC on burial issues. As required under HRS Chapter 6E, the City will ensure that City and State agencies that grant land use entitlements for the Project consult with SHPD prior to the issuance of permits in areas where the Project may affect a burial site. To ensure that OIBC maintains jurisdiction to determine whether preservation in place or relocation of previously identified native Hawaiian burial sites is warranted, the City will complete an AIS prior to construction in each construction phase as follows. To balance the current level of project design, the desire to limit disturbance of native Hawaiian burials and residences in Phase IV of the project area, and the potential transportation benefits that would accrue from the proposed Project, FTA, in consultation with the consulting parties, decided to develop a detailed approach in the Section 106 draft PA for conducting archaeological investigations for Phase IV of the project. The City has committed to conducting archaeological investigations in locations where foundations will be placed. This would limit the area disturbed for archaeological investigations and construction to potentially less than 10 percent of what would be disturbed if archaeological investigations were conducted for 100 percent of the alignment. The City's proposed schedule for the Project would have construction starting in 2013 for Phase IV (in the Kaka'ako neighborhood). Although, the development of more detailed design and, therefore, archeological investigations for the last construction phase would have typically been delayed until closer to the anticipated construction

start date, the City has committed to starting the process much earlier.

Mitigation will be conducted in advance of, and in some cases during, the construction phases in the Project's different geographic areas.

Cultural Resources

Cultural resources include sites or places associated with significant events and/or people important to the native Hawaiian patterns of prehistory in the study corridor. These resources also include sites or places that embody distinctive characteristics or that are likely to yield information important for research on the prehistory of Hawai'i. Sites that yield resources important for past and present native Hawaiian cultural practices and items that are part of a cultural place-based context are also included.

The analysis of cultural resources was based on compliance requirements for NEPA (USC 1969), HRS Chapter 343 (HRS 2008); Section 106 (USC 1966a), and Act 50 (HHB 2000).

The purpose of Act 50 is to (1) require that environmental impact statements include the disclosure of the effects of a proposed action on the cultural practices of the community and State; and (2) amend the definition of "significant effect" to include adverse effects on cultural practices.

The State of Hawai'i Office of Environmental Quality Control (OEQC) guidelines recommend that "an environmental assessment of cultural impacts gathers information about cultural practices and cultural features that may be affected by actions subject to Chapter 343, and promotes responsible decision making."

The OEQC Guidelines for Assessing Cultural Impacts states that "cultural impacts differ from other types of impacts assessed in environmental assessments or environmental impact statements.

A cultural impact assessment includes information relating to the practices and beliefs of a particular cultural or ethnic group or groups” and suggest the following methodology: (1) gather information about traditional cultural practices, ethnic cultural practices, urban cultural practices, and prehistoric and historic cultural resources and practices that may be affected by implementation of a development project; (2) analyze the data; (3) produce an impact assessment; and (4) provide mitigation measures and suggestions.

In accordance with OEQC’s guidelines, the cultural impact assessment information-gathering process included:

- Identifying individuals and groups with expertise on cultural resources, practices, and beliefs within the study corridor
- Conducting field surveys by canvassing (ethnographic pedestrian surveys) selected areas of the corridor
- Conducting semi-focused interviews of cultural experts or people familiar with details of cultural practices that would be adversely impacted
- Making site visits
- Reviewing pertinent archival and ethnographic documents.

Most archival and ethnographic research material came from Hawaiian Collections of the UH Hamilton Library (Mānoa Campus); the SHPO library, State Survey Division; Bishop Museum Archives; and the researcher’s private library.

Data, including transcripts, surveys, and literature, was obtained and analyzed for concepts, categories, or propositions generated by topic indicators (e.g., medicine, flora, burials). As required by OEQC guidelines, background research included inspecting tax, GIS, and historic maps. Available Land Commission Award parcels within or adjacent to the study area and historic resource and archaeol-

ogy reports completed within the vicinity of the Project were used to obtain data.

The Hawai‘i Supreme Court ruled in *Ka Pa‘akai* that native Hawaiian rights are a subset of culture protected by Act 50. To protect the traditional and customary rights of native Hawaiians, *Ka Pa‘akai* also requires the State to protect the cultural and natural resources that support these practices. The analytical framework imposed by the court was considered as part of this cultural impact assessments process.

Cultural resource assessment and findings are detailed in the Cultural Resources Technical Report (RTD 2008p).

Historic Resources

The Project’s Alternative Analysis phase included an initial assessment of the location of historic resources along each evaluated alignment. This was one of the evaluation criteria used in the selection of alternatives to study in the Draft EIS. Modifications to the Project that could avoid or minimize adverse effects involved making substantial engineering changes (e.g., alignment variations and changes in station designs) and shifting station locations. Further design refinement, such as exact column placement to avoid archaeological resources, will continue during the ongoing design of the Project. Consultation with the SHPO will continue regarding engineering options to minimize adverse effects where feasible.

Previously identified and potentially eligible historic (i.e., built) resources were identified and evaluated, and the Project’s effects on them were determined. GIS data were compiled and used to initially identify resources to survey. Properties within the APE were identified as those with construction dates before 1969. In addition, several buildings were surveyed at the request of the SHPO, despite being past the 1969 cut-off date or slightly outside the APE. Field observations were

made and photographs were taken of more than 1,000 surveyed properties. Research was conducted at the City and County of Honolulu Real Property Assessment and Treasury Divisions and other research centers. Summary forms were prepared for all surveyed properties. These were reviewed by the SHPO.

NRHP criteria defined in 36 CFR 60.4 were applied to evaluate pre-1969 properties in the APE—which will be 50 years or older at completion of the Project—for eligibility for listing in the NRHP. These regulations state that “the quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association.” These properties must also meet one or more of the following Significance Criteria (NPS 1991; 36 CFR 60.4):

- Criterion A—resource is associated with events that have made a significant contribution to the broad patterns of our history.
- Criterion B—resource is associated with the lives of persons significant in our past.
- Criterion C—resource embodies the distinctive characteristics of a type, period, or method of construction; represents the work of a master; possesses high artistic values; or represents a significant and distinguishable entity whose components may lack individual distinction.
- Criterion D—resource has yielded or may be likely to yield information important in prehistory or history.

In addition to 36 CFR 60.4, two criteria considerations were applied to resources within the APE. Criteria Consideration D provides guidance on applying NRHP eligibility criteria to cemeteries (Potter 1992). Criterion Consideration G offers guidance on applying the criteria to properties

that achieved significance in the last 50 years (Sherfy 1998).

In its review of technical reports prepared for the Project, the SHPO did not have any questions or comments regarding the methodology used to determine National Register eligibility. Appendix F of this Final EIS includes correspondence from the SHPO that includes its review comments on the Historic Resources Technical Report (RTD 2008o) and the Historic Effects Report (RTD 2009d), along with other correspondence related to the Project.

Effects to all identified eligible or listed properties were evaluated within the current context and setting of the property, with regards to the identified historic significance and level of retention of historic integrity, and in relation to changes to the property or within its vicinity that the Project would or may cause. An adverse effect was determined when the Project would alter, directly or indirectly, any of the characteristics of the historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property’s location, design, setting, materials, workmanship, feeling, or association. Consideration was given to all qualifying characteristics of a historic property, including those that may have been identified subsequent to the original evaluation of the property’s eligibility for the National Register.

Using the criteria of adverse effect established in 36 CFR 800.5(a)(1) and guidance found in the National Register Bulletin *How to Apply the National Register Criteria for Evaluation*, each historic property was evaluated to determine if implementation of the Project will alter any historically significant characteristics or features of a historic property by diminishing relevant aspects of that property’s historic integrity. For some eligible or listed resources within the Project’s APE, certain aspects of integrity are not critical to the reasons that a property was determined to be

eligible for listing. For each historic property, one of the following findings was made regarding the Project's potential to affect each aspect of integrity:

- No effect
- No adverse effect
- Adverse effect

The majority of historic properties identified within the APE were not associated with and/or did not retain historic setting. Therefore, when integrity of setting was determined to not be critical to character-defining features and/or National Register eligibility (regardless of whether the individual aspects of integrity were specifically called out in prior documentation) or when integrity of setting was no longer retained, introduction of the rail guideway in a portion of a historic property's setting or viewshed generally resulted in a No Adverse Effect determination.

Traditional Cultural Properties

The City will conduct a study to identify and evaluate the APE for the presence of traditional cultural properties (TCP). If FTA determines that TCPs are eligible for the NRHP, the City will meet with the Section 106 consulting parties to identify measures to avoid, minimize, and mitigate adverse effects (see Appendix H).

Section 106 Consultation

Extensive effort was made to identify, contact, and consult with groups with demonstrated interests relating to archeological, cultural, and historic resources within the APE. The information gathered at that time provided a starting-point for work to support this Final EIS.

The purpose of consultation was to identify archaeological, cultural, and historic resources and to discuss other issues relating to the Project's potential effects on such resources. Information was obtained from individuals and organizations likely to have knowledge of potential resources in the study corridor. A reasonable and good faith effort was

made to identify Native Hawaiian organizations that might attach religious and cultural significance to historic properties in the APE, and they were given opportunities to discuss issues and concerns.

In addition to consultation with the SHPO, the City also consulted with organizations and agencies with concerns regarding archaeological, cultural, and historic areas. This consultation included Hawaiian civic clubs that may have an interest in the Project. Letters sent by the FTA initiated an ongoing consultation process with the following groups (Section 106 consulting parties) to identify resources, consider project effects, and develop mitigation to limit the adverse effects of the Project:

- National Trust for Historic Preservation
- Historic Hawai'i Foundation
- University of Hawai'i Historic Preservation Certificate Program
- American Institute of Architects
- Hawai'i Community Development Authority
- U.S. Navy (U.S. Naval Base Pearl Harbor)
- Office of Hawaiian Affairs
- O'ahu Island Burial Council
- Hui Malama I Na Kupuna O Hawai'i Nei
- Royal Order of Kamehameha
- The Ahahui Ka'ahumanu
- The Hale O Na Ali'i O Hawai'i
- The Daughters and Sons of the Hawaiian Warriors
- Association of Hawaiian Civic Clubs—and 15 individual civic clubs
- Department of the Interior, National Park Service (NPS)
- Advisory Council on Historic Preservation

Since publication of the Draft EIS, this Section 106 consultation process has included contacting each consulting party and offering to meet to gather input, distributing all Section 106 related documents to the consulting parties with a request for review and comment, attending meetings as requested to provide project updates, and responding to requests for information. The SHPO

concluded on the Project's APE on February 4, 2008, Determination of Eligibility on October 3, 2008, and Effects on July 22, 2009. In June 2010, FTA submitted additional information and a request for SHPO concurrence of eligibility and effect for properties on Ualena Street. The SHPO concurred on the eligibility and effects for the Ualena properties on May 27, 2010. For a copy of the consultation letters, see Appendix F.

Between July 28, 2009, and November 13, 2009, FTA and the City invited all consulting parties to participate in a series of meetings to develop the draft PA. The process considered all adverse effects, including indirect and cumulative, to historic properties, measures undertaken to avoid and minimize harm, and additional evaluations required prior to construction. Appendix F of this Final EIS includes correspondence from the consulting parties received by the City and FTA during the Section 106 process. All comments from consulting parties were considered in the development of the draft PA. The draft PA provides for mitigation for adverse effects to historic properties and also outlines procedures to be followed to protect historic properties, including archeological resources and native Hawaiian burials, as construction proceeds. The draft PA includes stipulations that describe the roles and responsibilities of the signatories, which include FTA, ACHP and invited signatories, which include NPS and the City. Among the stipulations are the commitments to complete traditional cultural properties studies; a phased approach to undertaking archaeological studies that includes initial planning, consultation, fieldwork, treatment and mitigation plans, and curation; following established design standards; recording and documenting adversely affected built resources; completing NRHP and NHL nominations; funding and administering educational and interpretive programs, materials, and signage; mitigating adverse effects to specific resources by funding and supporting preservation and restoration efforts; and implementing measures to address reasonably

foreseeable indirect and cumulative effects caused by the Project. The draft PA also describes how post-review discoveries will be handled and commits to providing public information throughout the term of the draft PA. The draft PA was developed in consultation among the consulting parties. The Section 106 process identified historic properties potentially affected by the Project, assessed effects, and sought ways to avoid, minimize, or mitigate any adverse effects on any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion in, the NRHP. The draft PA records the terms and conditions agreed upon to resolve potential adverse effects and is attached to this Final EIS in Appendix H. The Section 106 signatories (FTA, SHPO, and ACHP) clarified the language in the draft PA and, in May 2010, FTA distributed the draft PA to the Section 106 consulting parties for informational purposes. FTA, SHPO, and ACHP, in coordination with the invited signatories, will finalize this draft PA prior to the ROD. FTA will distribute the executed PA to the Section 106 consulting parties and invite their signatures as concurring parties to the PA.

4.16.2 Affected Environment ***Archaeological Resources in the APE***

Archaeological resources already documented within the APE include remnants of fishponds, cultivation terraces, irrigation systems, habitated sites, and subsurface cultural layers related to Native Hawaiians that may include religious or cultural artifacts and resources, including iwi kupuna or Hawaiian burials.

Three general categories of archaeological resources that could be affected are identified: burials, pre-contact archaeology, and post-contact archaeology. They are shown by area and rated by probability of occurrence in Figure 4-73.

A draft archeological inventory survey (AIS) was completed for the first construction phase of the Project. The study area includes an approximate

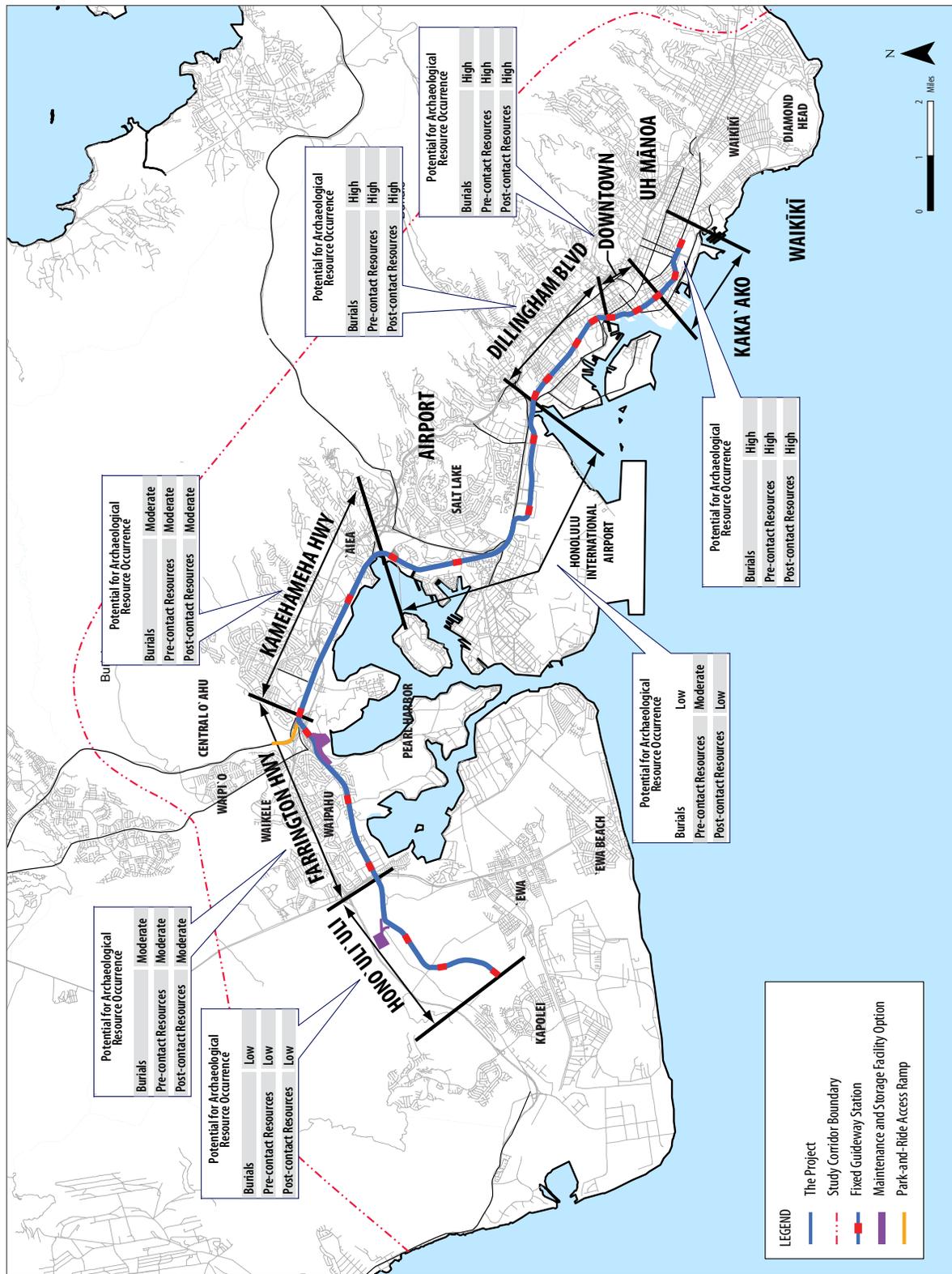


Figure 4-73 Potential to Affect Archaeological Resources

6.8-mile segment extending from North-South Road in East Kapolei to the Pearl Highlands Station and an approximate 0.6 mile segment extending from the Pearl Highlands Station to Waimano Home Road in Pearl City, which is part of the second construction phase.

This AIS investigation for the first construction phase identified one subsurface cultural deposit (lo'i sediments) in the project area near the Waipahu Transit Center that is recommended National/Hawai'i Register-eligible under Criterion D.

Cultural Resources in the APE

Because of the level of existing development along the study corridor, many cultural resources have been destroyed or altered beyond repair. The Cultural Resources Technical Report (RTD 2008p) lists cultural resources identified within the Project's APE.

Historic Resources in the APE

The APE contains 81 historic resources (individual or districts). These resources are shown in Figures 4-74 through 4-77. The Historic Resources Technical Report (RTD 2008o) and Addendum 01 to the Historic Resources Technical Report (RTD 2009c) include all historic resources identified within the Project's APE. The SHPO concurred with determinations of eligibility for historic structures on November 14, 2008. A copy of the SHPO correspondence is included in Appendix F of this Final EIS.

Two historic resources identified in the Draft EIS, the Sandobal House and the Solmirin House, are no longer considered eligible following additional consultation with the SHPO. Two additional historic resources, the Two-story (Tsumoto) Shop House and A/C Electric, have been demolished since their identification as historic resources. The OR&L Terminal Building and the OR&L Office/ Document Storage Building were individually

evaluated on separate survey forms in the Historic Resources Technical Report (RTD 2008o) and individually evaluated in the Historic Effects Report (RTD 2009d); thus, these properties are counted and listed as individual properties in the Final EIS. These changes account for the 81 historic resources listed in this Final EIS compared to 84 historic resources listed in the Draft EIS.

Since publication of the Draft EIS, historic properties in the APE on Ualena Street were surveyed. There were no properties eligible for inclusion on the NRHP register and, therefore, there will be no effect on properties in this area.

4.16.3 Environmental Consequences and Mitigation

Environmental Consequences

Archaeological Resources

Subsurface features and deposits, including iwi kupuna or Hawaiian burials, that have not been previously identified may be affected by the Project. Native Hawaiian testimonies in Land Commission Award claims indicate that there are burials within the study corridor. Other historical accounts related to land use and current understanding of traditional Native Hawaiian burials and mortuary traditions and practices are other indicators that iwi kupuna may be discovered in subsurface burials.

