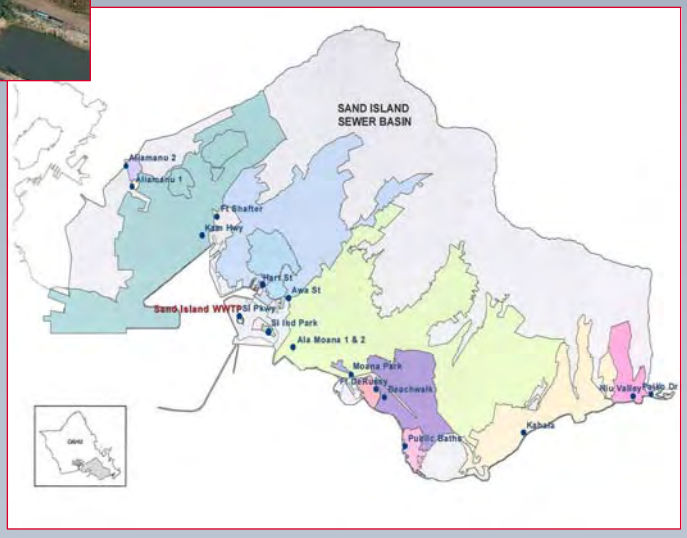
Sand Island Wastewater Treatment Plant & Sewer Basin Facilities, Phase I Area
O‘ahu, Hawai‘i

Final Environmental Assessment / Environmental Impact Statement Preparation Notice

January 2010

Department of Environmental Services
City and County of Honolulu



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Sand Island Wastewater Treatment Plant and Sewer Basin Facilities, Phase I Area

Honolulu, O‘ahu, Hawai‘i

Prepared for:

Department of Environmental Services
City and County of Honolulu

Prepared by:

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RMTC Reference No.1-21500-0P

January 2010

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Project Summary

Project:	Sand Island Wastewater Treatment Plant and Sewer Basin Facilities, Phase I Area
Applicant:	City and County of Honolulu Department of Environmental Services
Accepting Agency:	City and County of Honolulu Department of Environmental Services
Agent:	James Niermann, AICP, LEED AP, Senior Planner R.M. Towill Corporation 2024 North King Street, Suite 200 Honolulu, Hawai‘i 96819 (808) 842-1133
Location:	Honolulu, Island of O‘ahu
Tax Map Key:	Sand Island WWTP: 1-5-041:005 Beachwalk PS: 2-6-018:011 Fort DeRussy PS: 2-6-005:001 Moana Park PS: 2-3-037:022 Ala Moana PS #1: 2-1-015:023 Ala Moana PS #2: 2-1-015:023 Sand Island Industrial Park PS: 1-5-041:093 Sand Island Parkway PS: 1-5-041:005 ‘Awa Street PS: 1-5-040:003 Hart Street PS: 1-5-034:006 Kamehameha PS: 1-1-003:028 Additional Plats include 1-1-006; 1-2-001; 1-2-023; 1-2-025; 2-1-058; 2-1-059; 2-1-060; 2-3-036; 2-6-015; 2-7-36
Proposed Action:	Evaluate alternatives for upgrading and improving the major wastewater conveyance infrastructure in the Phase I Area of the Sand Island Sewer Basin (SISB) and the hydraulic capacity at the Sand Island Wastewater Treatment Plant (WWTP) to meet service demands to the year 2030 and beyond. Alternatives under consideration include: (i) the construction of a Gravity Sewer Tunnel (GST) System composed of GSTs and an associated new Influent Pump Station (IPS) located at the Sand Island WWTP, to replace existing conveyance system of wastewater pump stations (PSs) and force mains (FMs); (ii) upgrades to existing wastewater gravity mains, PSs, and FMs and future hydraulic capacity upgrades to the Sand Island WWTP if the GST System is not constructed; and (iii) no action / delayed action.

Project Summary

Land Area:	The SISB, Phase I service area extends from Niu Valley in the east, to Salt Lake / Aliamanu in the west. The SISB Phase I Area is defined by SISB conveyance facilities that connect the Sand Island WWTP to Waikīkī on the east, and to the Kamehameha Highway PS on Nimitz Highway on the west. Ten pump station sites are included in the project, as well as connecting land easements.
Present Use:	Urban residential, commercial, industrial, harbor and recreational uses along the waterfront between Waikīkī and Ke'ehi Lagoon, and including the downtown Central Business District.
State Land Use District:	Conservation, Urban
Honolulu General Plan Land Use Designation:	Urban
Present Zoning:	Residential, Apartment, Preservation, Business, Resort, Industrial
Special Management Area:	Yes
Permits Required:	*Clearances and permits needed from the various Federal, State and City and County of Honolulu agencies include but are not limited to the following.* **Federal** **Environmental Protection Agency** - CWA Section 301(h) review - Southern O'ahu Basal Aquifer review **U.S. Fish & Wildlife Service** - Section 7 review **National Park Service** - 6(f) approval **U.S. Army Corps of Engineers** - Department of the Army Permit (CWA Sections 404 and 303; Rivers and Harbors Act Section 10) **U.S. Coast Guard** - USCG Section 9 Permit Applicability Guidance **State of Hawai'i** **Department of Health (DOH)** - CWA Section 401 - CWA Section 402, National Pollutant Discharge Elimination System (NPDES) permits (construction storm water discharges, hydrotesting discharges, and discharges involving construction dewatering) - Community Noise Permit; Community Noise Variance - Air Quality Permit - Construction plan review and approval

Project Summary

	Department of Transportation (DOT) - Harbors Division (DOT-HAR) – Right-of-entry for construction activities within DOT-HAR facilities; possible easements - Highways Division (DOT-HWY) – highway easements; permit to discharge into State highway drainage system (required for NPDES permits) **Department of Land and Natural Resources (DLNR)** - "No effect" determination from State Historic Preservation Division **Hawai'i Community Development Authority (HCDA)** - Plan review for lands under HCDA authority **Office of Planning** - Coastal Zone Management Consistency Determination - Special Management Permit (Minor) for geotechnical borings on HCDA lands **City and County of Honolulu (CCH)** **Department of Environmental Services (ENV)** - EIS approval - Permission to discharge into CCH storm drain system (required for NPDES permits) **Department of Planning and Permitting (DPP)** - Special Management Area Permit for planned improvements within the Special Management Area - Shoreline Setback Variance (if required) - Construction plan review and approval - Grading and erosion control plan review - Building Permit - Grading, Grubbing, and Stockpiling Permit - Dewatering Permit - Flood Certification **Honolulu Board of Water Supply (BWS)** - Plan review and approval
Determination:	Project may result in significant effects to the environment. Environmental Impact Statement Required.

Acronyms

ACHP	Advisory Council on Historic Preservation
ADWF	Average Daily Dry Weather Flow
APE	Area of Potential Effect
AMPS	Ala Moana Pump Station
APPS	Ala Moana Park Pump Station
AWWF	Average Wet Weather Flow
BMP	Best Management Practices
BOD	Biological Oxygen Demand
BWAPS	Beachwalk Pump Station to Ala Moana Pump Station Sewer
BWPS	Beachwalk Pump Station
BWS	Board of Water Supply, City and County of Honolulu
CAA	Clean Air Act
CCFRPM	Centrifugally Cast Fiberglass Reinforced Polymer Mortar Pipe
CCH	City and County of Honolulu
CEPT	Chemically Enhanced Primary Treatment
CIP	Cast Iron Pipe
CJSC	Concrete Jacketed Steel Cylinder
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
CZMP	Coastal Zone Management Program
DAAF	Design Average Annual Flow
DAF	Dissolved Air Flotation
DDC	Department of Design and Construction, City and County of Honolulu
DEA	Draft Environmental Assessment
DIP	Ductile Iron Pipe
DLNR	Department of Land and Natural Resources, State of Hawai‘i
DMAF	Design Monthly Average Flow
DOH	Department of Health, State of Hawai‘i
DOT	Department of Transportation, State of Hawai‘i
DOT-HAR	Department of Transportation, Harbors Division, State of Hawai‘i
DOT-HWY	Department of Transportation, Highways Division, State of Hawai‘i
DWI	Dry Weather Infiltration
EA	Environmental Assessment
EIS	Environmental Impact Statement
EISPN	Environmental Impact Statement Preparation Notice
EMD	Environmental Management Division, Department of Health, State of Hawai‘i
ENV	Department of Environmental Services, City and County of Honolulu
EPA	Environmental Protection Agency

