

Environmental Assessment / Environmental Impact Statement Preparation Notice

Kaneohe/Kailua Wastewater Conveyance and Treatment Facilities



Prepared For

**CITY AND COUNTY OF HONOLULU
DEPARTMENT OF ENVIRONMENTAL SERVICES**



Prepared By

WILSON OKAMOTO CORPORATION

June 2010

**Environmental Assessment/
Environmental Impact Statement Preparation Notice**

**Kaneohe/Kailua Wastewater Conveyance
and Treatment Facilities**

District of Koolaupoko, Island of Oahu

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**ENVIRONMENTAL ASSESSMENT /
ENVIRONMENTAL IMPACT STATEMENT
PREPARATION NOTICE
FOR THE
KANEOHE/KAILUA WASTEWATER CONVEYANCE
AND TREATMENT FACILITIES**

Koolaupoko, Oahu, Hawaii

THIS ENVIRONMENTAL DOCUMENT IS SUBMITTED
PURSUANT TO CHAPTER 343, HAWAII REVISED STATUTES

PROPOSING AGENCY: City and County of Honolulu
Department of Environmental Services
650 South King Street
Honolulu, Hawaii 96813

ACCEPTING AUTHORITY: City and County of Honolulu
Department of Environmental Services

RESPONSIBLE OFFICIAL:



Timothy E. Steinberger, P.E.
Director
Department of Environmental Services

6/25/10
Date

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June 2010

TABLE OF CONTENTS

	<u>Page</u>
PREFACE	P-1
SUMMARY	S-1
1. INTRODUCTION	1-1
1.1 Introduction.....	1-1
1.2 Background	1-1
1.3 Project Location.....	1-3
1.4 Project Need.....	1-4
1.4.1 Wastewater Flow	1-4
1.4.2 Regulatory Mandates.....	1-10
2. ALTERNATIVES AND PROPOSED ACTION	2-1
2.1 No Action	2-1
2.2 Alternative Wastewater Conveyance.....	2-1
2.3 Alternatives Addressing Infiltration and Inflow.....	2-1
2.3.1 Reduce I/I in the Wastewater Collection System.....	2-1
2.3.2 Increase Capacity for Peak Wet Weather Flow	2-1
2.3.3 Flow Equalization.....	2-2
2.3.4 Treatment Plant Expansion	2-2
2.4 Proposed Action	2-2
2.4.1 Alternative 1 – Force Main No. 2 and New Equalization Facilities	2-2
2.4.2 Alternative 2 – Sewer Tunnel.....	2-6
2.4.3 Other Treatment-Related Facilities.....	2-11
3. EXISTING ENVIRONMENT, IMPACTS AND MITIGATION MEASURES	3-1
3.1 Climate	3-1
3.2 Physiography.....	3-1
3.2.1 Geology and Topography	3-1
3.2.2 Soils	3-3
3.3 Hydrology	3-4
3.3.1 Surface Water.....	3-4
3.3.2 Groundwater	3-8
3.3.3 Coastal Waters	3-12
3.3.4 Flood Hazard	3-13
3.4 Natural Environment.....	3-17
3.4.1 Flora	3-17
3.4.2 Fauna	3-17
3.4.3 Marine Resources.....	3-18
3.4.4 Wetlands.....	3-19
3.4.5 Historic, Archaeological, and Cultural Resources.....	3-23
3.5 Socio-Economic Characteristics.....	3-24
3.6 Air Quality	3-25
3.7 Noise	3-32

TABLE OF CONTENTS (CONTINUED)

	<u>PAGE</u>
3.8 Traffic	3-33
3.9 Visual Resources	3-34
3.10 Infrastructure and Utilities.....	3-35
3.11 Public Services and Facilities.....	3-36
3.11.1 Police Protection.....	3-36
3.11.2 Fire Protection	3-36
3.11.3 Health Care Services.....	3-36
3.11.4 Public Schools	3-36
3.11.5 Recreational Facilities	3-37
4. LAND USE DESIGNATIONS AND PERMITS	4-1
4.1. Land Use Designations	4-1
4.1.1. State Land Use District.....	4-1
4.1.2. Special Management Area	4-1
4.1.3. City and County of Honolulu Zoning.....	4-1
4.2. Permits and Approvals	4-1
5. DETERMINATION	5-1
6. CONSULTATION	6-1
7. REFERENCES	7-1

LIST OF FIGURES

	<u>Page</u>
Figure 1-1 Kahaluu-Kaneohe-Kailua Service Area	1-2
Figure 1-2 Regional Wastewater System.....	1-5
Figure 1-3 Tax Map Key Plats.....	1-7
Figure 1-4 Koolaupoko Sustainable Communities Plan.....	1-11
Figure 2-1 Preliminary Route Alternatives	2-3
Figure 2-2 Alternative 1 Force Main Route Profile.....	2-7
Figure 2-3 Alternative 2 Tunnel Route Profile	2-9
Figure 3-1 Soils Map.....	3-5
Figure 3-2 Aquifer Map	3-9
Figure 3-3 Flood Insurance Rate Map	3-15
Figure 3-4 Wetland Location Map	3-21

LIST OF FIGURES (CONTINUED)

	<u>Page</u>
Figure 3-5 U.S. Census Tracts and Neighborhood Board Boundary Map	3-27
Figure 4-1 State Land Use Districts	4-3
Figure 4-2 Conservation Districts Subzones	4-5
Figure 4-3 Special Management Area.....	4-7
Figure 4-4 County Zoning.....	4-9

LIST OF TABLES

	<u>Page</u>
Table 1-1 Tax Map Keys	1-4
Table 1-2 Projected Population, 1995 and 2020.....	1-9
Table 1-3 Projected Population, 2007 and 2035.....	1-9
Table 1-4 Modeled Wastewater Flows, Kailua-Kaneohe-Kahaluu, 1995 and 2020.....	1-10
Table 1-5 CIP Projects Completed for the Kailua-Kaneohe-Kahaluu Service Area.....	1-13
Table 3-1 Wetland Identification.....	3-20
Table 3-2 Demographic Characteristics: 2000.....	3-29

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PREFACE

This Environmental Assessment/Environmental Impact Statement Preparation Notice (EISPN) was prepared pursuant to Chapter 343, Hawaii Revised Statutes, and Title 11, Chapter 200, Administrative Rules, Department of Health, State of Hawaii. The City and County of Honolulu (City), Department of Environmental Services (ENV) proposes to undertake various improvements to the wastewater collection, treatment and disposal system in the Kaneohe-Kailua wastewater service area, Koolaupoko District, Oahu. The primary improvement being proposed by the City is the construction of a new force main to supplement an existing force main conveying pre-treated wastewater from the Kaneohe Wastewater Pre-Treatment Facility (WWPTF) to the Kailua Regional Wastewater Treatment Plant (WWTP). Completion of this new force main by 2014 is required in a Stipulated Order issued by the Environmental Protection Agency (EPA) in May 2007. While the City continues to progress towards initiating construction of the new force main, a potential new solution involving the construction of a gravity-flow sewer tunnel is now being considered. The primary focus of the forthcoming Draft Environmental Impact Statement (EIS) will be an assessment of impacts associated with these two alternative means of supplementing or replacing the existing 42-inch force main.

The alternative that is in the City's current Capital Improvement Plan (CIP) involves the construction of a 36-inch (inside diameter) force main through which wastewater would be pumped (as opposed to gravity flow) from the Kaneohe WWPTF to the Kailua Regional WWTP. This proposed pipe, referred to as Force Main No. 2, would allow the existing Force Main No. 1 to become a back up pipeline. The new force main would be constructed primarily by horizontal directional drilling (HDD) beneath the seafloor of Kaneohe Bay. Neither the waters nor seafloor of Kaneohe Bay would be disturbed unless a connection point within the bay is required. While current technology can achieve drilling of the proposed force main length in a single bore, alternatives involving a connection point within the bay could facilitate construction by shortening the HDD bore. Such a connection point would involve constructing a temporary coffer dam surrounding the connection point to contain excavation-related silt to the connection depth of approximately 25 feet below the seafloor. Still another alternative would involve constructing a nine-foot (inside diameter) tunnel beneath Kaneohe Bay and installing the force main within the tunnel.

Along with the force main system, the City's current CIP includes future construction of an up to 7-million gallon equalization facility at the Kaneohe WWPTF and an up to 3-million gallon equalization facility at the Kailua WWTP. The equalization facilities are essentially enclosed storage reservoirs similar to concrete water reservoirs. They would serve to store wastewater generated during periods of high rainfall when runoff entering the wastewater collection system through cracks and deteriorated lines significantly increases the volume of wastewater that needs to be treated.

An alternative to the force main system is proposed, which would involve constructing a tunnel up to 13 feet in diameter between the two facilities. The floor of the tunnel would begin at a depth of approximately 45 feet below sea level at the Kaneohe WWPTF. It would traverse approximately 3.0 miles, mostly beneath the Oneawa Hills range, reaching a floor depth of approximately 60 feet below sea level at the Kailua Regional WWTP, where the wastewater will be pumped to the surface for treatment by a new influent pump station

(IPS). In addition to conveying wastewater by gravity flow, the tunnel would also serve the same storage function that the equalization facilities in the force main alternative would offer when the volume of wastewater increases during periods of high rainfall. The tunnel alternative would allow the existing Kaneohe WWPTF and the existing force main to be taken out of service.

In addition to the two alternatives, there are facility improvements proposed at the Kailua Regional WWTP that would be implemented regardless of which alternative is selected. These include improvements for wastewater treatment and odor control. No improvements are proposed to the ocean outfall line.

The Department of Environmental Services, the proposing agency, has determined that the proposed alternative actions require the preparation of an Environmental Impact Statement.

SUMMARY

Proposing Agency: City and County of Honolulu
Department of Environmental Services

Accepting Authority: City and County of Honolulu
Department of Environmental Services

Location: Koolaupoko District, Oahu, Hawaii

Tax Map Keys: Alternative 1 – Force Main Route
4-4-08: 01
4-4-11: 81
4-5-30: 01, 36, and 47

Alternative 2 - Tunnel Route
4-2-15: 09
4-2-17: 01, 16, 18 and 21
4-4-11: 03, 81, 82 and 83
4-4-12: 01, 02, 64 and 65
4-5-30:01 and 36
4-5-31: 76
4-5-32: 01
4-5-38: 01
4-5-100: 01, 02, 03, 04 and 52
4-5-101: 33, 34, 35, 36, 37 and 38

Proposed Action: Two alternative wastewater conveyance and equalization facilities are proposed, one of which will be constructed:

1. Alternative 1 – Construct an approximately 2.9 mile long, 36-inch diameter force main from the Kaneohe Wastewater Pre-Treatment Facility (WWPTF) to the Kailua Regional Wastewater Treatment Plant (WWTP) to convey pre-treated wastewater. The force main will traverse beneath the seafloor of Kaneohe Bay. The exact size and method of construction of the force main has yet to be determined. Additional improvements include a new up to 7-million gallon equalization facility at the Kaneohe WWPTF and a new up to 3-million gallon equalization facility at the Kailua WWTP to store wastewater during periods of high rainfall.
2. Alternative 2 – Construct an approximately 3-mile long, up to 13-foot (inside diameter) tunnel from the Kaneohe WWPTF to the Kailua Regional WWTP to convey wastewater and a new Influent Pump Station (IPS) to lift the wastewater up to the surface WWTP for treatment. The tunnel will be aligned

to traverse mostly under the Oneawa Hills range, mauka of Kaneohe Bay Drive. The existing 42-inch force main will be taken out of service and the Kaneohe WWPTF will be decommissioned.

3. Other Treatment-Related Facilities - Regardless of which conveyance and storage alternative is selected, two improvements at the Kailua Regional WWTP are proposed, including a new headworks facility replacing the existing headworks and a new dewatering facility to replace the existing dewatering building. While the location and configuration of these facilities may vary according to the alternative selected, replacement of both is proposed.

Determination:

The proposing agency has determined that the proposed action requires the preparation of an EIS based on the significance criteria set forth in Chapter 200, Title 11, State of Hawaii Department of Health Rules.

**Parties to be Consulted
During Preparation of the
DEIS**Federal

U.S. Geological Survey
U.S. Fish & Wildlife Service
U.S. Army Corps of Engineers
U.S. Navy
U.S. Marine Corps
National Oceanic and Atmospheric Administration
Kaneohe Marine Corps Base Hawaii

State of Hawaii

Department of Business, Economic Development and
Tourism (DBEDT)
Department of Education (DOE)
Aikahi Elementary School
Puohala Elementary School
Department of Health (DOH)
DOH, Environmental Management Division
DOH, Office of Environmental Quality Control
Department of Land and Natural Resources (DLNR)
DLNR, Land Division
DLNR, Engineering Division
DLNR, Division of Aquatic Resources
DLNR, Division of Forestry & Wildlife
DLNR, Historic Preservation Division
DLNR, Office of Conservation and Coastal
Lands

**Parties to be Consulted
During Preparation of the
DEIS (continued)**

State of Hawaii (continued)

Department of Transportation (DOT)
DOT Highways Division
Office of Hawaiian Affairs (OHA)
University of Hawaii Environmental Center
Senator Jill Tokuda, District 24
Representative Ken Ito, District 48
Representative Pono Chong, District 49
Representative Cynthia Thielen, District 50

City and County of Honolulu

Office of the Mayor
Honolulu City Council
Council Member Ikaika Anderson, District 3
Department of Planning and Permitting
Department of Design and Construction
Department of Transportation Services
Board of Water Supply
Police Department
Fire Department

Organizations

Kaneohe Neighborhood Board, #30
Kailua Neighborhood Board, #31
Kaneohe Bay Regional Council
Pacific American Foundation (Waikalua Loko Fishpond)
Kaneohe Ranch

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1. INTRODUCTION

1.1 Introduction

Pursuant to a May 2007 Stipulated Order issued by the Environmental Protection Agency (EPA), the City and County of Honolulu (City) is pursuing construction of a new force main to supplement an existing force main conveying pre-treated wastewater from the Kaneohe Wastewater Pre-Treatment Facility (WWPTF) to the Kailua Regional Wastewater Treatment Plant (WWTP). Recently, however, a new solution involving the construction of a gravity-flow sewer tunnel to accomplish the same purpose of the new force main is being considered. The tunnel could be an alternative to the planned new second force main, which is intended to allow the existing force main to be used as a back-up. The existing 42-inch diameter concrete force main conveys pre-treated wastewater along a length of approximately 3.1 miles from the Kaneohe Wastewater Pre-Treatment Facility (WWPTF) to the Kailua Regional Wastewater Treatment Plant (WWTP). The existing force main is aligned primarily beneath Kaneohe Bay Drive.

On-going planning work for the new second force main has narrowed the alternative routes to one alignment traversing beneath the seafloor across Kaneohe Bay. The tunnel alternative is being evaluated because it has gained feasibility with the advancing technology for Tunnel Boring Machines (TBM).

Toward deciding whether the new tunnel alternative should be selected over the new force main alternative, the City is preparing a Preliminary Engineering Report (PER), which will develop both concepts as comparable alternative designs. A life-cycle cost analysis will be applied to both alternatives to determine if one alternative has a significant life-cycle cost advantage over the other.

The City will prepare an Environmental Impact Statement (EIS), pursuant to Chapter 343, Hawaii Revised Statutes (HRS). The EIS will assess the environmental and social impacts of both alternatives, which will be taken into consideration in the selection decision.

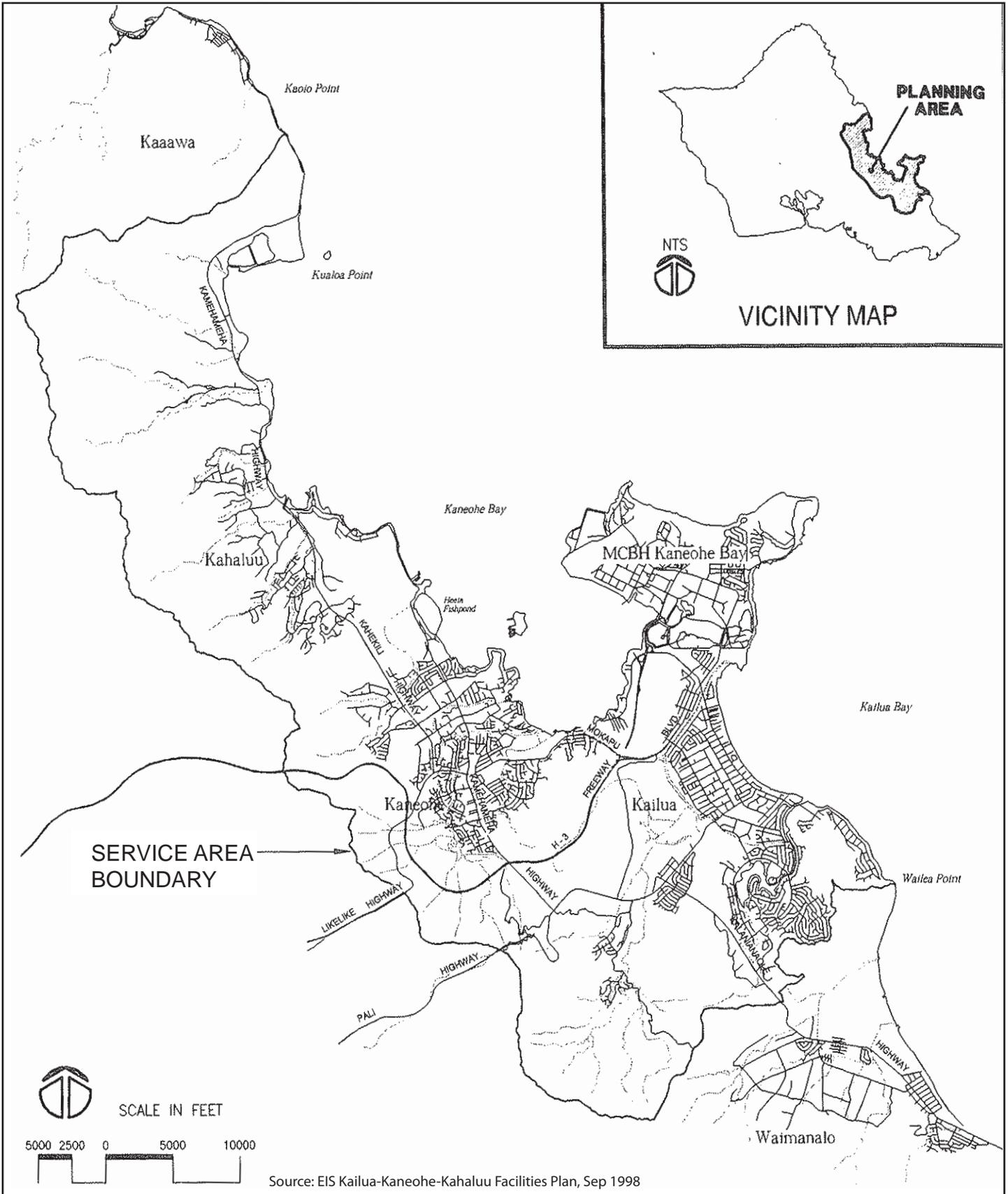
A community participation program, to be conducted by the City, will help determine what the community values are in terms of potential benefits, costs, and impacts of the respective alternatives. These values will be considered in the selection decision.

This Environmental Assessment/Environmental Impact Statement Preparation Notice (EISPN) was prepared to inform interested parties of the alternatives being considered and seek comments on areas which should be addressed in the forthcoming EIS.

Preparation of an EIS is required pursuant to Chapter 343, HRS and Chapter 200, Title 11, State of Hawaii Department of Health Administrative Rules (HAR), based on the use of County and State lands and County funds.

1.2 Background

The Kailua-Kaneohe-Kahaluu wastewater service area is in the Koolaupoko District on the windward side of the island of Oahu (see Figure 1-1). The service area boundaries extend from Kaoio Point and Waikane Valley to the north, to Wailea Point and Lanikai/Keolu Hills to the south, and inland along the ridgeline of the Koolau Mountain Range.



Source: EIS Kailua-Kaneohe-Kahaluu Facilities Plan, Sep 1998



WILSON OKAMOTO
CORPORATION
ENGINEERS • PLANNERS

KANEOHE/KAILUA WASTEWATER CONVEYANCE AND TREATMENT FACILITIES

KAHALUU - KANEOHE - KAILUA SERVICE AREA

FIGURE

1-1

The service area encompasses approximately 36,500 acres, or 57 square miles, and includes the suburban communities of Kailua and Kaneohe and the rural-agricultural community of Kahaluu.

The Kailua-Kaneohe-Kahaluu area is served by the Kailua Regional WWTP (see Figure 1-2). In late 1994, the former secondary treatment plants at Kaneohe and Ahuimanu were converted to wastewater pre-treatment facilities (WWPTF) and the Kailua WWTP was expanded to accommodate the flows from these areas. Wastewater flows conveyed to the Kailua Regional WWTP receive secondary treatment and are discharged to the receiving waters east of the Mokapu Peninsula through the Mokapu Outfall, which extends approximately 5,000 feet offshore to a depth of about 110 feet.

In 1996, the Kailua Regional WWTP processed an average of approximately 13.7 million gallons per day (mgd). According to the plant operators, the current volume of wastewater treated at the plant averages approximately 13 mgd.

The existing collection system consists of approximately 200 miles of gravity lines and force mains ranging in diameter from 6 to 66 inches, and 23 wastewater pump stations (WWPS), excluding the pump stations at the Kaneohe and Ahuimanu WWPTFs. The three major basins in the region are the Kailua Basin, Kaneohe Basin and Ahuimanu Basin. From the Kailua Basin, wastewater is collected primarily through gravity lines and conveyed to the Kailua Regional WWTP. From the Kaneohe and Ahuimanu Basins, wastewater is collected at the respective preliminary treatment facilities and conveyed via pumps and force mains to the Kailua Regional WWTP. Major problems that plague the system and contribute to hydraulic overloads are groundwater infiltration and stormwater inflow. Systems in low-lying areas along the coast are subject to seawater infiltration.

1.3 Project Location

The project is located within the service area, specifically between and including the Kaneohe WWPTF and the Kailua Regional WWTP. The project is identified by the Tax Map Keys (TMK) listed in Table 1-1 and the respective TMK plats are illustrated in Figure 1-3.

Kaneohe WWPTF: The Kaneohe WWPTF is located on an approximately 15-acre parcel in the Puohala area owned by the City and is further identified as TMK 4-5-30:36. Surrounding land uses include the Bay View Golf Course to the west, Kawa Stream and the Bay View Golf Course to the south, open areas and Waikalua and Waikalua Loko Fish Ponds to the east, and Kaneohe Stream and residences to the north.