The AIS investigation for the first construction phase identified one archeological resource (SIHP 50-80-09-7751) in the project area that may be affected by the Project. The Project will have an "effect, with proposed mitigation commitments" under State law and "no adverse effect" with mitigation under Federal law.

Cultural Resources

Potential long-term effects on cultural resources include permanent modification, such as displacement, damage, or destruction. Any cultural resources that are uncovered will be assessed

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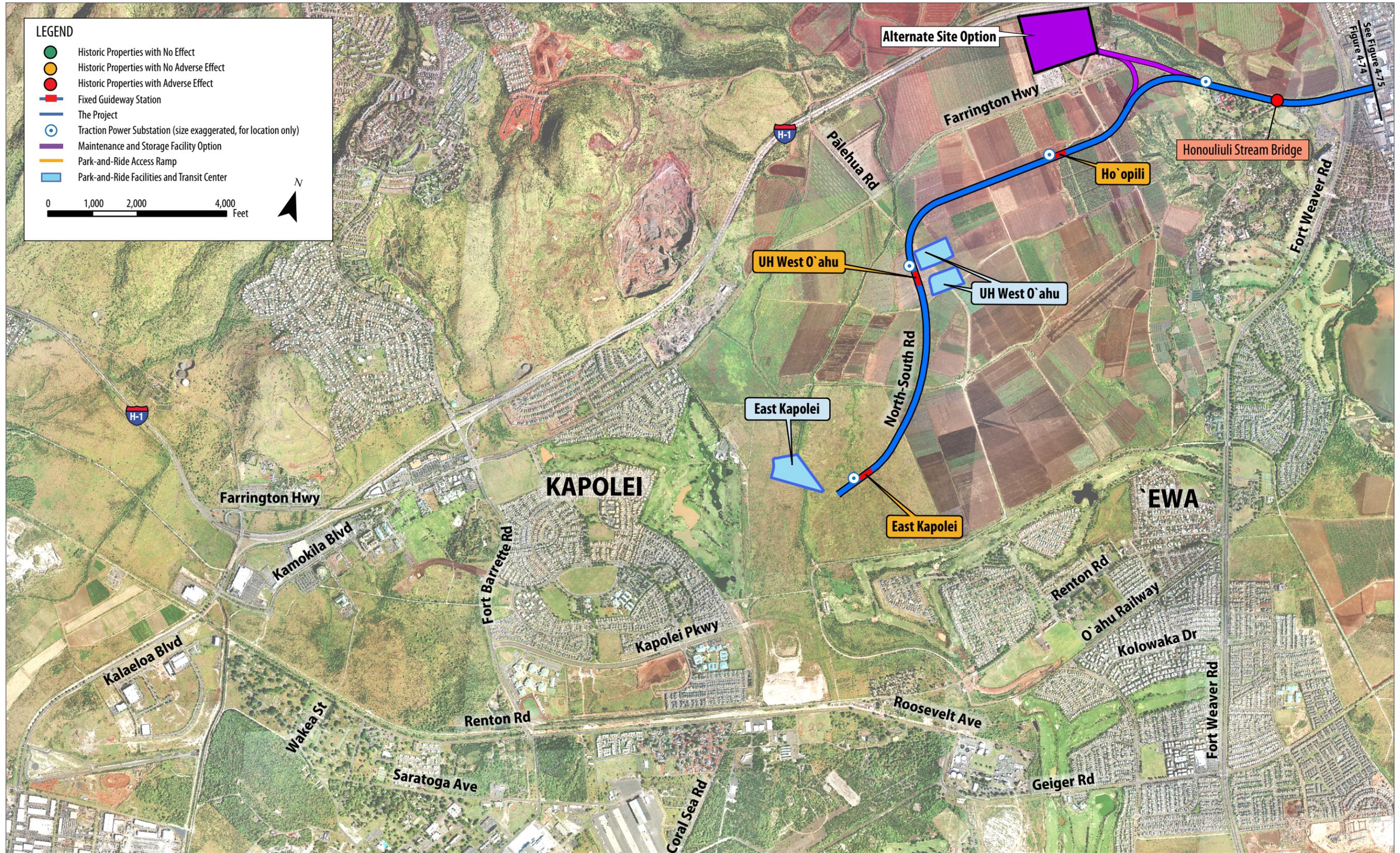


Figure 4-74 Historic Properties in Area of Potential Effects (East Kapolei to Fort Weaver Road)

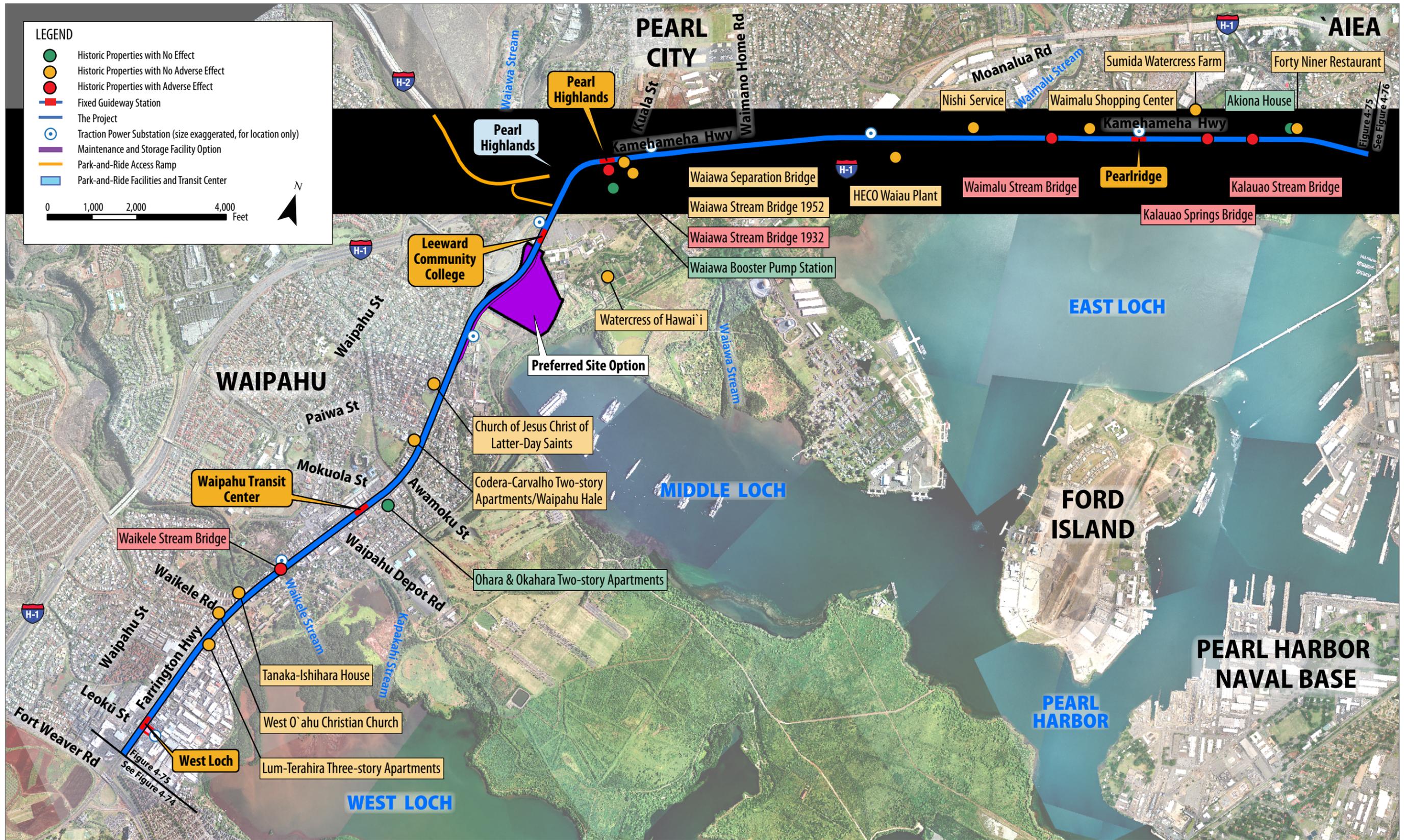


Figure 4-75 Historic Properties in Area of Potential Effects (Fort Weaver Road to Aloha Stadium)

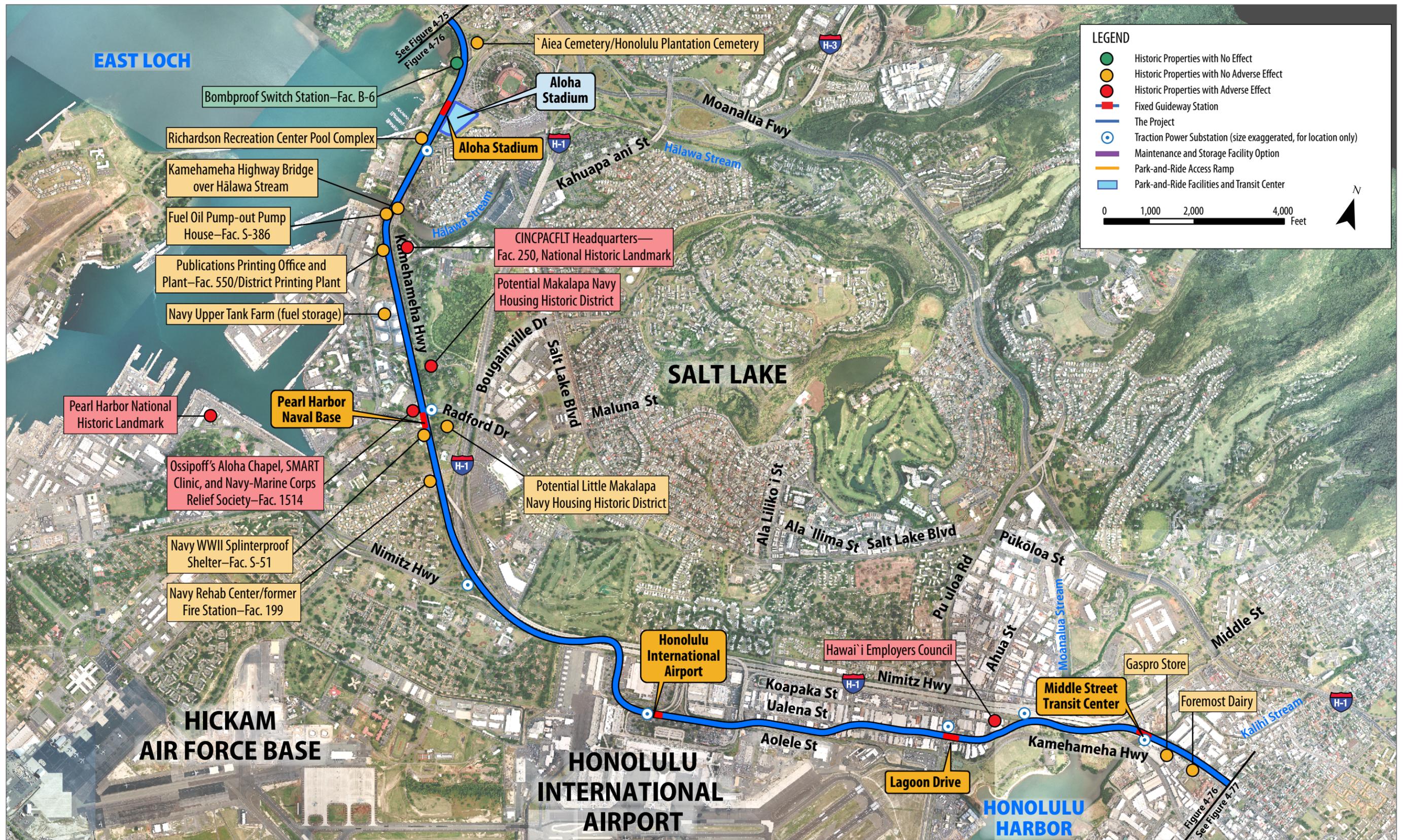


Figure 4-76 Historic Properties in Area of Potential Effects (Aloha Stadium to Kalihi)

through collaborative consultation with appropriate cultural practitioners and/or community groups. Table 4-33 lists resources within the APE that will be affected.

Traditional Cultural Properties

The Chinatown Historic District is listed in the NRHP and is likely a TCP. Further investigation for TCPs is being completed as stipulated in the draft PA, which is included in Appendix H.

Historic Resources

Eighty-one listed or eligible historic resources were identified within the APE. These properties, and potential impacts, are shown on Figures 4-74 through 4-77 and listed in Table 4-34.

An *adverse effect* is found when an undertaking may alter any of the characteristics that qualify an historic property for inclusion on the National Register [36 CFR 800.5(a)(1)].

At the time of the Draft EIS, the SHPO had reviewed the preliminary Section 106 effects determination but had not yet provided concurrence on the effects. Consultations with the SHPO and Section 106 consulting parties have continued regarding the effect determinations since the Draft EIS. Of the 81 historic resources, FTA has determined that the Project will have adverse effects to 33 historic resources. Included in these 33 are adverse effect determinations recommended by the SHPO and accepted by the

FTA. The SHPO did not provide the basis for these determinations. Therefore, general effects to the resource are assumed.

The Project is adjacent to the U.S. Naval Base, Pearl Harbor NHL and near the CINCPACFLT Building NHL, also a part of the Pearl Harbor Naval Base. The FTA accepted the SHPO determination of adverse effect. The Project is not within the boundary of the NHLs and does not have a direct impact on the resources. Therefore, individual, eligible resources located on the Pearl Harbor Naval Base that will be adversely affected by the Project due to changes to setting include Makalapa Navy Housing, Vladimir Ossipoff’s Aloha Chapel, SMART Clinic, and Navy-Marine Corps Relief Society–Facility 1514. These resources are not considered contributing elements to the NHL district. The USS Bowfin and the wrecks of the USS Arizona and USS Utah are NHLs located within the Pearl Harbor NHL, but they are not located within the APE for the Project. In addition, some properties within the NHL that also constitute a portion of the newly designated World War II Valor in the Pacific National Monument, including the Arizona Memorial and Visitor Center, were located outside of the APE.

Mitigation

Based on the results of the AIS for the first construction phase area, the City will conduct archaeological data recovery before station construction at the makai entrance building of the

Table 4-33 Adverse Effects on Cultural Resources Related to Act 50

Resource	Type	Effect
Waiawa Stream	Resource (water)	Project crosses stream. Transit center and park-and-ride in vicinity of stream may adversely affect access to stream and resources within stream.
Aku Bone Lounge & Grill	Practice	Displacement
Hawai`i International Child	Practice	Displacement
Makana Esthetics Wellness Academy	Practice	Displacement

Table 4-34 Historic Properties within Project’s Area of Potential Effects (continued on next page)

Tax Map Key	Resource Name	Description of Effect	Section 106 Determination
n/a	Hono’uli’uli Stream Bridge	<i>Effects to integrity of setting, feeling, and association</i>	<i>Adverse effect</i>
94039582	Lum-Terahira Three-story Apartments	No direct impact to resource	No adverse effect
94027127	West O’ahu Christian Church/former American Security Bank (round plan)	No direct impact to resource	No adverse effect
94025008	Tanaka-Ishihara House	No direct impact to resource	No adverse effect
n/a	Waialeale Stream Bridge eastbound span and Bridge over OR&L spur	<i>Effects to integrity of setting, feeling, and association</i>	<i>Adverse effect</i>
94019020 and 94019021	Ohara & Okahara Two-story Apartments	No effect	No effect
94017043	Codera-Carvalho Two-story Apartments/Waipahu Hale	No direct impact to resource	No adverse effect
94036071	Waipahu Hawai’i Stake, Church of Jesus Christ of Latter-Day Saints	No direct impact to resource	No adverse effect
96003026	Watercress of Hawai’i	No direct impact to resource	No adverse effect
96003045	Waiawa Booster Pump Station		No effect
n/a	Waiawa Stream Bridge 1932 (westbound lanes)	<i>Effects to integrity of setting, feeling, and association</i>	<i>Adverse effect</i>
n/a	Waiawa Stream Bridge 1952 (eastbound lanes)	No direct impact to resource	No adverse effect
n/a	Waiawa Separation Bridge	No direct impact to resource	No adverse effect
98003010	HECO Waiau Plant	No direct impact to resource	No adverse effect
98006024	Nishi Service	No direct impact to resource	No adverse effect
n/a	Waimalu Stream Bridge	<i>Effects to integrity of setting, feeling, and association</i>	<i>Adverse effect</i>
98022074, 98022081	Waimalu Shopping Center	No direct impact to resource	No adverse effect
98016047	Sumida Watercress Farm	No direct impact to resource	No adverse effect
n/a	Kalauao Springs Bridge	<i>Effects to integrity of setting, feeling, and association</i>	<i>Adverse effect</i>
n/a	Kalauao Stream Bridge	<i>Effects to integrity of setting, feeling, and association</i>	<i>Adverse effect</i>
98018041	Akiona House (Quonset)	No effect	No effect
98018042	Forty-Niner Saimin Restaurant	No direct impact to resource	No adverse effect
	‘Aiea Cemetery/Honolulu Plantation Cemetery	No direct impact to resource	No adverse effect
99003038	Bombproof Switch Station – Facility B-6	No effect	No effect

*Basis for effect determination not provided by the SHPO.

Table 4-34 Historic Properties within Project’s Area of Potential Effects (continued on next page)

Tax Map Key	Resource Name	Description of Effect	Section 106 Determination
99003029	Richardson Recreation Center Pool Complex (Swimming Pool – Facility S-21; Recreation – Facility 1; Bath House/Locker Room – Facility 2; Handball Court – Facility S-20)	No direct impact to resource	No adverse effect
n/a	Kamehameha Highway Bridge over Halawa Stream (mauka span)	No direct impact to resource	No adverse effect
99001001	Fuel Oil Pump-out Pump House – Facility S-386	No property acquisition, less than adverse effect to attributes	No adverse effect
99002004	Commander-in-Chief Pacific Fleet (CINCPACFLT) Headquarters – Facility 250, National Historic Landmark	<i>General effects to resource *</i>	<i>Adverse effect</i>
99001008	Publications Printing Office and Plant – Facility 550/District Printing Plant	No direct impact to resource	No adverse effect
99001008	Navy Upper Tank Farm (fuel storage)	No direct impact to resource	No adverse effect
99002004	Potential Makalapa Navy Housing Historic District	<i>Effects to setting and feeling</i>	<i>Adverse effect</i>
Various	United States Naval Base, Pearl Harbor National Historic Landmark	<i>General effects to resource *</i>	<i>Adverse effect</i>
99001008	Ossipoff’s Aloha Chapel, SMART Clinic, and Navy-Marine Corps Relief Society – Facility 1514	<i>Effects to setting only</i>	<i>Adverse effect</i>
99002004	Potential Little Makalapa Navy Housing Historic District	No property acquisition, less than adverse effect to attributes	No adverse effect
99001008	Navy WWII splinterproof shelter – Facility S-51	No property acquisition, less than adverse effect to attributes	No adverse effect
99001008	Navy Rehab Center/former Navy Fire Station – Facility 199	No property acquisition, less than adverse effect to attributes	No adverse effect
11016004	Hawai`i Employers Council	<i>Effects to setting, feeling, and association</i>	<i>Adverse effect</i>
12013007	Gaspro Store	No direct impact to resource	No adverse effect
12013006	Foremost Dairy	No direct impact to resource	No adverse effect
12012014	Pu`uhale Market	No direct impact to resource	No adverse effect
12009017	Afuso House	<i>Full acquisition</i>	<i>Adverse effect</i>
12009017	Higa Four-plex	<i>Full acquisition</i>	<i>Adverse effect</i>
12009018	Teixeira House	<i>Full acquisition</i>	<i>Adverse effect</i>
12009060	Pang Craftsman-style House	No direct impact to resource	No adverse effect
12002113	10 Courtyard Houses	No direct impact to resource	No adverse effect
n/a	Lava Rock Curbs	<i>Curb removal; effects to location, design, setting, materials, workmanship, feeling, and association</i>	<i>Adverse effect</i>
12002108	Duarte House	No direct impact to resource	No adverse effect
15029060	Boulevard Saimin	No direct impact to resource	No adverse effect

*Basis for effect determination not provided by the SHPO.