ESA	Endangered Species Act
FDPS	Fort DeRussy Pump Station
FEA	Final Environmental Assessment
FM	Wastewater Force Main
FSPS	Fort Shafter Pump Station
GST	Gravity Sewer Tunnel
GT	Gravity Thickeners
HAR	Hawai‘i Administrative Rules
HCDA	Hawai‘i Community Development Authority
HDPE	High Density Polyethylene
HECo	Hawaiian Electric Company
HRS	Hawai‘i Revised Statutes
HSPS	Hart Street Pump Station
ICFB	Inorganic Chemical Feed Building
INPPS	Sand Island Industrial Park Pump Station
IPS	Influent Pump Station
KHPS	Kamehameha Highway Pump Station
lb/d	Maximum Month Load (waste load)
LF	Linear Feet
LUO	Land Use Ordinance, City and County of Honolulu
LWCF	Land and Water Conservation Fund
LWCFA	Land and Water Conservation Fund Act
mgd	Millions of Gallons per Day
mg/l	Milligrams per liter
ml	Millileter
msl	Mean Sea Level
MLPS	Makai Lift Pump Station
MPPS	Moana Park Pump Station
MT	Microtunnel
NAGPRA	Native American Grave Protection and Repatriation Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPS	National Park Service
OCS	Odor Control System
OCRM	Office of Ocean and Coastal Resources Management, Department of Land and Natural Resources, State of Hawai‘i

OCTC	Odor Control Technology Consultants
OF	Office of Planning, State of Hawai'i
PDWF	Peak Daily Dry Weather Flow
ppm	Parts per Million
ppb	Parts per Billion
PDWF	Peak Dry Weather Flow
PF	Peaking Factor
PS	Wastewater Pump Station, when used with facility name. See also: WWPS.
PUC	Primary Urban Center
PVC	Polyvinyl Chloride
PWWF	Peak Wet Weather Flow
RCP	Reinforced Concrete Pipe
RMTC	R.M. Towill Corporation
ROH	Revised Ordinances of Honolulu
SDS	Storm Drain System
SHPD	State Historic Preservation Division, Department of Land and Natural Resources, State of Hawai'i
SHPO	State Historic Preservation Office, Department of Land and Natural Resources, State of Hawai'i
SISB	Sand Island Sewer Basin
SIWWTP	Sand Island Wastewater Treatment Plant
SLUD	State Land Use District
SMA	Special Management Area
SMP	Special Management Area Permit
SPWPS	Sand Island Parkway Wastewater Pump Station
SS, TSS	Suspended Solids, Total Suspended Solids
SSV	Shoreline Setback Variance
STI	Synagro Technologies, Incorporated
TAZ	Traffic Analysis Zone
TDD	Tentative Denial Decision
USACE	U.S. Army Corps of Engineers
USCG	U.S. Coast Guard
USFWS	U.S. Fish & Wildlife Service
USGS	U.S. Geological Service
UV	Ultraviolet
VFD	Varying Frequency Drive
WQC	Water Quality Certification
WQS	Water Quality Standards
WSST	Wet Sludge Storage Tanks
WWI/I	Wet Weather Infiltration / Inflow

WWLTP	Wastewater Long Term Plan
WWOMP	Wastewater Odor Control Master Plan
WWPS	Wastewater Pump Station, when used generally. See also: PS.
WWTP	Wastewater Treatment Plant

1. Project Overview

The City and County of Honolulu (CCH), Department of Environmental Services (ENV) is conducting a planning and engineering study for improvements to the Sand Island Sewer Basin (SISB) Phase I Area wastewater conveyance and treatment facilities that will be required to meet service demands to the year 2030 and beyond. CCH is undertaking the study to ensure that public investment in essential wastewater infrastructure is directed toward system improvements that provide the greatest benefit to current and future users.

The entire SISB service area extends from Niu Valley in the east, to Salt Lake / Aliamanu in the west and consists of two primary sub-basins, the Ala Moana sub-basin or East Basin, and the Hart Street sub-basin or West Basin. SISB wastewater facilities include one major wastewater treatment plant (WWTP) at Sand Island and 16 wastewater pump stations (WWPSs), as well as a collection and conveyance system consisting of sewer gravity mains and force mains (FMs). The SISB service area is illustrated in **Figure 1-1.**

The scope of the current project encompasses the Phase I Area of the SISB. The SISB Phase I Area consists of major wastewater conveyance infrastructure that connect the Sand Island WWTP to Waikīkī toward the east and to the Kamehameha Highway Pump Station PS on Nimitz Highway toward the west. The SISB Phase I Area consists of 10 WWPSs and related conveyance systems (gravity mains, and FMs).