Kailua Regional WWTP: The Kailua Regional WWTP is located in Aikahi on an approximately 25-acre site owned by the City and is further identified as TMK 4-4-11:81. The site is bounded by Nuupia Ponds and the Marine Corps Base Hawaii (MCBH) Kaneohe Bay facility to the north and west, Kaneohe Bay Drive and the Aikahi Gardens townhouse complex to the southwest, Aikahi Park and Aikahi Elementary School to the southeast, and Aikahi Park residences to the east.

**Table 1-1
Tax Map Keys**

Alternative 1 - Force Main Route

4-4-08: 01
4-4-11: 81
4-5-30: 01,36, and 47

Alternative 2 - Tunnel Route

4-2-15: 09
4-2-17: 01, 16, 18 and 21
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4-5-31: 76
4-5-32: 01
4-5-38: 01
4-5-100: 01, 02, 03, 04 and 52
4-5-101: 33, 34, 35, 36, 37 and 38

Kaneohe/Kailua Force Main No. 1: The existing force main conveys pre-treated wastewater collected at the Kaneohe WWPTF to the Kailua Regional WWTP. The force main begins at the Kaneohe Effluent Pump Station located within the fenced site of the Kaneohe WWPTF. It traverses underground along the makai boundary of the Bay View Golf Course and the Kokokahi YWCA, then turns mauka to Kaneohe Bay Drive. The force main continues beneath Kaneohe Bay Drive until it's termination at the Kailua Regional WWTP.

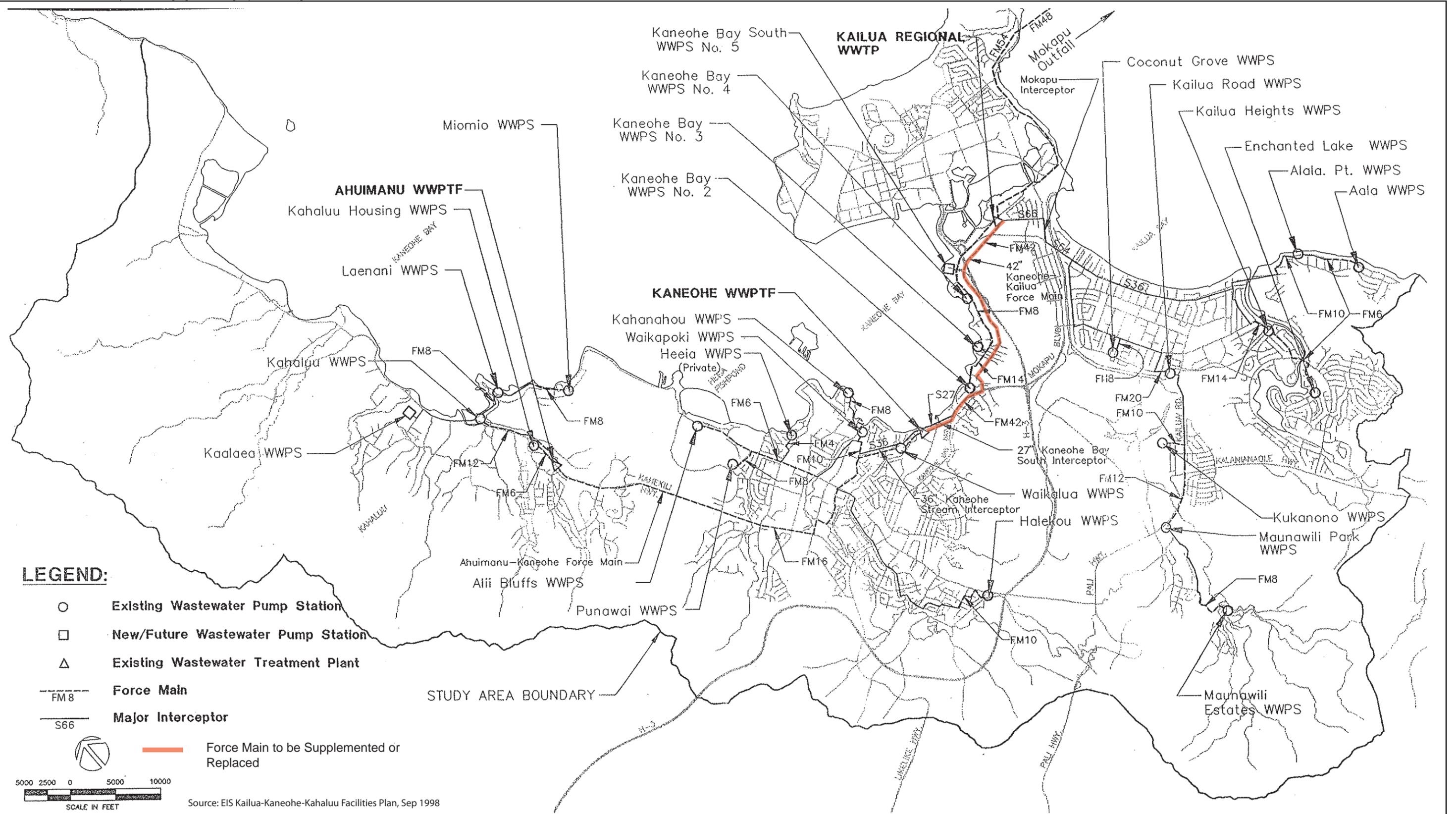
1.4 Project Need

1.4.1 Wastewater Flow

As is typical with most wastewater systems, a characteristic of wastewater flows in the Kailua–Kaneohe–Kahaluu service area is high peak wet-weather flows from inflow and infiltration (I/I). Peak flows occur during periods of high rainfall when runoff water can enter the wastewater collection system. The runoff entering the system is referred to as inflow. Sources of inflow include damaged sewer lines, pipes, and mains, as well as sewer manholes located in areas prone to flooding and illegal drain connections into the sewer system.

Infiltration occurs where pipes lie below the water table and water pressure causes water to leak into sewer pipes and mains. Depending on the location, the infiltrating water could be fresh, brackish or salty. Infiltration can also increase during periods of high rainfall when ground saturation causes water tables to rise over pipes.

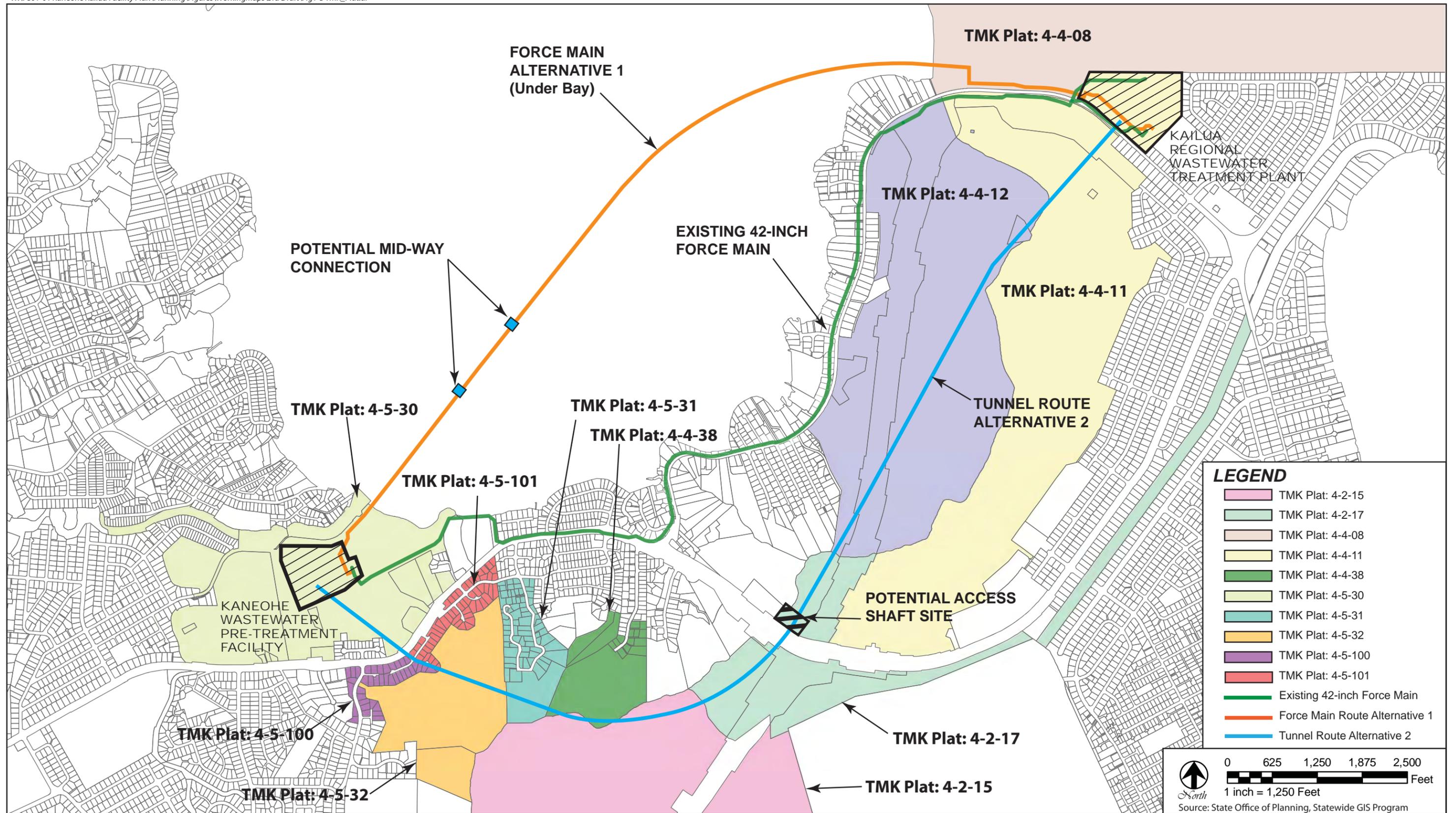
In the worst circumstances, rapid increases in wastewater flow due to I/I can result in overflows and spillages. Overflows and spillages can occur at bottlenecks, such as at the treatment plant or elsewhere upstream within the system.



KANEHOE/KAILUA WASTEWATER CONVEYANCE AND TREATMENT FACILITIES

REGIONAL WASTEWATER SYSTEM

FIGURE



KANEHOHE/KAILUA WASTEWATER CONVEYANCE AND TREATMENT FACILITIES

TAX MAP KEY PLATS

FIGURE

1-3



Average daily flow (ADF) includes the flow generated by the population in the service area, including residences, commercial and industrial uses. In addition to these flows, average daily flow also includes water that may enter the system through infiltration, where pipes and mains lie below the water table during normal dry weather.

Population in the service area was projected to increase slightly (3.23%) between 1995 and 2020, according to the Koolaupoko Sustainable Communities Plan (SCP) (August 2000), as shown in Table 1-2. A subsequent update of the population projections was prepared by the City Department of Planning & Permitting (DPP) in 2007 indicating a 3.5% decline in population between 2007 and 2035 for the service area, as shown in Table 1-3. This would suggest that the change in average wastewater flow attributable to population over the same period may also decline.

**Table 1-2
Projected Population, 1995 and 2020**

	1995	2020	Difference	Percent
Kailua	41,837	43,517	1,680	+4.02%
Kaneohe	47,742	46,550	-1,192	-2.50%
Kahaluu	16,240	19,169	2,929	+18.04%
Total	105,819	109,236	3,417	+3.23%
Oahu	882,509	1,071,226	188,717	+21.4%

Source: City DPP

**Table 1-3
Projected Population, 2007 and 2035**

	2007	2035	Difference	Percent
Kailua	40,206	38,791	123	+0.9%
Kaneohe	38,983	37,013	-1,970	-5.1%
Kahaluu	13,964	14,087	-1,415	-3.5%
Total	93,153	89,891	-3,262	-3.5%
Oahu	900,523	1,038,317	137,794	+15.3%

Source: City DPP

The low potential for population growth in the service area is evident in Figure 1-4, which is an aerial photo of the service area overlain by the Koolaupoko SCP Land Use Map. The Urban Community Boundary shown on the map indicates areas where future development may proceed through applicable land use entitlement processes, such as rezoning, without amending the SCP. Notably, the majority of the area encompassed by the Urban Community Boundary is already in urban development. Any potential future growth within the boundary would likely be limited to infill development or redevelopment.

The previous population projections prepared by DPP for the Koolaupoko SCP were used to project wastewater flows for the Kailua–Kaneohe-Kahaluu Wastewater Facilities Plan (1998)

(See Table 1-4). Based on the relative modest growth rate of approximately 3.23% between 1995 and 2020, the ADF received at the Kailua Regional WWTP was 12.4 mgd in 1995. The ADF was projected to increase by approximately 12% to 13.9 mgd in 2020. By contrast, the peak flow for 1995 was 98.2 mgd and projected to increase to 99.6 mgd by 2020, an increase of 1.4%. This indicates that peak flow is seven to eight times greater than average daily flow.

**Table 1-4
Modeled Wastewater Flows
Kailua-Kaneohe-Kahaluu, 1995 and 2020 (in mgd)**

Facility/ Basin	Existing Capacity	1995		2020	
		Ave.	Peak	Ave.	Peak
Ahuimanu WWPTF	3.3	0.9	4.4	1.6	7.1
Kaneohe WWPTF	10.0	5.6	51.5	6.0	52.9
Kailua Basin		5.9	40.0	6.2	41.5
Kailua Regional WWTP	28.0	12.4	98.2	13.9	99.6

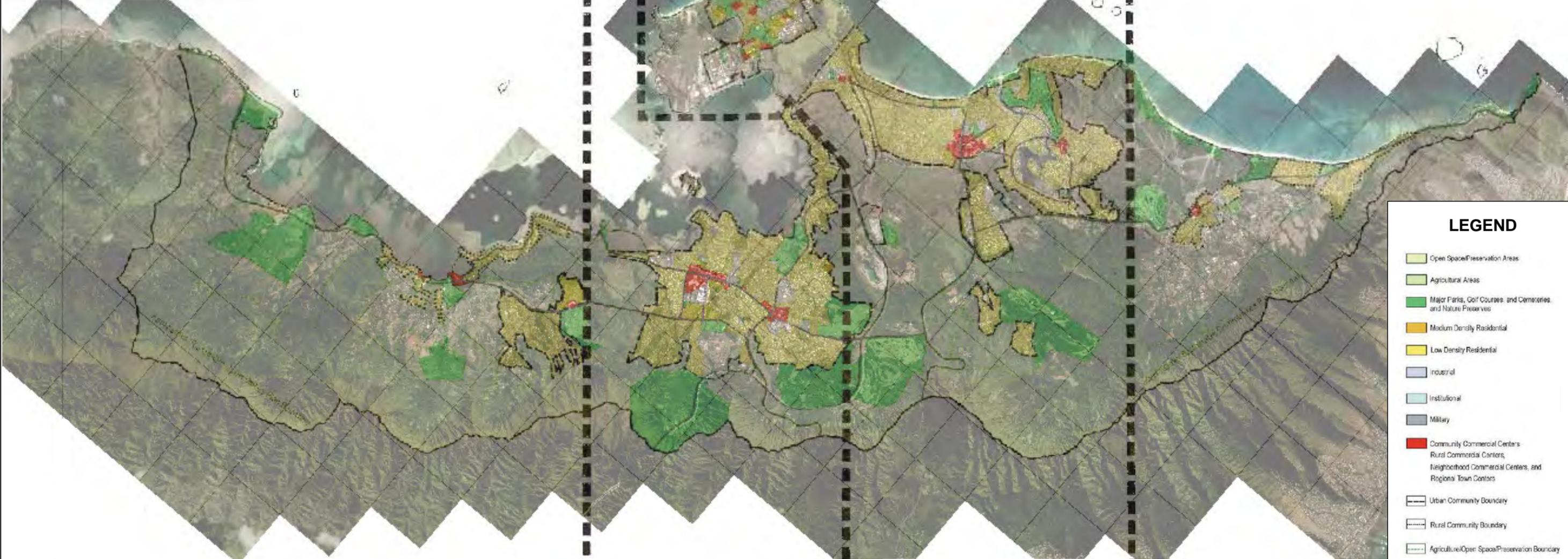
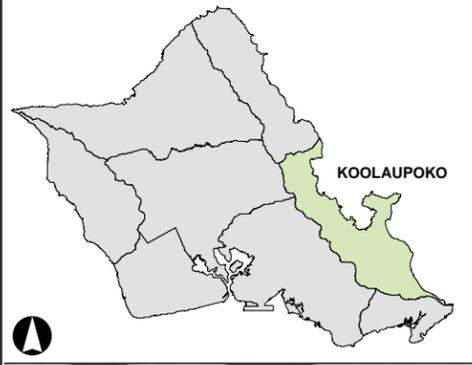
Source: Kailua-Kaneohe-Kahaluu Wastewater Facilities Plan

Although wastewater flows were not modeled using the DPP's updated population projections for 2007 to 2035, the volume of average daily flow could decline slightly, commensurate with the projected 3.5% population decline. Nevertheless, the volume of average daily flow would still be significantly overshadowed by the peak flow during wet weather.

1.4.2 Regulatory Mandates

In response to incidences of wastewater spills in May 1992, a citizens' suit was filed against the City by Save Our Bays and Beaches, Hawaii's Thousand Friends, Sierra Club, and the Surfrider Foundation. The suit alleged violations of the National Pollution Control Act (Clean Water Act) and the terms and conditions of the National Pollutant Discharge Elimination System (NPDES) permits for discharges at the Kailua Regional WWTP and the Kaneohe WWPTF. A Consent Decree between the City and the Environmental Protection Agency (EPA) was executed in 1995 to resolve the claims against the City for the alleged violations at the Kailua and Kaneohe facilities from August 1989 to May 1992. Preparation of the Kailua-Kaneohe-Kahaluu Wastewater Facilities Plan (September 1998) fulfilled one of the terms of the Consent Decree.

Subsequent to the 1998 Facilities Plan, the Final Sewer Infiltration and Inflow Plan (Final I/I Plan) was completed in 1999, also in compliance with the Consent Decree. The overall goal of the Consent Decree is to reduce and prevent sanitary sewer overflows. The Final I/I Plan projected I/I rates for each wastewater service basin and provided a key basis for developing design flows throughout the region. The Plan also includes a twenty year Rehabilitation Program that is mandated under the terms of the Consent Decree. It contains a prioritized list of conceptual Capital Improvement Program (CIP) projects developed to address structural and hydraulic deficiencies. The City has been implementing this Rehabilitation Program over the past ten years. Table 1-5 summarizes major CIP projects completed by the City.



LEGEND

- Open Space/Preservation Areas
- Agricultural Areas
- Major Parks, Golf Courses, and Cemeteries, and Nature Preserves
- Medium Density Residential
- Low Density Residential
- Industrial
- Institutional
- Military
- Community Commercial Centers, Rural Commercial Centers, Neighborhood Commercial Centers, and Regional Town Centers
- Urban Community Boundary
- Rural Community Boundary
- Agriculture/Open Space/Preservation Boundary
- Freeways, Highways, and Major Roads

SECTION 1: KAHALUU SECTION 2: KANEOHE SECTION 3: KAILUA SECTION 4: WAIMANALO

Source: EIS Kailua-Kaneohe-Kahaluu Facilities Plan, Sep 1998

KOOLAUPOKO
SUSTAINABLE COMMUNITIES PLAN



KANEOHE/KAILUA WASTEWATER CONVEYANCE AND TREATMENT FACILITIES
KOOLAUPOKO SUSTAINABLE COMMUNITIES PLAN
LAND USE MAP WITH AERIAL PHOTO OVERLAY

FIGURE
1-4

**Table 1-5
CIP Projects Completed for the Kailua-Kaneohe-Kahaluu Service Area**

Project Title	Construction Work
Alii Shores Sewer Rehabilitation	Rehabilitate approximately 2,356 feet of 36-inch pipe and 8 manholes
Mokapu Boulevard./Ilimalia Loop Sewer Reconstruction	Rehabilitate 167 feet of 24-inch pipe
Kahanahou Circle Sewer Rehabilitation	Rehabilitate approximately 3,715 feet of 8- and 10-inch pipe
Kaneohe Bay Drive Sewer Rehabilitation	Rehabilitate 1,572 feet of 10- and 15-inch pipe
Kailua Road/Makalii Place Sewer Rehabilitation	Rehabilitate 1,124 feet of 21-inch pipe
Kailua/Kaneohe Sewer Rehabilitation	Plan, Design, and Construct improvements to the Enchanted Lakes and Kokokahi sub-basins.
Kailuana Place Sewer Rehabilitation	Rehabilitate or reconstruct 4,975 feet of pipe and 25 manholes
Kainehe St, Hamakua Dr, Keolu Dr Sewer Reconstruction	Install approximately 8,500 feet of 18- to 36-inch pipe
Kainui Drive Trunk Sewer Reconstruction	Rehabilitate approximately 3350 feet of 48-inch pipe
Kalaheo Avenue/ Mokapu Road/ Aikahi Loop Sewer Rehabilitation	Rehabilitate approximately 3,400 feet of 66-inch pipe and 9 manholes
Kalaheo Avenue/Kainui Drive/Dune Circle Sewer Reconstruction	Install approximately 4,000 feet of 48-inch pipe and approximately 3,200 feet of 8-inch pipe
Kalaheo Avenue Sewer Reconstruction	Install approximately 5,300 feet of 48-inch pipe, approximately 3,600 feet of 8-inch pipe and rehabilitate approximately 1,900 feet of 54-inch pipe
Kalaheo Avenue Sewer Reconstruction	Install approximately 4,000 feet of 48-inch pipe and approximately 3,200 feet of 8-inch pipe
Kaneohe Bay Drive Trunk Sewer Reconstruction	Correct hydraulic and physical deficiencies and rehabilitate approximately 1,606 feet of 10-inch pipe
Kamehameha Highway Sewer Reconstruction	Rehabilitate approximately 2,700 feet of 27-inch pipe and 12 manholes
Wanaao Road/Keolu Drive Reconstructed Sewer	Install approximately 9,000 feet of 8- to 42-inch pipe

Pursuant to the Rehabilitation Program, and following discussions with the City, the EPA issued a Stipulated Order in May 2007 for the implementation of a CIP project involving construction of a new force main from the Kaneohe WWPTF to the Kailua WWTP. The new force main would supplement the existing force main such that there would be an alternative means of conveying the wastewater should the aging existing force main fail. The Stipulated Order requires the force main be constructed and operational by the end of 2014. The City

continues to pursue implementation of this project, which includes the preparation of this Environmental Impact Statement (EIS) pursuant to Chapter 343, Hawaii Revised Statutes (HRS).