Table 4-34 Historic Properties within Project’s Area of Potential Effects (continued on next page)

Tax Map Key	Resource Name	Description of Effect	Section 106 Determination
n/a	Kapālama Canal Bridge	<i>Effects to setting, feeling, and association</i>	<i>Adverse effect</i>
15015008	Six Quonset Huts	<i>General effects to resource *</i>	<i>Adverse effect</i>
n/a	True Kamani Trees	<i>Removal of approximately 28 trees along dillingham boulevard</i>	<i>Adverse effect</i>
15007033	Institute for Human Services/Tamura Building	<i>Effects to setting, feeling, and association</i>	<i>Adverse effect</i>
15007003	Tong Fat Co.	No direct impact to resource	No adverse effect
15007003	Wood Tenement Buildings behind Tong Fat Co.	<i>General effects to resource *</i>	<i>Adverse effect</i>
15007001, 15007002	O’ahu Railway & Land Co. Office/Document Storage Building	<i>Guideway will require 50 feet of right-of-way on property; effects to integrity of location, design, setting, feeling, and association</i>	<i>Adverse effect</i>
15007001, 15007002	O’ahu Railway & Land Co. Terminal Building	<i>Guideway will require 50 feet of right-of-way on property; effects to integrity of location, design, setting, feeling, and association</i>	<i>Adverse effect</i>
15007001	Former filling station on OR&L Property	No direct impact to resource	No adverse effect
15007001, 15007002	O’ahu Railway & Land Co. basalt paving blocks	No direct impact to resource	No adverse effect
n/a	Nū’uanu Stream Bridge	<i>Effects to integrity of setting, feeling, and association</i>	<i>Adverse effect</i>
17002, 17003, & 17004 plats	Chinatown Historic District	<i>Minor parcel acquisition near Chinatown Marketplace (0.3 acre); adverse effects to integrity of design, setting, feeling, and association</i>	<i>Adverse effect</i>
17002 & 21002 plats	Merchant Street Historic District (including Walter Murray Gibson Building/Honolulu Police Station)	<i>General effects to resource *</i>	<i>Adverse effect</i>
21001056	Harbor retaining wall of coral blocks from Honolulu Fort	No direct impact to resource	No effect
n/a	Walker Park	<i>General effects to resource *</i>	<i>Adverse effect</i>
21001005	DOT Harbors Division Offices	<i>General effects to resource *</i>	<i>Adverse effect</i>
21001001	Pier 10/11 Building	<i>General effects to resource *</i>	<i>Adverse effect</i>
21001013	Aloha Tower	<i>General effects to resource *</i>	<i>Adverse effect</i>
21013007	Irwin Memorial Park	<i>General effects to resource *</i>	<i>Adverse effect</i>
21014003	Dillingham Transportation Building	<i>Minor parcel acquisition, no impact to building; adverse effects to integrity of setting, feeling, and association</i>	<i>Adverse effect</i>
21014006	HECO Downtown Plant and Leslie A. Hicks Building	<i>General effects to resource *</i>	<i>Adverse effect</i>

*Basis for effect determination not provided by the SHPO.

Table 4-34 Historic Properties within Project’s Area of Potential Effects (continued from previous page)

Tax Map Key	Resource Name	Description of Effect	Section 106 Determination
21026022	Hawai`i Capital Historic District (including Attorney General’s Office/Hale Auhau)	No direct impact to resource	No adverse effect
21031012	Department of Transportation Buildings	No direct impact to resource	No adverse effect
21031021	Royal Brewery/The Honolulu Brewing & Malting Co.	No effect	No effect
21030014	Kamaka Ukulele	No direct impact to resource	No adverse effect
21031018	[Old] Kaka’ako Fire Station	No effect	No effect
21051005, 21051006	Mother Waldron Neighborhood Playground	<i>Effects to setting</i>	<i>Adverse effect</i>
21052008	Fuji Sake Brewing Company	No direct impact to resource	No adverse effect
21050049	Ching Market and House	No effect	No effect
21050052	American Savings Bank/Liberty Bank – Queen-Ward Branch	No direct impact to resource	No adverse effect
23007029	Pacific Development Office Building	No direct impact to resource	No adverse effect
23039023	Hawaiian Life Building	No direct impact to resource	No adverse effect
23039001	Ala Moana Building	No direct impact to resource	No adverse effect

*Basis for effect determination not provided by the SHPO.

Waipahu Transit Center Station for the subsurface cultural deposit (lo’i sediments).

If, in the unlikely event that subsurface cultural deposits or human skeletal remains are encountered during the course of project-related construction activities, all work in the immediate area will stop and the SHPO will be notified in accordance with Federal and State law (see Section 4.18). If archaeological resources are identified during pre-construction design or during construction, the City will avoid or minimize impacts.

Mitigation measures for historic resources adversely affected by the Project were developed in consultation with The SHPO and other Section 106 consulting parties. In addition, Section 106 regulations direct the Federal (or designated) agency to consult with the State Historic Preservation Officer, Chairperson of the Hawai`i Department of Land and Natural Resources, to develop “modifications to the undertaking that could avoid, minimize, or mitigate adverse effects on historic properties” (36 CFR 800.6).

While the Project was designed to avoid and minimize effects to historic properties, this was not always possible in meeting the Project’s Purpose and Need. Therefore, a draft PA was prepared to outline responsibilities and measures to mitigate or reduce adverse project effects. The draft PA was developed during extensive consultation with Section 106 consulting parties and included mitigation measures suggested by these consulting parties whenever possible.

The draft PA provides for mitigation for adverse effects to historic properties and also outlines procedures to be followed to protect historic properties, including archeological resources and native Hawaiian burials, as construction proceeds. The draft PA includes stipulations that describe the roles and responsibilities of the parties, which include FTA, the SHPO, ACHP, and the City and County of Honolulu. Stipulations are as follows:

- Committing to complete TCP studies
- A phased approach to undertaking archaeological studies that includes initial planning,

-
- consultation, fieldwork, developing treatment and mitigation plans, and curation
- Following established design standards
 - Recording and documenting adversely affected built resources
 - Completing NRHP and NHL nominations
 - Funding and administering educational and interpretive programs, materials, and signage
 - Mitigating adverse effects to specific resources by funding and supporting preservation and restoration efforts
 - Implementing measures to address reasonably foreseeable indirect and cumulative effects caused by the Project.

The draft PA also describes how post-review discoveries will be handled and commits to providing public information throughout the term of the draft PA. A copy of the draft PA is included in Appendix H of this Final EIS.

State of Hawai`i Act 50 Findings

Based on personal consultations and examination of historic documents and existing archaeological information, the cultural impact assessment concluded that most of the traditional cultural practices associated with cultural resources, such as the gathering of plant and marine resources for subsistence activities within the study corridor, have been heavily damaged or destroyed through previous development. No ongoing practices related to traditional gathering were identified during the assessment.

Effects on traditional cultural practices associated with Waiawa Stream will be mitigated through re-introduction of native planting and habitats in the area near Pearl Highlands Station, as discussed in Section 4.14.

Ethnic and urban cultural practices documented in the Cultural Resources Technical Report (RTD 2008p) would not be adversely affected because they could still exist in other locations.

Mitigation measures for the displacement of these cultural practices include relocation compensation for the affected businesses, as described in Section 4.4.

The City will complete an interpretive plan for the project area to include signage of the cultural history of the community in the station design and develop and implement an educational and humanities program to enhance understanding of the history and culture in the project area as described in the draft PA.

The Cultural Resources Technical Report did not identify project impacts associated with cultural practices and beliefs that are associated with Native Hawaiian burials. If cultural practices associated with Native Hawaiian burials are identified, the City will take reasonable measures to mitigate impacts, including consulting with appropriate stakeholders.

4.17 Maintenance and Storage Facility

This section describes the effects of the maintenance and storage facility options on the natural and built environments. The preferred site option for the maintenance and storage facility is a 44-acre vacant site in Waipahu near Leeward Community College. A 41-acre site in the proposed Ho'opili development in 'Ewa is the alternative site for the maintenance and storage facility. The maintenance and storage facility is described in Chapter 2, and the site options are illustrated on Figures 2-38 and 2-39. Effects of the maintenance and storage facility on transportation are described in Section 3.4.3 of this Final EIS.

The site will contain several buildings for administration, a system control center, and parking for maintenance employees. It will also include areas for operation and maintenance of the trains, including storage for approximately 100 vehicles,

a vehicle-wash area, and storage track. The facility will operate 24 hours a day. Each option will require special track work for trains to access the site from the guideway.

As documented below, the preferred location for the maintenance and storage facility is at the 44-acre vacant site in Waipahu near Leeward Community College. This site will have fewer land use impacts and will not contrast substantially with elements of the surrounding visual character, which include the highway interchanges, community college buildings, and adjacent parking lots. Use of this 44-acre vacant site will decrease the amount of agricultural land designated prime or of statewide importance that will be acquired for the Project from 80 acres to 47 acres.

The construction of the maintenance and storage facility on the 41-acre site in the proposed Ho'opili development in 'Ewa would result in conversion of land with active agricultural use and would place the facility in an open flat agricultural area that will contrast with the open, rural setting. All other environmental effects between the two locations are equivalent.

4.17.1 No Build Alternative

Under the No Build Alternative, the maintenance and storage facility would not be built and would not affect the natural or built environments.

4.17.2 The Project

Land Use

Option near Leeward Community College (preferred option)

This site is near Middle Loch, between Waipahu and Pearl City. The site is makai of Farrington Highway and the H-1 and H-2 Freeways and is near Waipahu High School and Leeward Community College. The site is vacant but was used by the Navy as a fuel storage and delivery facility during World War II; it is no longer used for fuel storage but remains under caretaker status with the Navy. The site will be converted from vacant land to a

transportation facility. If not developed as a maintenance and storage facility, the potential exists that the Department of Hawaiian Home Lands could develop the site. Use of the site for a vehicle maintenance and storage facility is consistent with the past industrial land use of the site.

Ho'opili Option

The Ho'opili maintenance and storage facility option will be mauka of Farrington Highway, makai of the H-1 Freeway between Pālehua and Fort Weaver Roads. This site is adjacent to a Hawaiian Electric Company (HECO) substation. The site is used for agricultural purposes by Aloun Farms and includes orchards, fields, storage facilities, operations buildings, and plant nursery shade areas. However, the site is near the future Ho'opili Master Planned Community. The site will be converted from current agricultural use and planned industrial/commercial use to a transportation facility. This option is consistent with planned land use in the area.

Noise

Noise generated from operations at the maintenance and storage facility will be similar at both sites. The nearest noise-sensitive use is approximately 700 feet or greater from the center of either site. No noise impacts will occur.

Option near Leeward Community College (preferred option)

This site lies between Waipahu High School in the 'Ewa direction and Leeward Community College Koko Head. Pearl Harbor is makai of the site, and a bike path runs between the site and Pearl Harbor. The two schools and the bike path are susceptible to noise and vibration effects. However, the school properties are approximately 700 feet from the center of the site. The nearest use at Waipahu High School is a sports field. The schools and the bike path will not experience noise impacts.

Ho'opili Option

This site is makai of the H-1 Freeway, which is a substantial noise generator. A HECO transmission station is makai of the site. The HECO site does not generate much noise, nor will it be affected by noise from the maintenance and storage facility. There are no existing noise-sensitive land uses near the site. Planned development adjacent to the site is anticipated to be light industrial and commercial. The Master Planned community will also include residential development that will be susceptible to noise and vibration impacts, but these uses are planned to be makai of Farrington Highway.

Visual

Option near Leeward Community College (preferred option)

This site is vacant and undeveloped property between the Waipahu High School and Leeward Community College campuses. Its topography slopes makai toward Pearl Harbor. Farrington Highway and the Farrington Highway/H-1 Freeway interchange are mauka of the site, with a single-family residential neighborhood farther mauka of the highway.

The maintenance facility will consist of buildings, paved parking areas, a complex of storage tracks and service bays, and site lighting. The multistory maintenance and storage facility buildings will be sited at various locations, with the tallest building (about 62 feet) near the makai end of the property at the base of the slope. A smaller building (about 36 feet high) is located 'Ewa of the Leeward Community College Station. The train wash facility will be makai of the guideway and Farrington Highway. This building will be about 24 feet high.

Most components of the facility will be highly visible from Pearl Harbor and from residences in the foothills mauka of the Farrington Highway/H-1 Freeway Interchange. For motorists traveling along Farrington Highway, the maintenance facility building will intermittently block distant views of the shoreline and Pearl Harbor. The facility will

not contrast substantially with elements of the surrounding visual character, which include the highway interchanges, community college buildings, and adjacent parking lots.

The maintenance and storage facility will be less visible from Waipahu High School and Leeward Community College due to topographic differences and vegetation. To avoid and minimize light spillage onto adjacent properties and night sky pollution, full cut-off luminaries (fixture and lamp design), low-pressure sodium lights, and low-reflective surfaces will be used. Use of low-pressure sodium lights will allow the Leeward Community College observatory to filter out any interfering light during use.

Although Pearl Harbor is in the middleground of most makai views in this area, these views are dominated by other elements in the wider panoramic scene, such as Diamond Head and the horizon at the Pacific Ocean. A maintenance facility at this site will result in moderate visual effects.

Ho'opili Option

This site is currently an open flat agricultural area adjacent to an electrical substation. The maintenance and storage facility will contrast with the open, rural setting. In addition, the facility buildings will be visible from mauka foothill residences. Planned future development near the Ho'opili option includes light industrial and commercial uses that are expected to occur in a similar time frame as the Project. Development of these uses on surrounding properties will reduce the visual contrast of the maintenance and storage facility. A maintenance and storage facility at this site will result in moderate visual effects.

Other Environmental Effects

Effects on air quality, energy use, and natural resources are not anticipated to result from either site option. Light from either site option is not anticipated to affect wildlife. Cultural and historic

resources are not anticipated to be affected by either option; the preferred site near Leeward Community College was formerly used by the military, and the Ho‘opili site has been disturbed by farming activities. Both sites are near or include some flood zones; however, the area that will be developed for the maintenance and storage facility is outside of the flood zone area. Stormwater treatment measures will be installed at either site to prevent the runoff of pollution or polluted stormwater. The option near Leeward Community College will have a stormwater outfall to Pearl Harbor and will require a Shoreline Setback Variance. Section 4.14 discusses impacts to waters of the U.S. associated with this outfall.

An SWMP to address permanent stormwater runoff and water quality will be prepared prior to construction of either option. Stormwater runoff from the developed area of the site will be collected through an on-site system consisting of catch basins, swales, and underground pipe to direct runoff to a stormwater detention basin located on-site. The yard and shops will be designed to minimize stormwater runoff from the operations areas. Drainage from inside buildings will enter an oil/water separator and then be disposed of into the sanitary sewer. Runoff from facilities located outside that are not covered by a roof or shelter will also require the installation of collection and pre-treatment facilities. Washing and service areas will drain into a collection system where all discharges will be treated before appropriate disposal. A separating system will be used to remove unwanted or harmful substances, such as oil or sediment, from discharged water. These permanent stormwater BMPs will be designed, installed, and maintained in accordance with the criteria and guidelines described in the State’s Storm Water Permanent Best Management Practices Manual.

Hazardous materials, waste, and contamination are not anticipated to be encountered at either site. The preferred option near Leeward Community

College was formerly occupied by the military, but a remedial investigation and environmental analysis completed by the Department of the Navy revealed that no adverse human health or ecological effects have resulted, or will result, from the previous petroleum spill on the site. USHHS and HDOH concur with this assessment.

Mitigation

Operation of the maintenance and storage facility will meet Federal, State, and Local regulations related to noise, air quality, wastewater treatment and disposal, and stormwater management typical of light industrial operations. The maintenance and storage facility will pursue Leadership in LEED Certification. This involves the incorporation of proven sustainable materials, methods, and technologies into its facility design to increase life-cycle value, including reduction of energy and resource use, and to enhance the health and comfort of employees and visitors. LEED is a performance-oriented system where credits are earned for satisfying criteria related to specific environmental impacts inherent in the design, construction, and operations and maintenance of buildings. The maintenance and storage facility will be designed to achieve Silver certification.

4.18 Construction Phase Effects

This section of the Final EIS discusses construction effects related to the natural and built environment with regard to the entire Project and mitigation. Section 3.5, Construction-Related Effects on Transportation, of this Final EIS discusses transportation-related construction impacts and mitigation. Construction effects will be temporary and limited in area as construction proceeds along the length of the project alignment. Construction work details will be developed during preliminary and final design. Effects could include dust, noise, and traffic disruption, congestion, and diversion, as well as limited or temporarily lost access and parking to residences and businesses.

Construction-related effects will result primarily during construction of the foundations and columns, superstructure (the elevated guideway structure), and stations. Construction of other system components, such as traction power substations, the maintenance and storage facility, access roadways, and park-and-ride lots, will also have associated effects.

The parcels acquired for the maintenance and storage facility, park-and-ride lots, and stations could be used for construction staging areas. Additional areas will be identified and obtained by the contractor as needed. The contractor is responsible for obtaining and preparing required permits and approvals. The effects of activities in the staging areas known at this time are included in the discussion of construction effects on the natural and built environments. Section 4.21 identifies who is responsible for obtaining anticipated permits, approvals, and agreements.

The City will coordinate with affected residents and businesses prior to construction. A public involvement plan will be developed prior to each construction phase that will detail outreach tailored to the construction phase. The City will maintain the Project website (www.honoluluantransit.org) and telephone hotline, which will also provide information to the community regarding construction phasing.

As described in Chapter 2, the Project will open in phases. Stations at the ends of each phase will operate temporarily as terminal stations until the next phase is completed. This operation will temporarily affect access and travel patterns around the stations.

The proposed construction methods, as described in Appendix E, Construction Approach, will minimize potential adverse construction effects. Construction is expected to begin in 2010, and construction is anticipated to be complete in 2018. Because construction will generally be completed

sequentially from the UH West O‘ahu to Ala Moana termini, the duration of disruption in any single location will be substantially less than the nine-year total construction period.

The length of time to complete a portion of the guideway in any one location will vary depending on the depth of foundation required for the guideway support column, the span length between adjacent columns, and access and work area constraints. On average, an individual support column will require approximately 20 to 30 working days to construct. Using the gantry system presented in Appendix E, the guideway will be constructed between consecutive support columns within approximately three to five days. Rail, traction power, and control systems will be installed following construction of the guideway. The durations for these system installations will vary but is expected to be several weeks. The stations will be constructed concurrently with the construction of the guideway and are expected to take 14 to 18 months each. The overall project construction schedule is presented in Section 2.5.10.