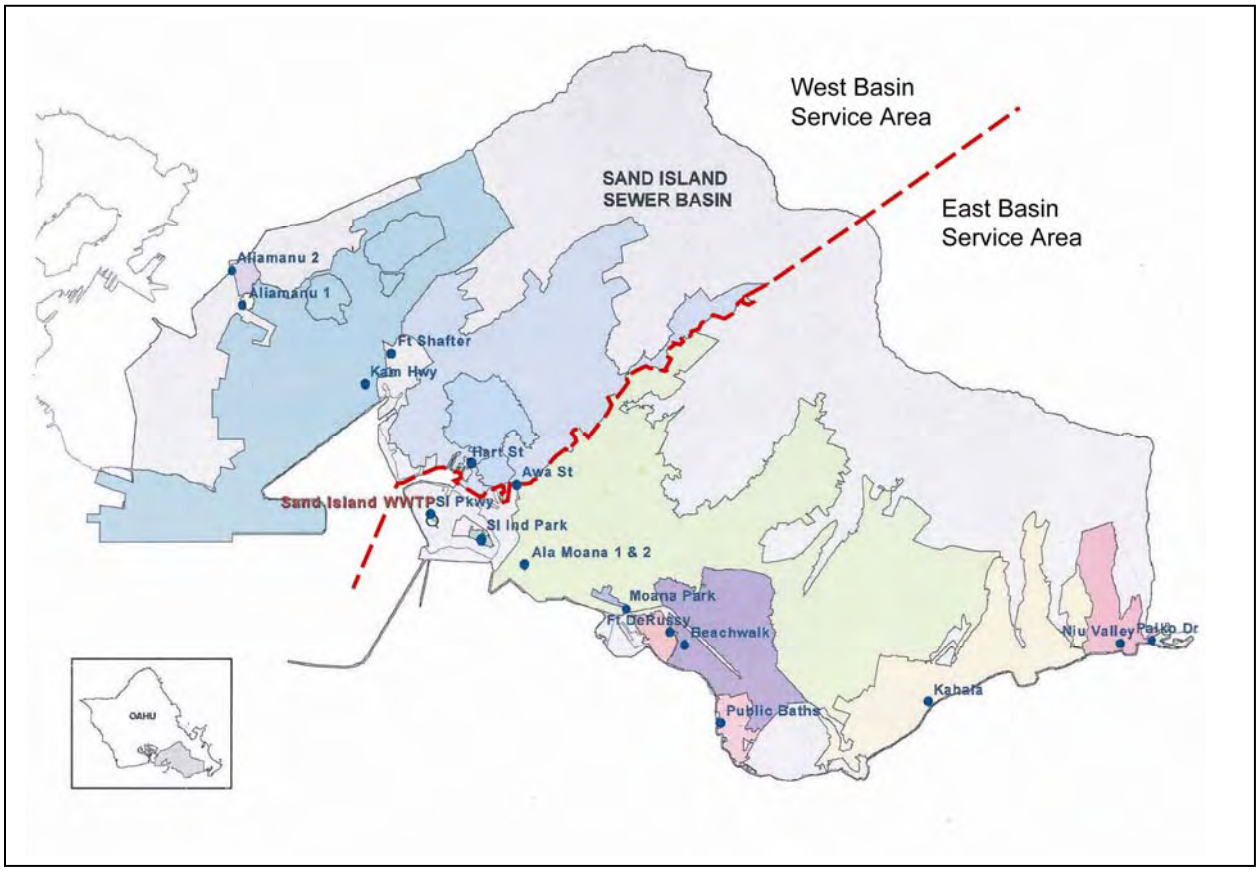

Figure 1-1. SISB Phase I Area

Two general concepts are being considered under the SISB Phase I Area project: (1) a Gravity Sewer Tunnel (GST) System composed of GSTs and an associated Influent Pump Station (IPS) located at the Sand Island WWTP; and (2) a conventional non-GST systems that utilizes WWPSs, FMs, and gravity mains. The selection and integration of GST and/or non-GST systems will have an effect on wastewater system facilities throughout the SISB; however, they will be located within the SISB Phase I Area. Use of a GST would result in the elimination of various WWPSs, sewer mains, and FMs, and upgrades to other WWPSs. If a GST is not selected, the existing system of WWPSs and related FMs and gravity mains will require replacement and upgrades, as well as future hydraulic upgrades to the Sand Island WWTP, over the planning period. Existing facilities are described in **Section 2** of this document. Alternatives under consideration are described in **Section 3**.

1.1 Project Background

The SISB is the largest sewer basin in the Islands. The SISB wastewater collection and treatment systems are essential public facilities that currently serve a population of approximately 800,000 urban residents. SISB facilities consist of one major WWTP at Sand Island, 16 WWPSs, and related conveyance infrastructure comprised of gravity sewers and FMs.

The current facility plan for the SISB is the 1993 *East Mamala Bay Facilities Plan* (1993 Facilities Plan) (Belt Collins, 1993a, 1993b). Alternatives for elimination of the Public Baths PS by a gravity line, elimination of the Fort DeRussy PS by a gravity line, elimination of Paiko Drive PS by a gravity line, elimination of Aliamanu PSs #1 and #2 by gravity lines, and new sewer tunnels to eliminate PSs in the entire SISB were included in the 1993 Facilities Plan. A cost estimate was presented in the 1993 Facilities Plan for the new sewer tunnels but no backup information regarding size, depth, construction methods, or contracting methods was included.

Since the preparation of the 1993 Facilities Plan, the Final Sewer Infiltration and Inflow Plan (Final Sewer I/I Plan) was completed in 1999 (Fukunaga, 1999) in compliance with requirements of a Consent Decree (Civ. No. 94-00765 DAE dated May 15, 1995) between the CCH, the State of Hawai‘i, and the EPA. The Final I/I Plan established infiltration and inflow rates for each wastewater services basin and provided a key basis for developing design flows throughout the region. The Final Sewer I/I Plan summarizes the work done in the Sewer Rehabilitation and Infiltration & Inflow Minimization Study, and describes the 20-year Rehabilitation Program that the CCH has been implementing over the past 10 years.

The 20-year Rehabilitation Program presented in the Final Sewer I/I Plan contains a prioritized list of conceptual Capital Improvement Program (CIP) projects developed to address structural and hydraulic deficiencies identified by the Sewer Rehabilitation and Infiltration & Inflow Minimization Study. CCH is currently half way through the 20-year program and is re-evaluating the conceptual CIP projects prioritized to be implemented in the next 10 years.

CCH has just completed an update to the Critical Sewer Structural Condition Assessment Program by conducting condition assessments of the large diameter sewers (generally gravity sewer mains fifteen inches in diameter and greater) to determine the potential need for additional structural upgrade projects to be implemented in the next ten years. In addition, CCH is currently conducting an update to the Wet Weather Infiltration and Inflow (WW I/I) Program to re-assess the conceptual CIP projects presented in the Final Sewer I/I Plan developed to address hydraulic deficiencies wastewater system.

In conjunction with the Critical Sewer Structural Condition Assessment Program Update that the WW I/I Program Update, CCH has conducted a holistic review of the wastewater CIP program to evaluate the application of infrastructure engineered to ensure longer service lives and to blend into the surrounding neighborhood. GST Systems are one of the infrastructure solutions that have been applied in other municipalities to achieve these objectives. Application of GST Systems to the SISB allows for elimination of several WWPSs and FMs, provides gravity flow to the Sand Island WWTP, and offers additional storage capacity for the system.

CCH has identified a subset of the SISB, the Phase I Area, where the use of GST system would have a higher likelihood of being feasible compared to the outlying areas of the collection system. The facilities in this area include the Sand Island WWTP and the following WWPSs.

1. Beachwalk Wastewater PS
2. Fort DeRussy PS
3. Moana Park PS
4. Ala Moana PS #1
5. Ala Moana PS #2
6. Sand Island Industrial Park PS
7. Sand Island Parkway PS
8. ʻAwa Street PS
9. Hart Street PS
10. Kamehameha Highway PS

A detailed description of the existing SISB Phase I Area wastewater system is included in **Section 2**.

In addition, in January 2009, EPA issued a denial of the renewal of the 1998 National Pollutant Discharge Elimination System (NPDES) permit under the Clean Water Act, Section 301(h) for the Sand Island WWTP. CCH is currently appealing the denial decision. Alternatives for expanding and upgrading the treatment process at the Sand Island WWTP will vary depending on the final resolution of the Sand Island WWTP NPDES Permit and will be addressed at a later date. Therefore, only future hydraulic upgrades at the Sand Island WWTP are being considered at this time.

Alternatives for upgrading and expanding the SISB conveyance facilities and the Sand Island WWTP, based on GST and non-GST systems, are the focus of this Final Environmental Assessment (EA) / Environmental Impact Statement Preparation Notice (EISPN), and the subsequent Environmental Impact Statement (EIS) that will be prepared for this project.

1.2 Project Purpose and Need

The project is being undertaken to address the following needs:

- Protect public health and safety through the development and maintenance of municipal wastewater conveyance and treatment facilities.
- Evaluate alternative wastewater conveyance systems to ensure recommended improvements provide the greatest benefit to current and future users.
- Evaluate alternatives to upgrade the hydraulic capacity of the Sand Island WWTP to address future flows over the planning period.
- Meet the requirements of federal and state permits and mandates.

1.3 Purpose and Need for Final Environmental Assessment

In accordance with Chapter 343, Section 5, Hawai‘i Revised Statutes (HRS), this project involves the following actions that require the preparation of an EA/EIS:

(1) Propose the use of state or county lands or the use of state or county funds;
(2) Propose any use within any land classified as a conservation district by the state land use commission under chapter 205;
(3) Propose any use within a shoreline area as defined in section 205A-41;
(5) Propose any use within the Waikiki area of Oahu, the boundaries of which are delineated in the land use ordinance as amended, establishing the "Waikiki Special District";
(9) Propose any:
A) Wastewater treatment unit, except an individual wastewater system or a wastewater treatment unit serving fewer than fifty single-family dwellings or the equivalent;
(B) Waste-to-energy facility;

Pursuant to the requirements of Chapter 343 HRS, and Chapter 11-200, Hawai‘i Administrative Rules (HAR), this document is submitted as a Final EA/EISPN by the proposing agency, ENV, based on the determination that the proposed project may have a significant effect and hence will require the preparation of an EIS.

Following publication of this Final EA/EISPN and completion of the 30-day public comment period, ENV shall prepare and publish an EIS for the project. ENV invites public comment on the contents of this document and on other subject areas concerning the project that should be addressed during the EIS process.

1.4 Proposing Agency and Accepting Authority

The proposing agency and accepting authority is ENV, CCH.

2. Existing SISB Phase I Area Facilities

2.1 SISB Phase I Area Wastewater System Flow Diagram

The SISB Phase I Area consists of two primary sub-basins, the Ala Moana Basin and the Hart Street Basin. The former is referred to in this document as the East Basin and the latter as the West Basin. The configuration of these two sub-basins, and their respective wastewater system components, creates a logical framework for describing and evaluating project alternatives. The integrating factors are (1) collective impacts on the Sand Island WWTP, and (2) the interrelationship of east and west tunnel alternatives, as discussed below.