The alternative of constructing a sewer tunnel that could serve to convey flows while additionally providing flow equalization to prevent wastewater overflows and spillages, as well as allowing the existing 42-inch force main to be abandoned and the Kaneohe WWPTF to be decommissioned, was not considered in previous studies as the cost was thought to be prohibitive. Progressing tunnel technology, however, suggests that, while costly, the life cycle cost of the tunnel could compare favorably to the cost of constructing, operating, and maintaining a new force main, pump station, flow equalization facilities and Kaneohe WWPTF over the tunnel's projected life. The City is pursuing the evaluation of the tunnel alternative to determine whether the life cycle costs, environmental and social impacts, along with community input, prove favorable.

Should the City determine that the sewer tunnel is the preferred alternative, it will need to obtain EPA's concurrence that it would fulfill the intent of the May 2007 Stipulated Order. Moreover, since the time required to design and construct the tunnel would unlikely meet the Order's current deadline of 2014, a time extension may also be required.

2. ALTERNATIVES AND PROPOSED ACTION

The primary alternatives to be assessed in the forthcoming EIS involve two objectives. The first objective is to provide an alternative or supplemental facility to convey wastewater from the Kaneohe WWPTF to the Kailua Regional WWTP. The second objective is to address the problem of peak I/I flows that can occur during wet weather and result in spillages due to potential bottlenecks within the collection and treatment system. The primary alternatives address this problem by providing storage facilities to capture peak flows and allowing subsequent treatment of flows as wastewater after the peaks subside.

2.1 No Action

The no action alternative will not address either of the objectives. The existing force main will remain the only facility conveying wastewater between the Kaneohe WWPTF and the Kailua Regional WWTP. The problem of high I/I during periods of heavy rainfall that can overwhelm the wastewater collection and treatment system would remain unresolved. The no action alternative will also fail to fulfill the May 2007 Stipulated Order.

2.2 Alternative Wastewater Conveyance

The force main alternative was initially developed in response to the May 2007 Stipulated Order. Various alternative routes were considered before the alignment beneath the seafloor of Kaneohe Bay was determined. The sewer tunnel alternative was considered when it appeared that tunnel boring technology had progressed to the stage that such a tunnel could be economically competitive with the force main alternative.

2.3 Alternatives Addressing Infiltration and Inflow

As discussed in Section 1.4 Project Need, infiltration and inflow (I/I) during wet weather conditions can result in extreme peaks in flow that potentially can be seven to eight times greater than the average daily flow within the service area. Discussed below are several alternative means of addressing I/I.

2.3.1 Reduce I/I in the Wastewater Collection System

The primary sources of I/I to the wastewater collection system are damaged sewer lines, pipes, mains, and manhole shafts. Damage to the wastewater collection system is widespread, especially in older portions of the system which were constructed using materials and methods that make them less durable than portions built to current standards with modern materials. These damaged sewer facilities can be repaired, replaced, bypassed with new lines, or rehabilitated, such as by placing durable liners within older pipes. Such methods may be cost-effective for larger facilities, but infeasible for the vast multitude of smaller lines that eventually branch into individual properties. Hence, it is anticipated that I/I to the wastewater collection system will continue to be significant in the future.

2.3.2 Increase Capacity for Peak Wet Weather Flow

When sewer facilities are not sufficient to accommodate peak flows, back-ups can cause spillages. In gravity flow lines, spillages could occur at manholes. In pump stations and force mains, insufficient capacity could result in a spill at the wastewater pump station. Capacity can be increased by replacement with a larger line or larger capacity force main

and pump station, or installation of a relief line to add capacity while keeping the older line in service.

2.3.3 Flow Equalization

Flow equalization refers to the temporary storage of excess wastewater generated during periods of high flow. Stored flows can subsequently be fed back into the system at a controlled rate that the system can accommodate. To be effective, flow equalization would be provided upstream of potential bottlenecks, such as before a sewer main, wastewater pump station or wastewater treatment plant with insufficient capacity to accommodate a peak flow. The equalization facility could be an open or closed reservoir, similar to a water tank, or an oversized underground sewer pipe, such as a sewer tunnel. There are unique requirements for each of these types of storage options involving how wastewater is sent to the facility, how it is drained and cleaned, and how odors and debris are managed.

2.3.4 Treatment Plant Expansion

Once I/I enter the wastewater collection system, it becomes wastewater that must be treated along with the wastewater that is intended to be in the system. A wastewater treatment plant must accommodate peak flows regardless of the disparity between average flows and peak flows. If this disparity is too great, however, the efficiency of the treatment process may be compromised. Unless sufficient flow equalization is provided, treatment plant expansion to accommodate peak flows may be necessary.

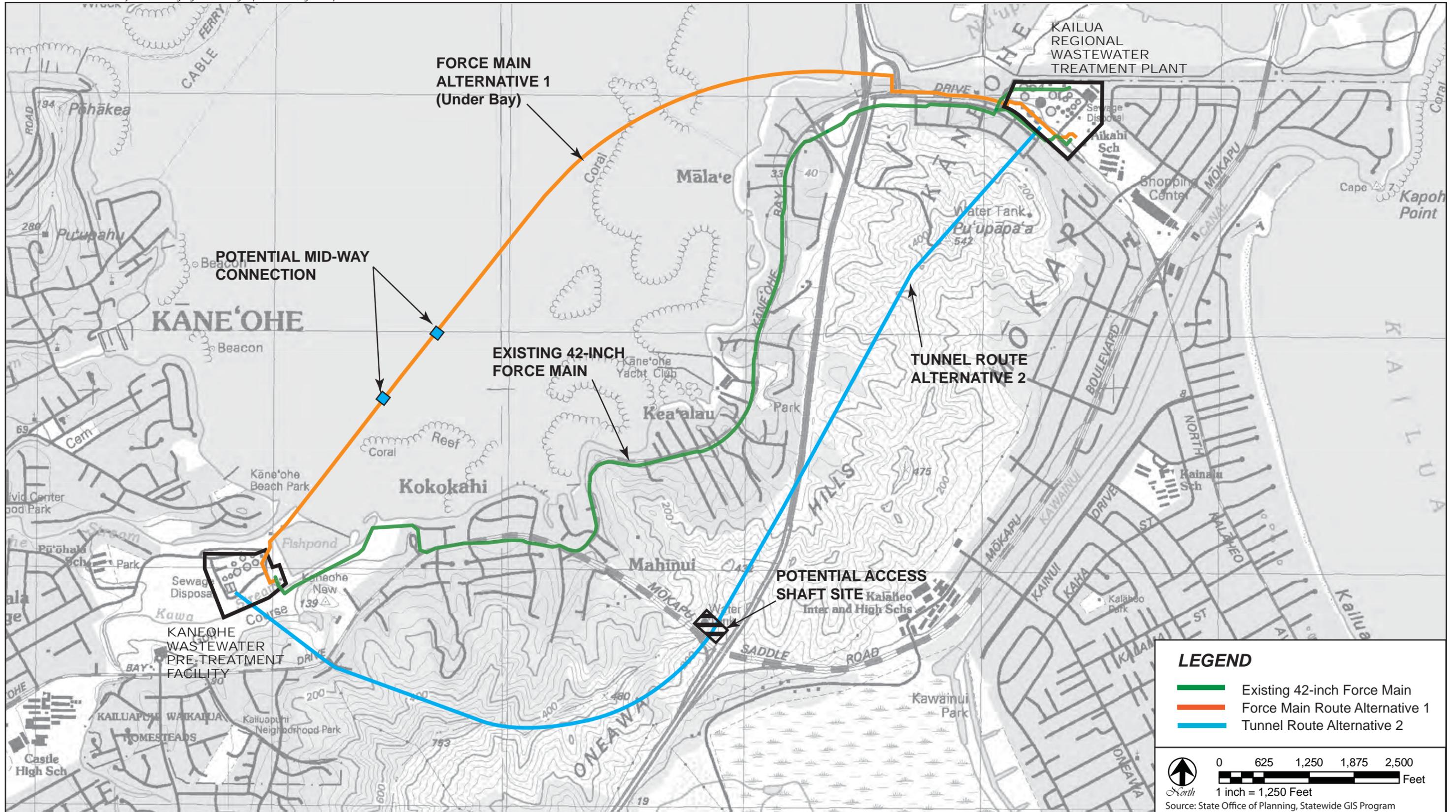
2.4 Proposed Action

The proposed action consists of two major alternatives to convey and store wastewater, one of which would be constructed (see Figure 2-1). To provide a basis for comparing the impacts of the two major alternatives, they are defined to comparably address conveyance and storage needs. The two major alternatives are described below.

2.4.1 Alternative 1 – Force Main No. 2 and New Equalization Facilities

This alternative involves constructing a 36-inch diameter (interior size) force main beneath the seafloor of Kaneohe Bay. The force main will convey pre-treated wastewater from the Kaneohe WWPTF to the Kailua Regional WWTP. Since the force main will convey the wastewater under pressure, its profile need not be sloped downhill. Also, the pressurized force main has no air space to allow for storage of excess wastewater. Therefore, the force main alternative will require the construction of an up to 7-million gallon equalization facility, which is essentially a wastewater reservoir, at the Kaneohe WWPTF, and an up to 3-million gallon equalization facility at the Kailua Regional WWTP. These equalization facilities are not required by the May 2007 Stipulated Order.

The force main will primarily be constructed by horizontal directional drilling (HDD). HDD involves the use of a drilling machine that can be steered to its destination from its launching point. After the bore is completed, the pipe, which is made of PVC plastic and jacketed by a steel casing, is installed by pulling it through the bore hole.



KANEOHE/KAILUA WASTEWATER CONVEYANCE AND TREATMENT FACILITIES

PRELIMINARY ROUTE ALTERNATIVES

FIGURE

2-1



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The limitation of using HDD is the distance over which a size of pipe can be installed in a single operation. This limitation is governed by the amount of friction exerted on the pipe when it is pulled through the bore. Until recently, the approximately three-mile distance between Kaneohe WWPTF and the Kailua Regional WWTP for the size of pipe required had not been done in a single operation, or “pull.” More recent technology and methods, however, suggest that this may be possible, although some risk would be involved. The City intends that the future contractor be allowed to choose his own methods for construction and this may involve choosing to include a connection point within Kaneohe Bay. Figure 2-2 shows sub-alternative routes 1A, 1B, 1C and 1D, which are based on potential advantages suggested by the type of materials comprising the seafloor through which the force main would be constructed. Also shown are potential connection points within the Bay.

If the force main is constructed in a single operation, the drill will be launched from the Kaneohe WWPTF, where more space is available to stage the operation. A large staging area is required to lay out the relatively rigid pipe. Ideally, installation of a pipe would be accomplished in a single pull without stopping. By stopping, the momentum of the pull is lost and materials around the pipe could settle, increasing friction when the pull resumes. For a pipe approximately three miles long, it would not be feasible to accomplish installation in a single pull, so the alternative would be to minimize the number of stoppages required to join pipes and resume the pull. The risk is that if the pipe gets stuck and cannot be pulled through without damage, it may need to be cut and abandoned in place and the effort redone.

Sub-alternative 1A involves construction of the force main in a single operation and assumes that the pipe will be laid out in four sections that will be joined and installed in four pulls in as quick succession as possible.

Sub-alternatives 1B and 1C shorten the length of pipe that would be pulled through an HDD bore, thereby reducing the risk of not being able to complete the operation. Both involve a connection point in Kaneohe Bay.

Sub-Alternative 1B would divide pipe installation into two parts by making two HDD bores and pulling two lengths of pipe. The first bore and pipe insertion would be staged from the Kaneohe WWPTF to the connection point in Kaneohe Bay. A temporary platform constructed at the connection point would be used to stage the pipe pull. The second bore could be staged from either the temporary platform in Kaneohe Bay to the Kailua Regional WWTP or from the plant to the connection point in Kaneohe Bay. Likewise, the pipe pull could be done from either end. If the insertion is from the connection point in Kaneohe Bay, the pipe would be constructed at the Kaneohe WWPTF and towed, floating, to the bore for insertion. It would be installed by pulling it through from the Kailua Regional WWTP. Alternatively, if a sufficient staging area can be accommodated at the Kailua Regional WWTP, the pipe could be inserted there and pulled to the connection point from the temporary platform in Kaneohe Bay.

Regardless of which option is chosen for the bore and pipe pull, at the connection point, a cofferdam constructed of interlocking steel sheet piling driven into the seafloor will contain any disturbed silt. The enclosed seafloor will then be excavated to the depth of the connection point and divers will cut, fuse, and weld the two ends of the force main.

Sub-Alternative 1C would shorten the HDD bore and pipe pull by initially constructing a pipe larger than the force main pipe from the Kaneohe WWPTF to a connection point within Kaneohe Bay, then conducting the HDD bore and pipe pull to the Kailua Regional WWTP through the larger pipe. The larger pipe would be constructed by a method referred to as micro-tunneling. In this method, a cutter head is pushed through the ground by sections of pipe that are “jacked” into the hole behind it. The excavated spoil material is removed through the pipe. Unlike HDD, micro-tunneling cannot be steered, so it must be directed in a straight line to the connection point. Once the larger pipe is installed, the HDD drill would be inserted into the pipe up to the connection point, then bore through to the Kailua Regional WWTP. The force main pipe would then be pulled through the larger pipe to complete the installation. As in Sub-Alternative 1B, a cofferdam would be constructed at the connection point where the micro-tunneling cutter head would be retrieved by excavating the seafloor.

Sub-Alternative 1D does not involve HDD or pipe pulling. Instead a tunnel up to nine feet in interior diameter would be constructed from the Kaneohe WWPTF to the Kailua Regional WWTP and the force main would be placed and secured within the tunnel. The tunnel will be constructed using a Tunnel Boring Machine (TBM). It will excavate a bore up to nine feet in diameter. As the TBM proceeds, the completed bore will be lined with pre-cast reinforced concrete sections and backfilled for a finished minimum interior diameter of eight feet. Spoils generated by the TBM could be extracted as slurry, or removed by conveyor or rail car. Depending on what the spoils are comprised of, it may be processed, dewatered and hauled away by trucks for disposal. Alternatively, wet material would be hauled away in trucks with lined beds to prevent leakage. The construction contractor could dispose of the spoils as fill material, where permitted, as arranged through agreements with landowners desiring such fill. If not, the spoils could be disposed of at a landfill where it would be used as “daily cover” (each day’s landfill disposal is required to be covered by a layer of earthen material). Workers, air, lighting, construction materials, machinery, and replacement parts, such as the cutter heads for the TBM, will be delivered to the front of the bore through the tunnel, most likely by rail car on tracks, from the Kailua Regional WWTP.

2.4.2 Alternative 2 – Sewer Tunnel

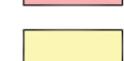
This alternative involves constructing an approximately three-mile long tunnel, up to 13 feet in interior diameter from the Kaneohe WWPTF to the Kailua Regional WWTP to convey wastewater. The tunnel will be aligned to traverse under Oneawa Hills, mauka of Kaneohe Bay Drive, as shown in Figure 2-3.

Tunnel construction could be staged from either the Kaneohe WWPTF or the Kailua Regional WWTP and would involve the use of the TBM to bore an initial tunnel up to 15 feet in diameter. The access and retrieval points for the TBM will be at vertical shafts at either end of the tunnel. Depending on the substrate, controlled blasting may be used to construct the shaft at the Kailua Regional WWTP. Since approximately 95% of the proposed route will be through un-weathered basalt, no structural lining will be required in these areas. Instead, pins, wire mesh and steel bands will be used, as necessary, to achieve structural stability. A reinforced concrete lining will then be applied, resulting in a finished interior diameter of up to 13 feet. Spoils generated by the TBM will be extracted through the completed portion of the tunnel. Comprised mostly of un-weathered basalt, the spoils will be removed as crushed rock, which can be readily processed for use as construction material.

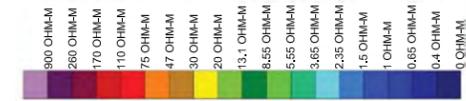
LEGEND

-  BORINGS BY YKE
-  GEOPHYSICAL SURVEY
-  PROPOSED NEW SEWER FORCE MAIN ALIGNMENT
- 21 STANDARD PENETRATION (SPT) BLOW COUNTS
- [21] DAMES & MOORE SAMPLER BLOW COUNTS
-  GROUNDWATER LEVEL MEASURED DURING SOIL EXPLORATION
- REC CORE RECOVERY, IN PERCENT
- RQD ROCK QUALITY DESIGNATION, IN PERCENT

GEOLOGIC UNITS

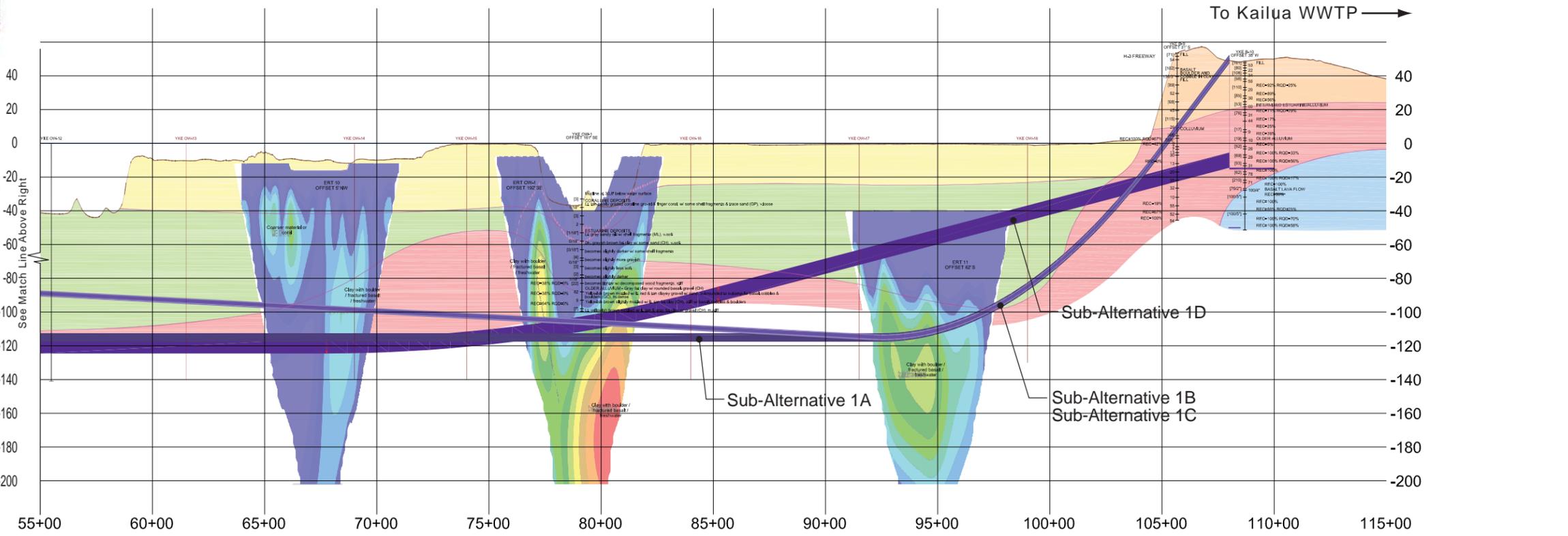
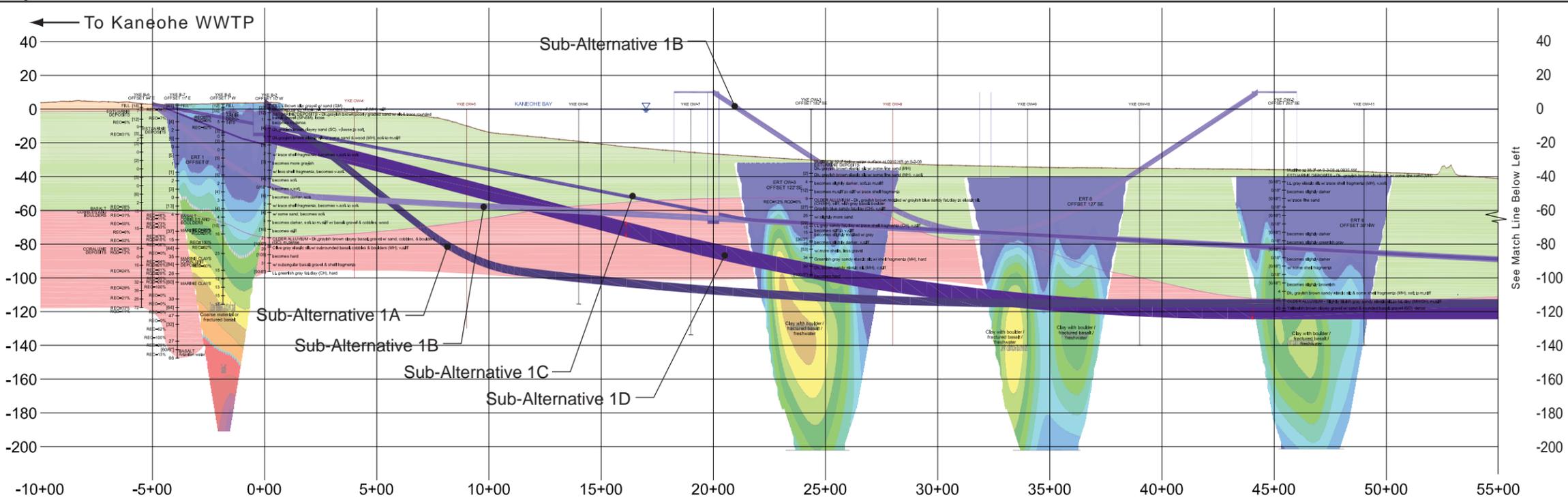
-  PRIMARILY FILL MATERIALS
-  PRIMARILY ESTUARINE DEPOSITS
-  PRIMARILY OLDER ALLUVIAL DEPOSITS
-  PRIMARILY CORAL REEF LIMESTONES AND CORALLINE DEPOSITS
-  PRIMARILY BASALT LAVA FLOWS TO WEATHERED BASALT

NOTES ON GEOPHYSICAL SURVEY:



1. RESISTIVITY VALUES AT TOP OF OLDER ALLUVIUM IS 5.5 OHM-M AT BORING B-2, AND 0.4 OHM-M AT BORINGS OW-1 AND OW-3.
2. ZONES WITH RESISTIVITY GREATER THAN 0.4 TO 5.5 OHM-M ARE INTERPRETED AS COARSER MATERIALS, SUCH AS BOULDER, GRAVEL, CORAL, FRACTURED BASALT, AND PRESENCE OF FRESHWATER.
3. ZONES WITH RESISTIVITY GREATER THAN 75 OHM-M INTERPRETED AS BEDROCK.
4. S-WAVE CONTOUR LINE OF 600 FT/S INTERPRETED AS TOP OF OLDER ALLUVIUM.