The City will ensure that the environmental commitments in the Final EIS and the permit conditions are met during the final design and construction of the Project. The City will employ a dedicated environmental compliance manager to oversee construction contractor compliance with all stormwater best management practices, construction noise mitigation measures, utility coordination, business access requirements, and any mitigation plans prepared for the Project, including those presented in permit conditions and the MOT Plan. The City has prepared a *Construction Safety and Security Manual* that requires the contractor to adhere to safe construction practices.

Project construction will not have a substantial effect on some resources discussed in earlier

sections of Chapter 4, including electric and magnetic fields, natural hazards, and farmlands. Effects on other resources are discussed in the following sections.

4.18.1 Land Use and Economic Activity

Developed areas Koko Head of Waipahu will experience more land use and community effects during construction than currently undeveloped sections in West O‘ahu. Temporary construction activities, such as detours, may be required in parcels near the project right-of-way. Effects on land use from these activities will be temporary.

Business Access

Access to businesses near construction activities could be temporarily affected but will be maintained. In several locations, left-turn lanes will be closed during construction, requiring drivers to change their approach and make a right-hand turn to businesses. Such closures are expected on Farrington Highway in Waipahu, Kamehameha Highway in Pearl City, and Dillingham Boulevard. Segments of Halekauwila and Queen Streets may be made temporarily one-way or have parking eliminated during construction.

The MOT Plan that is described in Chapter 3 will address temporary effects on access to businesses during construction. Proposed mitigation to reduce adverse economic hardships for existing businesses along the project alignment during construction activities may include the following:

- Coordinate construction planning and phasing with nearby property owners and businesses
- Develop a public involvement plan prior to construction to inform business owners of the construction schedule and activities
- Initiate public information campaigns, including signs and lighting, to reassure people that businesses are open during construction and to encourage their continued patronage

- Minimize the extent and number of businesses, jobs, and access affected during construction
- To the extent practicable, coordinate the timing of temporary facility closures to minimize impacts to business activities—especially those related to seasonal or high sales periods
- Minimize, as practical, the duration of modified or lost access to businesses
- Provide public information (e.g., press releases or newsletters) regarding construction activities and ongoing business activities, including advertisements in print and on television and radio
- Phase construction in each area so as to maintain access to individual businesses for pedestrians, bicyclists, passenger vehicles, and trucks during business hours and important business seasons
- Provide advance notice if utilities will be disrupted and scheduling major utility shut-offs during non-business hours

Employment

Based on construction cost estimates and state-specific employment multipliers, construction-related employment was estimated for direct, indirect, and induced employment. Direct employment refers to all new jobs created within the heavy civil engineering and construction sector. Indirect employment is created when jobs are created in other sectors as a result of construction (i.e., increases in the food service sector to support increases in construction employment). Induced employment results from an overall expansion of the regional economy (and thus new jobs) as a result of the proposed construction.

The yearly estimate for the total direct, indirect, and induced jobs over the nine-year construction period is shown in Table 4-35.

Table 4-35 Employment Effects during Construction

Alternative	Number of Jobs per Year									
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
No Build	0	0	0	0	0	0	0	0	0	0
Project	3,183	8,209	11,680	17,270	15,020	10,902	6,229	3,872	3,091	1,719

4.18.2 Communities and Neighborhoods

During construction, automobile, pedestrian, and transit access to communities and neighborhoods surrounding the project alignment will be affected. These effects are discussed further in the following sections. Site-specific Construction Safety and Security Plans will be developed and implemented by the construction contractors to mitigate effects on community services, such as fire prevention and emergency preparedness and response, as well as to protect the general public, private property, and workers from construction risks. The FTA requires that such plans be prepared to address these potential construction effects.

The following emergency services departments will be consulted in preparing the Construction Safety and Security Plans and will have some responsibility for the Project’s safety hazards and security risks:

- The Honolulu Police Department
- The Honolulu Fire Department
- The Department of Emergency Management
- The Honolulu Emergency Services Department

During development of the Construction Safety and Security Plans, measures will be identified to minimize effects on communities and their resources that address specific consequences anticipated at each location within the various communities, as well as ensure the safety of the public and the environment.

In cases where traffic rerouting or delays are expected to affect access to public facilities or the functioning of public and emergency services, alternate access routes will be maintained during

construction. Construction in high-volume traffic and pedestrian areas could employ police support to direct and control traffic and pedestrian movements to lessen effects on mobility. To maintain the functionality of public facilities, social resources, and transportation routes during construction, mitigation will include relocating and rearranging certain facilities, noise mitigation, and other efforts deemed necessary to maintain full functionality. In cases where project placement will restrict existing vehicular or pedestrian access routes to public service buildings, alternate access points will be included in mitigation efforts.

Schools, Parklands, and Recreational Resources

Schools adjacent to the project alignment may be affected by a variety of construction issues, such as noise, vibration, air quality, and visual intrusion, depending on a school’s distance from the Project. The various parks and recreational resources directly along the project alignment are expected to be affected by temporary nuisances associated with construction, such as noise, dust, and visual intrusion.

In instances where any school, parkland, or recreational resource will experience a disruption in access, the effects will be mitigated as necessary and appropriate using applicable practices similar to those outlined in Business Access in Section 4.18.1. Temporary barrier walls or fences will be placed around any school, parkland, or recreational resource to clearly delimit a construction area, to avoid public exposure to any possible construction hazards.

Utilities

Utilities comprise facilities owned by public utility agencies and private utility companies and include service lines to adjoining properties. Utilities include sanitary sewers; storm drains; water, gas, electric power, telephone, and oil pipelines; street lights; and traffic signals. Communication and coordination have been initiated with the affected utility agencies and companies and will continue throughout design and construction. HDOT will be involved with utility coordination for utility work in the state roadways and roadway rights-of-way.

Design criteria will govern all new utility construction outside of buildings, as well as the support, maintenance, relocation, and restoration of utilities encountered or affected by project construction. Utility service to abutting properties may be temporarily interrupted for short periods. Property owners will be contacted prior to interruption of utility services. If facilities are temporarily relocated, the area will be restored as close as possible to its original condition. Replacements for existing utilities will provide service or capacity equal to that currently offered.

Utility rearrangements will ensure that construction of transit facilities may proceed without affecting utility service. Utilities that penetrate through or cross over transit structures will be designed so as to prevent damage. The vertical and lateral clearances of overhead and underground utility lines shall comply with the rules and regulations of the appropriate utility agency and Hawai'i Administrative Rules during final design and approved by the utility agencies. Existing underground utilities that are in the way of structural foundations and overhead utilities in the way of the aerial guideway will be relocated. Along several roadway corridors, most existing overhead utilities are in conflict with the guideway and safety clearance requirements and will be relocated underground. Existing overhead utilities not in conflict with the aerial

guideway and safety clearance requirements will remain overhead. Coordination will occur with emergency services and utility companies to ensure that utility relocations meet their needs and that sufficient clearance is provided.

Environmental Justice

Construction activities will occur along the entire project alignment and will affect all population groups equally.

4.18.3 Visual and Aesthetic Conditions

During construction, visual quality may be altered for all viewer groups. Construction-related signage and heavy equipment will be visible at and near construction sites. The removal or pruning of mature vegetation, including trees, to accommodate construction of the guideway, stations, and park-and-ride lots will degrade or partially obstruct views or vistas. Short-term changes to the visual character of areas adjacent to the alignment could result from introducing the following construction elements:

- Construction vehicles and equipment
- Clearing and grading activities that result in exposed soils until replanting or repaving occurs
- Erosion-control devices, such as silt fences, plastic ground cover, and straw bales
- Dust, exhaust, and airborne debris in areas of active construction
- Stockpiling of excavated material
- Staging areas for equipment storage and construction materials

These short-term changes will be greatest at station locations, park-and-ride lots, elevated guideway, and maintenance and storage facility sites.

Temporary lighting may be necessary for nighttime construction of certain project elements or in existing highway rights-of-way to minimize disruption to daytime traffic. Temporary lighting could affect residential areas by exposing residents

to glare from unshielded light sources or increasing ambient nighttime light levels.

The contractor will incorporate construction management practices as practical to minimize visual impacts during construction, including:

- Remove visibly obtrusive erosion-control devices, such as silt fences, plastic ground cover, and straw bales, as soon as an area is stabilized
- Locate stockpile areas in less visibly sensitive areas whenever possible so they are not visible from the road or to residents and businesses
- Shield temporary lighting and direct it downward to the extent possible
- Limit the times construction lighting could be used in residential areas
- Replace removed street trees and other vegetation with appropriately sized vegetation as soon as practical after construction is completed in the same location or another location in accordance with City and State requirements

4.18.4 Air Quality

Air pollution from construction activities will be limited to short-term increased fugitive dust or airborne particulate matter (generally of a relatively large particulate size) and mobile-source emissions. Fugitive dust primarily results from particulate matter being “kicked up” by vehicle movement around a construction site and material being blown from uncovered haul trucks. The State regulates fugitive air pollutant emissions (HAR Section 11-60.1). The Project will comply with these regulations. Mobile-source pollution is generated from the operation of construction equipment near construction sites and from traffic disruption and congestion during construction.

The contractor will select appropriate measures to comply with fugitive dust requirements. The following control measures can substantially reduce fugitive dust:

- Minimize land disturbance
- Use watering trucks to moisten disturbed soil
- Use low emission equipment when feasible
- Cover loads when hauling dirt
- Cover soil stock piles if exposed for long periods of time
- Use windbreaks to prevent accidental dust pollution
- Limit the number of vehicular paths and stabilize temporary roads
- Maintain stabilized construction area ingress/egress areas
- Wash or clean trucks prior to leaving construction sites
- Minimize unnecessary vehicular activities

Mobile-source pollution can be reduced by minimizing unnecessary vehicular and machinery activities and limiting traffic disruptions, particularly during peak travel hours (see Section 3.5 for more detail). All State and Local regulations for dust control and other air quality emission reduction controls will be followed.

4.18.5 Noise and Vibration

Noise

Noise during construction could be bothersome and annoying to nearby residents, visitors, tourists, and businesses. Project construction will generate noise, which will occur sporadically in different locations throughout the nine-year construction period.

The most common noise source in construction areas will be engine-powered machinery, such as earth-moving equipment (bulldozers), materials handling equipment (cranes), and stationary equipment (generators). Mobile equipment (e.g., trucks and excavators) operate in a cyclic manner, and stationary equipment (generators and compressors) generate noise at fairly constant levels. The loudest and most disruptive construction activities could be impact pile-driving followed by demolition, jackhammers, and hoe rams. Impact pile-driving,

if used as a method for pile placement, will result in the loudest and most disruptive construction work. Impact pile-driving will only be used where less disruptive foundation placement methods cannot be used. Vibration or hydraulic insertion could be used where appropriate to replace impact pile-driving to reduce noise.

Figure 4-78 shows the range of noise levels that can be expected from different types of construction equipment. Construction noise at locations more than 50 feet away decreases at a rate of 6 to 8 dBA per doubling of the distance from the source. For example, if the noise level is 90 dBA at 50 feet from a jackhammer, it will decrease to approximately 83 dBA at 100 feet and 76 dBA at 200 feet. Doubling the number of noise sources will increase the noise level by 3 dBA. In the above example, two jackhammers operating together will generate a noise level of 93 dBA at 50 feet from the activity.

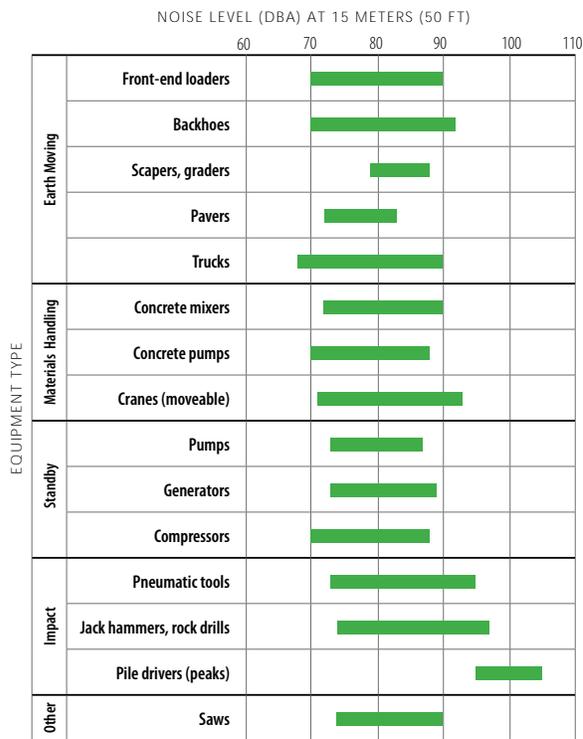


Figure 4-78 Typical Construction Equipment Noise Levels

The mitigation discussed in this section is meant to be a guideline for developing project-specific measures to reduce construction noise. Prior to construction, an approved Community Noise Variance will be obtained from HDOH for the Project. Noise permits will be obtained prior to the construction of each phase of the Project. The permits will regulate construction times and activities and include mitigation commitments. The following measures are examples of what could be included in the permits:

- Develop a monitoring plan with noise limits
- Construct temporary noise barriers or curtains
- Equip construction equipment engines with adequate mufflers and intake silencers
- Strategically place stationary equipment, such as compressors and generators

The noise and vibration construction mitigation plan will be prepared to establish a protocol to monitor noise during construction and a plan to mitigate for impacts as required. The City will implement the mitigation measures defined in this Final EIS, construction plan, and HDOH noise permit requirements.

The contractor will comply with standard specifications and all applicable local sound control and noise level rules, as well as regulations set by HDOH. Construction noise from some activities (e.g., pile-driving in certain sections of the alignment) could exceed levels set in the State noise regulations for work between 6 p.m. and 7 a.m. A permit will be required for such nighttime work. Permit requirements will specify mitigation measures to minimize effects by limiting the time of day that certain activities could occur.

Vibration

Common sources of vibration during construction activities include jackhammers, pavement breakers, hoe rams, bulldozers, and backhoes. Pavement breaking and soil compaction will likely produce

the highest levels of vibration. Depending on soil conditions in an area, activities such as pile-driving can generate enough vibration to result in substantial short-term noise impacts. Pile-driving, where required, will cause the highest vibration levels of the proposed construction activities. Pile-driving activities more than 75 feet from newer, non-historic buildings will not exceed risk criteria for those buildings. For buildings closer than 75 feet to pile-driving activities, the contractor will be required to provide mitigation for vibration levels during these activities. Contractors will be required to perform a video survey of the immediate area prior to the start of any construction activity where vibration levels may be high enough to affect surrounding structures. Drilled shafts or auger-cast piles, which are cast in-place rather than driven into the ground, will be used by the Project wherever possible. By using these types of foundations, impact driving will be eliminated and drilling will generate lower vibration levels.

Construction vibration will have less of an effect on underground and buried utilities than on buildings. Pile-driving is the only proposed construction activity that will generate vibration levels that could damage utilities. Utilities less than 25 feet from pile-driving locations may need to be further evaluated during final design to determine whether mitigation is needed.

Mitigation

Prior to construction, the City, in cooperation with its contractors, will develop a noise and vibration construction mitigation plan. The plan will follow FTA's *Transit Noise and Vibration Impact Assessment* (FTA 2006a) and meet HDOH noise permit requirements. The plan will be updated as needed to include the results of the construction noise and vibration assessment that will be completed to identify potential impacts at sensitive receptor locations. The vibration element of the noise and vibration construction mitigation plan will identify

sensitive receptors and establish a protocol to monitor vibration effects during construction.

4.18.6 Construction Energy Consumption

Construction of at-grade high-capacity transit systems generally requires 20,000 MBTUs of energy per track mile (Caltrans 1983), including track and power systems. Because the guideway is elevated, an additional 150,000 MBTUs of energy per track mile will be required to construct the elevated structure. Table 4-36 summarizes the energy that will be required to construct the Project.

Measures that maintain roadway speeds and construction practices that reduce energy consumption could reduce energy demand during construction. Any transportation-control measures that reduce traffic volumes and congestion will also decrease energy consumption. Mitigation of traffic impacts during construction are discussed in Chapter 3.

Table 4-36 Total Construction Energy Required

Alternative	Project Construction Energy (MBTUs)
Project	7,480,000

MBTUs = million British thermal units

4.18.7 Contaminated Media and Solid Waste Contaminated Media

Subsurface conditions are highly variable throughout the construction area where earthwork will occur. Excavation will primarily occur during installation of guideway foundations and relocation of utilities. Other ground disturbance and grading will occur at the maintenance and storage facility, park-and-ride lots, and construction baseyards.

Earthwork could uncover contaminated soil. The Initial Site Assessment prepared for the Project identified a number of sites and neighborhoods of concern where contaminated soil and

groundwater may be present (Section 4.12). The presence of unanticipated contamination could threaten worker health and safety and affect the Project's schedule and cost. Contaminated media can also negatively impact water quality as a result of stormwater runoff and drainage.

To identify soil and groundwater conditions along the project alignment, in-depth assessments of the sites and neighborhoods identified as concerns in the Initial Site Assessment are being performed by the City during the Project's design phase. It is appropriate to perform additional studies during the design or construction phase because subsurface conditions can change dramatically between the time a project is planned and constructed. Additional studies could include a complete Phase I Environmental Site Assessment, or portions of an Environmental Site Assessment, as well as soil and groundwater sampling. Future study will vary by area or site and will depend on the level of concern in each area as identified during the initial site assessment.

If hazardous materials are identified during construction, the City will follow notification procedures in accordance with regulations (as described in Section 4.12).

Solid Waste

Large volumes of solid waste are often generated at construction sites. Solid waste, ranging from unused construction materials to soda containers, can blow around causing a general nuisance in addition to degrading the quality of stormwater runoff.

BMPs will be used to minimize impacts related to borrow and waste disposal activities. The location of borrow and waste disposal sites will be identified by the contractors. Solid waste generated by clearing and grubbing, demolition, or other construction practices will be removed from the location and properly disposed. Contractors

must comply with all permitting requirements for borrow locations and follow other applicable contract specifications.

In addition to and/or in support of NPDES permits, the contractor will prepare the following plans to mitigate construction impacts related to wastes:

- **Construction Safety and Security Plan**—this plan will meet the FTA requirement in 49 CFR 633 and address fire prevention, emergency preparedness and response, and protection of the general public and private property from construction activities, including exposure to toxic materials.
- **Construction Health and Safety Plan**—this plan will meet the requirements of 29 CFR 1910 and 1926 and all other applicable Federal, State, and Local regulations and requirements. It will also include provisions for identifying asbestos and lead-based paint that will be disturbed by the Project.
- **Construction Contaminant Management Plan**—this plan will identify procedures for contaminant monitoring and identification and the temporary storage, handling, treatment, and disposal of waste and materials in accordance with applicable Federal, State, and Local regulations and requirements.
- **Construction Contingency Plan**—this plan will identify provisions for responding to events, such as discovery of unidentified underground storage tanks, hazardous materials, petroleum hydrocarbons, or hazardous or solid wastes, during construction.
- **Solid Waste Management Plan**—this plan will identify procedures for recycling green waste during clearing and grubbing activities; maximizing the recycling of construction and demolition wastes, if appropriate; and properly containing solid waste generated during construction and disposing of it at solid waste disposal or recycling facilities permitted by the

HDOH. Every effort will be made to recycle all appropriate demolished material.

4.18.8 Natural Resources

Construction activities could affect wildlife, vegetation, wetlands, and streams near the Project.