A schematic diagram of the existing SISB Phase I Area wastewater system is presented in **Figure 2-1**. The schematic reflects the anticipated completion of the Beachwalk PS to Ala Moana Park Sewer (BWAPS) currently in development. The existing Beachwalk Temporary Line (BWTEMP) will remain in service until the BWAPS is completed. Existing SISB Phase I Area wastewater system facilities that are the subject of this project are shown in **Figure 2-2**.

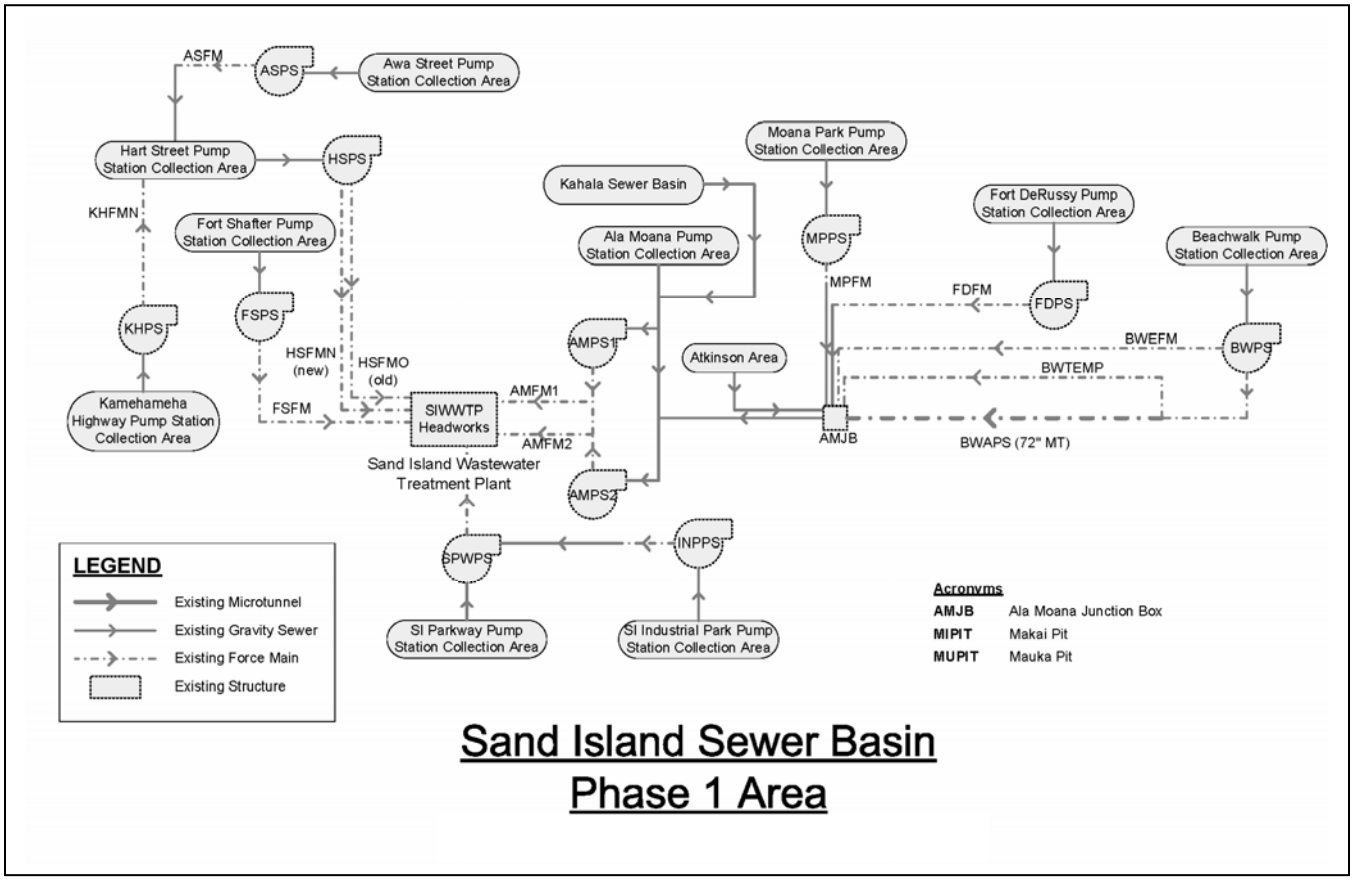

Figure 2-1. Sand Island Sewer Basin Phase I Area – Existing Wastewater System Schematic

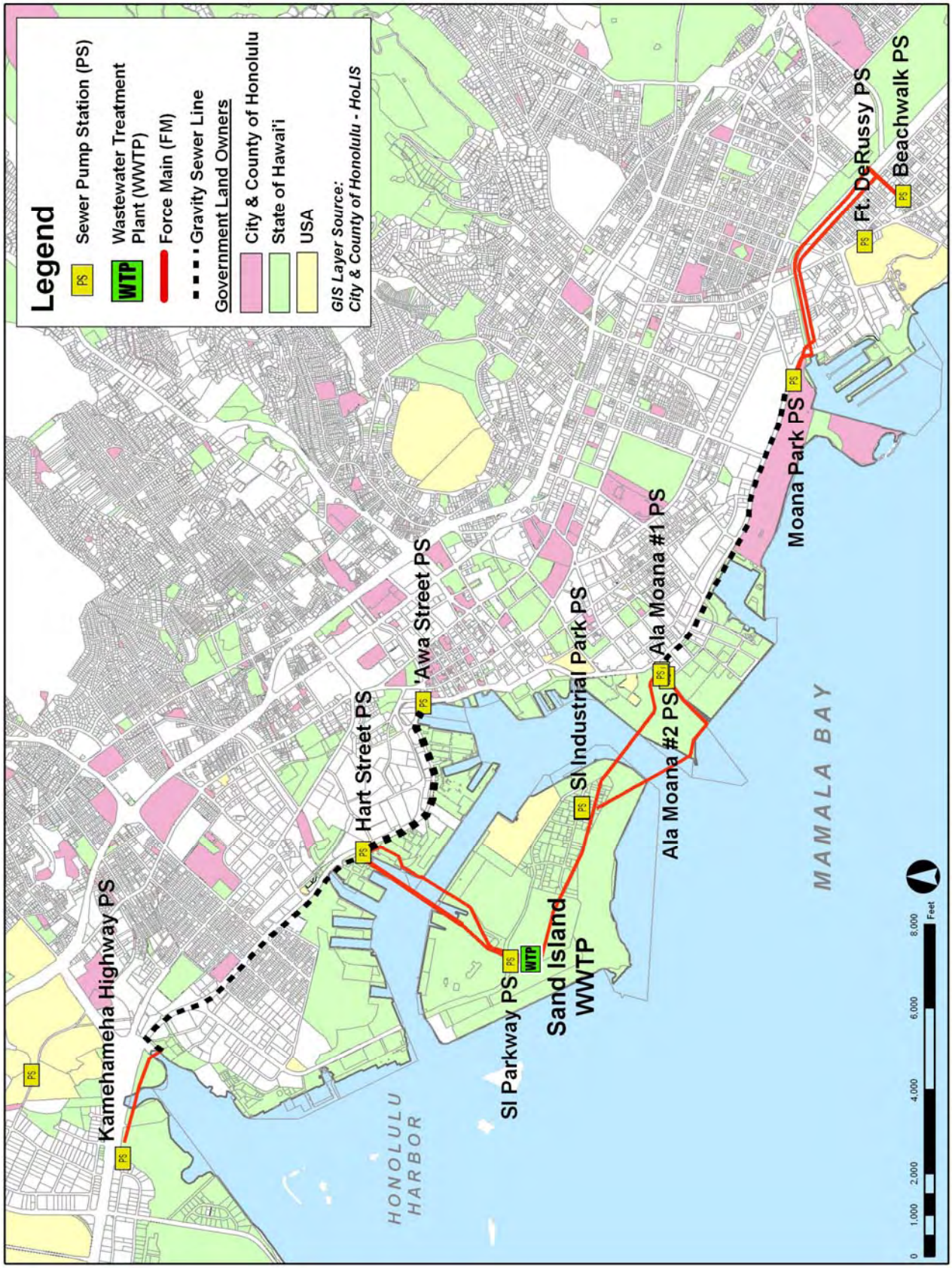

Figure 2-2. Existing SISB Wastewater System Map

2.1.2 West Basin Flows

In the West Basin, flows from the Kamehameha Highway PS and the ʻAwa Street PS are conveyed to gravity sewers which eventually discharge to the Hart Street PS. The Hart Street PS conveys all of the West Basin non-Department of Defense (DOD) flows to the Sand Island WWTP. Separately, the DOD facility, Fort Shafter, has its own WWPS and FM system that discharges directly to the Sand Island WWTP.