Prepared by: Yogi Kwong Engineers, LLC
May 18, 2010



PROFILE
NOT TO SCALE

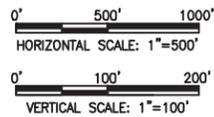
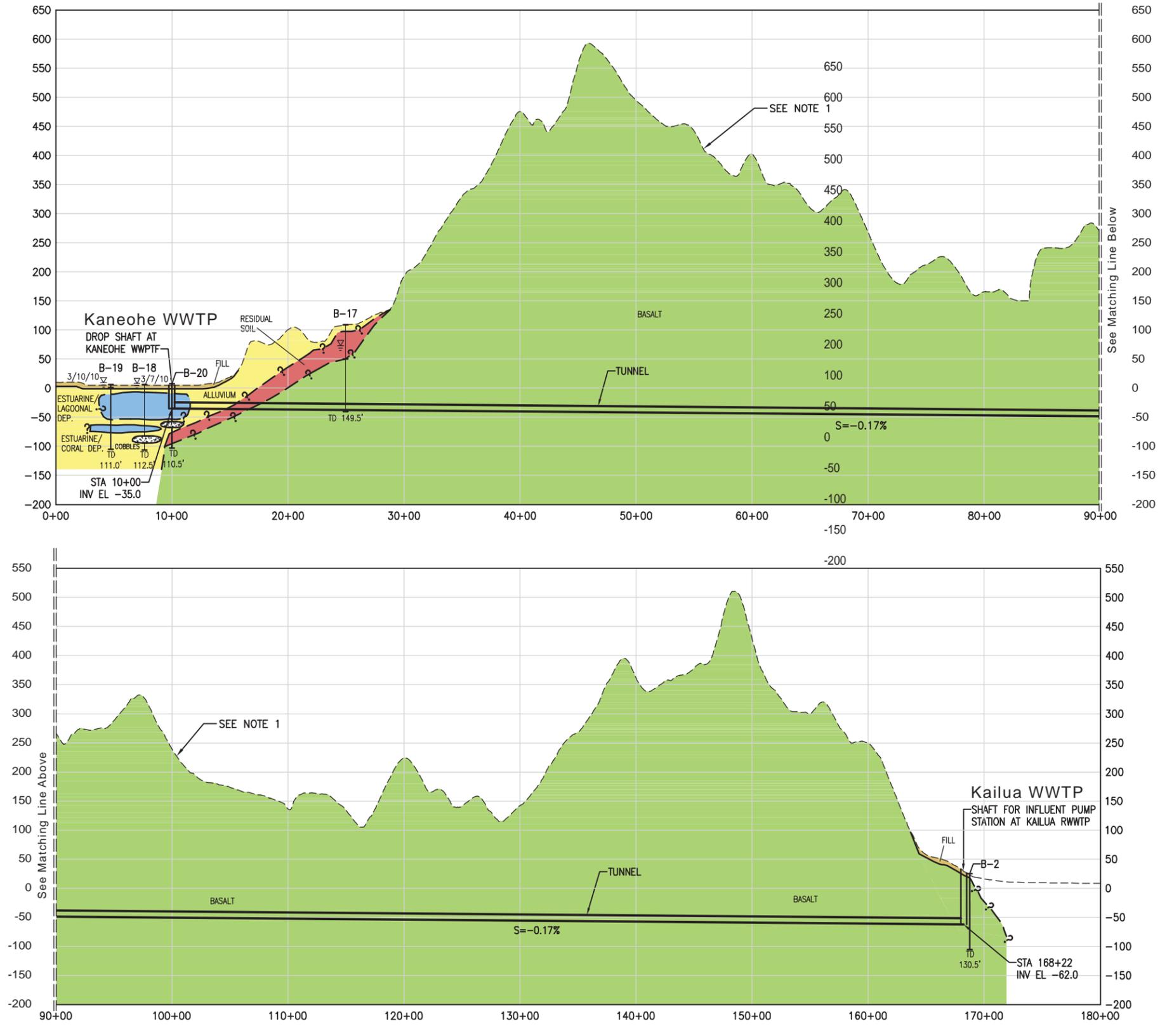
KANEOHE/KAILUA WASTEWATER CONVEYANCE AND TREATMENT FACILITIES

ALTERNATIVE 1 FORCE MAIN ROUTE PROFILE

FIGURE

2-2





Prepared by: Jacobs Associates Engineering/Consultants
May 19, 2010

KANEOHE/KAILUA WASTEWATER CONVEYANCE AND TREATMENT FACILITIES

ALTERNATIVE 2 TUNNEL ROUTE PROFILE

FIGURE

2-3

Spoils that are unsuitable as construction material will be disposed of as described in Sub-Alternative 1D, above. Workers, air, lighting, construction materials, machinery, and replacement parts such as cutter heads for the TBM will be delivered to the front of the bore through the tunnel, most likely by rail car on tracks. A vertical access shaft will be drilled into the tunnel in the vicinity of the Mokapu Saddle Road interchange of the John A. Burns Freeway (Interstate Route H-3).

Since the finished tunnel would convey wastewater by gravity flow, it is inclined throughout its length toward the Kailua Regional WWTP. It will start at a depth (bottom of tunnel) of approximately 35 feet below mean sea level (MSL) at the Kaneohe WWPTF, where it will be approximately 40 feet below ground level. Wastewater from the incoming sewer lines will enter the tunnel through a drop shaft. An odor control system will be incorporated at the drop shaft. The tunnel will end at a depth (bottom of tunnel) of 62 feet below MSL at the Kailua Regional WWTP, where it will be approximately 82 feet below ground level. A new influent pump station (IPS) will lift the wastewater from the vertical shaft to the surface for treatment. An odor control system will be incorporated in the IPS. The diameter of the tunnel will allow it to store wastewater during periods of high wastewater flow, such as during periods of high rainfall when significant amounts of I/I enter the wastewater collection system.

2.4.3 Other Treatment-Related Facilities

Regardless of which conveyance and storage alternative is selected, two improvements at the Kailua Regional WWTP are proposed, including a new headworks facility replacing the existing headworks and a new dewatering facility to replace the existing dewatering building. While the location and configuration of these facilities may vary according to the alternative selected, replacement of both is proposed.

The headworks houses equipment for screening and grit removal from wastewater prior to treatment. Currently, this is accomplished at the Kaneohe WWPTF prior to flows entering the existing force main from the Ahuimanu and Kaneohe portion of the service area. Flows from the Kailua area are screened twice, once upstream of the Kailua Regional WWTP and again for additional grit removal at the existing WWTP headworks. A new headworks at the Kailua Regional WWTP would include construction of a new facility in an enclosed building with odor control. Its location and design will depend on the alternative selected for wastewater conveyance.

The aging biosolids dewatering building at the Kailua Regional WWTP has structural problems and needs to be replaced. Dewatering involves the use of centrifuges to remove water from digested sludge prior to disposal. Alternative locations for the new digester building within the WWTP are being considered.

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3. EXISTING ENVIRONMENT, IMPACTS AND MITIGATION MEASURES

3.1 Climate

The climate in Koolaupoko is characterized as mild subtropical. Temperatures in the area are relatively uniform throughout the year, ranging from 71° Fahrenheit (F) to 78°F. Relative humidity ranges between 70 and 80 percent. Northeast tradewinds prevail throughout most of the year, with average wind speeds from 10 to 15 miles per hour (mph). In general, tradewinds are more persistent during summer months. Windward Oahu receives high average annual rainfall, with the most intense rainfall occurring along the ridgeline of the Koolau Range. Due to its proximity to the ridgeline, the project area experiences annual rainfall averages of approximately 50 inches along coastal areas and 150 inches along the crest of the Koolau Range.

Impacts and Mitigation Measures

No significant impacts on climate in the project area are anticipated. The proposed tunnel route and force main corridor is not anticipated to affect temperatures, wind, or rainfall levels in the project area.

3.2 Physiography

3.2.1 Geology and Topography

The physiography of Windward Oahu is dominated by the Koolau Range, the eroded remnants of a volcanic dome. The Koolau Range runs generally northwest to southeast and forms the western-southwestern boundary of the project area. Precipitous fluted cliffs (pali) extend for 20 miles on the windward side of the Koolau Range, transitioning to a fringing coastal plain.

Kaneohe WWPTF: Along the base of the Koolau Range, the land is characterized by both older and younger alluvium sediment comprised of predominantly silt and clay, with lesser amounts of sand and gravel and a few beds of poorly sorted gravel and cobbles. The younger alluvium, which extends up stream valleys, consists primarily of gravel, sand, and silt. Much of the coastal plain is underlain by calcareous sedimentary material.

The topography in the area of the Kaneohe WWPTF consists of gentle slopes extending from the back of valleys to the shoreline. The coastal plain, which encompasses most of the relatively flat and developable areas, rises at a gentle slope to the 200-foot elevation. The Kaneohe WWPTF is located at an elevation of approximately 20 feet mean sea level (MSL). Moderate slopes of less than 10 percent prevail in much of the Kaneohe area, however, steep to moderately steep ridges separating Kaneohe from the Waimanalo area to the south.

Kailua Regional WWTP: In the Kailua area, substrata generally consists of alluvium, dune sand, colluvium erosional deposits, mudflow deposits, and lagoonal deposits. Along the Kailua Bay coastline, coralline sand deposits occur for several thousand feet inland, along with highly permeable dune and beach deposits. Much of the Mokapu Peninsula was formed by late-stage basaltic eruptions.

The Kailua Regional WWTP is located at an elevation of approximately 4 feet MSL. Moderate slopes of less than 10 percent occur across much of the Kailua area. In the southern portion of Kailua, steep to moderately steep slopes are present near the coast. Steep to moderately steep ridges separate Kailua from Waimanalo to the south.

Alternative 1 Force Main and Equalization Facilities: The proposed alignment for the force main corridor is underlain by estuarine deposits and older alluvial deposits to elevations between 60 and 120 feet below MSL. In sub alternative 1B and 1C, a mid-way connection will be built at 60 feet below MSL. The force main corridor will travel through layers of older alluvial, estuarine, and primary fill materials to the H-3 Interchange (approximate elevation of 20 to 50 feet below MSL), then continue to the Kailua Regional WWTP.

Alternative 2 Tunnel: Primarily underlain by basalt, the proposed tunnel route will begin at the Kaneohe WWPTF at sea level and will traverse through lagoonal/coral deposits to a depth of approximately 38 feet below MSL. The tunnel route will continue beneath Oneawa Hills for approximately three miles through layers of basalt to the Kailua Regional WWTP, near the H-3 interchange at a depth of approximately 62 feet below MSL. The tunnel will emerge at the surface of the Kailua Regional WWTP through layers of basalt, lagoonal deposits and fill materials.

Impacts and Mitigation Measures

No significant impacts on the geology of the affected project sites are anticipated as a result of the construction and operation of the proposed improvements.

In the short-term, there will be impacts related to construction activities at the Kaneohe WWPTF and the Kailua Regional WWTP. Construction will entail site preparation followed by tunneling operations that will generate spoils, which will be removed from the construction site for disposal. In general, the tunnel alternative will involve significantly greater construction activity and spoils removal than the force main alternative at the Kailua Regional WWTP. If the force main alternative involves a mid-way connection, a portion of the drilling and HDD operation will be conducted from the Kailua side. Construction of the equalization facilities at the Kaneohe WWPTF and the Kailua Regional WWTP in the force main alternative will disturb a greater area of the facility than the tunnel alternative. Although the construction activities will not adversely impact or alter the geological character of the affected project sites, there is the potential for increased erosion and runoff, as well as loss of soil due to the handling of spoils. The potential impacts resulting from any increase in erosion and runoff and applicable mitigative measures are discussed in Section 3.2.2.

Construction activities will involve grading and some excavation of presently undeveloped and developed areas within the affected project sites. However, the relatively flat terrain of these areas would minimize the amount of grading required. The proposed project is not anticipated to have any long-term impacts on area geology and topography. Following construction, disturbed areas will either be built over, paved over, or backfilled to its existing contours.

3.2.2 Soils

There are nine different principal soil series in the project area based on the U.S. Department of Agriculture Natural Resources Conservation Service soil classifications: the Hanalei series, Alaeloa series, Helemano series, Kaneohe series, Papaa series, Kokokahi series, Keaau series, Mamala series, and the Jaucas series (see Figure 3-1).

Kaneohe WWPTF: The Kaneohe WWPTF is located on Hanalei soils. Hanalei soils are found on bottom lands and low terraces along streams. They consist of somewhat poorly drained to poorly drained soils. Hanalei soils are formed in alluvium derived from basic igneous rock.

Kailua Regional WWTP: The Kailua Regional WWTP is located on four different types of soils series. The western and southern portions of the WWTP are located on Kokokahi soils. Kokokahi soils are found on coastal plains, alluvial fans, and talus slopes adjacent to uplands at elevations from sea level to 125 feet. They consist of deep, well drained soils that formed in alluvium and colluvium from basalt. The central portion of the WWTP is located on Keaau soils. Keaau soils are found on coastal plains at elevations of 5 to 40 feet. They consist of deep, poorly drained soils that formed in alluvium weathered from basic igneous rocks and deposited over reef limestone or consolidated coral sand. The north eastern portion of the WWTP is located on Mamala soils. Mamala soils are found on coastal plains at elevations near sea level to 100 feet. They consist of well drained soils formed in alluvium deposited over coral sand. A small area of the eastern portion of the WWTP is located on Jaucas soils. Jaucas soils are found above high tide on coastal beaches. They consist of very deep; excessively drained, very rapidly permeable soils formed from sand-sized fragments of coral and sea shells on vegetated beach areas along the coast.

Alternative 1 Force Main and Equalization Facilities: The force main corridor will traverse through Hanalei soils at the Kaneohe WWPTF, Bay View Golf Course, and the Kokokahi YWCA before entering the substrata underlying Kaneohe Bay. After exiting Kaneohe Bay, the force main will pass through Jaucas, Keaau, and Kokokahi soils from the Kaneohe Bay Drive/H3 Freeway Interchange to the Kailua Regional WWTP. The equalization basin located at the Kaneohe WWPTF will be underlain by Hanalei soils.

Alternative 2 Tunnel: Beginning at the Kaneohe WWPTF, the tunnel route will traverse through Hanalei, Alaeloa, Helemano, Papaa, Kokokahi, and stony steep land soils. Helemano soil series are found at elevations of 500 to 1,200 feet on sides of V-shaped gulches with slopes of 30 to 90 percent. They consist of very deep, well drained soils formed in alluvium and colluvium from basic igneous rock. Papaa soils are found on uplands from near sea level to elevations of 500 feet with slopes ranging from 6 to 70 percent. They consist of deep, well drained soils formed from weathered basalt and colluvium. Stony steep land is characterized as a mass of boulders and stones deposited by water or gravity in valley bottoms or on side slopes of drainage ways, with very steep slopes.

Impacts and Mitigation Measures

No significant impacts on soils in the project area are anticipated. The construction of the proposed improvements will occur underground at depths of approximately 38 feet below MSL at the Kaneohe WWPTF to approximately 62 feet below MSL at the Kailua Regional WWTP.

In the short-term, there will be impacts on soils as a result of construction activities at the Kaneohe WWPTF and the Kailua Regional WWTP. Excavation and grading activities will be regulated by the City and County of Honolulu's grading ordinance and the National Pollutant Discharge Elimination System (NPDES) permit requirements administered by the State Department of Health (DOH). An NPDES Individual Permit for Storm Water Associated with Construction Activities will be required should the area of soil disturbance from activities such as clearing, grubbing, grading, and stockpiling be in excess of one acre. In conjunction with the NPDES permit, a Best Management Practices (BMP) plan will be prepared, which requires compliance with City ordinances pertaining to grading, grubbing, stockpiling, soil erosion, and sedimentation.

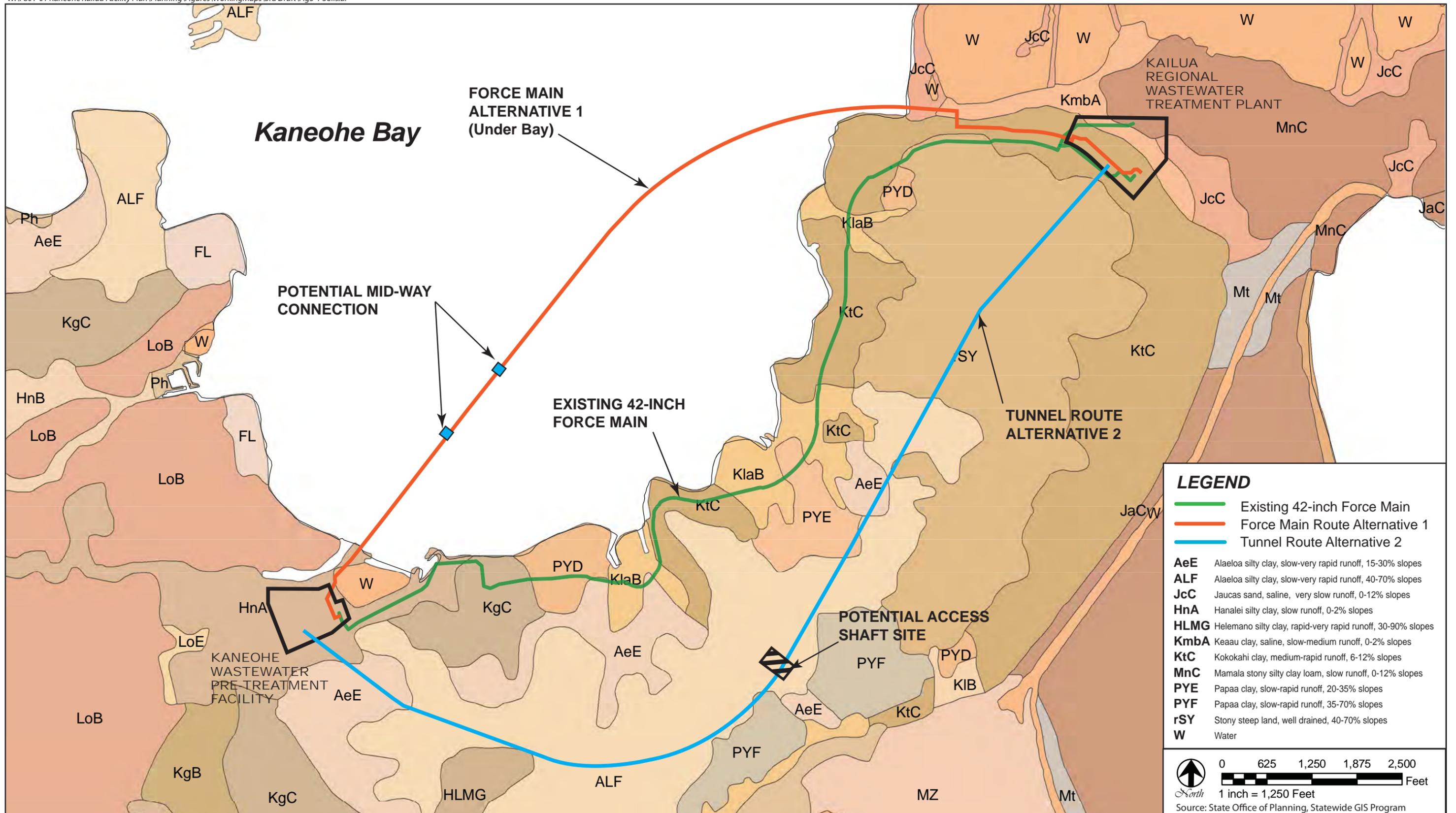
Subsurface construction activities will remove most of the existing soils near the surface of the affected areas. It will be the responsibility of the construction contractor(s) to dispose of any excess soils removed during construction of the project. Depending on its quality and usefulness, excess soils may be used as fill at other project sites or disposed of in a landfill.

The proposed project is not anticipated to have any long-term impacts on area soils. Following construction, disturbed areas at the Kaneohe WWPTF and the Kailua Regional WWTP will be built over, paved over, or re-vegetated to control erosion.

3.3 Hydrology

3.3.1 Surface Water

The high quantity of rainfall on the Windward side of the Koolau Range supports numerous perennial streams. Perennial streams found within the project area include Kamooalii Stream, Kaneohe Stream, Kawa Stream, and Kawainui/Maunawili Stream (Hawaii Stream Assessment, 1990) (see Figure 1-3). There are no designated wild or scenic rivers in the project area as defined under the Federal Wild and Scenic Rivers Act.



KANEOHE/KAILUA WASTEWATER CONVEYANCE AND TREATMENT FACILITIES

SOILS MAP

FIGURE

3-1

Kaneohe WWPTF: Kaneohe Stream begins at the base of the Koolau Range in Hoomaluhia Park, about one-half mile to the southwest of Windward Community College. Together with its tributaries Kamooalii, Luluku, and Kapunahala Streams, Kaneohe Stream drains the entire Kaneohe area. Kaneohe Stream flows through Kaneohe Town, 250 feet from the northern boundary of the Kaneohe WWPTF, and enters Kaneohe Bay northwest of Waikalua Loko Fish Pond. The lower reach of Kaneohe Stream, below the confluence of Kamooalii and Kapunahala Streams, is approximately 1.2 miles long and discharges flows of 13 million gallons per day (mgd) (U.S. Fish and Wildlife, 1978). According to the Hawaii Stream Assessment, the Kaneohe Stream System has moderate aquatic resources and substantial riparian and recreational resources.

Kawa Stream flows along the southern boundary of the Kaneohe WWPTF and discharges into Kaneohe Bay makai of Kokokahi YWCA. It is a relatively short perennial stream (approximately 2.5 miles) with no tributaries. Kawa Stream has a mean daily flow of 1 mgd and has a drainage area of approximately 1,330 acres (Kailua Bay Advisory Council, 2002). It flows through the southern portion of Kaneohe Town and enters Kaneohe Bay near Waikalua Loko Fish Pond.

Kailua Regional WWTP: The Kailua Regional WWTP is located approximately 0.5 miles west of the Kawai Nui Canal. The Kawainui/Maunawili, Kawailoa, and Kawaiiki Streams are part of the Anahulu Stream System, which drains an area of approximately 10,394 acres on the slopes of Maunawili Valley and Mount Olomana. The stream flows north through Kawai Nui Marsh and into Kawai Nui Canal, which empties into Kailua Bay. Maunawili Stream is rated as a "candidate stream for protection" by the State Department of Land and Natural Resources (DLNR), Commission Water Resource Management (CWRM) because of outstanding cultural, riparian and recreational values. According to the Hawaii Stream Assessment, Kawainui/Maunawili Stream has limited aquatic resources, outstanding riparian and cultural resources and substantial recreation resources.

Alternative 1 Force Main and Equalization Facilities: The proposed force main corridor route will directly enter the substrata beneath Kaneohe Bay, the nearest surface water body.

Alternative 2 Tunnel: The proposed tunnel route will traverse beneath the Kaneohe, Kawa, and Keaalu Streams.

Impacts and Mitigation Measures

In the short-term, construction activities occurring at the Kaneohe WWPTF and the Kailua Regional WWTP have the potential of affecting surface waters. Potential impacts to the quality of surface waters in streams and drainage systems during construction will be mitigated by adherence to State of Hawaii and City and County of Honolulu water quality regulations governing grading, excavation, and stockpiling.