Vegetation

During construction, impacts to vegetation will result from the following:

- Footprints cleared for cranes and other equipment
- General clearing and grubbing activities
- Accidental fires resulting from the operation of construction equipment
- Dust generated from construction equipment and from moving and grading earth

To mitigate impacts to vegetation, cranes and other equipment will be sited on previously disturbed areas to the extent possible, and clearing and grubbing will be kept to a minimum. Accidental fires and excessive dust could directly and adversely impact the endangered ko'oloa'ula (*Abutilon menziesii*, red 'ilima), a native Hawaiian dryland shrub that is present in an 18-acre contingency reserve located within 200 feet of the East Kapolei Station and associated guideway. No other endangered or threatened species or critical habitat will be affected by project construction.

Construction impacts to the endangered ko'oloa'ula will be mitigated by following a Habitat Conservation Plan, using high-visibility construction barriers, having all contractors create fire mitigation plans, educating site workers, maintaining emergency site access, and establishing appropriate buffers. A Construction Safety and Security Plan addressing fire prevention, including worker education, access maintenance, designated smoking areas, identification of fire-fighting resources, and other requirements, is being reviewed for other projects in the area and will be incorporated into the Project as appropriate. Additionally, prior

to clearing and grubbing near the ko'oloa'ula contingency reserve, the area will be surveyed. If any ko'oloa'ula are found, a horticulturist approved by DLNR will be given an opportunity to remove the plants and transplant them to the contingency reserve (see Section 4.13 for a discussion on abutilon plants).

Street Trees

Street trees that require pruning for construction activities will be pruned more extensively than they will later for system operation. For street trees that will not be affected by system operation, a tree protection zone will be established during construction. The protection zone will be delineated by protective fencing.

Wildlife

Construction activities near wetlands and other wildlife habitat that do not permanently alter the habitat are likely to only temporarily disturb wildlife in these areas, including endangered waterbirds. It is anticipated that, over time, wildlife in nearby habitats will adjust to the new structures.

Although noise and activity associated with construction may cause stilts and other shore and water birds to temporarily vacate the two open wetlands near the Project, there remains adequate like habitat within relatively close proximity to the Project to provide feeding and loafing areas for any potentially displaced birds. Water and shore birds use of these wetlands will return to preconstruction levels once construction along the adjacent highway is completed.

The white tern uses large canopy trees for roosting and nesting. The pruning of large canopy trees prior to construction could affect the nests of this species. The City will survey all large canopy trees to be pruned prior to construction to ensure that no trees have white tern chicks. If any are found, pruning will be delayed until chicks fledge.

4.18.9 Invasive Species

Construction equipment and materials and landscaping plants that will be imported to the island may harbor species that do not currently occur on O‘ahu and may become invasive. Dirty construction equipment is a known pathway for plant and animal invasive species. Seeds, vegetative matter, insects, and even small animals can be accidentally transported to O‘ahu on vehicles and harm its watersheds, local agriculture, environment, and way of life.

Construction equipment or material imported to O‘ahu from the mainland, neighbor islands, or foreign countries must be free of dirt, vegetative matter, and animals. Construction equipment will be cleaned and inspected before being brought to the project site. On-site workers will be trained to recognize common invasive species growing in the construction area. Site surveys to assess the construction area for invasive species will be conducted before, during, and after construction. When fill is imported to or exported from the job site, care will be taken to avoid spreading invasive species, and location records will be kept. Criteria for cleaning, inspection, and treatment of plants that are at risk of harboring pests will be part of the landscaping requirements. Species that can be harmful invaders will not be used for project plantings.

4.18.10 Water Resources

There are several types of temporary construction-phase impacts from the Project on water resources, as follows:

- Placement of Fill in Waters of the U.S.**—the Project will encroach into a maximum of 0.13 acre of waters of the U.S. temporarily during construction of the guideway (Table 4-37) in Waiawa Springs, Moanalua Stream, Kapālama Canal Stream, and Nu‘uanu Stream. There will be temporary construction impacts in Kalo‘i Gulch, which is not under the jurisdiction of the USACE. Construction in Kalo‘i Gulch will encroach into 0.86 acre of temporary impact during construction of a park-and-ride lot and 0.07 acre during construction of the guideway.
- Stormwater Drainage from Construction Sites**—an NPDES permit for construction stormwater will be obtained. Project and site-specific BMPs will be prepared and submitted with the NPDES permit. BMPs include methods to mitigate possible pollution, soil erosion, and turbidity caused by stormwater runoff from all sources during construction. Agency reviews conducted as part of the NPDES permit process ensure that proper control techniques are identified in the permit and implemented during construction. Possible stormwater BMPs are discussed in more detail below.

Table 4-37 Construction Impacts to Waters of the U.S. (Linear Transportation Features)

	Waiawa Stream & Springs (Sites 12 and 13)	Moanalua Stream (Site 27)	Kapālama Canal Stream (Site 29)	Nu‘uanu Stream (Site 30)	Total Impact of Project
Total impact area (acres)	0.06	0.005	0.06	0.00	0.13
Total impact volume (cubic yards) (below OHWM and above mudline)	300	26	513	35	874
Total impact volume (cubic yards) (below mudline)	0	698	58	276	1,032

- **Wastewater Discharges**—discharges, such as concrete truck wash down water, dust control sprays, and drilling fluids, will be collected and managed in accordance with NPDES requirements.
- **Groundwater Impacts**—a range of measures will be employed to ensure there are no adverse impacts to groundwater resources.

Placement of Fill

Stream channel alterations will be necessary during construction. Section 4.14 discusses the measures taken to avoid and minimize impact on water resources. The activities described here have been determined to be necessary only after all reasonable and feasible means are employed to avoid and minimize encroachment. Columns, foundations, diversions, and other temporary and permanent structures will be placed in or on the banks of Kalo'i Gulch, Waiawa Stream, Waiawa Springs, Moanalua Stream, Kapālama Canal Stream, and Nu'uuanu Stream.

Work in these waters is highly regulated and will require permits from Federal and State agencies. Through the permitting process, details of BMPs will be developed to mitigate potential impacts to streams due to placement of fill. BMPs used may include, but not be limited to:

- Isolate the column construction area from the water through the use of cofferdams, sandbags, or other temporary water-diversion structures
- Prohibit fueling of equipment while in the stream channel
- Prevent wet or green concrete from coming into contact with flowing water
- Maintain fish passage—consider migration of native fish (e.g., 'o'opu) and avoid work in streams during spawning
- Minimize removal of riparian vegetation
- Monitor for turbidity both upstream and downstream of the work area

- When demolition of preexisting structures is required, such as the retaining walls at Kapālama Canal Stream, enclose the work area during demolition to contain airborne dust and debris and keep it from entering the stream
- To mitigate potential impacts to streams or wetlands where there is no inwater work, establish a construction buffer during work in the area
- Prohibit the contractor from entering wetlands during construction
- Secure netting below guideway superstructure construction to prevent construction debris from falling into streams
- Secure tight-woven netting under joints to catch excess epoxy when segments are post-tensioned
- Install toe boards along edge of the guideway deck to prevent loose material from being knocked off the deck into streams
- Air-test post-tensioning ducts before grouting to ensure no grout seepage
- Use silt fence and casing between foundation construction and stream to contain soil and construction debris
- Collect and handle drilling spoils to eliminate uncontrolled releases into surface waters
- Construct columns during the dry season, where feasible
- Place silt fencing around temporary construction platforms or structures to contain disturbed sediment
- Provide sheet piling around abutment extensions at Kapālama Canal Stream to prevent soil and sediment from entering the stream during abutment and wall construction

Wetlands

The contractor will be prohibited from entering the wetlands during construction. The wetlands will be designated as a no-work area on the plan sheets and 3-foot-high orange fencing will be installed around the wetland to designate

the no-work area. The orange fencing will be inspected routinely to ensure that it is maintained.

Groundwater

Shallow excavations for utility work, support structure foundations, and pile caps may encounter groundwater along parts of the alignment. Typical groundwater management practices for shallow excavations include dewatering by shallow well points or dewatering wells, cutoff walls in combination with sumps from within the stabilized excavation, ground treatment, such as soil amendment or possibly even ground freezing, or a combination of these methods to enable construction in dry conditions. Actual dewatering methods will be determined during the final design and construction stage, depending on actual conditions encountered, size/depth of excavations, and site-specific considerations.

Dewatering operations are required to comply with NPDES permit requirements when they discharge into State waters. A variety of methods can be used to treat water during dewatering operations. The size of particles present in the sediment and NPDES permit or receiving water limitations on sediment will be key considerations for selecting sediment treatment options. In some cases, such as where contamination may occur, use of multiple devices may be appropriate to manage sediments and any chemical contaminants. Typical dewatering BMPs include sediment traps or a larger basin, dewatering tank with filter or baffled weir tank, gravity bag filter, and various mechanical filtering systems. In addition, oil-water separators, specialty media filters, and bio-filters can be used in conjunction with the sediment filters to mitigate groundwater contaminants.

Dewatering alters groundwater's natural level and flow characteristics. Depression of the natural groundwater table in soft ground areas can induce consolidation of subsoils and subsequent ground settlement. Excessive or differential settlement can

cause cracking and other damage to structures. Settlement is expected to be minimal because the level of the groundwater depression is expected to be localized and generally not greater than about 5 feet below static groundwater levels. Where dewatering produces a drawdown in excess of 5 feet, construction monitoring will be required to monitor for dewatering-induced settlement.

Deep excavations, exceeding more than about 10 feet below grade, are limited to drilled foundations for support of the aerial guideway and possibly some stations. These deep foundations will likely extend below groundwater levels along a substantial portion of the alignment. Dewatering of drilled foundation excavations is typically not practicable except under special circumstances where the groundwater inflow quantity is minimal over a finite period and the seepage forces do not destabilize the completed excavation before concreting. Generally, when groundwater is encountered in the drilled foundations, the contractor will employ construction methods where the fluid within the excavation is allowed to remain as it is displaced by the concrete. Uncontrolled releases of drilling fluids are not permitted. The displaced fluid will be collected and treated as necessary for either reuse or disposal in accordance with permit requirements.

In localized areas, drilled foundations will likely penetrate caprock and extend into the deep-seated artesian conditions associated with the Southern O'ahu Basal Aquifer basalts. At locations where the level of the groundwater pressure head exceeds existing ground surface, casing will likely be used to extend the work zone sufficiently above existing ground surface to counterbalance the excess water column. Another alternative is to use special additives in the drilling fluid to substantially increase the unit weight of the medium to counterbalance the artesian pressure head with a column of fluid. Another alternative may be to locally grout the water bearing stratum to reduce the excess pressure head through the work zone. The contractor

may have other methods for construction in these conditions, but any methods used will consider the vulnerability of the sole source aquifer.

Drilled foundations that penetrate into the underlying basalt bedrock will only remain open long enough to insert a waiting, premade rebar cage support system. The project standard specifications for reinforcing steel require that it be clean and free of deleterious substances, which is anything that would hinder the bonding of the concrete to the rebar (e.g., require that the rebar is not sprayed or coated with any petroleum or other potentially contaminating product). Surface water will be prevented from draining into the open hole. No hazardous materials will be stored within the drilling area. Standard construction BMPs, such as regular inspections of equipment to ensure there are no leaks, will be employed. Drilling spoils will be collected and managed in accordance with applicable regulations.

Stormwater

The City will obtain an NPDES permit for construction stormwater. Stormwater BMPs may include, but not be limited to:

- Minimize land disturbance
- Stabilize or cover the surface of soil piles
- Revegetate all cleaned and grubbed areas to the extent possible
- Maintain stabilized construction area ingress/egress areas
- Wash or clean trucks prior to leaving the construction site
- Install silt fences and storm drain inlet filters
- Prevent off-site stormwater from entering the construction site
- Implement other stormwater management techniques

4.18.11 Archaeological, Cultural, and Historic Resources

Archaeological Resources

Three general categories of archaeological resources (burials, pre-contact archaeology, and post-contact archaeology) could be affected during construction of the Project. With few exceptions, the resources that could be affected are subsurface features and deposits that have not been previously identified. Prior to construction, additional archaeological work will be completed to investigate the potential for sub-surface deposits. This additional archaeological work will focus on the following work locations once they are known: locations of columns, foundations for buildings and structures, utility installation, grading to provide parking, or other construction-related ground disturbance, including preparation of construction staging areas. This additional work will also focus on the new location of any utilities that will be relocated by the Project. This archaeological work will be completed in advance of the completion of final design so that the presence of any sensitive archaeological sites/burials discovered during fieldwork can be addressed during final design.

The draft PA pertaining to archaeological resources has been developed in consultation with the SHPO, ACHP, FTA, the City, and other Section 106 consulting parties to address the identification and treatment of traditional cultural properties (TCP), the identification and protection of archaeological sites and burials, and the identification and treatment of historic buildings and structures within the Project's APE. The following sections describe the draft PA components that will be employed during construction to mitigate potential impacts to archaeological resources (including burials).

Archaeological Sampling

Prior to construction, an archaeological sampling plan will be developed for each construction phase in coordination with the O'ahu Island

Burial Council and the SHPO, as discussed in Section 4.16.1. The sampling will be completed in advance of final design completion so that the presence of any sensitive archaeological sites/burials discovered during fieldwork can be addressed during final design.

Archaeological Monitoring

Consultation with the SHPO will assess the need for archaeological monitoring during construction. The archaeological monitoring program will follow the draft PA. A monitoring report will be prepared to document all results at the completion of construction.

In the vicinity of the Waipahu Transit Center, archaeological monitoring will include the recovery of data from the identified subsurface cultural deposit (Lo'i sediments) described in Section 4.16.

Preserving Archaeological Resources

In advance of construction, archaeological resources deemed worthy of preservation in place may be identified. If this occurs and the Project is modified to avoid such resources, construction activities will also avoid those resources. Protection zones will be established around these resources to avoid disturbance during construction.

Burial Treatment

During the archaeological sampling, burials will be identified and managed in compliance with applicable laws. This will include consulting with project proponents, the O'ahu Island Burial Council, The SHPO, and recognized lineal and/or cultural descendants to develop burial treatment plans. Although the goal of the archaeological sampling will be to identify all burials and treat them appropriately prior to the start of construction in a particular area, the chance exists that additional previously undiscovered burials will be encountered during construction.

In each geographic area, the parties consulted regarding burials during the Project's archaeological sampling phase will be consulted if a find is made during construction. The draft PA outlines the treatment of burials discovered during preliminary archaeological work, prior to final design, as well as burials found during project construction.

Cultural Resources

Adverse impacts related to cultural resources resulting from construction of the Project will likely be short-term and consist of affecting access to areas where cultural resources exist or cultural activities are practiced. The impact to cultural resources or areas will be mitigated using the same maintenance of access policies outlined for businesses.

Historic Resources

Historic resources could be inadvertently affected during construction. Any potential construction impacts will be mitigated using measures outlined in previous construction sections related to noise, vibration, air quality, and water quality and as described in the draft PA. In addition, to avoid collision with or damage to historic resources during construction, protection zones will be established around such resources to avoid disturbance during construction activities.

4.18.12 Relationship between Short-term Uses of the Environment and Long-term Productivity

Construction of the Project will have short-term effects on the environment during construction, as described in this section. These effects will end with the completion of construction. The Project will provide the following improvements in productivity, which are identified as the Purpose of the Project in Chapter 1 of this Final EIS:

- Provide faster, more reliable public transportation service

- Provide reliable mobility in areas of the corridor with limited income and aging populations
- Serve rapidly developing areas
- Provide an alternative to the private automobile
- Moderate anticipated growth in traffic congestion

The long-term benefit that will be provided by the Project will be greater than the short-term adverse effects to the human environment.

The Project is consistent with the land use and transportation elements of plans, policies, and controls within the study corridor. The Project does not exclude future options, narrow the range of beneficial uses of the environment, or pose long-term risks to health and safety.

4.19 Indirect and Cumulative Effects

The CEQ regulations at 40 CFR 1500 et seq. and HRS Chapter 343 (HAR Section 11-200) require an assessment of indirect and cumulative impacts. This section describes and analyzes these impacts. For more information on land use impacts associated with TOD, see *the Honolulu High-Capacity Transit Corridor Project Land Use Technical Report* (RTD 2008b). For more information on study corridor and regional economics, see *the Honolulu High-Capacity Transit Corridor Project Economics Technical Report* (RTD 2008c).

The cumulative effects analysis includes evaluation of the planned extensions to the Project and the effects of past, present, and reasonably foreseeable future projects in the study corridor. Additional details about the anticipated effects of the planned extensions may be found by topic in the Honolulu High-Capacity Transit Corridor Project Technical Reports; however, because the planned extensions are not being constructed at this time and will require further planning and design, information

about the extensions is less specific than information about the Project. For more information on existing and future land use development in the study corridor, see the *City and County of Honolulu General Plan* (DPP 2002a) and the other planning information provided in Section 4.2.

4.19.1 Background and Methodology Regulatory Requirements

Indirect impacts are defined by CEQ as “effects which are caused by the [proposed] action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth-inducing effects and other effects related to changes in the pattern of land use, population density, or growth rate...”

Cumulative impacts are defined by CEQ as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such actions. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.” Cumulative impacts include the direct and indirect impacts of a project together with the reasonably foreseeable future actions of others.

Methodology

A qualitative assessment of indirect and cumulative effects, including growth, was based on available information on historical, present, and foreseeable future development. Information was obtained from DPP, planning officials in the areas, and plans and studies prepared by others related to future development, including land developers active in the study area. Quantitative analysis is included for resources where data was available and for the resource areas. Federal guidance was used in evaluating the Project’s cumulative effects, specifically CEQ’s Considering Cumulative Effects

under the National Environmental Policy Act (CEQ 1997a).

Time Frame for the Analysis

The time frame for the cumulative impacts analysis included both past actions and reasonably foreseeable future actions. The time period of the past analysis was determined by the information available for the resources studied, in broad terms, the time since the start of O‘ahu’s rapid population growth in 1920. Generally, the time for future effect analysis extends from the present day to 2030. This is the time frame for which the City has plans and projections and anything beyond that is speculation and not reasonably foreseeable.

Geographic Areas of the Analysis

Indirect effects of the Project are likely to occur within the station areas and within the area of the ‘Ewa Development Plan (DPP 2000), which is in the process of converting from an agricultural area into an urban area. The ‘Ewa area and the station areas are where the greatest changes in access to the transit system will occur; these are likely to be the areas where development and change in development densities can be reasonably expected in response to the Project.

The cumulative effects analysis considers many of the planned and reasonably foreseeable projects within three major planning areas (‘Ewa, Central O‘ahu, and the PUC) within the study corridor. The cumulative effects analysis compares the amount of land required for planned and reasonably foreseeable developments with the amount of developable land within the study corridor.

For the ‘Ewa and Central O‘ahu planning areas, estimates of the amount of developable land within the study corridor were made based on GIS analysis of existing undeveloped land. Because the PUC currently lacks undeveloped land, estimates of the amount of land available for redevelopment were used for the comparative analysis described above.

Planned development within the study corridor was used to qualitatively analyze the cumulative effects on the visual environment and impervious surfaces and changes to the hydrology for water resources. Other resources were analyzed for the cumulative effect based on past, present, and future development.