2.2 Sand Island Wastewater Treatment Plant

The Sand Island WWTP began operations in 1978 as an advanced wastewater treatment plant. The facility treats all of the flows from the SISB Phase I Area except for the collection area serviced by the Kuliʻouʻou PS on the east end, which discharges to the East Honolulu Wastewater System.

The Sand Island WWTP has undergone a number of major modifications in the past decade. As a result of these projects, the facility capacity was expanded to 90 million gallons per day (mgd) and its hydraulic capacity to 271 mgd. The current design data for the existing facility are presented in **Table 2-1**. A site plan of the existing Sand Island WWTP is shown in **Figure 2-3**. The facility treatment process is described below in terms of liquid waste streams and solid waste streams.

Table 2-1.
Sand Island WWTP – Current (2009) Design Information

Flows		
	Design Average Flow	90 mgd
	Intraday Elevated Flow	113 mgd
	Design Peak Wet Weather Flow	271 mgd
	Design Storm	2 year 6 hour

2.2.1 Liquid Waste Stream Processes

The process flow diagram of the Sand Island WWTP is shown in **Figure 2-4**. The following is a description of the major liquid stream units:

New Headworks: This facility was placed in operation in 2005 and replaced the original Screenings Building. An influent receiving area receives flows from the Ala Moana PS, Hart Street PS, Sand Island Parkway PS, Fort Shafter PS, and the Makai Lift PS. The facility consists of six bar screens and associated screenings washers and compactors for screenings removal, six Parshall flumes for flow measurement and four aerated grit chambers for grit removal. Screenings and grit are conveyed and discharged into a dump truck.

Flotator Clarifiers and Primary Clarifiers: This system consists of six flotator clarifiers and two primary clarifiers. The original Sand Island WWTP included six flotator clarifiers to provide advanced primary treatment. The flotator clarifiers were originally designed to utilize dissolved air flotation to "float" the solids to the surface where surface skimmers remove the solids. The flotator clarifiers are also utilized in the gravity mode as traditional primary clarifiers.