Dewatering of excavated areas may be required where facilities will lie below the water table. Discharging dewatering effluent into the City's drainage systems and waters of the United States has the potential for increasing sediment loads in surface waters. An NPDES Permit for Discharges Associated with Construction Dewatering will be required if any discharges of dewatering effluent is anticipated into the City

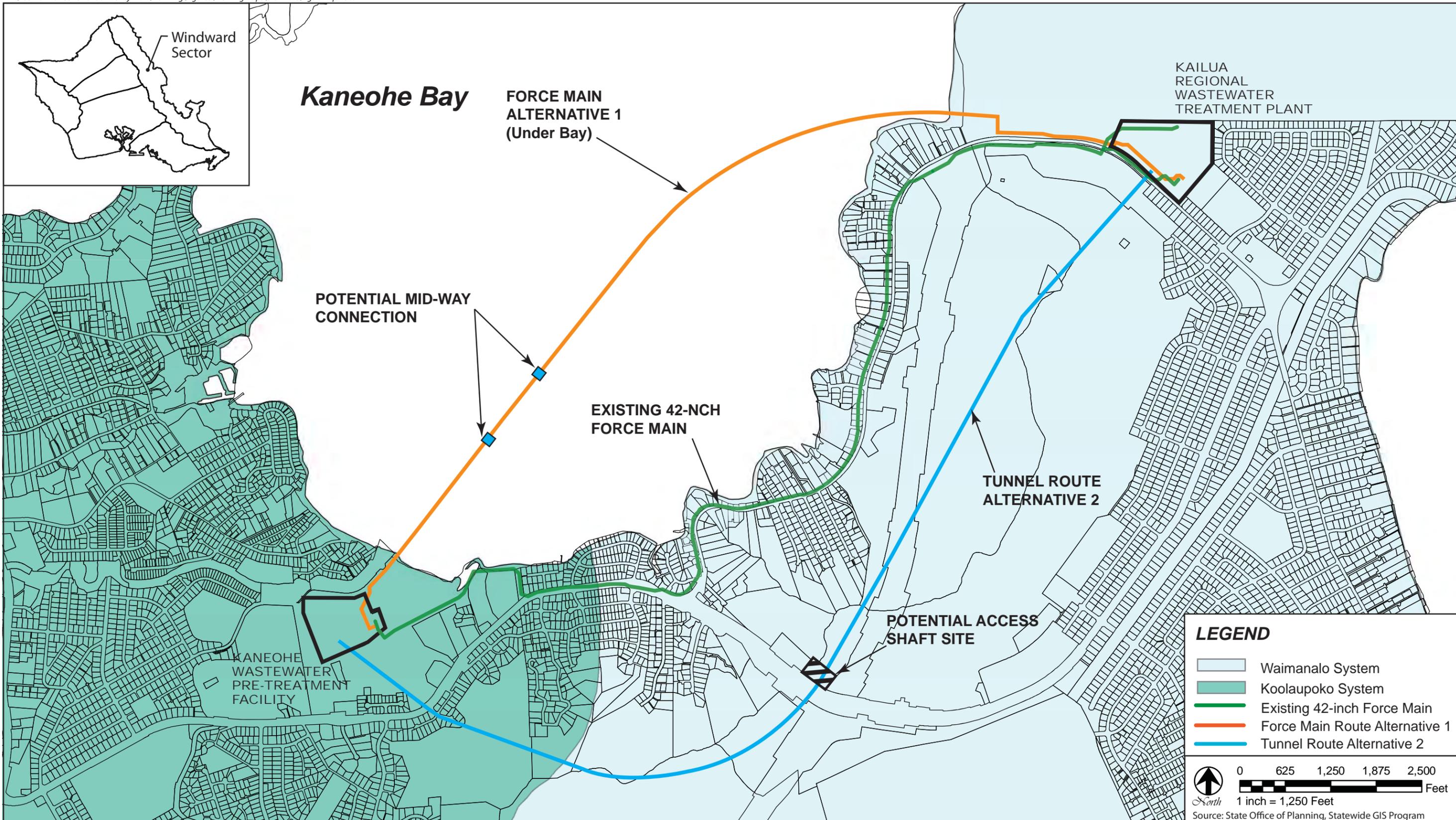
drainage systems and waters of the United States. In conjunction with the NPDES permit, a dewatering plan is required to address the anticipated rate of dewatering and method of treatment and disposal. If it is determined that dewatering effluent will be discharged into a municipal drainage system, a permit from the City and County of Honolulu Department of Planning and Permitting will also be required. The municipal storm drains in the project area discharge into area streams and canals and ultimately into either Kaneohe Bay or Kailua Bay.

The NPDES permit for dewatering activities will include a BMP plan, erosion control and water quality monitoring plans, as may be required. A BMP plan establishes procedures for operating the dewatering system, including appropriate or applicable structural or non-structural methods that will be established and implemented to reduce and control discharge or effluent resulting from dewatering activities. Typically, specific procedures are provided for the maintenance of dewatering equipment, including disposal of sediments collected in settling containers; monitoring water quality of samples collected from designated points in the dewatering system; preventing storm runoff and sediment from entering the excavated area; and procedures for modifying or terminating dewatering activities if the system is failing to operate as intended. Water quality impacts associated with the disposal of dewatering effluent will also be addressed in the BMP plan, including appropriate characterization of any potential pollutants such as sediments and nutrients in the effluent.

The proposed improvements will have beneficial, long-term water quality impacts on surface waters in the project area. Potential impacts due to leakage or accidental breakage of the force main or tunnel will be mitigated by proper design, construction, and operation of facilities. Standard procedures for detecting leaks and breaks and for shutting down and repairing the lines will minimize impacts. Appropriate public health warnings will be issued to mitigate risks of public contact with the wastewater. Any potential for wastewater spills at the affected wastewater facilities affecting streams and drainage systems in the vicinity in the event of flow diversion or flooding will be mitigated by designing the proposed facilities with adequate capacities and flood protection. The facilities will be designed to handle a design storm above that required by previous design standards, which should result in less spills and therefore improve water quality. The reduction of spills and bypasses will help to reduce the cumulative impacts on the water quality resulting from regional non-point source pollution.

3.3.2 Groundwater

The project area overlies the Koolaupoko and Waimanalo Aquifer Systems within the Windward aquifer sector (see Figure 3-2). Aquifer types found within these systems include basal aquifers, high-level dike aquifers, and dike basal aquifers, which are a combination of the first two. In the upper elevations of both the Waimanalo and Koolaupoko aquifer systems, CWRM has concluded that a direct relationship exists between surface water and groundwater conditions. At mid-elevations, surface water may be hydraulically separated from the basal and dike basal aquifers by layers of thick sediments. Lower elevation stream flows may or may not be affected by basal groundwater withdrawals.



KANEOHE/KAILUA WASTEWATER CONVEYANCE AND TREATMENT FACILITIES

AQUIFERS MAP

FIGURE

3-2



WILSON OKAMOTO CORPORATION ENGINEERS • PLANNERS

Kaneohe WWPTF: The Kaneohe WWPTF overlies the Koolaupoko Aquifer System. Extending from Waikane Valley to the Nuuanu Pali, the Koolaupoko Aquifer System coincides with portions of streams that are sensitive to groundwater withdrawals, such as Waihee Stream. The aquifer system consists of a dike complex and marginal dike zone. Some groundwater from the system eventually drains to streams or emerges in wetlands, although flows also seep through the caprock to the ocean. The sustainable yield of the Koolaupoko Aquifer System is estimated to be 30 mgd.

Kailua Regional WWTP: The Kailua Regional WWTP overlies the Waimanalo Aquifer System. The Waimanalo Aquifer System extends from the Nuuanu Pali in Kailua to Makapuu Point, the easternmost point on Oahu. The system includes a dike complex, marginal dike zone, and the collapsed caldera of the original Koolau volcano. There is limited developable groundwater in the marginal dike zone. The sustainable yield of the Waimanalo Aquifer System is estimated to be 10 mgd.

Alternative 1 Force Main and Equalization Facilities: The proposed force main route also begins at the Kaneohe WWPTF and travels through the Koolaupoko Aquifer System to the shore. After crossing beneath Kaneohe Bay, the force main route exits at Kaneohe Bay at the H-3 Interchange and travels through the Waimanalo Aquifer System to the Kailua Regional WWTP.

Alternative 2 Tunnel: The proposed tunnel route begins at the Kaneohe WWPTF and travels under the Oneawa Hills mauka of Kaneohe Bay Drive through the Koolaupoko Aquifer System. The route then continues through the Waimanalo Aquifer System until it reaches Kailua Regional WWTP.

Impacts and Mitigation Measures

In the short-term, construction activities occurring at the Kaneohe WWPTF and the Kailua Regional WWTP have the potential to impact groundwater. Construction activities, however, are not likely to introduce, nor release from the soil, any materials which could adversely affect groundwater or groundwater sources for domestic use.

Both wastewater conveyance alternatives will be constructed below the groundwater table and below sea level. Depending on subsurface conditions, any groundwater encountered will likely be brackish or seawater. During construction, water flowing into the bore will need to be removed by the contractor(s). Hence, any contaminant in the bore will not flow into the surrounding groundwater bodies.

In both alternatives dewatering of excavated areas may be required to construct wastewater transmission facilities below the water table. An NPDES permit for dewatering activities will be required. The NPDES permit will also address the anticipated rate of dewatering.

The proposed improvements will have beneficial long-term impacts on groundwater in the project area. Improvements accommodate existing infiltration and inflow, exfiltration, and any potential infiltration from groundwater sources. The potential for wastewater spills impacting groundwater underlying the affected facility during rain

storms will be reduced, as both alternatives will provide infiltration and inflow storage capabilities.

The probability of wastewater entering groundwater through leaks in the conveyance methods is low. The tunnel alternative will mostly be in the negative pressure state, where any leakage would be groundwater entering the tunnel. In the force main alternative, there will be a net positive pressure such that a leak during operation would outflow into groundwater. The purpose and design for the force main, however, is to convey wastewater under pressure without any leakage. Should a leak occur, it is unlikely that the outflow will migrate into Kaneohe Bay, as the gradient will draw groundwater downward from the force main. No potable groundwater would be affected.

3.3.3 Coastal Waters

Kaneohe WWPTF: Coastal waters in Kaneohe Bay, which extend from Kualoa Point in Waikane to Pyramid Rock on the Mokapu Peninsula, are classified as AA Marine waters. Class AA Marine waters are recognized as high quality coastal waters by DOH, with the objective that "these waters remain in their natural pristine state as nearly as possible with an absolute minimum of pollution or alteration of water quality from any human-caused source or actions" (Hawaii Administrative Rules (HAR) Title 11, Chapter 54, Water Quality Standards). Kaneohe Bay has a surface area of approximately 2 square miles with depths ranging from 50 feet to less than one foot. A shallow offshore barrier reef at the entrance to Kaneohe Bay separates the bay from the open ocean.

DOH's water quality monitoring of Kaneohe Bay has shown a dramatic decline in phosphorous and turbidity since 1979, when effluent discharge was diverted to the Mokapu Outfall and terminated at two major outfalls in Kaneohe Bay. Effluent from the Kaneohe WWTP was diverted to Mokapu in 1977 (3.57 mgd) and from the Kaneohe Marine Corps Air Station in 1978 (1.27 mgd) (City & County of Honolulu Water Quality Plan, 1990).

Sedimentation of Kaneohe Bay has occurred from both marine and land sources. Since 1927, there has been an average shoaling of 3.3 feet within the lagoon of Kaneohe Bay. It has been estimated that 60 percent of the sediment is carbonate material from reefs, 13 percent from dredging spoils, and 27 percent from land-derived sediments. Eighty-seven percent of the land-derived sedimentation occurs in the south bay. Urbanization in this area has increased the amount of sediment that storm waters carry into this portion of the bay.

Kailua Regional WWTP: The Kailua Regional WWTP operates under an NPDES Permit which authorizes ENV to discharge secondary treated wastewater from the plant through the Mokapu Outfall.

Impacts and Mitigation Measures

No significant impacts on coastal waters in the project area are anticipated as a result of the construction and operation of the proposed improvements.

In the short-term, there is the potential for coastal water quality impacts resulting from construction activities at the Kaneohe WWPTF and the Kailua Regional WWTP. Potential impacts will be mitigated by adherence to State and City water quality regulations governing grading, excavation, and stockpiling.

For dewatering that may be required during excavation and construction, an NPDES Permit for Construction Dewatering will be required for discharging dewatering effluent into City drainage systems and waters of the United States. The permit will require a BMP plan, erosion control plan and water quality monitoring.

The proposed improvements will have beneficial long-term water quality impacts on coastal waters. The provision of flow equalization facilities and collection system improvements will reduce the probability of spills and bypasses to coastal waters during rain storms. The improved facilities would enable treatment of flows, which may otherwise manifest as overflows, to a secondary level and allow the eventual discharge of treated flows via the Mokapu Outfall.

The proposed improvements and resulting flows from the Kailua Regional WWTP would not cause a significant change in the ambient coastal water quality condition, which under normal circumstances meets State Water Quality Standards.

3.3.4 Flood Hazard

Floods are caused by heavy rainfall associated with tropical rain storms. In Hawaii, streams originate in steep mountains and flow relatively quickly to the ocean, triggering flash floods in coastal areas. Coastal plains and stream floodplains in the Kailua and Kaneohe areas are susceptible to flooding, especially where urban development prevents infiltration of water into the ground.

Tsunami is a series of very long waves triggered by a water-displacing disturbance of the seafloor, either resulting from an earthquake, volcanic eruption, or underwater landslide. These waves travel rapidly and can cause significant damage to coastal areas. Tsunami have such enormous energy that waves can reach far inland with great force.

Kaneohe WWPTF: According to the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map, Community Panel Number 150001 0060 B, revised September 4, 1987, the Kaneohe WWPTF, located between Kaneohe and Kawa Streams, is situated in an area determined to be within the 100-year flood plain (Zone AE) with flood elevations ranging from eight to nine feet. An area within the southernmost portion of the Kaneohe WWPTF site is located within the floodway area in Zone AE. An area within the central portion of the site is located within Zone X, areas determined to be outside the 500-year flood plain (see Figure 3-3).

Due to the broad coastal reef extending seaward and the shape of the bottom of the bay, most of the Kaneohe Bay shoreline does not lie in the tsunami inundation zone. The Kaneohe WWPTF is not located in the tsunami inundation zone.

Kailua Regional WWTP: According to the FEMA FIRM, Community Panel Number 150001 0060 B, revised September 4, 1987, the Kailua Regional WWTP is situated within Zone D, areas in which flood hazards are undetermined, and Zone X, areas determined to be outside the 500-year flood plain (see Figure 3-3).

According to the Civil Defense Tsunami Inundation Map for Oahu, the shoreline areas in Kailua, from Lanikai to Mokapu Peninsula, are within the tsunami inundation zone. The inundation area extends to include the airfield area of Mokapu Peninsula. The Kailua Regional WWTP is the central part of Mokapu peninsula, which is not located in the tsunami inundation zone.

Alternative 1 Force Main and Equalization Facilities: The proposed force main route begins at the Kaneohe WWPTF and traverses beneath Kaneohe Bay near Waikalua Loko Fish Pond, which is located in Zone AE. The equalization basin at Kaneohe WWPTF is also located in Zone AE. After crossing Kaneohe Bay, the force main route travels to the Kailua Regional WWTP, which is located in Zone D. The equalization basin at the Kailua Regional WWTP is also located in Zone D.

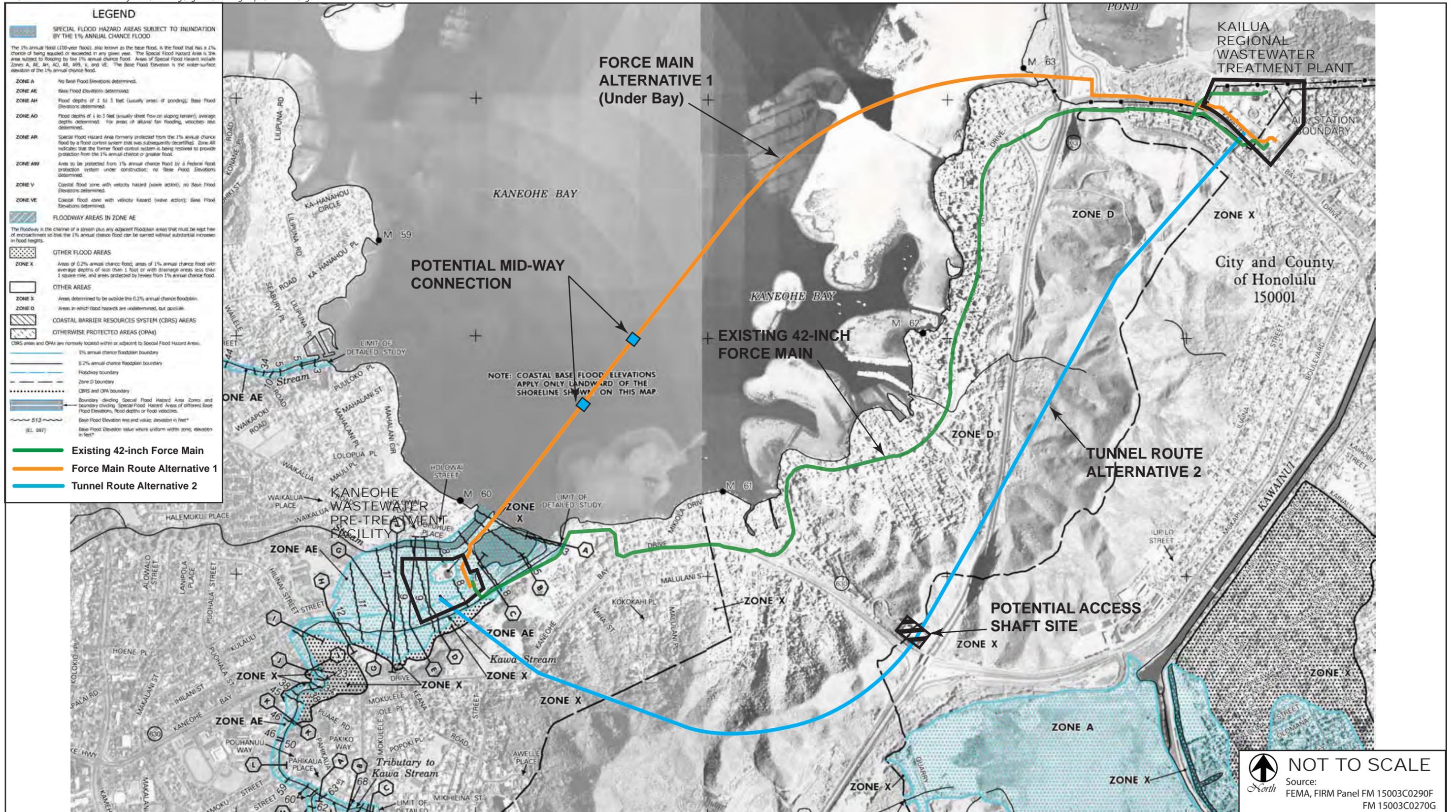
Alternative 2 Tunnel: The proposed tunnel route begins at the Kaneohe WWPTF which is located in Zone AE. The tunnel route then travels beneath the Oneawa Hills, mauka of Kaneohe Bay Drive through Zone X and Zone D to the Kailua Regional WWTP, which is located in Zone D.

Impacts and Mitigation Measures

No significant long-term impacts on flood hazards in the project area are anticipated as a result of the construction and operation of the proposed improvements.

In the short-term, construction activities occurring at the Kaneohe WWPTF and the Kailua Regional WWTP have the potential to be affected by flooding. Construction activities within the respective flood hazard districts, however, will be in accordance with regulations set forth in Section 21-9.10 Flood Hazard Districts of the City and County of Honolulu's Land Use Ordinance (LUO) and will be subject to the preparation of flood studies, as may be required. Studies will be conducted to ensure that any proposed encroachment of facilities in the floodway will not result in any increase in the regulatory flood elevations during occurrence of the regulatory flood. The studies will identify a certified flood elevation and evaluate flooding impacts, including the potential impact of proposed structures on flood elevations. All improvements will be designed to withstand potential flooding impacts.

The proposed improvements will have beneficial long-term impacts by providing facilities to accommodate and contain increased infiltration and inflow to the wastewater system. Both alternatives will mitigate any potential for operational disruptions or wastewater spills during heavy rainfall events. The improvements will prevent localized flooding due to system overflows by providing adequate capacity to collect excess rainwater that enters wastewater collection lines.



3.4 Natural Environment

3.4.1 Flora

Kaneohe WWPTF and Kailua Regional WWTP: The area surrounding the existing wastewater facilities is a highly disturbed, urban environment where open areas are encumbered by wastewater facility structures or graded, paved, or landscaped areas. There are no known rare, threatened or endangered plants within these areas.

Alternative 1 Force Main and Equalization Facilities: There are no terrestrial botanical resources in this area, since the corridor passes under Kaneohe Bay. There are no terrestrial botanical resources at the equalization basins located at the Kaneohe WWPTF and the Kailua Regional WWTP where the environment has been highly disturbed and consists of structures or graded, paved, or landscaped areas. See Section 3.4.3 for discussion of existing conditions and impacts to marine resources.

Alternative 2 Tunnel: The botanical characterization of the tunnel route is generally that of undeveloped areas. Natural vegetation found in undeveloped areas includes pili grass, kiawe, koa haole, and finger grasses (Kawai Nui Marsh Master Plan, 1994). There are no known rare, threatened, or endangered species within the project route.

Impacts and Mitigation Measures

Kaneohe WWPTF and Kailua Regional WWTP: No significant short- or long-term impacts on botanical resources are anticipated as a result of the construction and operation of the proposed improvements since the Kaneohe WWPTF and Kailua Regional WWTP sites do not provide unique habitats.

Alternative 1 Force Main and Equalization Facilities: No significant short- or long-term impacts on botanical resources are anticipated as a result of the construction and operation of the proposed improvements since the corridor passes beneath the seafloor of Kaneohe Bay. The environment at the existing Kaneohe WWPTF and Kailua Regional WWTP is highly disturbed; therefore, equalization basins are not anticipated to impact floral species. See Section 3.4.3 for discussion of existing conditions and impacts to marine resources.

Alternative 2 Tunnel: No significant short or long-term impacts on botanical resources are anticipated as a result of the construction and operation of the proposed improvements. The proposed tunnel will be built using a TBM approximately 45 feet below sea level at the Kaneohe WWPTF to 60 feet below sea level at the Kailua Regional WWTP. Therefore, no species or habitat will be disturbed. The affected tunnel route does not provide a unique habitat, thus no significant impacts on floral species are anticipated.