4.19.2 Indirect Effects

Large infrastructure projects play an important role in determining the amount, density, and pace of land use development. However, other factors also determine the amount and type of additional growth in the study corridor, including market demand, local planning policies, land availability, and the availability of other infrastructure (roads, wastewater treatment, schools, etc.). Future development will be greatly influenced by factors outside the control of the project sponsor or any of the other planned projects. U.S. and Asian economic trends can affect the economy of Hawai‘i as well as how, when, and to what degree land is developed on O‘ahu. The growth projections in the City and State plans are predicated on current information. Actual growth may be more or less than projected.

The City has adopted plans that direct future development to occur within the study corridor and away from less developed portions of O‘ahu. City policies and plans for areas outside the study corridor allow for limited growth and development. The Project is consistent with the City’s policies to direct growth on O‘ahu to the study corridor.

The study corridor has the highest population and employment area in Hawai‘i. It is a center of Hawai‘i’s tourism and trade industries. The study corridor is served by substantial existing transportation and other infrastructure that tends to encourage continued growth.

According to the 2000 census, 63 percent of O‘ahu’s population of 876,200 was located within the study corridor. By 2030, the total island

population will increase by 28 percent, with 91 percent of that increase occurring within the study corridor. This level and concentration of growth within the study corridor are consistent with public policy and plans.

Effects of the Project on Growth

After completion of construction, the Project will not decrease or increase regional population or the number of jobs; however, it will influence the distribution, rate, density, and intensity of development in the study corridor. Without the Project, growth is more likely to be dispersed outside of the study corridor, including in undeveloped areas of Central and North O‘ahu. Development in these areas will affect environmental resources as would be expected of dispersed development patterns. Planned and reasonably foreseeable actions presented in Section 4.19.3 will occur with or without the construction of the Project and constitute the basis for the No Build Alternative in this document.

The Project is a major element of the ORTP. The ORTP is intended to provide a transportation system to support existing and planned growth in accordance with Local and State land use policies. These policies and the presence of a transit system can also have an indirect effect on property values in station areas (increases have been demonstrated in other cities with transit systems). At the study corridor level, the Project will support the development programmed in the *‘Ewa Development Plan* (DPP 2000), *Central O‘ahu Sustainable Communities Plan* (DPP 2002b), and *Primary Urban Center Development Plan* (DPP 2004a).

Development in ‘Ewa

The *‘Ewa Development Plan* supports development in concert with a transit system. Although the construction of a transit system does not directly cause development to occur, land use plans and policies will encourage new development to be located near transit stations to take advantage of

the transportation infrastructure and increased accessibility with the Project. The Project may also increase the rate of development in the ‘Ewa Plain.

Transportation from the ‘Ewa area to the employment centers in the study corridor is constrained by traffic congestion and increasing commute times to employment centers in the study corridor. As shown in Table 3-14 (in Chapter 3), the Project will reduce traffic congestion and improve mobility in the corridor by providing an alternative to the automobile.

The State is constructing a major new north-south highway in the ‘Ewa Plain that is intended to serve planned growth in this area (North-South Road and Kapolei Parkway Final Environmental Assessment Finding of No Significant Impact [September 2004]). The State and the City have concluded that the highway study corridor will continue to grow and that this growth is likely to occur regardless of whether the highway project is built.

Station Area Development

Within station areas, the Project combined with land use policies and favorable real estate market conditions will likely attract TSD and TOD. TSD supports the development of uses such as office space and multi-story residential buildings near transit stations. For example, offices generate more transit riders per square foot of space than any other land use. TOD integrates land use and transportation elements. The intent is to plan development to combine transit with land use that may include retail, high-density residential, mixed use, and pedestrian-oriented communities.

The City has adopted plans that direct future development to occur within the study corridor and away from less developed portions of O‘ahu. The TOD policy will focus the growth into patterns that will increase the viability of a number of travel options available to corridor residents and employees, including transit, walking, and bicycling.

The City passed this TOD ordinance in March 2009 in anticipation of the Project. Development in the study corridor, whether highway-oriented or TOD, will be based on market demands. Pursuant to the policy, TOD may occur in project station areas as an indirect effect of the Project. The increased mobility and accessibility that the Project will provide may also increase the desirability and value of land near the stations, attracting new real estate investment nearby. Therefore, the Project's primary indirect effect will be to alter development near the stations, bringing higher densities than presently planned or could otherwise be developed near transit stations. These land use effects could take the form of TOD or TSD. If development occurs around stations, it is anticipated that City infrastructure will be improved in these areas. It is not expected that the Project will lead to an increase in the overall level of growth allowed or expected in the study corridor. Rather, it will focus the growth into patterns that will increase the number of viable travel options available to corridor residents and employees, including transit, walking, and bicycling. As an additional benefit, compact TOD development will reduce the cost of providing utilities, facilities, and services to new residential and commercial developments. The potential for TOD will differ at each station site. Factors that could spur TOD development, beyond the addition of a transit station, include available and undeveloped land, adoption of TOD zoning and policies, other real estate investment in the area, and market demand for new and additional floor space. The following sections generally discuss TOD potential at stations.

East Kapolei, UH West O'ahu, and Ho'opili

The undeveloped 'Ewa Plain area has potential for TOD because of the availability of vacant parcels (Figure 4-3). The undeveloped nature of this area and the fact that fixed guideway construction will occur during or prior to many of the surrounding developments make this area ideal for TOD. The specific stations and planned developments in the

station areas that could incorporate TOD elements are as follows:

- East Kapolei—developments by the Department of Hawaiian Home Lands (DHHL) and the Salvation Army (Kroc Center) are planned in this area. In addition, a regional shopping center is being planned by DHHL.
- UH West O'ahu—developments are planned for the campus as well as the surrounding area on the 'Ewa side of North-South Road.
- Ho'opili—the proposed Ho'opili development surrounds this station.

West Loch and Waipahu Transit Center

Due to a lack of undeveloped land, TOD in Waipahu and the West Loch Station areas will primarily be the result of redevelopment of existing land uses rather than greenfields development. The same factors that spur TOD in undeveloped areas will apply in these areas but, instead of the availability of undeveloped land, the presence of outdated buildings and uses could spur redevelopment and, hence, TOD.

Leeward Community College and Aloha Stadium

These two stations differ from the other project stations. Both are fairly remote from other developments and not likely to have any indirect TOD effects. The Leeward Community College Station area is difficult to access by vehicle, and the little available land in the area will most likely be used as a maintenance and storage facility. The maintenance and storage facility is not expected to have any indirect land use effects. The primary land use near the Aloha Stadium Station is the stadium and Pearl Harbor Navy facilities, neither of which is likely to be redeveloped before 2030.

Pearl Highlands and Pearlridge

The commercial uses near the stations in Pearl City and 'Aiea are well established and draw regional customers. These include big-box retail stores near the Pearl Highlands Station and Pearlridge Center near the Pearlridge Station. The volume of traffic

through the area and recent investments indicate that development will continue; however, the lack of open space and the relative newness of surrounding development suggest TOD will likely be limited in the near term.

Pearl Harbor Naval Base, Honolulu International Airport, and Lagoon Drive

The Pearl Harbor Naval Base, Honolulu International Airport, and Lagoon Drive Stations are largely industrial, airport-operation related, or military in character (Figure 4-5). TOD is not considered likely in these areas given their military industrial use. Development is limited by the proximity of the airport due to development and height limitations.

Middle Street Transit Center, Kalihi, Kapālama, and Iwilei

These stations will be in relatively urban areas where existing land uses differ parcel to parcel, generally becoming more commercial approaching Downtown (Figures 4-5 and 4-6). Parcel size may limit TOD in some areas; parcels near the Kalihi Station tend to be small, but some parcels near the other three stations are of sufficient size to support TOD. Parcel ownership may also affect redevelopment potential; the smaller parcels are owned by individuals unlikely to substantially change land use, but Kamehameha Schools has substantial holdings in the area and has suggested it is planning redevelopment. Public housing in the area could also be redeveloped to take advantage of the transit system. Considerable investments have been made in the area Koko Head of Kapālama Stream in the last 10 years. These investments suggest redevelopment in the area is possible and could be further spurred by the Project.

Chinatown and Downtown

Chinatown and Downtown already have TOD or TOD-like developments. Redevelopment in the area has taken place with recent condominium towers being built Downtown. Further redevelopment could occur, particularly around the port,

and incorporate more TOD elements in the future. The historic districts restrict redevelopment to a degree. The Project is unlikely to substantially alter existing development plans in the Chinatown and Downtown areas.

Civic Center, Kaka`ako, and Ala Moana Center

Land use in much of this area is overseen by the Hawai'i Community Development Authority, and new developments already include some TOD features. Considerable investments in both condominium high-rises and commercial developments have been made in this area recently. Continued redevelopment is planned and is expected to continue. Parcel size and ownership is likely to play a role; the smaller parcels in the mauka area are less likely to undergo TOD, while the larger underused parcels owned by Kamehameha Schools and General Growth Properties, among others, will be more likely to redevelop and incorporate TOD elements.

Property Values

Changes in property values that will result from construction of the transit system are an indirect effect. Research based on New York and other cities has shown that residential property values can increase close to a transit station (Table 4-38). While most studies of transit's impact on real estate values show increases, they cannot explicitly isolate transit benefits from other market forces.

Property-value increases near a transit station are realized in sales prices or rents. For residential properties, these increases probably reflect better access to the transit system and associated reductions in vehicle costs. For commercial properties, transit proximity potentially broadens the customer base, increases foot traffic near the business, and contributes to employee accessibility.

In some cases, transit may have a negative effect on real estate values due to what are often called "nuisance" effects—noise, increased foot traffic,

Table 4-38 Rail System Benefits on Real Estate Values

Rail System	Rail Technology	Increase in Home Sales Price	Source
BART–San Francisco	Rapid rail	\$1,578 increase for every 100 feet closer to a station	Lewis-Workman 1997
MTA–New York City	Rapid rail	\$2,300 increase for every 100 feet closer to a station	Lewis-Workman 1997
San Diego	Light rail transit	\$82.90 increase for every 100 feet closer to a station	Landis 1995
San Jose	Light rail transit	\$60 increase for every 100 feet closer to a station	Landis 1995
MAX–Portland	Light rail transit	\$202 increase for every 100 feet closer to a station	Al-Mosaind 1993
Metro–Washington, D.C.	Rapid rail	\$0.23 increase in per square foot rent for every 100 feet closer to a station	FTA 2000

visible infrastructure, transit-associated parking lots, and increased bus traffic. These factors can reduce the desirability of properties in the immediate vicinity of the fixed guideway. Such nuisance effects will most likely occur in areas where value is attributable to the remoteness of the location. Because the Project is forecast to result in travel time savings and will be placed on already busy roadways, the likelihood of negative effects on real estate value is minimal.

4.19.3 Cumulative Effects

This section describes the cumulative effects of the Project with other past, present, and reasonably foreseeable actions.

Past Actions

O‘ahu experienced major population growth (between 42 and 64 percent per decade) between 1920 and 1950 (Figure 1-2 in Chapter 1). Much of this growth can be attributed to a military buildup before, during, and after World War II, as well as rapid increases in the tourism industry as air travel became more available. Growth rates decreased steadily in subsequent decades and fell to only 5 percent during the 1990s.

The study corridor has been extensively modified by land reclamation, sugar cane production, military construction, and urban development. The most notable past action was the urban and suburban development of O‘ahu beginning in the 1940s. This development pressure has continued as

Waipahu, the Pearl Harbor area, Salt Lake, Kalihi, and Downtown Honolulu became built-out and in-filled in the post-World War II years. By 1960, the study corridor was virtually built out between Downtown and Waipahu. Since then, ‘Ewa and Kapolei have been developing. The latter is the only section of the study corridor with vast amounts of land available for new development. However, even in ‘Ewa and Kapolei, these areas have been drastically altered by historic and modern land use, including intensive sugar cane cultivation, large-scale limestone quarrying operations, and residential and commercial development.

The development of the OR&L’s route across ‘Ewa also established the first urban development at Pearl City in the late-19th century. By 1920, urban development had begun at ‘Aiea, followed by further development at Waimalu and Pearl City in the 1950s. Construction of the H-1 and H-2 Freeways further supported this western push into Central and West O‘ahu. The construction of other highways, such as Farrington, Kamehameha, and Nimitz, helped improve accessibility between West O‘ahu and Downtown and reinforced growth and development.

Present and Reasonably Foreseeable Actions

The 2030 population within one-half mile of the project alignment will range from 229,000 to 252,000, which will be approximately a 10-percent increase from 2007. Employment in 2030 within the same area will range from 299,000 to 317,000, an approximate 6-percent increase from 2007.

In addition to the Project, other transportation improvements are anticipated to be completed on O‘ahu by 2030. Table 2-3 (in Chapter 2) lists major roadway projects that are anticipated to be completed. The planned extensions to West Kapolei, Salt Lake Boulevard, UH Mānoa, and Waikikī also are included in the ORTP. The planned extensions will be evaluated through a separate NEPA and HRS Chapter 343 environmental review process.

O‘ahuMPO updates and revises the ORTP every five years in accordance with Federal regulations. It is an essential part of the continuing, cooperative, and comprehensive statewide multimodal transportation planning efforts conducted in Hawai‘i. It focuses on improving mobility with a series of strategies and programs to address future transportation needs.

Table 4-39 summarizes planned and foreseeable development within the ‘Ewa Development Plan, Central O‘ahu Sustainable Community Plan, and PUC Development Plan areas in the study corridor. The development areas within the study corridor are illustrated in Figure 4-2. The Project will not change the effects of development in the vicinity of the Project. The current ‘Ewa Development Plan anticipates extensive development of the ‘Ewa Plain whether or not the Project is built. Although the Project may have the effect of intensifying land use in the areas near the planned station (as discussed in Section 4.19.2), the overall development plan will not be substantially altered by the Project. Planned development is occurring independent of the Project; consequently, the Project will not cumulatively affect the resources described below beyond what will occur due to these planned and reasonably foreseeable developments.

The State of Hawai‘i prepared an Environmental Assessment (EA) of the effects of two major transportation projects (North-South Road and Kapolei Parkway) in the ‘Ewa area. The EA evaluated the growth-inducing and cumulative impacts

of these transportation projects under the Hawai‘i Environmental Policy Act. These transportation projects and others under construction, such as the widening of Fort Weaver Road, will facilitate the planned and foreseeable developments within the ‘Ewa plain, even in the absence of this Project.

The City, other State and Local agencies, and private developers also prepared EIS/EAs under NEPA and HRS Chapter 343 with regard to several of the planned development projects in the ‘Ewa area. (See Table 4-39 and specific EIS/EAs, including Ho‘opili Final Environmental Impact Statement [Horton 2008], Kapolei Sustainable Energy Park Final Environmental Impact Statement [Hoku 2007], Ocean Pointe Final Supplemental Environmental Assessment [Haseko 2001], and Kapolei Village Final Environmental Impact Statement [HHFDC 1988]).

Land Use

At a regional level, land use changes associated with past projects have included transformation of the land from undeveloped to urban, suburban, and rural farm uses. This has coincided with the population growth in the City and County of Honolulu from 490,000 in 1959 to 905,600 in 2007. The bulk of future regional land use changes are expected in the study corridor. Most undeveloped land within the study corridor is likely to become urban or suburban. Many developed lands within the study corridor also are likely to be redeveloped to higher-density uses. Expansion of public services and facilities will be associated with future growth. Such growth will be consistent with community plans.

Much of the cumulative effect of development on resources in the ‘Ewa Plain and West Kapolei in West O‘ahu is on transformation of rural and currently undeveloped lands. These areas are rapidly urbanizing due to development in Kapolei, ‘Ewa Villages, and elsewhere. Alternatively, the cumulative effect of development on resources in the

Table 4-39 Planned and Foreseeable Actions in the Study Corridor (continued on next page)

Plan Areas in the Project Study Corridor		
Name of Project	Development Characteristics	Development Status
O`ahu Regional Transportation Plan 2030 (ORTP) (O`ahuMPO 2007)	The O`ahuMPO updates and revises the ORTP every five years in accordance with Federal regulations. It is an essential part of the continuing, cooperative, and comprehensive statewide multimodal transportation planning efforts conducted in Hawai`i. It focuses on improving mobility with a series of strategies and programs to address future transportation needs.	The ORTP (2030), as of Amendment #1, was endorsed by the O`ahuMPO Policy Committee in April 2006. ORTP (2035) began in early 2009.
`Ewa Development Plan Area —this plan area includes Kapolei, `Ewa, and Makakilo		
West Kapolei future extension (RTD 2008u)	Provides direct connection with the Project to West Kapolei communities and the Kapolei Transit Center.	Future planning effort
North-South Road (ORTP 2030) (DPP 2000)	A 4-mile Federal-aid, limited-access, principal arterial highway that would connect the H-1 Freeway to the proposed Kapolei Parkway. This is the connection between the East Kapolei and UH West O`ahu Stations.	Final EA, September 2004 Construction completed early 2010
Kroc Center (Salvation Army) (TSA 2007)	Recreation and community center on 10 acres with 100,000 square feet.	Planned project
DHHL property (DHHL 2006)	Located in East Kapolei on 67 acres with 1.5 million square feet, of which some property is planned to be leased for the Ka Makana Ali`i project.	Planned project
Disney resort (Disney 2008)	Hotel and timeshare with 800 units on 21 acres. Expansion of existing Ko `Olina Resort & Marina development.	Construction started 2009 Opening anticipated 2011
Kapolei Commons (TMG/TKG 2009)	Located on Kalaeloa Boulevard. This is a 610,000-square-foot shopping center on 50 acres.	Completed project Opened 2009
University of Hawai`i at West O`ahu (UH 2002b)	A new campus on less than 70 acres.	Planned project Ground breaking 2009 Opening anticipated 2010
Ho`opili (Horton 2008)	Mixed-use community with up to 15,000 dwellings on 1,554 acres. Features a traditional neighborhood design with a grid street pattern and neighborhood facilities.	Planned project Final EIS, July 2008 (HRS Chapter 343)
Ocean Pointe (Haseko 2001)	1,100-acre residential, retail, harbor, and golf course development.	Final EA completed April 1998 Final Supplemental EA, June 2001 Under construction
Makaiwa Hills residential development (DPP 2006)	Located `Ewa of Makakilo. This is a mixed-use community on 1,781 acres with 4,100 homes with commercial and retail elements, recreational facilities, and a school. Affordable housing will be provided in accordance with City standards.	Planned project Final EIS for Makaiwa Hills accepted by the County Department of General Planning, April 1991 EIS Preparation Notice, October 2006
Mehana subdivision (Horton 2009)	Residential community on 135 acres with 1,000 square feet and multi-family residences in eight communities. Nanala, one of eight communities within the Mehana Subdivision, will have 78 townhomes including 20 "Live-Work" units and a community park. This is an expansion of an existing development.	Planned project Conceptual Master Plan completed by Helber Hastert & Fee

Table 4-39 Planned and Foreseeable Actions in the Study Corridor (continued on next page)