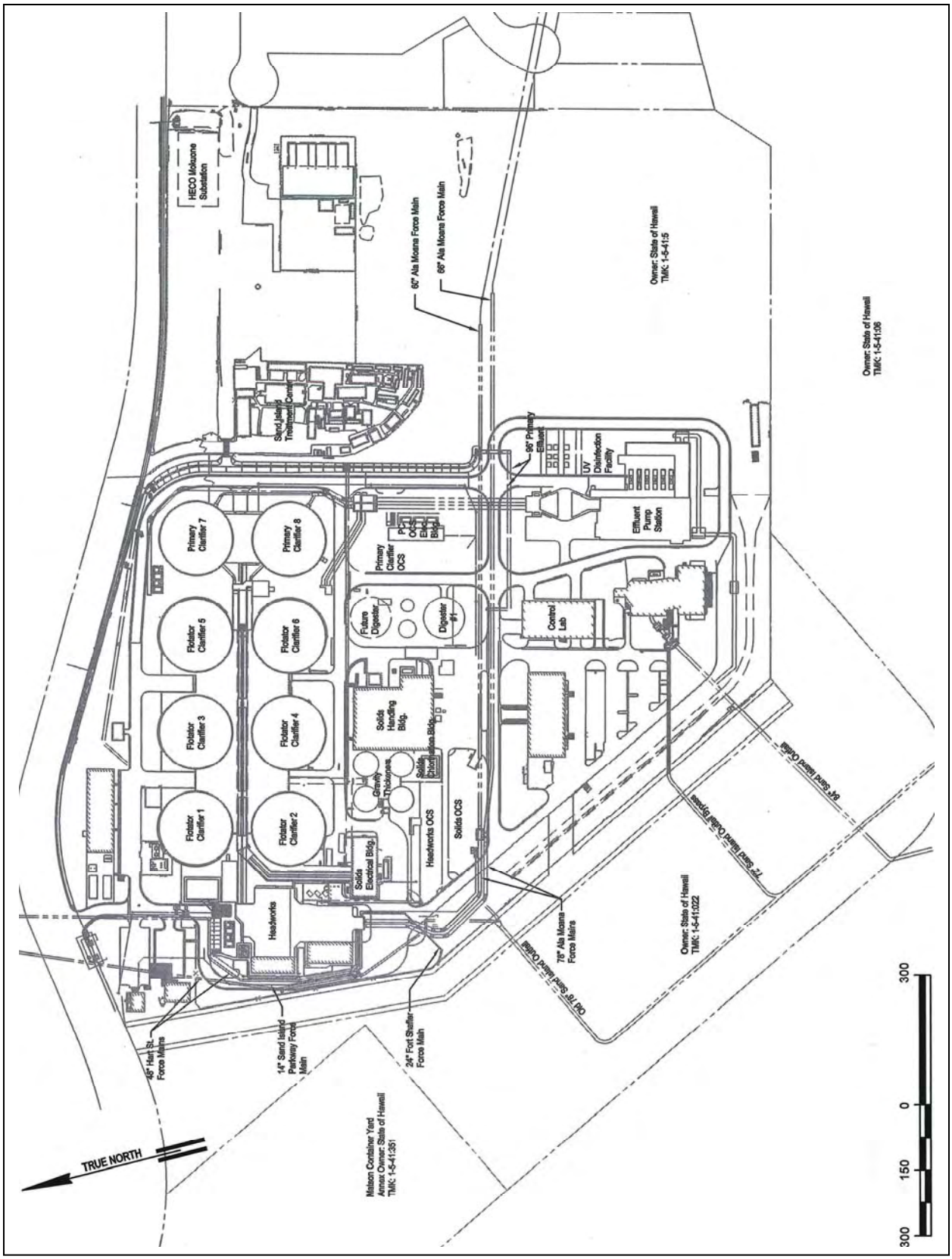

Figure 2-3. Sand Island WWTP Site Plan

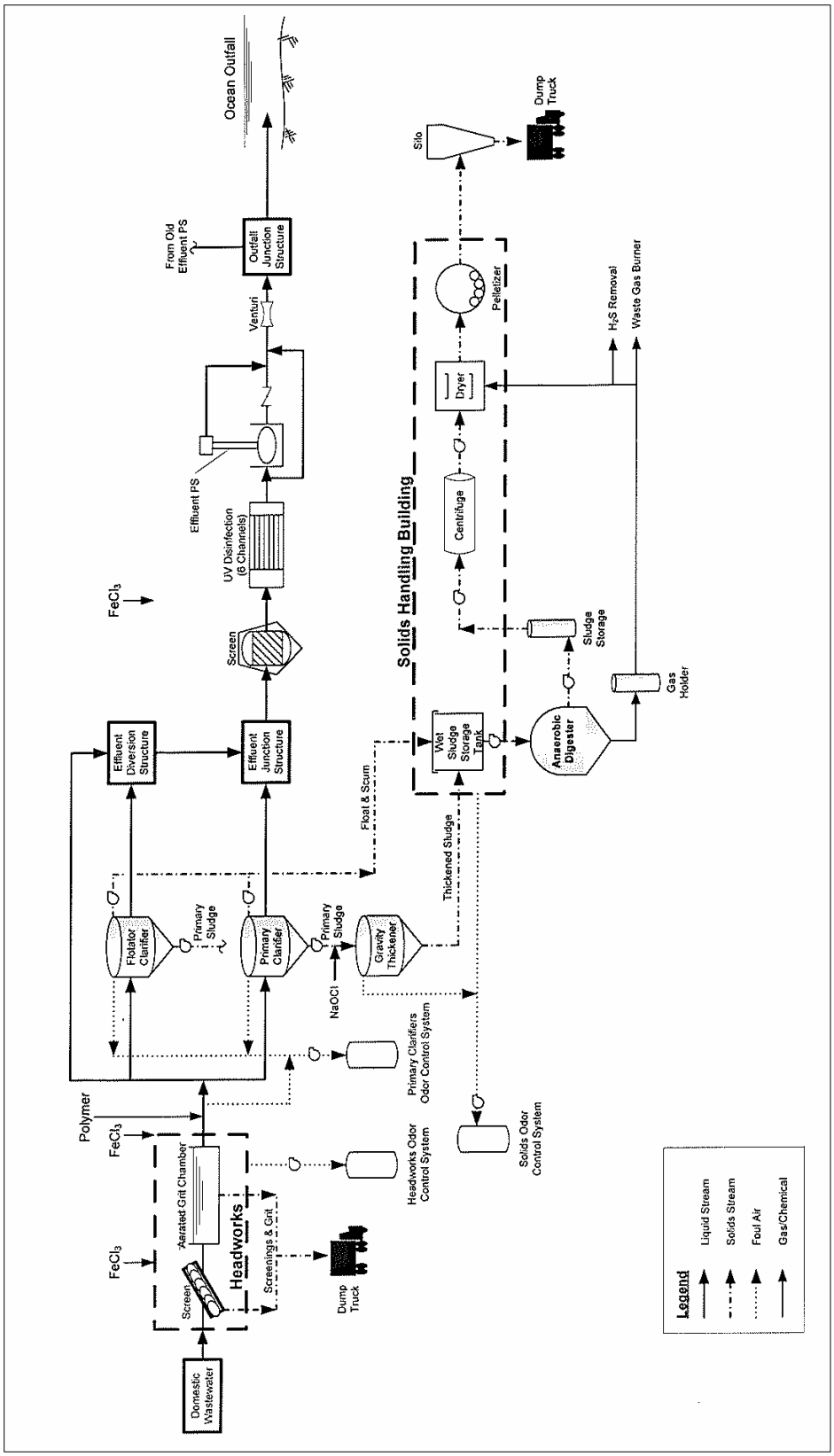

Figure 2-4. Sand Island WWTP Process Schematic (Existing)

Primary Clarifiers 7 and 8 were added to increase the capacity of the clarification system to 90 mgd. These PCs were designed as gravity-type primary clarifiers. In recent years, the FCs have been operated in the gravity mode.

Inorganic Chemical Feed Building (ICFB): The ICFB allows for the injection of chemicals used for chemically enhanced primary treatment (CEPT). Currently iron chloride ($FeCl_3$, ferric chloride) is being utilized to provide for advanced primary treatment and odor control.

Ultraviolet (UV) Disinfection Facility: This facility consists of four effluent screens, six UV disinfection channels and an effluent WWPS. Five of the six UV disinfection channels are currently populated with UV lamps. The UV system has room for expansion from the current six UV disinfection channels to ten. The effluent WWPS is used to control the water level in the UV disinfection channels. The additional pumping head is required to push the effluent through the 84-inch diameter ocean outfall pipeline. During low flows effluent can be discharged through the 84-inch ocean outfall pipeline by gravity.

Ocean Outfall: Effluent is discharged through an 84-inch diameter ocean outfall extending nearly two miles offshore (**Figure 2-5**). The total length of the outfall is approximately 14,000 linear feet (lf). The wastewater is diffused through the final approximately 3,400 lf of the outfall which is located at a depth of over 220 feet.

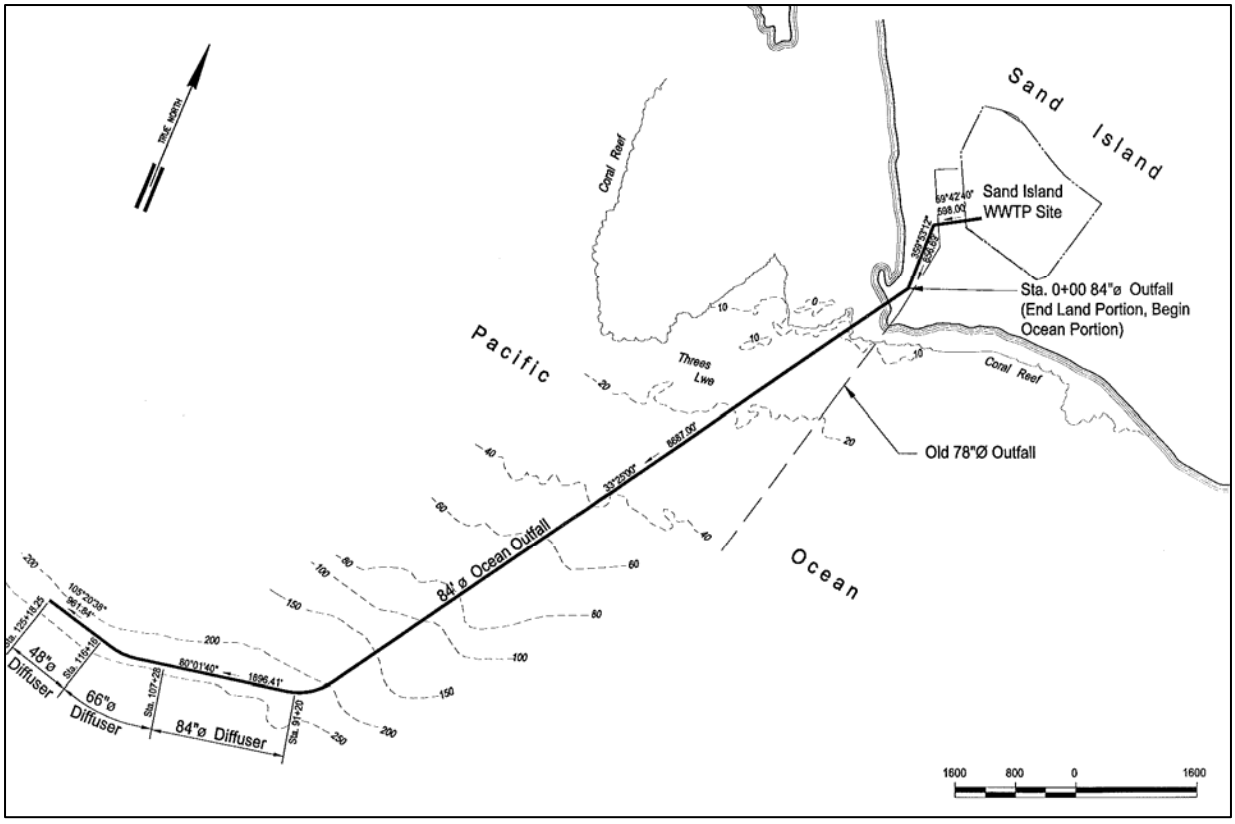

Figure 2-5. Sand Island WWTP Ocean Outfall

2.2.2 Solid Waste Stream Processes

The major solid waste stream processes are as follows:

Gravity Thickeners (GT): Primary sludge from flotator clarifiers and primary clarifiers is pumped to four gravity thickeners where chlorine is added to the influent to control odors and assist in thickening.

Wet Sludge Storage Tanks (WSST): Thickened sludge from the GTs is pumped to the WSSTs. There are four WSSTs. The WSSTs were originally designed to serve as sludge equalization tanks for the original solids handling processes which formerly included a thermal conditioning system, centrifuges and sludge incinerators. These systems were replaced with a turnkey sludge drying and pelletizing system.

Sludge Drying and Pelletizing System: The sludge drying and reuse system consists of digestion containment, centrifuges and final drying and pelletizing. Pelletized sludge is available for use as fertilizer. The system is a turnkey design-build-operate system by Synagro Technologies Incorporated (STI).

2.3 Conveyance Facilities

A summary of the current conveyance facilities is presented in **Table 2-2**.