3.4.2 Fauna

Kaneohe WWPTF and Kailua Regional WWTP: The area surrounding the existing wastewater facilities is a highly disturbed, urban environment. Feral mammals found in the

vicinity of the wastewater facilities include mongoose, mice, rats, dogs, and cats. There are no known endangered, threatened, proposed, or candidate species within these areas.

Alternative 1 Force Main and Equalization Facilities: There are no terrestrial faunal resources in the project area for Alternative 1 since the corridor passes beneath the seafloor of Kaneohe Bay. See Section 3.4.3 for discussion of existing conditions and impacts to marine resources.

Alternative 2 Tunnel: The tunnel route traverses beneath the Oneawa Hills mauka of Kaneohe Bay Drive. This region provides natural habitat and feeding areas for many introduced exotic birds such as cardinals, linnets, sparrows, and mynah birds.

Impacts and Mitigation Measures

Kaneohe WWPTF and Kailua Regional WWTP: No significant short- or long-term impacts on faunal species are anticipated as a result of the construction and operation of the proposed improvements. The Kaneohe WWPTF and Kailua Regional WWTP sites do not provide unique habitats.

Alternative 1 Force Main and Equalization Facilities: No significant short- or long-term impacts on faunal species are anticipated as a result of the construction and operation of the proposed improvements. The corridor passes under Kaneohe Bay. See Section 3.4.3 for discussion of existing conditions and impacts to marine resources.

Alternative 2 Tunnel: No significant short- or long-term impacts on fauna species are anticipated as a result of the construction and operation of the proposed improvements. The proposed tunnel will be built using a TBM at depths ranging from approximately 35 feet below sea level at the Kaneohe WWPTF to 62 feet below sea level at the Kailua Regional WWTP. Therefore, no species or habitat will be disturbed.

3.4.3 Marine Resources

This section primarily applies to Alternative 1 Force Main because the corridor runs under Kaneohe Bay. Alternative 1 may also include the construction of a mid-way connection within Kaneohe Bay which is known to host marine biota. A marine biological survey will be conducted by AECOS, Inc. to determine a suitable location for the mid-way connection where impacts on marine biota will be minimized. The survey findings will be included in the forthcoming Draft EIS.

Impacts and Mitigation Measures

Should construction of Alternative 1 require a mid-way connection, there will be short-term, construction-related impacts to the benthic community. To avoid minimize potential impacts to sensitive benthic communities, the mid-way connection site will not be located where there is coral or sea grass. A temporary construction platform, if required for Sub-Alternative 1B, would also be located to avoid these sensitive areas.

A more detailed discussion will be provided in the forthcoming Draft EIS, pursuant to the findings of the marine biological survey.

No significant long-term impacts or adverse effects are anticipated from the installation and operation of the force main. The force main will be located at least 20 feet below the sea floor of Kaneohe Bay and will be installed via direct drilling or micro-tunneling; therefore, no habitat or species will be disturbed.

3.4.4 Wetlands

In the general vicinity of the project site are 26 different wetland systems, comprised mostly of marine and estuarine systems. See Table 3-1 for a list and description of the wetland areas and Figure 3-4 for wetland locations relative to the project area.

Kaneohe WWPTF: Located adjacent to the Kaneohe WWPTF is a wetland area identified as wetland area 4. Wetland area 4 is described as an estuarine, subtidal system and classified as having an open water/or unknown bottom.

Kailua Regional WWTP: Located near the Kailua Regional WWTP are approximately seven wetland areas, identified as wetland areas 16, 17, 18, 19, 20, 21, and 22. These seven wetland areas are a part of the Nuupia Ponds Wildlife Management area. This area encompasses significant natural and cultural features, including a historic fishpond complex, and provides habitat for the endangered Hawaiian stilt. A total of eight (8) ponds encompassing approximately 231.8 acres comprise the fishpond complex. The wetland area also serves as a natural buffer for Marine Corps activities. Wetland 18 is an estuarine, intertidal system classified as a scrub/shrub area containing mostly broad-leaved Evergreen species. Wetland 17 is unclassified. Wetlands 16, 19, 20, 21, and 22 are described as estuarine, intertidal systems and classified as having unconsolidated bottoms, consisting mostly of sand.

Alternative 1 Force Main and Equalization Facilities: The force main corridor will pass beneath three wetland areas identified as wetland areas 4, 14, and 15. Wetland 4 is described as an estuarine, subtidal system and classified as having an open water/or unknown bottom. Wetland 14 is a marine tidal system classified as reef mainly containing coral species. Wetland 15 is an estuarine, intertidal system classified as a scrub/shrub area containing mostly broad-leaved Evergreen species.

Alternative 2 Tunnel: The tunnel route will not pass directly beneath any wetland areas.

Impacts and Mitigation Measures

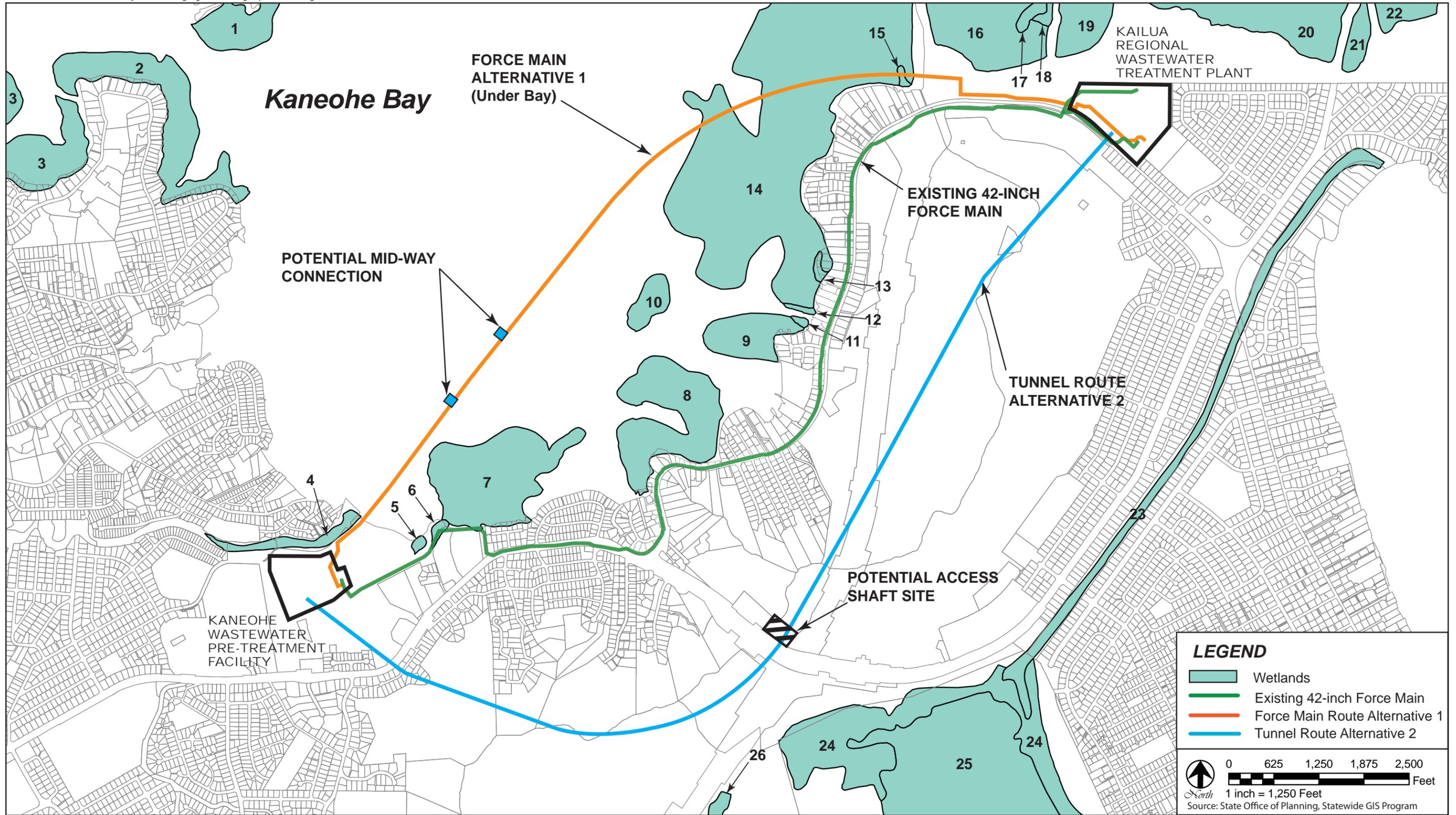
Kaneohe WWPTF and Kailua Regional WWTP: No significant short- or long-term impacts are anticipated as a result of the construction and operation of the proposed improvements since there are no wetlands specifically within the Kaneohe WWPTF and Kailua Regional WWTP sites. Mitigation measures described in Section 3.3.1 Surface Water will also minimize impacts on nearby wetlands.

**Table 3-1
Wetland Identification**

ID	Code	System	Subsystem	Class	Subclass	Regime	Modifier
1	M1RF1L	Marine	Tidal	Reef	Coral	Subtidal	N/A
2	M1RF1L	Marine	Tidal	Reef	Coral	Subtidal	N/A
3	M1RF1L	Marine	Tidal	Reef	Coral	Subtidal	N/A
4	E1OWLx	Estuarine	Subtidal	Open Water/ Unknown Bottom	N/A	Subtidal	Excavated
5	E2SS3N	Estuarine	Intertidal	Scrub/Shrub	Broad-leaved Evergreen	Regular	N/A
6	E2SS3N	Estuarine	Intertidal	Scrub/Shrub	Broad-leaved Evergreen	Regular	N/A
7	M1RF1L	Marine	Tidal	Reef	Coral	Subtidal	N/A
8	M1RF1L	Marine	Tidal	Reef	Coral	Subtidal	N/A
9	M1RF1L	Marine	Tidal	Reef	Coral	Subtidal	N/A
10	M1RF1L	Marine	Tidal	Reef	Coral	Subtidal	N/A
11	E2SS3N	Estuarine	Intertidal	Scrub/Shrub	Broad-leaved Evergreen	Regular	N/A
12	E2SS3N	Estuarine	Intertidal	Scrub/Shrub	Broad-leaved Evergreen	Regular	N/A
13	E2SS3N	Estuarine	Intertidal	Scrub/Shrub	Broad-leaved Evergreen	Regular	N/A
14	M1RF1L	Marine	Tidal	Reef	Coral	Subtidal	N/A
15	E2SS3N	Estuarine	Intertidal	Scrub/Shrub	Broad-leaved Evergreen	Regular	N/A
16	E2US2P	Estuarine	Intertidal	Unconsolidated Bottom	Sand	Irregular	N/A
17	N/A	N/A	N/A	N/A	N/A	N/A	N/A
18	E2SS3N	Estuarine	Intertidal	Scrub/Shrub	Broad-leaved Evergreen	Regular	N/A
19	E2US2P	Estuarine	Intertidal	Unconsolidated Bottom	Sand	Irregular	N/A
20	E2US2P	Estuarine	Intertidal	Unconsolidated Bottom	Sand	Irregular	N/A
21	E2US2P	Estuarine	Intertidal	Unconsolidated Bottom	Sand	Irregular	N/A
22	E2US2P	Estuarine	Intertidal	Unconsolidated Bottom	Sand	Irregular	N/A
23	E1OWLx	Estuarine	Subtidal	Open Water/ Unknown Bottom	N/A	Subtidal	Excavated
24	PEM1C	Palustrine	N/A	Emergent	Persistent	Seasonal	N/A
25	PEM1F	Palustrine	N/A	Emergent	Persistent	Semi- permanent	N/A
26	PEM1C	Palustrine	N/A	Emergent	Persistent	Seasonal	N/A

* Wetlands 16-22 are associated with the Nuupia Pond Complex

Source: State Office of Planning GIS Program



KANEOHE/KAILUA WASTEWATER CONVEYANCE AND TREATMENT FACILITIES

WETLANDS LOCATION MAP

FIGURE

3-4



Alternative 1 Force Main and Equalization Facilities: No significant short- or long-term impacts are anticipated as a result of the construction and operation of the Force Main Alternative since the line will be installed via directional drilling or micro-tunneling 20 feet below the sea floor of Kaneohe Bay.

Alternative 2 Tunnel: No significant short- or long-term impacts are anticipated as a result of the construction and operation of the proposed improvements since the tunnel will be built using a TBM approximately 38 feet below sea level at the Kaneohe WWPTF to approximately 62 feet below sea level at the Kailua Regional WWTP.

3.4.5 Historic, Archaeological, and Cultural Resources

Historic, archaeological, and cultural resources in the project vicinity mainly include coastal ponds. Archaeological literature reviews and field investigations will be conducted for Alternatives 1 and 2 by Cultural Surveys Hawaii, Inc (CSH) and Aki Sinoto Consulting, respectively. Based on the findings and consultation with DLNR Historic Preservation Division (SHPD), the need for further investigations will be determined. CSH and Aki Sinoto Consulting will also conduct cultural impact assessments for the respective project alternatives. The findings will be included in the forthcoming Draft EIS.

Kaneohe WWPTF: Waikalua Loko is a known historic fishpond located between Kaneohe Stream and Kawa Stream, approximately 0.1 mile northeast from the Kaneohe WWPTF. Current historical information to date indicates that the pond has been in existence for at least 150 years. The historic Kanohuluiwi Pond is located approximately 0.7 mile northwest of the Kaneohe WWPTF.

Kailua Regional WWTP: There are no known historic or archaeological resources on the existing Kailua Regional WWTP site. However, Nuupia Ponds, which are considered to be historic, are located immediately north of the plant on the grounds of the MCBH Kaneohe Bay.

Alternative 1 Force Main and Equalization Facilities: There are no known historic or archaeological sites along the project corridor.

Alternative 2 Tunnel: There are no known historic or archaeological sites along the proposed tunnel route.

Impacts and Mitigation Measures

Kaneohe WWPTF and Kailua Regional WWTP: No significant short- or long-term impacts to historic, archaeological, or cultural resources are anticipated as a result of the construction and operation of the proposed improvements. A detailed discussion will be provided in the forthcoming Draft EIS pursuant to the findings of the archaeological literature reviews, field investigations, and cultural impact assessments.

Should any significant archaeological, cultural or historic resources be found during construction activities, all work will cease and SHPD will be notified immediately.

Alternative 1 Force Main and Equalization Facilities: No significant short- or long-term impacts to historic, archaeological, or cultural resources are anticipated as a result of the construction and operation of this alternative. The force main will be installed 20 feet below the sea floor of Kaneohe Bay via directional drilling or micro-tunneling. Therefore, it is unlikely that construction will have any impact on archaeological, cultural or historic sites in the project area. A detailed discussion will be provided in the forthcoming Draft EIS pursuant to the findings of the archaeological literature reviews, field investigations, and cultural impact assessments.

Should any significant archaeological, cultural or historic sites be found during construction activities, all work will cease and SHPD will be notified immediately.

Alternative 2 Tunnel: No significant short- or long-term impacts are anticipated as a result of the construction and operation of this alternative since the tunnel will be built using a TBM approximately 38 feet below sea level at the Kaneohe WWPTF to approximately 62 feet below sea level at the Kailua Regional WWTP. Therefore, adverse impacts on archaeological, cultural or historic resources within the project area are not anticipated. A detailed discussion regarding historic, archeological, and cultural resources will be provided in the forthcoming Draft EIS pursuant to the findings of the archaeological literature reviews, field investigations, and cultural impact assessments.

Should any significant archaeological, cultural or historic sites be found during construction activities, all work will cease and SHPD will be notified immediately.

3.5 Socio-Economic Characteristics

The project area falls within portions of the Kailua and Kaneohe Neighborhood Board areas; specifically the Waikalua Road, Puohala, Kokokahi, and Puu Papaa Census Tracts (CTs) (see Figure 3-5). The majority of development in this area has occurred on the relatively flat coastal plain. Neighborhoods are predominantly residential, with supporting business establishments located along major thoroughfares.

A mix of land uses can be found in the project area including residential, commercial and agricultural activities. Commercial activity in Kaneohe is centered along Kamehameha Highway and Kahuhipa Street, where numerous retail, office, and other business establishments are located. In Kailua, businesses are dispersed through the neighborhood, but are generally concentrated along Kailua and Kuulei Roads.

In 2000, the population in the project area (CTs combined) had a resident population of approximately 15,309. The 2000 Census identified 30.3 percent of the population in the area as Caucasian, 29.5 percent as Asian, and 28.2 percent as being of two or more races. Average household size in the project area in 2000 was 3.21 persons, and the median annual household income was approximately \$68,000. The unemployment rate in 2000 was approximately 5.3 percent. A summary of the demographic characteristics in the area can be found in Table 3-2.

Impacts and Mitigation Measures

The proposed project will generally have positive social and economic impacts in the region. In the short-term, the project will confer some positive benefits in the local area with additional construction jobs and indirect economic benefits to local retail businesses resulting from construction activities. Construction activities will create some adverse impacts, such as potential disruptions to local area traffic near the activity sites and increased noise nuisances in the immediate vicinity of the work sites.

In the long-term, the proposed wastewater facility improvement alternatives will reduce the risk of wastewater spillage during high rainfall events. This will allow the wastewater system to safely and efficiently accommodate projected flows up to the year 2030 and provide an adequate wastewater system to support the needs of the population and economy in the service area.

3.6 Air Quality

Kaneohe WWPTF: Odor is not a prevalent concern at the Kaneohe WWPTF since odor sensitive uses are not in close proximity and its operation as a pre-treatment facility has less potential for generating odors than a wastewater treatment plant.

Kailua Regional WWTP: The major sources of odor at the Kailua Regional WWTP are treated by an odor oxidation process followed by granular activated carbon towers. Sensitive receptors to odor are the nearby residences located to the southwest and east of the plant and Aikahi Elementary School located to the southeast. Previous construction at the plant has included significant investments in odor control features. Additional odor control measures are also being designed for the plant.

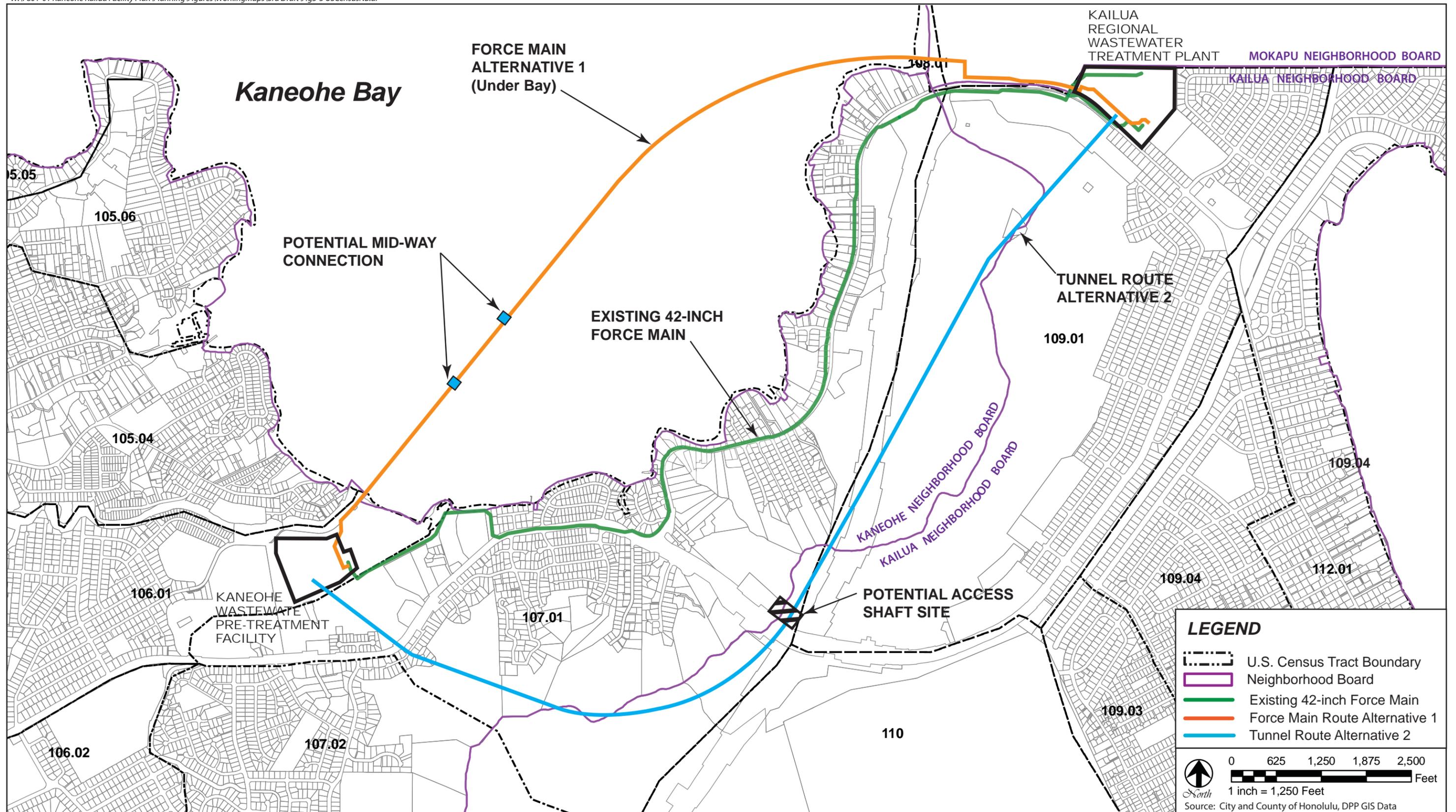
Alternative 1 Force Main and Equalization Facilities: Within the immediate vicinity of the improvements along the project corridor, potential sources of emissions are those associated with boat traffic in Kaneohe Bay. The volume of boat traffic emissions, however, is miniscule compared to those of vehicles traveling along nearby roads.

Alternative 2 Tunnel: The proposed tunnel route traverses under the Oneawa Hills mauka of Kaneohe Bay Drive which is undeveloped, therefore the volume of vehicle related emissions from adjacent roadways should not be significant.

Impacts and Mitigation Measures

Kaneohe WWPTF: In the short-term, there will be air quality impacts related to construction activities at the Kaneohe WWPTF site including dust generated by soil disturbance and emissions from construction vehicles and equipment and commuting construction workers. Construction will entail site preparation and vertical shaft construction that will generate spoils, which will be removed from the construction site for disposal.