Plan Areas in the Project Study Corridor		
Name of Projects	Development Characteristics	Development Status
Kaupe`a—Villages of Kapolei (HHFDC 1988)	Located on the `Ewa Plain. The Villages of Kapolei is an 888-acre mixed-use community made up of eight villages. It features affordable and market-priced single-family and multi-family residences. It includes schools, religious facilities, parks, recreational centers, retail centers, and a golf course. Seven of eight villages are complete. The eighth village, Kaupe`a, is 52 acres. Affordable housing will be available. This is an expansion of an existing development.	Planned project Kapolei Village Final EIS, February 1988
Kānehili (East Kapolei 1) and East Kapolei 2 (DHHL 2005)	A DHHL affordable sustainable housing community on a 92-acre parcel with 403 residences located on the `Ewa Plain. It is adjacent to the UH West O`ahu campus and between the existing Kapolei Golf Course and the future North-South Road.	Under construction as of April 2009
Kapolei Sustainable Energy Park—solar farm (Campbell Industrial Park) (Hoku 2007)	New electric power plant supplying biodiesel energy.	Planned project Final EIS, July 2007
O`ahu Commercial Harbors 2020 Master Plan (HDOT 1995)	Located about 19 nautical miles `Ewa of Honolulu Harbor near the southwestern tip of O`ahu, Kalaeloa Barbers Point Harbor is the State's second busiest commercial harbor.	Final EIS for the O`ahu Commercial Harbors 2020 Master Plan Immediate Phase, September 1999
Kalaeloa Master Plan (HCDA 2006)	The Master Plan serves as an amendment to the existing Kalaeloa Community Redevelopment Plan, prepared as part of the U.S. Navy's Base Realignment and Closure process. Kalaeloa, the former site of the Barbers Point Naval Air Station, consists of approximately 3,700 acres. The goal of the plan is to create a Wahi Ho`okela (center of excellence), by increasing opportunities for new employment, educational institutions, mass transit, regional connectivity, recreation, affordable housing, resource protection, new industries, economic growth, and national defense in Kalaeloa.	Kalaeloa Master Plan, 2006
Central O`ahu Sustainable Communities Plan Area—this plan area includes Waipahu, Waikele, and Waiawa		
Salt Lake future extension (RTD 2008u)	Provides direct connection with the Project to residential, retail, and commercial developments on and in the vicinity of Salt Lake Boulevard.	Future planning efforts
Koa Ridge (C&C 2009)	Koa Ridge is a 578-acre mixed use community in Central O`ahu that includes more than 3,100 residences, a mixed-use village center, and town center to serve regional shopping needs.	Planned project EIS Preparation Notice, May 2008
Waipahu Neighborhood Transit-oriented Development (TOD) Plan (includes two community plans for future urban redevelopment) (DPP 2009) Leokū TOD, also known as the future West Loch Station Mokuola TOD, also known as the future Waipahu Transit Center	Leokū TOD will be the retail and employment center of Waipahu with infill and mixed-use developments. Development intensity will be adjacent to the station. Mokuola TOD within the Waipahu Transit Center Station development will reflect the historic plantation town once located at this site. It will use both infill and mixed-use developments. Development intensity will be within one-quarter mile creating a pedestrian-friendly environment.	Planned projects Waipahu Neighborhood TOD Plan (Public Review Draft), March 2009

Table 4-39 Planned and Foreseeable Actions in the Study Corridors (continued from previous page)

Plan Areas in the Project Study Corridor		
Name of Projects	Development Characteristics	Development Status
Wahiawā Transit Center (DTS 2009)	The purpose of this project is to develop a transit center/park-and-ride facility to accommodate express, trunk, and circulator bus services. It will provide connections to the Project.	Planned project Final EA, February 2009
Primary Urban Center (PUC) Development Plan —this area includes Pearl City-ʻAiea, Salt Lake-Āliamanu, Airport-Pearl Harbor, Kalihi-Iwilei, Palama-Liliha, Downtown, Kakaʻako, Makiki-Mānoa, and Mōʻiliʻili-Ala Moana		
UH Mānoa future extension (RTD 2008u)	Provides direct connection with the Project to residential, retail, and commercial developments in areas near UH Mānoa and Waikiki.	Future planning efforts
Waikiki future extension (RTD 2008u)	Provides direct connection with the Project to residential, retail, and commercial developments in Waikiki.	Future planning efforts
Redevelopment of Kalihi properties (DPP 2004c)	Mixed-use developments, including residential and retail.	Kalihi Palama Action Plan, September 2004 Planned projects Projects under construction Constructed projects
Kamehameha Schools Kaiāulu ʻo Kakaʻako Master Plan (KKMP) (HCDA 2008)	This Master Plan proposes a mixed-use urban village that will add more than 2 million square feet for commercial uses, more than 4 million square feet for residential uses, and more than 125,000 square feet for industrial uses. It includes redevelopment of 29 acres in Kakaʻako, including 2,750 residential units in seven high rises and commercial/retail development.	Planned projects Kaiāulu ʻo Kakaʻako Master Plan, November 2008
Ward Village Shops project (HCDA 2009b)	Includes a 17-story structure with 165 rental residential units, 224,000 square feet of commercial space, 34,000 square feet of open space, and 1,010 parking spaces. Expansion of the existing Ward Village development.	Planned project
Halekauwila Place (MVE 2009)	A 1.25-acre, 14- to 17-story proposed affordable housing mixed-use complex with street-level commercial development. It will contain approximately 202 units.	Planned project
Vanguard Lofts (HCDA 2009c)	It involves the renovation and conversion of the old National Cash Register office building into a modern mixed-use urban loft project with 32 residential lofts and 3,470 square feet of ground floor retail.	Project under construction
Hawaiʻi Airports Modernization Program (HAMP 2006)	Part of the Hawaiʻi Airports Modernization Program is the Terminal Modernization Program at Honolulu International Airport (HNL). This planned project at HNL includes the construction of a new mauka concourse, relocation of commuter airline facilities, and a new consolidated rental car facility.	Planned project Hawaiʻi Airports Modernization Program, 2006
University of Hawaiʻi John A. Burns School of Medicine (JABSOM) (HCDA 2009a)	Medical research facilities on 9.1 acres strategically located in the Kakaʻako Waterfront area. Phase Two will include a research center and parking structure containing 363 spaces. Expansion of existing JABSOM development.	Planned project EA for the JABSOM campus in 2002 New Proposed EA for the Pacific Regional Biosafety Lab, December 2008

Sources: DPP, DHHL, DBEDT, HCDA

Central O‘ahu and PUC areas is the redevelopment of existing urbanized areas. The direct effect of the Project on land use is the conversion of approximately 1 percent (161 acres) of total land within the study corridor to a transportation use. Many of the planned and foreseeable actions presented in Table 4-39 will have a larger direct effect than the Project. Therefore, the Project will not cumulatively affect land use resources beyond what will occur due to these planned developments.

The Salt Lake Boulevard, UH Mānoa, and Waikīkī planned extensions will not substantially affect land use because those areas are already highly urbanized.

‘Ewa Development Plan Area

By 2020, the ‘Ewa Development Plan area, which covers approximately 10,000 acres, will have experienced growth and will have made progress toward providing a secondary urban center for O‘ahu. At the heart of the secondary urban center will be the City of Kapolei, with an urban mix of commercial, office, and residential uses. It is projected that the City of Kapolei will house over 7,000 residents and provide work sites for about 25,000 private jobs and 5,000 City and State jobs (located at the City’s Civic Center).

Many of the jobs in the City of Kapolei will be supported by development of the UH West O‘ahu campus, which is expected to have approximately 7,600 students and 800 staff and faculty by 2020. Continued expansion of industrial uses at Campbell Industrial Park, Barbers Point Deep Draft Harbor, and Kapolei Business Park and growth of the Ko‘olina Resort and ‘Ewa Marina, to include over 3,700 visitor units, will also provide jobs in the City of Kapolei.

Open space will be preserved in parks, golf courses, and agricultural areas, which will also help to protect significant views. Wildlife habitats will be located at the former Barbers Point Naval

Air Station (now known as Kalaeloa), ‘Ewa Marina, and West Loch. Many of the ‘Ewa Development Plan projects listed in Table 4-39 and all of the developable acreage are within the study corridor. This table shows about 6.0 acres (60 percent) of the developable acreage in the ‘Ewa Development Plan area is proposed for future development. Less than 1 percent of the planned development is outside the study corridor. Within the study corridor, approximately 90 acres within this plan area will be developed by the Project, including land associated with the optional maintenance and storage facility at Ho‘opili, proposed park-and-ride facilities, and other guideway infrastructure. If the maintenance and storage facility is not constructed at Ho‘opili, approximately 50 acres will be used by the Project within the ‘Ewa Development Plan area.

Moreover, future development in East Kapolei has spurred opportunities for roadway connectivity. The completion of North-South Road and Kapolei Parkway, between Renton Road and the Kapolei Middle School area, will significantly enhance roadway connectivity in the area. As the area builds out, Farrington Highway will be widened between North-South Road and Fort Weaver Road.

A key roadway in this area is a new east-west arterial roadway through the Ho‘opili and UH West O‘ahu projects that would facilitate mobility within this area. This new roadway would provide relief for Farrington Highway and would help to preserve the collector status of Renton Road. Without the new east-west roadway, Renton Road could easily become the east-west arterial by default.

The extension of North-South Road makai into Kalaeloa would facilitate access to future planned development in Kalaeloa as described in the *Kalaeloa Master Plan* (HCDA 2006) and provide an alternative path to new developments, such as Ocean Pointe, as well as to the Project. Additionally, a supportive collector roadway system would relieve the pressure on North-South Road,

Farrington Highway, and the proposed East-West Arterial. These roadway projects are supporting future growth and development in the 'Ewa Development Plan area independent of the Project.

The North-South Road EA and the environmental analyses of the development projects in the 'Ewa Plain identified the following impacts of growth:

- Conversion of agricultural land-to-urban uses
- Short-term adverse air quality impacts from construction
- Increased long-term air emissions flood plain and water quality impacts from urban runoff to wetlands streams and coastal surface waters
- Impacts to several cultural and historic sites
- Increased noise from urban uses
- Visual impacts from conversion of agricultural to urban uses
- Impacts to vegetation and wildlife.

Many of the waters in the Project area are degraded with several listed as impaired or water quality limited segments by the State of Hawai'i. In the absence of measures to offset these impacts, the increased urbanization of the Project area will increase the existing adverse condition of the water quality in the Project area.

The 2002 Census of Agriculture (USDA 2004) reported that there are more than 70,000 acres of agricultural land in cultivation on O'ahu, including those designated as prime, unique, or of state-wide importance. The past, proposed, and reasonably foreseeable developments in the 'Ewa Plain will eliminate approximately 6,000 acres from agricultural uses, or 8.6 percent of the remaining agricultural lands in O'ahu and 3.8 percent of the approximately 160,000 acres of agricultural lands in the State of Hawai'i. This includes the conversion of approximately 20 additional acres of farmland from the planned Kapolei extension, none of which is actively cultivated. The estimate

of the loss of agricultural land use is based on the assumption that all land in the 'Ewa Development Plan area is agricultural, which was the historical use of this land.

As described in Section 4.2.3, the Project will only contribute to the displacement of less than one tenth of one (<0.1) percent of available agricultural land. The projected reduction in agricultural lands in the 'Ewa area is not substantial. The current 'Ewa Development Plan preserves 3,000 acres of the highest value prime agricultural land for protection from development. By protecting agricultural lands from urban development, an opportunity is created for retention and development of diversified agriculture on small farms and agricultural parks. Agriculture within the 'Ewa Plain would likely change in character over time from intensive monoculture farming of export crops to diversified crops for consumption on the islands in the State of Hawai'i. The loss of agricultural production from the Project and other reasonably foreseeable projects throughout the State of Hawai'i are expected to be offset by:

- Hawai'i Agriculture Research Center (HARC) conducting studies on vegetable crops and forage to help diversify agricultural activities in the area
- Agricultural businesses maintaining their current levels of operation and production by leasing replacement lands in Kunia and/or the North Shore and possibly cultivating their remaining lands more intensively

Statewide agricultural production, revenues, employment, or payroll are not anticipated to be adversely affected but may change as the agricultural industry changes.

Central O'ahu Sustainable Communities Plan Area

The Central O'ahu Sustainable Communities Plan area, which covers approximately 3,000 acres, is expected to experience moderate growth as existing areas zoned for residential development are

built out by 2025. Over 11,000 new housing units will have been built in master-planned communities, and substantial job growth is also expected to be over 65,000 new jobs (almost 10 percent of O‘ahu total projected). The bulk of the private non-construction job growth is projected to be in services, retail, or transportation/communications/utilities (about 70 percent) with another 20 percent in industrial occupations.

Urban growth will be contained within a boundary which will protect prime agricultural lands for diversified agriculture. Preservation of these lands will help retain open space, in addition to supporting economic diversification. A regional system of open space and greenways will give Central O‘ahu the feel of a network of communities “within a garden.” Open space will be preserved in parks, golf courses, agricultural areas, deep ravines, and wildlife habitats.

A Shoreline Park and Preservation Area developed along the entire shoreline in Pearl Harbor’s West Loch and Middle Loch will restore the shoreline in Waipahu to public use, provide active and passive recreational facilities, and help create the Pearl Harbor Historic Trail, a pedestrian path, bikeway, and restored historic train system running from Rainbow Marina near Aloha Stadium to the Wai‘anae Coast.

Special area plans prepared in partnership with the Waipahu and Wahiawā communities will guide redevelopment of these gateway towns. To support the revitalization of these towns, commercial and industrial development outside of Waipahu and Wahiawā will be limited to completing the Mililani Technology Park development and building new commercial centers designed to meet the demand from their surrounding residential communities, rather than for a regional or islandwide market.

Central O‘ahu will be developed with a transportation system that will provide easy access to transit,

use of traffic calming design, and encouragement of people to walk and bike, reducing the need for use of automobiles. Moderate density housing and commercial development will be built along the Project stretching from the City of Kapolei through Waipahu to Pearl City in the PUC.

Many of the projects in the Central O‘ahu Sustainable Communities Plan area listed in Table 4-39 and about 450 acres (15 percent) of developable acreage are within the study corridor. Approximately 70 acres will be used for the Project, including for the preferred site option of 44 acres for the maintenance and storage facility near Leeward Community College, proposed park-and-ride facilities, and other guideway infrastructure. If the maintenance and storage facility is not constructed near Leeward Community College, then approximately 26 acres will be used by the Project within the Central O‘ahu Plan area.

A roadway project located in Central O‘ahu includes Central Mauka Road, a new four-lane road from Mililani mauka to Waiawa as shown in the ORTP, is further evidence of growth in Central O‘ahu independent of the Project. The road connects Meheula Parkway to Kamehameha Highway in Pearl City. It is parallel to and mauka of the H-2 Freeway. The new four-lane North-South Road includes connections to H-2 Freeway interchanges. Another project is a new two-lane second access road to Wai‘anae. It runs from Farrington Highway in the vicinity of Maili, over the Wai‘anae Mountain Range, to Kunia Road. Both projects would provide improved mobility options in areas close to future planned development in Central O‘ahu.

Primary Urban Center Area

The PUC is an interconnected network of vibrant, distinct neighborhoods. Each has qualities that make it a livable and enjoyable place to live, work, and play. The City supports an ongoing program of neighborhood planning and improvement with

the redevelopment of existing urban land. Livable neighborhoods include business and community services as well as residences. Key to livability is convenient access to work and to the many services and attractions found in an urban center.

Mauka residential neighborhoods primarily consist of single-family homes and townhouses on the edges of the central city. They retain their historically residential character, with mostly one- and two-story buildings and plenty of yard space and trees. Shops, parks, and schools are located within walking or bicycling distance of most residents. Churches, schools, and other uses coexist harmoniously. In-town residential neighborhoods offer the greatest amenities for urban living. Consisting mostly of apartment dwellings, these neighborhoods are closest to employment centers, educational facilities, and cultural institutions. They are also close to grocery stores, shopping districts, and other government, health, and commercial services. Proximity to the Project will give residents mobility and make it possible to live with fewer automobiles. Newer apartment buildings are typically four to six stories tall, with shops and services on the ground floor. Small parks, plazas and “green streets” provide places for people to meet and for small children to play.

The PUC Plan covers approximately 24,000 acres. All of the PUC Plan, including several PUC projects, approximately 45 acres listed in Table 4-39, are within the study corridor. Less than 45 acres will be developed by the Project for proposed park-and-ride facilities and other guideway infrastructure. According to the PUC Plan, there are no large areas of developable land. Therefore, the majority of development in the PUC will be redevelopment of existing urban land.

Future roadway projects in the PUC would be enhancements or maintenance of existing infrastructure. For example, a new two-lane elevated and reversible HOV flyover above Nimitz Highway

will be constructed from the Ke‘ehi Interchange to Pacific Street, as shown in the ORTP.

Economy

Economic changes have come with transitions to and from agricultural, military, and tourism economies. In 1958, military defense operations and sugar and pineapple production were the State’s primary economic activities, accounting for 40 percent of the gross state product (GSP). In 2007, the GSP reached \$61.69 billion. Honolulu County’s gross metropolitan product in 2005 was \$41.11 billion. Hawai‘i’s retail sales revenue has been in excess of \$21.5 billion, partially driven by its tourism industry. In 2007, Hawai‘i’s visitor expenditures were more than \$12.2 billion. “Finance, insurance, and real estate” and “services” are the biggest private sector industry contributors, contributing 22 percent and 29 percent of the State’s 2006 output, respectively. Retail and wholesale trade together account for 11 percent of the GSP.

The economic forecast is for continued steady growth. Planned projects are intended to continue to encourage and enable economic growth in the region. Continued focus on tourism is anticipated. To the extent that the Project will reduce travel times and decrease the growth of congestion, the Project is expected to generate an atmosphere conducive to future economic development. Completion of the planned extensions and other planned projects will include additional land conversion to public transportation use, decreasing the taxable land and associated property tax revenues.

The Project also will require hiring additional workers to support the expanded system.

In general, the Project is not a major long-term economic driver for O‘ahu’s economy.

Displacements

Past projects, such as the H-1 Freeway construction project, have resulted in a number of relocations of residents and businesses.

Planned projects, including transportation projects listed in the ORTP, will result in some level of displacement of a variety of land uses. Projects likely to result in displacements include widening of the H-1 Freeway in Kalihi and Pearl City. The planned extensions to the fixed guideway system are anticipated to require additional acquisitions and displacements of residential units and businesses.

Community Facilities and Public Services

As growth proceeds, community facilities and public services will need to expand to meet increasing demand as has historically occurred with past development. Public policy requires that large developments provide land and develop such facilities, including schools. As development proceeds, the tax base also will grow to fund the expansion of such facilities.

The network of utilities will grow and be upgraded as a result of continued development. Water, sewer, and electrical upgrades will be a benefit to the community as they will improve availability and reliability of services. Additional electrical generation will be required to support the increase in population and employment as well as to provide energy for propulsion for the Project. Since the majority of the electricity generated on O'ahu is through the combustion of fuel oil, increased fuel oil consumption and air emissions would be expected. However, this will be partially offset by the Hawai'i Clean Energy Initiative, which has as its goal that 40 percent of the electrical-generating capacity will be from clean sources by 2030.

Potable water is currently limited on the Island of O'ahu and is delivered by the City and County of Honolulu Board of Water Supply. Since 1990, demand for potable water supplies on O'ahu has

remained constant at 155 million gallons per day, even with significant urban residential and commercial development growth occurring within the water supply system area of service. This has been accomplished through conservation, loss prevention, and growth in the use of recycled water for industrial and irrigation activities.

Additional potable water supplies will be required to support the increase in population and employment as well as at the stations and at the maintenance and storage facility for the Project, although the Project is not anticipated to be a major water consumer. Since all of the potable water on O'ahu is from sole source aquifers, it is imperative that O'ahu residents embrace water conservation measures and that the Board of Water Supply continue to upgrade their facilities in order to minimize system loss through upgrades to their aging water delivery system. To the extent that recycled water supplies are available, the Project will use recycled water at their maintenance and storage facilities, at their stations, and through irrigation of landscaped areas.