Table 2-2.
Current SISB Phase I Conveyance Facilities

Facility Name	Associated Sewer Main
East Basin	
Ala Moana PS#1	Ala Moana FM #1
Ala Moana PS#2	Ala Moana FM #2
Beachwalk PS	Beachwalk FM Emergency Temporary Line Beachwalk PS to Ala Moana Park Sewer
Fort DeRussy PS	Ft. DeRussy FM
Moana Park PS	Moana Park FM
Sand Island Industrial Park PS	Sand Island Industrial Park FM
Sand Island Parkway PS	Sand Island Parkway FM
West Basin	
Hart St. PS	Hart St. FM Old Hart St. FM New
Kamehameha Highway PS	Kamehameha Highway FM New
‘Awa St. PS	‘Awa St. FM

2.3.1 East Basin Conveyance Facilities

Existing East Basin conveyance facilities include the Ala Moana PS #1 and #2, Beachwalk PS, Fort DeRussy PS, Moana Park PS, Sand Island Industrial Park PS and the Sand Island Parkway PS and their related FMs. East Basin conveyance flows and facilities are described as follows:

- The Fort DeRussy FM discharges to the East End Relief Sewer. From there, the wastewater flows by gravity to the Moana Park PS.

- The Beachwalk PS and FM and the Moana Park FM discharge to a junction box at the Diamond Head (east) end of Ala Moana Beach Park. From the junction box, a 69-inch sewer conveys wastewater to the Ala Moana PS #1 and #2.

Ala Moana PS and FM System

All flows from the East Basin arrive at the Ala Moana PS. The facility consists of two separate WWPSs and their respective FMs. The original Ala Moana PS #1 and FM#1 were constructed in the early 1950s. In 1983, the Ala Moana PS #2 and FM#2 were placed online. The systems operate in parallel and their FMs are interchangeable.

A complete rebuild of Ala Moana PS #1 was completed in 2007. The Ala Moana PS #2 has room for five pumps of which four have been installed. Minor modifications were completed in 2008.

In 2007, 2008 and 2009, CCH performed a condition assessment of the Ala Moana FM#2. The most significant condition found by the condition assessment was at the horizontal bend at Station 23+00. In August 2009, CCH completed the interim repair at Station 23+00 and issued a Notice to Proceed on the design of the permanent repair. No other conditions were found that constituted an immediate risk of pipe failure or service interruption. In conjunction with the condition assessment of Ala Moana FM#2, CCH has proceeded with the planning and design of a new Ala Moana FM#3.

Beachwalk PS and FM System

The Beachwalk PS and FM system is the next largest pumping facility in the East Basin area. The facility serves the Mō‘ili‘ili area and a portion of the Waikīkī area and conveys the wastewater to the Ala Moana Park Junction Box located at the Diamond Head end of Ala Moana Park. From there it flows by gravity to the Ala Moana PS.

The original Beachwalk PS and FM were constructed in the early 1960s with three of four possible pumps installed. In the mid-1980s the fourth and largest pump was installed.

As a result of a FM break in March 2006, CCH constructed a temporary by-pass force main by installing a thick walled, 42-inch inside diameter (ID) high density polyethylene (HDPE) pipe from the Beachwalk PS to the 69-inch diameter gravity line within Ala Moana Beach Park.

In 2007 and 2008, CCH performed a condition assessment of the existing Beachwalk FM. The condition assessment found small infiltration leaks at four pipe joints, which were subsequently repaired by installing joint seal rings. In addition, two small areas of concrete corrosions and one 1.5 feet long longitudinal crack were found and subsequently repaired in April 2008. The condition assessment of the existing Beachwalk FM found no conditions that constituted an immediate risk of pipe failure or service interruption.

In conjunction with the condition assessment of the existing Beachwalk FM, CCH has proceeded with the design and construction of a new Beachwalk FM. The new line, referred to as the “Beachwalk Pump Station to Ala Moana Park Sewer Phase 1 – Force Main System” (BWAPS) started construction in late 2009.

In addition to the above measures, this project evaluates long term alternatives that would eliminate the two WWPSs in Waikīkī (Fort DeRussy and Beachwalk) by converting the Beachwalk PS to a gravity line in the future and conveying the flows by gravity out of Waikīkī.

Fort DeRussy PS and FM System

The Fort DeRussy PS and FM system serves a portion of the Waikīkī area. The Fort DeRussy PS pump motors and control system were recently upgraded. The FM was extended to the East End Relief Sewer (on Kanunu Street) and is currently in service.

Moana Park PS and FM System

The Moana Park PS and FM is a small system located at the Diamond Head end of Ala Moana Beach Park. The Moana Park PS and FM system primarily serves the Ala Moana Center area with a short FM that discharges to the nearby Ala Moana Park Junction Box.

Sand Island Industrial Park PS and FM System

The Sand Island Industrial Park PS and FM is a small system that primarily serves the industrial area on Sand Island east of the Sand Island WWTP. This system conveys flows to the Sand Island Parkway PS.

Sand Island Parkway PS and FM System

The Sand Island Parkway PS and FM is a small system that receives wastewater from the Sand Island area including the flows from the Sand Island Industrial Park PS. It conveys flows directly to the Sand Island WWTP.

2.3.2 West Basin Conveyance Facilities

The major West Basin conveyance facilities include the Hart Street PS, the Kamehameha Highway PS and the ʻAwa Street PS and their respective FMs. The Kamehameha Highway PS conveys wastewater for eventual discharge to the Hart Street PS. The ʻAwa Street PS conveys wastewater to a nearby gravity line which also eventually discharges to the Hart Street PS. All West Basin flows eventually flow to the Hart Street PS which then conveys the wastewater to the Sand Island WWTP.

Hart Street PS and FM System

The Hart Street PS is the second largest WWPS in the SISB wastewater system. All flows from the West Basin arrive at the Hart Street PS for conveyance to the Sand Island WWTP. The Hart Street PS consists of five permanent and three temporary pumps.

Kamehameha Highway PS and FM

The Kamehameha Highway PS receives wastewater from the westernmost portion of the SISB Phase I Area. The Kamehameha Highway PS conveys wastewater to a 54-inch sewer line along Nimitz Highway and eventually discharges into the Hart Street PS.

ʻAwa Street PS

The ʻAwa Street PS receives wastewater from an area just to the west of Nuʻuanu Stream. The wastewater is conveyed only a short distance, 200 linear feet (lf), to a gravity sewer on Nimitz Highway which eventually discharges into the Hart Street PS.

3. Project Description and Alternatives

3.1 Planning Period

The alternatives under consideration are being developed to meet projected wastewater service demands in the SISB Phase I service area to at least the year 2030. Individual system components have different life cycle characteristics that are factored into the overall project evaluation in terms of capital costs, depreciation, and operation and maintenance costs. A summary of the planning periods utilized for the various system components is presented in **Table 3-1**.

Table 3-1.
Planning Period

Population Estimates	2030
Gravity Sewer Tunnels	150 years
Pump Stations	30 years
Force Mains	30 years
Mechanical Equipment (at WWPS and WWTPs)	20 years
Wastewater Treatment Plant (structures)	50 years

3.2 Design Standards and References

The following documents contain design standards and design criteria, as well as historical references on wastewater facilities in the SISB Phase I Area. These documents are being used for the development and evaluation of project alternatives:

1. Design Standards of the Department of Wastewater Management, Volume 1, Design of Sewers and Pump Stations (July 1993)
2. Design Standards of the Department of Wastewater Management, Volume 2, Design of Treatment Plants (July 1984)
3. Final Sewer Rehabilitation and Infiltration & Inflow Minimization Plan, City and County of Honolulu (Fukunaga and Associates, Inc., December 1999)
4. "309 Consent Decree" arising out of Civil No. 94-00765DAE, *United States of America et al. v City and County of Honolulu*
5. East Mamala Bay Final Facilities Plan, City and County of Honolulu, (Belt Collins Hawai'i, December 1993)
6. Final Environmental Impact Statement for the East Mamala Bay Facilities Plan, City and County of Honolulu, (Belt Collins Hawai'i, December 1993)
7. Beachwalk FM Condition Assessment, City and County of Honolulu (HDR Engineering, November 2009)
8. Ala Moana FM #2 Condition Assessment, City and County of Honolulu (RMTC, November 2009)
9. Old Hart Street FM Condition Assessment, City and County of Honolulu (HDR Engineering, November 2009)
10. Beachwalk PS Condition Assessment, City and County of Honolulu (RMTC, November 2009)
11. Sand Island WWTP NPDES Permit, No. HI 00201117
12. 2007 Stipulated Order, District Court, Civil No. 07-00235 HG-KSC
13. 2004 FM Administrative Order

3.3 Population, Flow and Waste Loads

To determine system capacity requirements within the planning period, population and flow projections will be developed for the year 2030 and for the "tunnel life" scenario. "Tunnel life" is in reference to the possibility of implementation of a GST and related facilities that are expected to have a useful life of up to 150 years.