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KANEHOE/KAILUA WASTEWATER CONVEYANCE AND TREATMENT FACILITIES

U.S. CENSUS TRACT AND NEIGHBORHOOD BOARD BOUNDARY MAP

FIGURE
3-5

Table 3-2
Demographic Characteristics: 2000 U.S. Census Bureau

Subject	Kaneohe NB						Kailua NB		Total		City & County of Honolulu	
	CT 105.4 (Waikalua Rd.)		CT 106.01 (Puohala)		CT 107.01 (Kokokahi)		CT 109.01 (Puu Papaa)		Number	Percent	Number	Percent
	Number	Percent	Number	Percent	Number	Percent	Number	Percent				
Total Population	5,150	100	3,232	100	3,766	100	3,161	100	15,309	100	876,156	100
AGE												
Under 5 years	311	6.0	167	5.2	206	5.4	173	5.4	857	5.6	56,849	6.5
5-19 years	1,138	22.1	680	21.0	648	17.2	770	24.4	3,236	21.1	175,175	20.0
20-64 years	2,900	56.3	1,767	54.7	2,386	63.4	1,861	58.9	8,914	58.2	526,395	60.1
65 years and over	804	15.6	616	19.1	526	14.0	357	11.3	2,303	15.1	117,737	13.4
Median age (years)	36.1	--	38.5	--	40.8	--	38.7	--	--	--	35.7	--
RACE												
White	656	12.7	449	13.9	1,663	44.1	1,881	59.5	4,649	30.3	186,484	21.3
Black or African American	36	0.7	11	0.3	34	0.9	19	0.6	100	0.6	20,619	2.4
American Indian and Alaskan Native	7	0.1	10	0.3	14	0.4	9	0.3	40	0.3	2,178	0.2
Asian	1,844	35.8	1,233	38.1	1,082	28.7	356	11.3	4,514	29.5	403,371	46.0
Native Hawaiian and other Pacific Islander	768	14.91	471	14.6	203	5.4	146	4.6	1,588	10.4	77,680	8.9
Two or more races	1,809	35.1	1,033	32.0	747	19.8	725	23.0	4,314	28.2	118,908	13.6
Other	33	0.7	25	0.8	23	0.7	25	0.7	106	0.7	11,200	1.3
HOUSEHOLD (BY TYPE)												
Total Households	1,397	100	970	100	1,318	100	1,009	100	4,694	100	286,450	100
Family households (families)	1,191	85.3	757	78.0	1,012	76.8	833	82.6	3,793	80.8	205,672	71.8
Married-couple family	860	61.6	531	54.7	843	64.0	680	67.4	2,914	62.1	156,195	54.5
With own children under 18 years	371	26.6	189	19.5	318	24.1	332	32.9	1,210	25.8	70,442	24.6
Female householder, no husband Present	238	17.0	165	17.0	126	9.6	116	11.5	645	13.7	35,138	12.3
With own children under 18 years	96	6.9	57	5.9	38	2.9	52	5.2	243	5.2	15,235	5.3
Nonfamily Household	60	4.3	36	3.7	98	7.4	61	6.0	255	5.4	18,815	6.6
Average Household Size	3.54	--	3.31	--	2.84	--	3.13	--	3.21	--	2.95	--
HOUSING OCCUPANCY AND TENURE												
Total Housing Units	1,451	100	999	100	1,376	100	1,029	100	4,855	100	315,988	100
Occupied Units	1,397	96.3	970	97.1	1,318	95.8	1,009	98.1	4,694	96.7	286,450	90.7
By owner	895	31.7	657	65.8	951	69.1	786	76.4	3,289	67.7	156,290	49.5
By renter	502	34.6	313	31.3	367	26.7	223	21.7	1,405	28.9	130,160	41.2
Vacant units	54	3.7	29	2.9	58	4.2	20	1.9	161	3.3	29,538	9.3

Construction of the equalization facilities at the Kaneohe WWPTF associated with the force main alternative will disturb a greater area of soil at the facility than the tunnel alternative. Fugitive dust will be created from construction activities, as well as from the handling of spoils, particularly dry spoils. Potential air quality impacts during construction of the proposed project will be mitigated by complying with DOH Administrative Rules, Title 11, Chapter 60-11.1, "Air Pollution Control". Compliance with State regulations will require adequate measures to control fugitive dust by methods such as water spraying of loose or exposed soil or ground surface areas and dust-generating equipment during construction. Exhaust emissions from construction vehicles are anticipated to have a negligible impact on air quality in the project vicinity, as the emissions would be relatively small and readily dissipated.

In the long-term, the primary air quality concern will be potential odor nuisance associated with the equalization basin in Alternative 1. The basin will only be in use during periods of heavy rainfall to hold excess wastewater until it can be pumped to the Kailua Regional WWTP for treatment and disposal. After such periods of heavy rainfall, the empty basin will be cleaned and allowed to dry until it is needed again. Further discussion of potential odor controls will be included in the forthcoming Draft EIS. In the tunnel alternative, odor control will be provided at the drop-shaft, where wastewater will enter the tunnel.

Kailua Regional WWTP: Short-term construction-related impacts may occur at the Kailua Regional WWTP site if the force main alternative involves a mid-way connection requiring staging of drilling and/or micro-tunneling operations at the WWTP site. This will generate spoils, which will be removed from the site for disposal. Fugitive dust will be generated by construction activities and from spoils, particularly any dry spoils. In general, the tunnel alternative will involve significantly greater construction activity and spoils removal compared to the force main alternative. Potential air quality impacts during construction of the proposed project will be mitigated by complying with DOH Administrative Rules, Title 11, Chapter 60-11.1, "Air Pollution Control". Compliance with State regulations will require adequate measures to control fugitive dust by methods such as water spraying of loose or exposed soil or ground surface areas and dust-generating equipment during construction. Exhaust emissions from construction vehicles are anticipated to have a negligible impact on air quality in the project vicinity, as the emissions would be relatively small and readily dissipated.

In the long-term, the primary air quality concern will be the odor generated from the Kailua Regional WWTP. In the force main alternative, odor control measures being designed for the plant will also address odor control for the new force main. In the tunnel alternative, odor control will be provided at the influent pump station where wastewater will be drawn from the tunnel for processing. Further discussion of potential odor controls will be included in the forthcoming Draft EIS.

Alternative 1 Force Main and Equalization Facilities: No significant short- or long-term air quality impacts are anticipated along the corridor. The force main will be installed using directional drilling or micro-tunneling technology 20 feet below the sea floor of Kaneohe Bay.

Alternative 2 Tunnel: No significant short- or long-term air quality impacts are anticipated along the route. The tunnel will be built using a TBM approximately 38 feet below sea level to approximately 62 feet below sea level at the Kailua Regional WWTP.

3.7 Noise

Ambient noise levels and impacts from the project alternatives will be assessed in a noise and vibration study to be conducted by Y. Ebisu and Associates.

Kaneohe WWPTF and Kailua Regional WWTP: Noise levels from the existing wastewater facilities are primarily associated with equipment used in the collection and treatment process. Primary noise sources are electrical motor generators, air compressors and standby electrical generators.

Alternative 1 Force Main and Equalization Facilities: Noise in the vicinity of the project corridor is low, with occasional increased noise associated with boat traffic during events and with aircraft from Kaneohe Marine Corps Base Hawaii.

Alternative 2 Tunnel: Noise in the vicinity of the project route is low since the tunnel route traverses under Oneawa Hills, mauka of Kaneohe Bay Drive, which is undeveloped.

Impacts and Mitigation Measures

Kaneohe WWPTF: Short-term construction noise impacts are anticipated to affect nearby noise-sensitive land uses in the immediate vicinity of the project. Impacts will be mitigated to some degree by complying with the provisions of DOH Administrative Rules, Title 11, Chapter 46, "Community Noise Control". These rules require a noise permit if noise levels from construction activities are expected to exceed the allowable range. It shall be the contractor's responsibility to minimize noise by properly maintaining noise mufflers and other noise-attenuating equipment and to maintain noise levels below allowable regulatory limits. The contractor must also adhere to the guidelines for the hours of heavy equipment operation and noise curfew times as set forth by DOH noise control regulations.

No significant increase in noise levels over the long term are expected from operation of the proposed project alternative. A detailed discussion will be provided in the forthcoming Draft EIS pursuant to the findings of the noise and vibration study related to tunneling and drilling construction activities.

Kailua Regional WWTP: Short-term construction noise impacts are anticipated to affect nearby noise-sensitive land uses in the immediate vicinity of the project. In general, the construction of the tunnel itself will involve significantly greater activity, while the force main alternative will involve more activity related to the construction of the equalization basin. Impacts will be mitigated to some degree by complying with the provisions of DOH Administrative Rules, Title 11, Chapter 46, "Community Noise Control". These rules require a noise permit if noise levels from construction activities are expected to exceed the allowable range. It shall be the contractor's responsibility

to minimize noise by properly maintaining noise mufflers and other noise-attenuating equipment and to maintain noise levels below allowable regulatory limits. The contractor must also adhere to the guidelines for the hours of heavy equipment operation and noise curfew times as set forth by DOH noise control regulations.

Also in the short-term, ambient noise levels in the vicinity of the project site will primarily be affected by the increase in traffic noise levels.

No significant increase in noise levels over the long term are expected from operation of the proposed project alternative. A detailed discussion will be provided in the forthcoming Draft EIS pursuant to the findings of the noise and vibration study related to tunneling and drilling construction activities.

Alternative 1 Force Main and Equalization Facilities: No significant short- or long-term impacts on noise levels are anticipated as a result of the construction and operation of the project alternative since the force main will be installed using directional drilling or micro-tunneling technology 20 feet below the sea floor of Kaneohe Bay. A detailed discussion will be provided in the forthcoming Draft EIS pursuant to the findings of the noise and vibration study related to tunneling and drilling construction activities.

Alternative 2 Tunnel: No significant short- or long-term impacts on noise levels are anticipated as a result of the construction and operation of the project alternative since the tunnel will be built using a TBM approximately 38 feet below sea level at the Kaneohe WWPTF to approximately 62 feet below sea level at the Kailua Regional WWTP. A detailed discussion will be provided in the forthcoming Draft EIS pursuant to the findings of the noise and vibration study related to tunneling and drilling construction activities.

3.8 Traffic

Kaneohe WWPTF: Access to the Kaneohe WWPTF is provided by a City access road easement through a private golf course off of Kulauli Street, a local two-lane road providing local residential and school access, and terminating at the golf course. The access easement is not open to the public.

Traffic on roadways in the vicinity of the Kaneohe WWPTF facility operates fairly well on weekdays.

Kailua Regional WWTP: Access to the Kailua Regional WWTP is provided by Kaneohe Bay Drive, a two-lane road connecting the communities of Kaneohe and Kailua.

Traffic on roadways in the vicinity of the Kailua Regional WWTP operates fairly well on weekdays.

Alternative 1 Force Main and Equalization Facilities: The corridor passes under Kaneohe Bay; there are no roadways in this area.

Alternative 2 Tunnel: The tunnel route passes under the Oneawa Hills range, mauka of Kaneohe Bay Drive. There are no roadways in this area.

Impacts and Mitigation Measures

Kaneohe WWPTF: In the short-term, temporary traffic impacts associated with construction activities at the Kaneohe WWPTF are anticipated, primarily if the force main alternative involves a mid-way connection requiring staging of the drilling and micro-tunneling operations at the WWTP site. This will generate spoils requiring off-site disposal. The force main alternative will generate less spoil material, but the construction of the equalization basin will involve more on-site construction. Due to the amount of construction activity anticipated, a traffic control plan to accommodate construction traffic will be prepared prior to construction.

In the long-term, no significant traffic impacts are anticipated during the operation of the proposed improvements. No significant increase in traffic associated is expected.

Kailua Regional WWTP: In the short-term, temporary traffic impacts are anticipated in relation to construction activities at the Kailua Regional WWTP. In general, the construction of the tunnel alternative is anticipated to generate significantly greater activity because of the amount of spoils that will require off-site disposal. Due to the amount of construction activity anticipated, a traffic control plan to accommodate construction traffic will be prepared prior to construction.

No long-term, significant traffic impacts are anticipated due to the operation of the proposed improvements. No significant increase in traffic is expected.

Alternative 1 Force Main and Equalization Facilities: No significant short- or long-term traffic impacts are anticipated as a result of the construction and operation of the proposed alternative. Roadways and traffic will not be affected, as the force main will be installed using directional drilling or micro-tunneling technology 20 feet below the sea floor of Kaneohe Bay.

Alternative 2 Tunnel: No significant short- or long-term traffic impacts are anticipated as a result of the construction and operation of the proposed alternative. Roadways and traffic will not be affected, as the tunnel will be built using a TBM approximately 38 feet below sea level at the Kaneohe WWPTF to approximately 62 feet below sea level at the Kailua Regional WWTP.

3.9 Visual Resources

Kaneohe WWPTF and Kailua Regional WWTP: The wastewater facility sites are currently occupied by wastewater treatment and collection system facilities.

Alternative 1 Force Main and Equalization Facilities: The project corridor for the force main alternative is beneath the lagoon area of Kaneohe Bay.

Alternative 2 Tunnel: Along the project corridor for the tunnel alternative, the view is mainly that of undeveloped lands. The tunnel route is beneath the Oneawa Hills, mauka of Kaneohe Bay Drive.

Impacts and Mitigation Measures

Kaneohe WWPTF and Kailua Regional WWTP: No significant short- or long-term visual or aesthetic impacts are anticipated as a result of the proposed improvements. Since the proposed facility improvements at the Kaneohe WWPTF and Kailua Regional WWTP will be similar in visual character to the existing facilities, the change in views from public vantage areas will either be negligible or of a slight intensification of the existing uses.

Alternative 1 Force Main and Equalization Facilities: No significant short- or long-term visual or aesthetic impacts are anticipated as a result of the proposed alternative, as the force main will be installed using directional drilling or micro-tunneling technology 20 feet below the sea floor of Kaneohe Bay.

Alternative 2 Tunnel: No significant short- or long-term visual or aesthetic impacts are anticipated as a result of the proposed alternative since the tunnel will be built using a TMB approximately 38 feet below sea level at the Kaneohe WWPTF to approximately 62 feet below sea level at the Kailua Regional WWTP.

3.10 Infrastructure and Utilities

A number of existing City Board of Water Supply (BWS) water lines and City drainage system improvements are located within the Kaneohe WWTP and Kailua Regional WWTP sites and along wastewater transmission pipeline corridors. Also located within these areas are various overhead and underground Hawaiian Electric Company, Inc. (HECO) power lines, Hawaiian Telcom telecommunication lines, cable lines, and gas distribution lines.

Impacts and Mitigation Measures

Construction and operation of the proposed improvements are not anticipated to impact water, electrical, telephone, cable, and gas services or existing storm drain collection and transmission facilities since most of the improvements will occur underground. Alternative 1 will be installed using directional drilling or micro-tunneling technology 20 feet below the sea floor of Kaneohe Bay. Alternative 2 will construct a tunnel using a TMB approximately 38 feet below sea level at the Kaneohe WWPTF to approximately 62 feet below sea level at the Kailua Regional WWTP.

During design and construction of the proposed improvements, close coordination will be maintained with the respective government agencies and utility companies to ensure that utility lines will not be adversely impacted and utility services will not be interrupted in adjacent areas.

3.11 Public Services and Facilities

3.11.1 Police Protection

Kaneohe: Police protection is provided by the City through the Kaneohe Police Station, located at 45-270 Waikalua Road, approximately one mile from the Kaneohe WWPTF.

Kailua: Police protection is provided by the City through the Kailua Police Station, located at 219 Kuulei Road, approximately two miles from the Kailua Regional WWTP.

3.11.2 Fire Protection

Kaneohe: Fire protection is provided by the City. The nearest station is the Kaneohe Fire Station, located at 45-910 Kamehameha Highway, approximately one mile from the Kaneohe WWPTF.

Kailua: Fire protection is provided by the City. The nearest station is the Kailua Fire Station, located at 211 Kuulei Road, approximately two miles from the Kailua Regional WWTP.

3.11.3 Health Care Services

Health care services for residents of the Kaneohe area are available at Straub Family Health Center located at Windward Mall in Kaneohe. The facility offers diagnosis and treatment of illness and injury, physical examinations, complete obstetrics/gynecology and family planning services, lab testing and on-site x-ray, mammography, and dietary and health education counseling. The Kaiser Permanente Koolau Clinic, located at 45-602 Kamehameha Highway, provides family medicine, internal medicine, obstetrics/gynecology, and pediatrics, as well as behavioral health services, diabetes education, diagnostic imaging, health education, laboratory, medical social services, medication and nutrition counseling, pharmacy services, and physical therapy. In addition, the Windward Comprehensive Health Center, a State facility located along Kealahala Road, provides services including dental health, early intervention, family health, health promotion and education, mental health for children and for adults, public health nursing, and a Women, Infants, and Children (WIC) program. The adjacent Hawaii State Hospital is a 244-bed facility dedicated to serving adults with serious mental illnesses. Medical care and emergency services are available to both Kaneohe and Kailua residents at the Castle Medical Center in Kailua.

3.11.4 Public Schools

Kaneohe: The State Department of Education (DOE) administers seven public schools within the Kaneohe area, including Heeia Elementary School (K-6), Benjamin Parker Elementary School (K-6), Kapunahala Elementary School (K-6), Puohala Elementary School (K-6), Kaneohe Elementary School (K-6), King Intermediate (7-8), and Castle High School (9-12). The University of Hawaii's Windward Community College (WCC) campus provides post-secondary education services. The public library serving the Kaneohe area is the Kaneohe Regional Library, which is part of the State of Hawaii Library System.

Kailua: DOE administers five public schools and one charter school within the Kailua area, including Aikahi Elementary School (K-6), Kailua Elementary School (K-6), Kainalu Elementary School (K-6), Lanikai Elementary PCS (K-6), Kailua Intermediate School (7-8), and Kalaheo High School (9-12). The public library serving the Kailua area is the Kailua Public Library, which is part of the State of Hawaii Library System.

3.11.5 Recreational Facilities

Public recreational facilities within the project vicinity include Kaneohe Beach Park, Keaalau Neighborhood Park, and Aikahi Community Park. These facilities are operated by the City Department of Parks and Recreation.

In close proximity to the Kaneohe WWPTF, Bay View Golf Course is a private golf course located at 45-285 Kaneohe Bay Drive. Access to the Kaneohe WWPTF is provided through a city access road easement through the Bay View Golf Course.

Kaneohe Bay is a popular recreational boating resource. The nearest public boating facility is Heeia Kea Small Boat Harbor, which is located approximately 3.0 miles northwest of Kaneohe WWPTF. The State's Kaneohe Bay Offshore Mooring Areas (moorings allocated by permit) and the private Kaneohe Yacht Club are located within the immediate vicinity of the Alternative 1 alignment.

Impacts and Mitigation Measures

Short-term, construction-related impacts are anticipated at the Kaneohe WWPTF. Construction vehicles and commuting workers will have to access the City easement through Bay View Golf Course. Alternative I may have short-term marine navigational impacts in Kaneohe Bay, as Sub-Alternatives 1B and 1C will require construction of a temporary coffer dam surrounding a mid-way connection point. Sub-Alternative 1B may also involve a temporary construction platform and could involve floating and assembling long sections of the force main pipe in the bay prior to installation.

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4. LAND USE DESIGNATIONS AND PERMITS

4.1. Land Use Designations

This section discusses State and City land use plans, policies and controls relating to the proposed project.

4.1.1. State Land Use District

The Hawaii Land Use Law, contained in Chapter 205, HRS, classifies all land in the State into four land use districts: Urban, Agricultural, Conservation, and Rural. The project site is located within the Urban and Conservation Districts (see Figure 4-1).

Within the Conservation District, there are five subzones as follows: Protective (P), Limited (L), Resource (R), General (G), and Special Subzone (SS). Excluding the Special Subzone, the four remaining subzones are arranged in a hierarchy of environmental sensitivity, ranging from the most environmentally sensitive (protective) to the least sensitive (general). The objective of these subzones is to protect valuable resources in designated areas such as restricted watersheds, marine, plant, wildlife sanctuaries, significant historic, archaeological, geological, and volcanological features and sites, and other designated unique areas. The project site lies within the Resource and General subzones (see Figure 4-2).

4.1.2. Special Management Area

Portions of the project lie within the boundary of the City's Special Management Area (SMA) (see Figure 4-3). Proposed improvements within the SMA are subject to SMA permit requirements pursuant to Section 205A, HRS, and Chapter 25 Revised Ordinances of Honolulu. The objectives, policies and SMA guidelines, as set forth in Chapter 205A, HRS, are intended to ensure that adequate shoreline access is provided, public recreation and wildlife preserves are reserved, and that minimum adverse effects to water, visual and natural resources are assured.

4.1.3. City and County of Honolulu Zoning

The City Land Use Ordinance (LUO) regulates land use in accordance with adapted land use policies, including the Oahu General Plan and the Development Plans. The project lies within several zones, including P-1 Restricted Preservation District; P-2 General Preservation; R-5, R-7.5 and R-10 Residential Districts; and I-2 Intensive Industrial District (see Figure 4.4).

4.2. Permits and Approvals

The following is a list of permits, approvals, and reviews that may be required prior to construction and operation of the proposed project.