Planned development, including the planned extensions, will affect existing parks and recreational resources. They also may affect, but not displace, some existing community resources through partial acquisition of properties where they operate.

Neighborhoods

Past projects, such as construction of the H-1 Freeway, have affected neighborhoods by cutting through and separating communities in the urban area and changing the character of communities. Continued development and increased density in the study corridor will affect the character of neighborhoods; however, effects as extensive as those caused by the construction of a new freeway will not occur. Future projects will likely have less severe effects than previous H-1 Freeway construction. Those effects will be gradual as individual projects are implemented.

Redevelopment, and specifically TOD, will occur in neighborhoods and communities where stations are planned. However, in areas such as Chinatown, Downtown, and Waikīkī, TOD will not likely change neighborhood character. In other areas, TOD could have an effect. The principles of TOD, such as pedestrian-orientation and mixed uses, are generally credited with reviving neighborhoods or making them more vibrant.

The planned extensions will serve additional neighborhoods with transit stations, such as Makakilo-Kapolei-Honokai Hale, Ala Liliko‘i, McCully-Mō‘ili‘ili, and Waikīkī. No substantial effects to those neighborhoods are expected. This is primarily because the extensions will follow already busy thoroughfares or pass through undeveloped areas. The increase in mobility resulting from the extensions will generally improve the quality of life for neighborhood residents, especially for those with limited financial resources and those who may be transit-dependent.

Environmental Justice

Environmental Justice communities and communities of concern are expected to benefit from the Project, planned extensions, and related development. The planned extensions will expand the extent of the fixed guideway transit system, which will improve travel options for transit-dependent groups and improve mobility in the corridor by providing an alternative to the automobile. An affordable and reliable means of transportation throughout the study corridor will provide more opportunity for low-income groups to live and work throughout the study corridor.

Visual

In general, the visual environment has been transformed from rural to urban over the past 70 years. The visual environment has been affected by past changes in land use and by the increasing height of buildings in the Downtown, Kaka‘ako, and Waikīkī areas. Similar effects are expected to

gradually continue throughout the study corridor. In the ‘Ewa area, visual resources will be affected more rapidly than other areas in the study corridor by the replacement of undeveloped land and farmland with housing, commercial, and public facility developments in accordance with development plans. Currently, when traveling from the Wai‘anae direction of the H-1 Freeway near Exit 5 (East) Kunia Road/‘Ewa/Waipahu, drivers have an unobstructed panoramic view towards the Ko‘olau Mountain Range, Pearl City, Pearl Harbor, ‘Ewa, and the Pacific Ocean. The planned developments in the ‘Ewa Plain, which will be located at a lower elevation than the freeway, will be visible from the freeway; and the visual character will change from open space to urban development.

Modification of height limit and/or setback distances near transit stations could change the aesthetic character and design in transit station areas. More views and open areas outside the study corridor may be preserved as a result of concentrating development within station areas and away from more rural portions of O‘ahu.

Views of the planned extensions will be similar to those of the Project shown in Section 4.8. Figures 4-79 and 4-80 show simulated views of the planned UH Mānoa and Waikīkī extensions.

Noise

Noise has been steadily increasing in the region as it has become more urban and suburban as traffic has increased. As the study corridor becomes more densely developed, ambient noise levels will continue to increase. The planned extensions and other future development will create additional noise impacts in the vicinity of the alignment, which are similar to those discussed for the Project in Section 4.10. With existing land uses, no noise impacts will occur at ground level, but users of outdoor lanais located above the height of the guideway and facing the planned extensions would experience moderate noise impacts at some



Figure 4-79 Visual Simulation of UH Mānoa Planned Extension at Convention Center, looking Mauka



Figure 4-80 Visual Simulation of Waikiki Planned Extension at Kālimoku, looking Mauka

locations between the Ala Moana Center Station and the end of the Waikīkī extension and along the Salt Lake extension.

Hazardous Materials

Industrial and military land uses in the past have resulted in the release of hazardous materials, such as fuels and solvents, into the environment. Several brownfield sites are located in the study corridor. As a result of laws enacted since the 1970s, new developments and industrial activities are not expected to result in the release of hazardous materials. Redevelopment of previously contaminated properties offers the potential to remove some of the legacy chemicals in the soil and groundwater that resulted from waste discharge practices occurring before the current regulatory framework was established. This would be an overall benefit to the environment.

Planned future development, including the planned extensions to the fixed guideway system, are anticipated to affect additional sites of concern for hazardous materials contamination.

Ecosystems

Past development of suburban areas and farms has replaced undeveloped lands throughout the region. Even in the 1920s, there was almost no undeveloped land in the study corridor due primarily to sugar cane plantations. The former sugar cane lands do not provide significant habitat. The few wetland areas that were not used for sugar cane production were mostly developed for post-war housing, such as in the Salt Lake area. The Project is in a disturbed urban environment and will remain urbanized in the future. Continued development will not likely affect bird species that adapt well to urbanization. The Project could result in the preservation of a larger volume of vacant and undeveloped land outside the study corridor by supporting development within the corridor. This will have a commensurate benefit to ecosystems.

Threatened and Endangered Flora

The City will mitigate for potential impacts to ko'oloa'ula. An 18-acre ko'oloa'ula (*Abutilon menziesii*) contingency reserve lies within the 'Ewa Development Plan area. Mitigation measures, including the reserve, have already been specified in the HCP for this population by the USFWS. The City will secure a Certificate of Inclusion from the State for the Project as described in Section 4.13.3 of this Final EIS.

Impacts to other threatened and endangered flora are unlikely because few species are present within the area and, if any are encountered, they will be protected by existing regulations; all future developments will be responsible for complying with the Federal Endangered Species Act for their own projects.

Threatened and Endangered Wildlife

There is no habitat for threatened and endangered wildlife species in the 'Ewa area even though it is relatively undeveloped. No cumulative impacts to these species are likely. All endangered species are currently protected by existing regulations; all future developments will be responsible for complying with the Federal Endangered Species Act for their own projects.

Water Resources

Water resources have been degraded by past residential, industrial, military, and farm developments. The most substantial effects of past actions include the following:

- The channelization of most streams in urban and suburban areas
- The draining and filling of wetlands in Waikīkī, Salt Lake, and Pearl Harbor
- The pollution of surface water and groundwater with agricultural (herbicide and insecticide) and other chemicals

Future projects, including the incremental effect of the Project, will modify surface-water

resources in the ‘Ewa Development Plan Area by the incremental conversion of pervious surface to impervious surface. The loss of pervious surface increases the pollutant load that is discharged to surface-water resources, increases peak flow due to the loss of infiltration, and decreases base flow due to the loss of infiltration. There is the potential for loss of flood storage capacity due to encroachments into regulated flood zones. However, infrastructure, such as the Kalo‘i Gulch Drainage Canal being constructed as part of the North-South Road project, will be constructed as part of future development as required by regulations to accommodate flood storage capacity. Landscapes in the Central O‘ahu Sustainable Communities Plan area and the PUC Development Plan area are already altered by past loss of pervious surfaces, altered flow conditions, and conversion to a built environment. The future projects for Central O‘ahu and the PUC listed in Table 4-39 would have less cumulative impact on water resources compared to developments in the ‘Ewa area because conversion to urbanization has already occurred. The additive effects of the Project, in combination with other actions, could further degrade surface-water resources. However, mitigation measures that will be part of Federal, State, and Local permitting requirements will help offset negative effects to surface-water resources. In addition, future projects in the ‘Ewa Plain will not affect wetlands because the developable upland area is dry and has permeable soil that does not contain any wetlands.

The current and reasonably foreseeable actions described in Table 4-39 will also be required to follow City, County, State, and Federal environmental regulations and mitigation measures; therefore, the additional cumulative effects to water resources as a result of the planned extensions are the same as described above.

Street Trees

The planned extensions would affect street trees along those alignments, including monkeypod

trees on Kapi‘olani Boulevard and mahogany trees along Kalākaua Avenue. Some of the monkeypod trees would require removal, while the mahogany trees could be preserved with pruning. All street trees are currently protected by existing regulations; future development is also subject to these regulations to protect street trees.

Archaeological, Cultural, and Historic Resources

Archaeological, cultural, and historic resources have previously been affected during prior development within the study corridor.

Future development may occur near pre-contact and post-contact archaeological and burial sites. Future development also could affect historic resources, churches, cemeteries, schools, parks, recreational facilities, and other urban cultural entities. Such resources are located throughout the corridor.

The planned extensions could affect additional archaeological, cultural, and historic resources. The likelihood of encountering burials will be high for the Waikiki extension. Any future development or future extensions to this Project will be required to comply with appropriate Federal and State laws to protect archaeological, cultural, and historic resources.

Future development will be subject to review in accordance with Federal, State, and Local regulations and approval processes applicable to archaeological, cultural, and historic resources.

4.19.4 Effects of No Build Alternative on Growth

The effects on growth with the No Build Alternative would be more severe than the impacts of the Project. If the Project is not built, O‘ahu will experience continued growth, but the growth likely would be more dispersed and less dense. Under the No Build Alternative, there would be increasing pressure to develop in the undeveloped areas of

Central and North O‘ahu. Development in these areas would have greater impacts on agricultural and natural resources, including to threatened and endangered plant and animal species.

Those portions of the island do not have sufficient infrastructure to support growth; expenditure of funds for infrastructure development in these undeveloped areas would impact the ability to meet the infrastructure needs of the rest of the island. The central and northern areas would undergo a dramatic change in community character with the transformation from rural to suburban in areas that have been fairly rural since Hawai‘i entered statehood.

The No Build Alternative would have more adverse impacts on growth in the ‘Ewa Plain. The No Build Alternative would likely displace more farmland than the Project because lower density development patterns would be anticipated. There would be increased traffic congestion and air quality emissions because of the absence of a rapid transit system to service the Project corridor.

The No Build Alternative would have greater greenhouse gas emission than the Project because the development pattern would be less dense and would require greater reliance on the use of private automobiles. The No Build Alternative would result in higher VMT with a corresponding higher level of greenhouse gas emissions. On a daily basis, the Project will reduce greenhouse gas emissions by approximately 171 metric tons of carbon dioxide.

The No Build Alternative does not include the Project; it does incorporate transportation improvements identified in the ORTP. Under the 2030 No Build Alternative, approximately 13.6 million VMT per day are projected in the transportation system, including major freeways, highways, arterials, and collectors. This would be an increase of approximately 21 percent (or over 2 million miles) over 2007 conditions. VHT would increase by

28 percent by 2030 compared to 2007 levels. VHD would increase by 46 percent. VHT and VHD would increase at a higher rate than VMT because as roadway facilities become oversaturated, travel times through the affected sections would increase dramatically. The increase in congestion within the study corridor would have a ripple effect on the following resources, facilities, and services:

- Increase in emergency response times
- Underserve transit-dependent and low income populations
- Increase in air pollutant burdens for the air basin
- Increase in pollutant load in stormwater runoff

VMT, VHT, and VHD are projected to decrease under the Project compared to the No Build Alternative. Daily VMT will decrease by 4 percent and VHT will decrease by 8 percent. VHD will experience the greatest decrease—18 percent. This reflects that even moderate decreases in traffic volumes under congested conditions can result in relatively large decreases in travel delay.

4.20 Irreversible and Irretrievable Commitments of Resources

As described in Chapter 4 of this Final EIS, the Project will convert land to transportation use and consume energy, construction materials, and labor and impact natural and cultural resources. These resources will not be available for other projects.

4.21 Anticipated Permits, Approvals, and Agreements

Table 4-40 summarizes permits, certificates, and/or approvals anticipated to be required for implementation of the Project. When it states that permits, approvals, and agreements are required, it is anticipated that they will be received prior to commencing the activity that triggers the permit, approval, or agreement.

Table 4-40 List of Anticipated Permits, Approvals and Agreements (continued on next page)

Type of Permit, Approval, or Agreement	Granting Agency	Responsible Party and Status
Preliminary Engineering Phase		
CWA Section 404—Department of the Army Permit; various nationwide permits and/or Section 10 of the Rivers and Harbors Act.	USACE, Regulatory Branch; EPA	City will submit application prior to construction of the Project in waters of the U.S.
CWA Section 401—Water quality certification	HDOH—CWB	City will submit application prior to construction of the Project in State waters
Stream channel alteration permit	DLNR—WC	City will submit application prior to construction of the Project in stream channels
Section 9 of the Rivers and Harbors Act	USCG	USCG has provided advanced approval (December 23, 2008)
CWA Section 402—NPDES for stormwater associated with construction activity	HDOH—CWB	Notice of General Permit Coverage received December 3, 2009
Community noise permit	HDOH—IRHB	Application for first segment submitted by City Public meeting held on October 5, 2009
Community noise variance	HDOH—IRHB	Application for first segment submitted by City
CZM Program consistency determination—Section 404	DBEDT—OP	City will submit application prior to construction of the Project in waters of the U.S.
CZM Program consistency determination—FTA funds	DBEDT—OP	Application will be submitted by City following submittal of FTA New Starts FFGA application
Special management area (Figure 4-81)	DPP—LUPD	Application will be submitted by City; public hearing to take place after Final EIS is available
Shoreline Setback Variance	DPP—LUPD	Application will be submitted by City for stormwater outfall at maintenance and storage facility near Leeward Community College site option concurrently with the Special Management Area permit
Special district permit	DPP—LUPD	Application will be submitted by the City when project design in vicinity of Chinatown and Capital Special Districts matures
Project eligibility permit and development permit	HCDA	Application will be submitted by the City when project design in vicinity of Kaka'ako matures
Agreement for storm drain connection to existing MS4—construction, dewatering, and operation; right-of-way access to construct Project (use and occupancy)	HDOT—Highways; Airport	City and HDOT working on master agreement to be completed prior to construction in highway and airport property
Agreement for storm drain connection to existing MS4—construction, dewatering, and operation; right-of-way access to construct Project	University of Hawai'i	City working with University to obtain easement

Table 4-40 List of Anticipated Permits, Approvals and Agreements (continued on next page)

Type of Permit, Approval, or Agreement	Granting Agency	Responsible Party and Status
Unconditional approval of the ALP showing project alignment	FAA	HDOT–Airports and FAA, included in Appendix K of this Final EIS
Agreement for storm drain connection to existing MS4—construction, dewatering, and operation; right-of-way to construct Project	U.S. Navy	City will seek an easement on Navy property
Utility engineering agreement	Private and public utility companies	Submitted by the City as segment designs become available
Archaeological inventory survey	SHPO	Submitted by the City as segment designs become available
Plan Review Use	DPP-LUPD	DTS will submit review as project design is available for the project area near Leeward Community College and Honolulu Community College
Final Design Phase		
City one-time review of construction plans	Various City agencies	To be submitted by contractor by construction segment as designs become available
Sewer connection	DPP–SDD/Wastewater	To be submitted by contractor by construction segment as designs become available
Permit for storm drain connection	DES; DPP–SDD/Civil Engineering	To be submitted by contractor by construction segment as designs become available
Interstate airspace use approval for crossing: H-1 Freeway in Pearl City; H-1 Freeway in `Aiea; H-2 Freeway in Pearl City; H-1 Freeway Koko Head-bound lanes near Honolulu Airport; H-1 Freeway access ramps near Pearl Harbor Naval Base; and H-1 Freeway access ramps at Ke`ehi Interchange	FHWA, through HDOT	To be submitted by City to HDOT, which then sends to FHWA for concurrence and approval prior to construction
Form 7460.1—Notice of Proposed Construction or Alteration of Impacts to the Airport and FAA Facilities	FAA	To be submitted by City at a minimum of 45 days prior to construction at Honolulu International Airport
Interstate access modification	FHWA, through HDOT	To be submitted by City to HDOT, which then sends to FHWA for concurrence and approval prior to construction
Waiver to construct in runway protection zone	HDOT–Airport (submitted to FAA)	To be submitted by contractor within two years of intended construction of airport portion of the Project
Utility construction agreement	Private and public utility companies	Submitted by the City as segment designs become available
Final design subdivision/easement	DPP–SDD/Subdivision	City to submit subdivisions and easements for each construction segment when final design is complete and before construction of segment begins
Flood hazard district compliance	DPP–SDD/Subdivision	City to submit documents as required to comply with Flood Hazard District Regulation (Article 9. Special District Regulations, Section 21-9.10) before construction of segment begins
Building permit—for work outside of right-of-way	DPP–BD	To be submitted by contractor by construction segment as designs become available

Table 4-40 List of Anticipated Permits, Approvals and Agreements (continued from previous page)

Type of Permit, Approval, or Agreement	Granting Agency	Responsible Party and Status
Construction Phase		
CWA Section 402—NPDES for dewatering discharges	HDOH—CWB; DPP—SDD/Civil Engineering	To be prepared and submitted by contractors as needed
CWA Section 402—NPDES for hydrotesting discharges	HDOH—CWB	To be prepared and submitted by contractors as needed
Underground injection control	HDOH—SDWB	To be prepared by the contractors and submitted as required by project designs
Permit to perform work upon state highways	HDOT—Highways	To be prepared and submitted by contractors
Street usage permit—for city streets	DTS	To be prepared and submitted by contractors
Grading, grubbing, stockpiling, trenching	DPP—SDD/Civil Engineering	To be prepared and submitted by contractors
Construction to cross or enter the state energy corridor requires coordination	HDOT—Harbors	To be prepared and submitted by designers and contractors as needed
Landscape plans affecting HDOT roadways	HDOT	To be prepared and submitted by contractors as needed
Operation Phase		
Agreement for operation phase stormwater discharge	DES	DTS and DES will submit MS4 to HDOH prior to initiation of operation of the Project

ALP	Airport Layout Plan
CWA	Clean Water Act
CZM	Hawai'i Coastal Zone Management
DBEDT—OP	State of Hawai'i Department of Business, Economic Development and Tourism, Office of Planning
DES	City and County of Honolulu, Department of Environmental Services
DLNR—WC	State of Hawai'i Department of Land and Natural Resources, Commission on Water Resource Management
DPP—BD	City and County of Honolulu, Department of Planning and Permitting, Building Division
DPP—LUPD	City and County of Honolulu, Department of Planning and Permitting, Land Use Permits Division
DPP—SDD/Civil Engineering	City and County of Honolulu, Department of Planning and Permitting, Site Development Division, Civil Engineering Branch
DPP—SDD/Subdivision	City and County of Honolulu, Department of Planning and Permitting, Site Development Division, Subdivision Branch
DPP—SDD/Wastewater	City and County of Honolulu, Department of Planning and Permitting, Site Development Division, Wastewater Branch
DTS	City and County of Honolulu, Department of Transportation Services
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FFGA	Full Funding Grant Agreement
FHWA	Federal Highway Administration
HCDA	State of Hawai'i, Hawai'i Community Development Authority
HDOH—CWB	State of Hawai'i Department of Health, Environmental Management Division, Clean Water Branch
HDOH—IRHB	State of Hawai'i Department of Health, Environmental Health Services Division, Indoor and Radiological Health Branch
HDOH—SDWB	State of Hawai'i Department of Health, Environmental Management Division, Safe Drinking Water Branch
HDOT—Airport	State of Hawai'i Department of Transportation, Airport Division
HDOT—Harbors	State of Hawai'i Department of Transportation, Harbors Division
HDOT—Highways	State of Hawai'i Department of Transportation, Highways Division
MS4	Municipal Separate Storm Sewer System
NPDES	National Pollutant Discharge Elimination System
SHPO	State Historic Preservation Officer
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USDHS	U.S. Department of Homeland Security

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