Federal

Section 404, Clean Water Act, Department of the Army

Section 10, Rivers and Harbors Act, Department of the Army and Coast Guard

State of Hawaii

Department of Health

- Section 401, Clean Water Act, Water Quality Certification
- National Pollutant Discharge Elimination System (NPDES) Individual Permit for Storm Water Associated with Construction Activity
- NPDES Permit for Dewatering
- Noise Permit
- Noise Variance

Department of Land and Natural Resources

- Conservation District Use Permit
- Chapter 6E, HRS Historic Preservation Review

Office of Planning

- Coastal Zone Management (CZM) Program Consistency Determination

Department of Transportation

- Permit to Perform Work Within State Highways

City and County of Honolulu

Department of Environmental Services

- Environmental Impact Statement

Department of Planning and Permitting

- Special Management Area Permit
- Shoreline Setback Variance
- Grading/Grubbing Permit
- Excavation Permit
- Trenching Permit

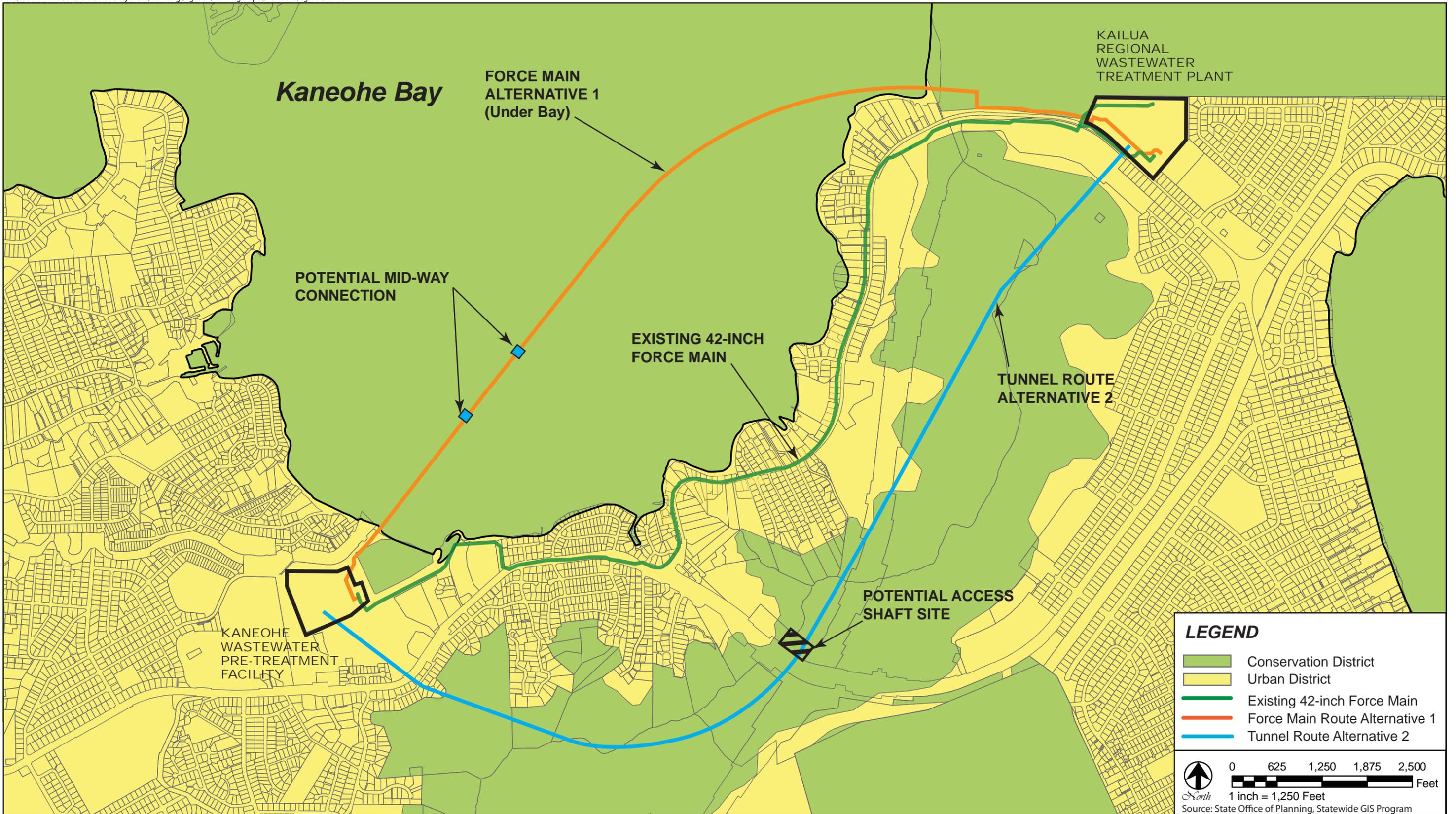
Department of Transportation Services

- Street Usage Permit

Other

Rights of Entry

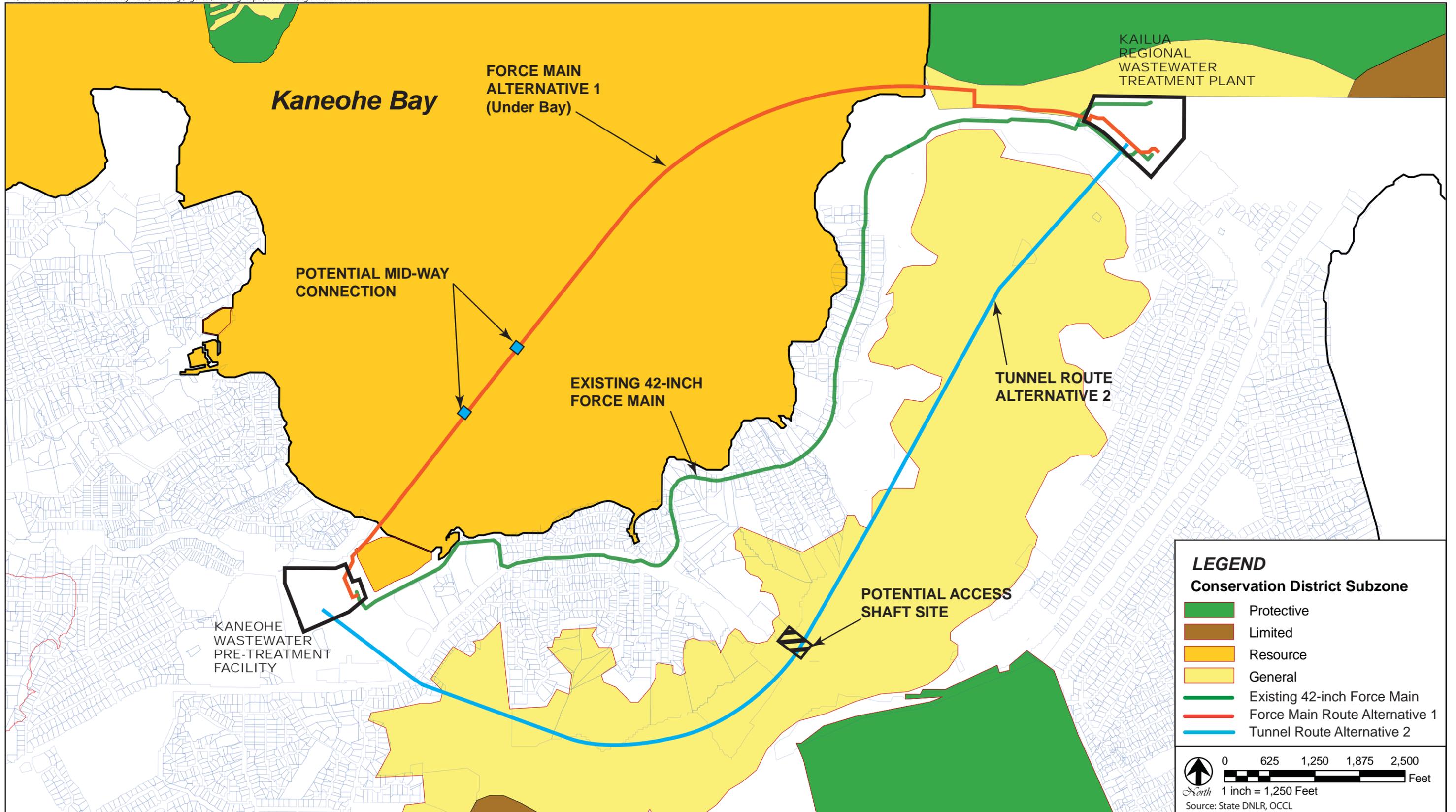
Utility Line Easements



KANEOHE/KAILUA WASTEWATER CONVEYANCE AND TREATMENT FACILITIES

STATE LAND USE DISTRICTS

FIGURE



KANEOHE/KAILUA WASTEWATER CONVEYANCE AND TREATMENT FACILITIES

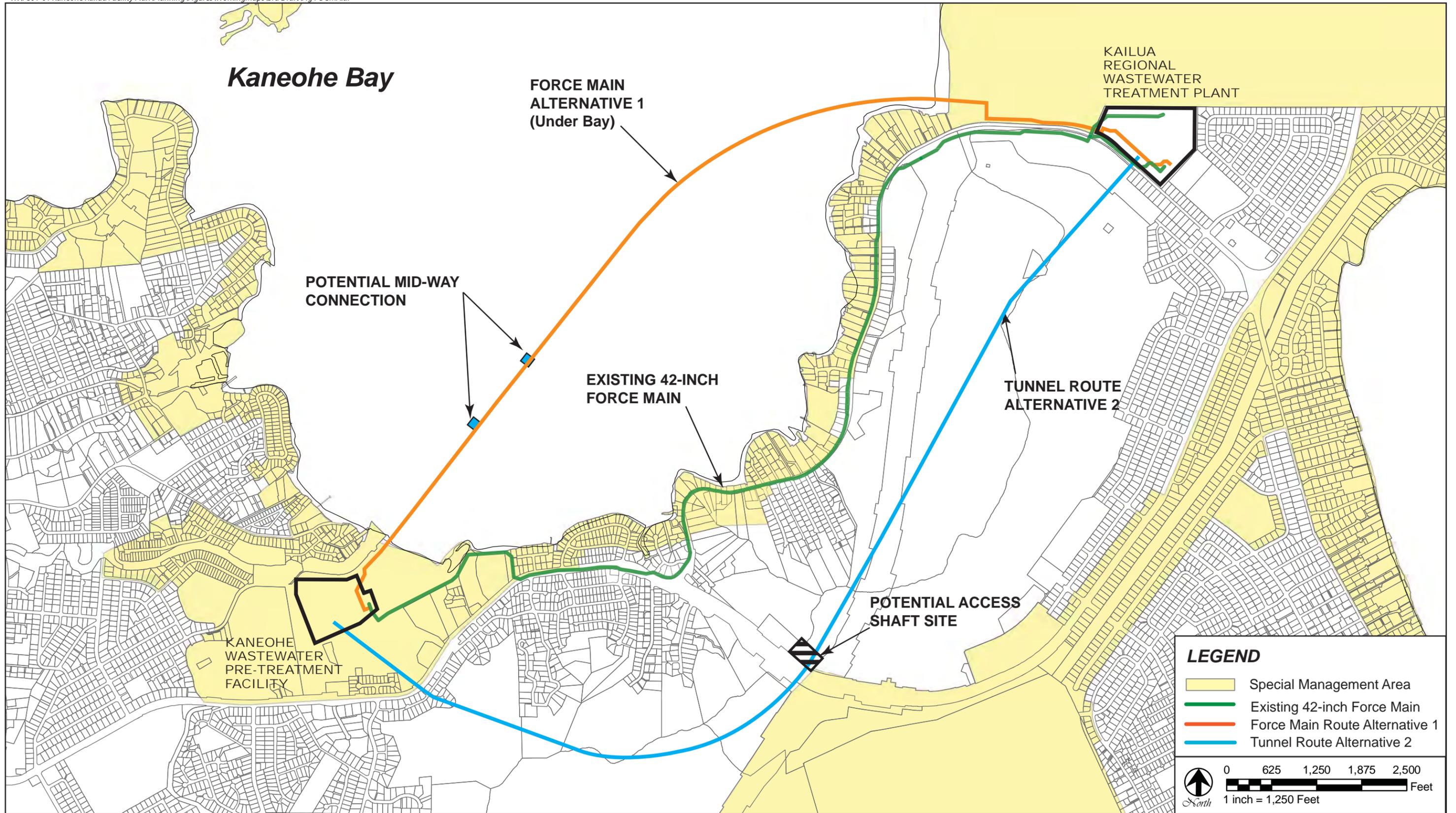
CONSERVATION DISTRICT SUBZONES

FIGURE

4-2



WILSON OKAMOTO CORPORATION
ENGINEERS • PLANNERS

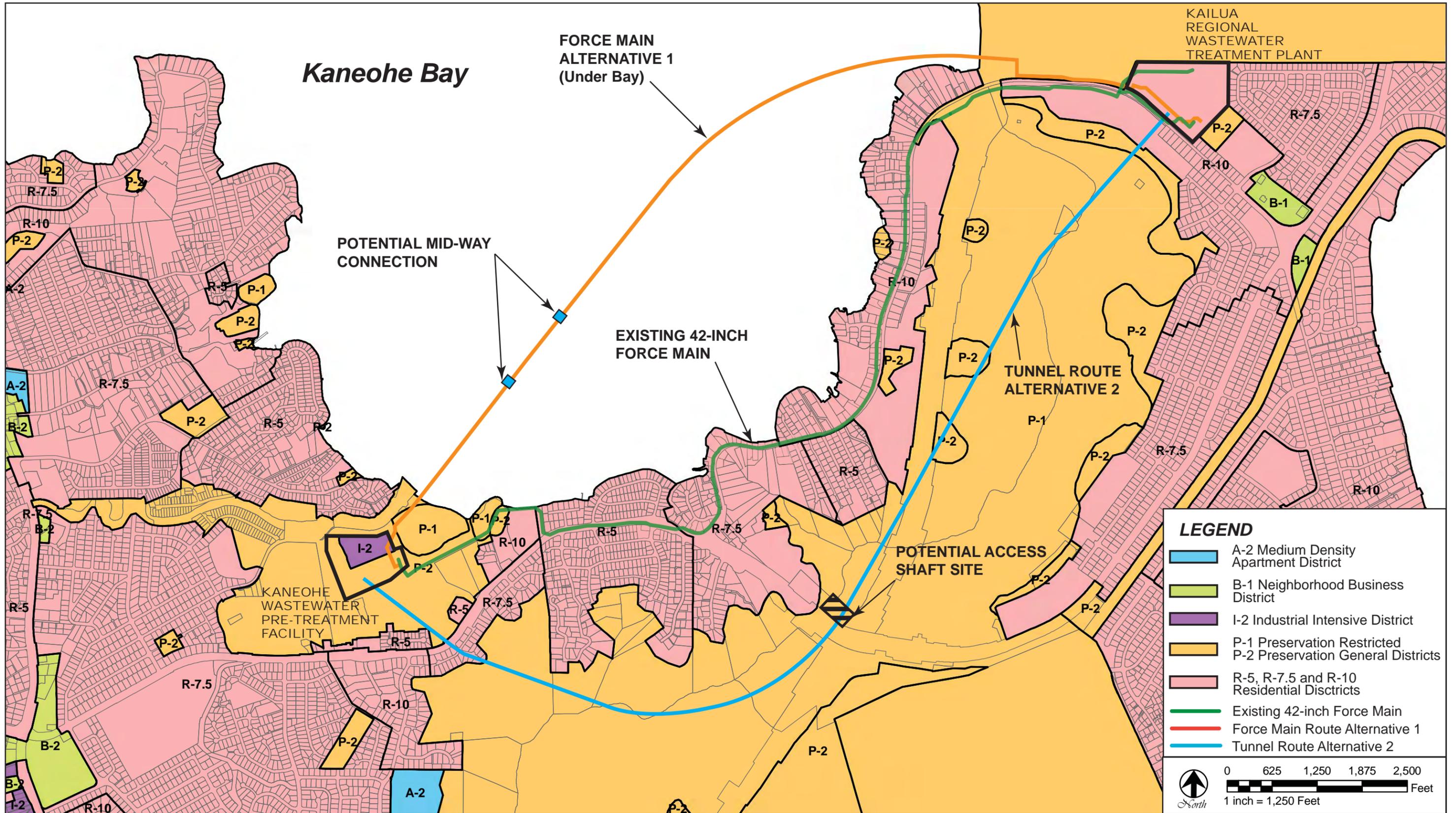


KANEOHE/KAILUA WASTEWATER CONVEYANCE AND TREATMENT FACILITIES

SPECIAL MANAGEMENT AREA

FIGURE





KANEOHE/KAILUA WASTEWATER CONVEYANCE AND TREATMENT FACILITIES

COUNTY ZONING

FIGURE

4-4



WILSON OKAMOTO CORPORATION
ENGINEERS • PLANNERS

5. DETERMINATION

The City ENV, the proposing agency, has determined that the proposed action requires the preparation of an EIS based on the significance criteria set forth in Chapter 200, Title 11, DOH Administrative Rules. The reasons supporting this determination are described below according to significance criteria:

1) *Involves an irrevocable commitment to loss or destruction of any natural or cultural resource*

Development of the proposed wastewater facility improvements will require an irrevocable commitment of land and energy. However, the majority of Alternative 1 Force Main will involve the use of areas beneath the sea floor of Kaneohe Bay. The proposed facility improvements are not anticipated to result in a loss or destruction of natural or cultural resources. A Marine Biological Survey will be conducted to assess the impacts of constructing a potential mid-way connection for Alternative 1 Force Main Corridor in Kaneohe Bay. Alternative 2 Tunnel Route will lie beneath the Oneawa Hills range, mauka of Kaneohe Bay Drive. Therefore, the proposed action is not anticipated to result in the loss or destruction of natural or cultural resources. Also, the lands associated with the Kaneohe WWPTF and Kailua WWTP are already urbanized, therefore the proposed action represents an intensified use of the existing land resources rather than a commitment of new land resources. In addition, an Archaeological Literature Review and Field Investigation and a Cultural Impact Assessment will be conducted for the project, the findings for which will be included in the forthcoming DEIS.

2) *Curtails the range of beneficial uses of the environment*

The intention of the proposed facility improvements is to commit the affected project sites to the proposed use over the long-term. Beneficial use of the affected land areas would not be curtailed since the proposed wastewater facilities are appropriate uses for the respective sites in terms of planning and zoning.

3) *Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344 HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders*

The proposed action is consistent with the environmental policies, goals and guidelines set forth in Chapter 344, HRS.

4) *Substantially affects the economic, social welfare, or cultural practices of the community or State*

The proposed wastewater facility improvements will provide beneficial enhancement of public health and safety and thereby promote the economic and social welfare in the Kailua-Kaneohe-Kahaluu region. In addition, the project will be constructed underground and will minimize impacts associated with traditional open trench construction methods. No adverse effects to cultural practices are anticipated as a result of the project. A Cultural Impact Assessment will be conducted for the project, the findings for which will be included in the forthcoming DEIS.

5) Substantially affects public health

The proposed improvements to the region's wastewater system are intended to prevent negative health affects to the public by reducing and preventing the probability of spills or bypasses to the coastal waters during wet weather periods. The proposed improvements are also intended to address odor concerns associated with the Kailua Regional WWTP.

6) Involves substantial secondary impacts, such as population changes or effects on public facilities

The proposed project is not expected to induce population growth in the region or influence the future distribution of the island's population. Rather, the proposed wastewater facility improvements will accommodate projected flows and will provide adequate wastewater systems to support the population in the Kailua-Kaneohe-Kahaluu region.

7) Involves a substantial degradation of environmental quality

The proposed project is not expected to involve a substantial degradation of environmental quality. The proposed wastewater facility improvements will reduce and prevent the probability of spills or bypasses to coastal waters during wet weather periods, thereby having a beneficial long-term impact on the water quality of coastal receiving waters.

8) Is individually limited but cumulatively has a considerable effect upon the environment or involves a commitment for larger actions

The proposed wastewater facility improvements consider the long-range improvements to the region's wastewater system.

9) Substantially affects a rare, threatened or endangered species, or its habitat

No adverse affect is anticipated on rare, threatened or endangered species or its habitat from the construction or operation of the proposed wastewater facility improvements. A Marine Biological Survey, however, will be conducted to assess the impacts of constructing a potential mid-way connection for the Alternative 1 Force Main in Kaneohe Bay.

10) Detrimentially affects air or water quality or ambient noise levels

The City ENV is designing odor control measures for the Kailua Regional WWTP. These measures will accommodate the force main alternative. The tunnel alternative will require associated odor control equipment for the drop shaft at the Kaneohe WWPTF and the influent pump station (IPS) at the Kailua Regional WWTP. Further discussion of potential odor controls will be included in the forthcoming DEIS. A noise and vibration study will also be conducted for the project, the finding for which will be included in the forthcoming DEIS.

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

Construction of the proposed facility improvements will be mitigated by designing the facilities to minimize adverse effects on flood heights. As required, studies will be conducted to ensure that any proposed encroachment of facilities in the floodway will not result in any increase in the regulatory flood elevations during occurrence of the regulatory flood. Any potential for operational disruptions or wastewater spills from the proposed facility improvements in the event of flooding will be mitigated by designing the facilities with adequate capacities and flood protection.

Any potential for wastewater spills at the wastewater facilities that may impact streams in the vicinity in the event of flow diversion or flooding will be mitigated by designing the proposed facilities with adequate capacities and flood protection. Also, the proposed wastewater facility improvements will have beneficial long-term water quality impacts on coastal receiving waters.

12) *Substantially affects scenic vistas and viewplanes identified in county or state plans or studies*

The proposed wastewater facility improvements will not affect any scenic vistas or viewplanes identified in City or State plans or studies.

13) *Requires substantial energy consumption*

The proposed wastewater facility improvements will increase energy consumption due to the increased capacity of the associated facilities.

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6. CONSULTATION

6.1 Pre-Assessment Consultation

Meetings were conducted with the following agencies, organizations, elected officials and stakeholders:

1. March 30, 2010 – Joint meeting with Senator Jill Tokuda, Representative Ken Ito, and Representative Pono Chong
2. April 7, 2010 - Kaneohe Bay Regional Council
3. April 8, 2010 - Telephone call with the office of Representative Cynthia Theilen
4. April 9, 2010 - Pacific American Foundation (Waikalua Loko Fishpond)
5. April 15, 2010 – Joint meeting with Council Chair Todd Apo and Councilmember Ann Kobayashi
6. April 15, 2010 - Councilmember Ikaika Anderson
7. April 22, 2010 – Telephone call with Kaneohe Ranch
8. April 29, 2010 – Joint meeting with U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, National Oceanic and Atmospheric Administration, and State DLNR Division of Aquatic Resources
9. June 8, 2010 – DLNR Office of Conservation and Coastal Lands
10. June 22, 2010 – City and County of Honolulu Department of Planning and Permitting

6.2 Consultation During Draft EIS Preparation

The following agencies, organizations, and individuals will be consulted during the preparation of the Draft EIS:

Federal Agencies

- U.S. Geological Survey
- U.S. Fish & Wildlife Service
- U.S. Army Corps of Engineers
- U.S. Navy
- U.S. Marine Corps
- National Oceanic and Atmospheric Administration
- Kaneohe Marine Corps Base Hawaii

State Agencies

- Department of Business, Economic Development and Tourism (DBEDT)
- Department of Education (DOE),
Aikahi Elementary School

State Agencies (continued)

Puohala Elementary School
Department of Health (DOH)
DOH, Environmental Management Division
DOH, Office of Environmental Quality Control
Department of Land and Natural Resources (DLNR)
DLNR, Land Division
DLNR, Engineering Division
DLNR, Division of Aquatic Resources
DLNR, Division of Forestry & Wildlife
DLNR, Historic Preservation Division
DLNR, Office of Conservation and Coastal Lands
Department of Transportation (DOT)
DOT, Highways Division
Office of Hawaiian Affairs (OHA)
University of Hawaii Environmental Center
Senator Jill Tokuda, District 24
Representative Ken Ito, District 48
Representative Pono Chong, District 49
Representative Cynthia Thielen, District 50

County Agencies

Office of the Mayor
Honolulu City Council
Council Member Ikaika Anderson, District 3
Department of Planning and Permitting
Department of Design and Construction
Department of Transportation Services
Board of Water Supply
Police Department
Fire Department

Organizations

Kaneohe Neighborhood Board, #30
Kailua Neighborhood Board, #31
Kaneohe Bay Regional Council
Pacific American Foundation (Waikalua Loko Fishpond)
Kaneohe Ranch



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