3.3.1 Population Projections

Population estimates for the years 2000 and 2030 were obtained through data analysis of Traffic Analysis Zone (TAZ) projections provided by the CCH Department of Planning and Permitting (DPP). The year 2000 TAZ data set is based on the 2000 census and is therefore reflective of the actual population of that year. Results are presented in **Table 3-2**. The TAZ data includes 764 zones on O'ahu and various residential and occupational categories of people that make up the entire population. The categories were grouped into three distinct population types – residential, commercial, and resort. The TAZ boundaries were overlaid with the WWPS tributary boundaries to determine the population of each tributary area.

Table 3-2.
2000 & 2030 Population Summary

Pump Station	2000 Population				2030 Population			
Tributary Area	Res	Comm	Resort	Total	Res	Comm	Resort	Total
Aliamanu #2	3,382	117	0	3,499	3,152	205	0	3,357
Aliamanu #1	705	24	0	729	657	43	0	700
Kamehameha Hwy	35,947	31,342	1,550	68,839	34,342	34,266	982	69,590
'Awa Street	15,750	15,500	0	31,250	17,342	20,647	0	37,989
Hart Street	59,400	36,201	54	95,654	60,127	47,508	20	107,655
Ala Moana	139,816	152,871	3,780	296,466	167,360	202,183	1,667	371,210
Moana Park	312	4,027	0	4,339	687	4,274	0	4,961
Fort DeRussy	6,356	12,372	15,618	34,345	6,716	14,005	6,894	27,615
Beachwalk	48,074	42,025	51,769	141,868	48,078	54,881	19,411	122,370
Public Baths	1,377	1,056	506	2,940	1,315	1,676	190	3,181
Kahala	16,638	7,532	798	24,968	17,150	13,354	342	30,846
Niu Valley	2,628	633	0	3,262	2,564	1,780	0	4,344
Paiko Drive	339	65	0	403	326	333	0	659
Sand Island Industrial Park	75	802	0	877	74	762	0	836
Sand Island Parkway	109	1,172	0	1,281	109	1,113	0	1,222
Fort Shafter	3,229	6,779	0	10,008	3,037	7,347	0	10,384
TOTAL	334,136	312,518	74,074	720,728	363,036	404,377	29,506	796,919

"Tunnel Life" Projections

The GST system has a projected life expectancy, referred to as "tunnel life", of 150 years. Projecting population growth past the year 2030 is difficult. Population projections to assess the GST system alternative will be provided in the Draft EIS that will be published for this project.

3.3.2 Flow Components and Projections

Wastewater flows used as a basis of design are determined by the following components:

- Base flows are based on population projections for the planning period multiplied by per capita unit flow rates (i.e., the amount of wastewater generated per capita).
- Peaking factor (PF) is applied to account for fluctuations in flow throughout the day. The peaking factor is affected by human use patterns, which anticipates surges in use, and by the topography of the service areas which accounts for the relative speed that flows travel through the system.
- Dry and wet weather inflow and infiltration accounts for ground water and storm water that enters the sewer system. Infiltration levels are affected by the structural characteristics and conditions of the wastewater system components, groundwater levels, rainfall intensity, and soil conditions.

The above components are used to determine four design flow categories:

- Average Daily Dry Weather Flow (ADWF) = Base Flow + Dry Weather Infiltration (DWI)
- Peak Daily Dry Weather Flow (PDWF) = (Base Flow x Peak Factor) + DWI
- Average Daily Wet Weather Flow (AWWF) = Base Flow + DWI + Peak Daily Wet Weather Inflow and Infiltration (WW/II)
- Peak Hourly Wet Weather Flow (PWWF)= (Base Flow x Peak Factor) + DWI + Peak Hourly WW/II

The sizing of WWPSs and conveyance lines are normally based on the PWWF. Typically WWPSs must be designed to convey the PWWF with the largest pump out of service. Conveyance lines are also sized to accommodate this flow rate.

For the design of WWTPs, the design annual average flow (DAAF) and the design monthly maximum average flow (DMAF) are important design flow parameters. The DAAF reflects base flows and dry weather infiltration. The DMAF accounts for base flows, dry weather infiltration and wet season increases.

Flow projections are based on population projections. Due to the current potential for infrastructure to be engineered to ensure a long service life, it is reasonable to expect the GST system alternative to have a life expectancy of 150 years or more. Projecting population growth and related flow projections beyond the 2030 planning period, let alone into the next century, is difficult. However, there are methods that can be used to do so. Population projections to assess the GST system alternative will be provided in the Draft EIS that will be published for this project.

3.3.3 Waste Loads

Waste loads refer to the concentrations and loads of Biochemical Oxygen Demand (BOD) and Suspended Solids (SS) that must be treated and disposed by the WWTP. Estimates of these loads for the planning period are required to properly size the various components to meet projected service needs. BOD and SS estimates are determined by combining historic waste load data with population and flow projections. Because population and flow projections are still being developed, BOD and SS estimates will be provided in the Draft EIS that will be published for this project.

3.4 Conveyance System Alternatives

The SISB Phase I Area consists of two primary sub-basins, the Ala Moana Basin and the Hart Street Basin. The former is referred to in this document as East Basin and the latter the West Basin. The configuration of these two sub-basins and their respective wastewater system components creates a logical framework for describing and evaluating project alternatives. The integrating factors are (1) collective impacts on the Sand Island WWTP, and (2) the interrelationship of east and west tunnel alternatives, as discussed below.

3.4.1 Conveyance System Concepts

At a broad level, two general conveyance system concept alternatives are being considered by the SISB Phase I Area project: (1) GST and (2) conventional non-GST systems that utilize WWPS, FMs and gravity mains. The selection and integration of GST and/or non-GST systems will have an effect on wastewater system facilities throughout the SISB Phase I Area. SISB Phase I Area wastewater conveyance system alternatives are shown in **Figure 3-1**.

Gravity Sewer Tunnels

GSTs are large-capacity sewer conveyance/storage systems that convey wastewater flows by gravity and can store and equalize flows to downstream facilities during peak flow conditions. As conceived for the SISB Phase I Area project, a GST system would consist of a concrete-lined, 14- to 20-foot diameter tunnel constructed by means of a boring machine at depths ranging from 60 feet to 150 feet below mean sea level (msl). Flows would be conveyed to the deepest point of the GST, situated beneath the Sand Island WWTP, and a new Influent Pump Station (IPS) would be used to raise the wastewater from the tunnel to the treatment facility. Additional components of the GST system include drop shafts to connect sewer mains to the GST, and ventilation and odor control facilities to manage and treat air flows within the tunnel.

Four GST alignments are being considered, all of which terminate at the Sand Island WWTP:

- Sand Island East Sewer Tunnel, extending from the Sand Island WWTP to the Moana Park PS (located at the east end of Ala Moana Beach Park) along one of three alternative routes;
- Sand Island West Sewer Tunnel, extending from the Sand Island WWTP to the Hart Street PS along one of five alternative routes;
- Sand Island West Conveyance Tunnel, extending from the Kamehameha Highway PS to the Sand Island West Sewer Tunnel along one of three alternative routes; and,
- ‘Awa Street Conveyance Tunnel, a conveyance tunnel extending from the Hart Street PS to the ‘Awa Street PS on a route below Nimitz Highway.

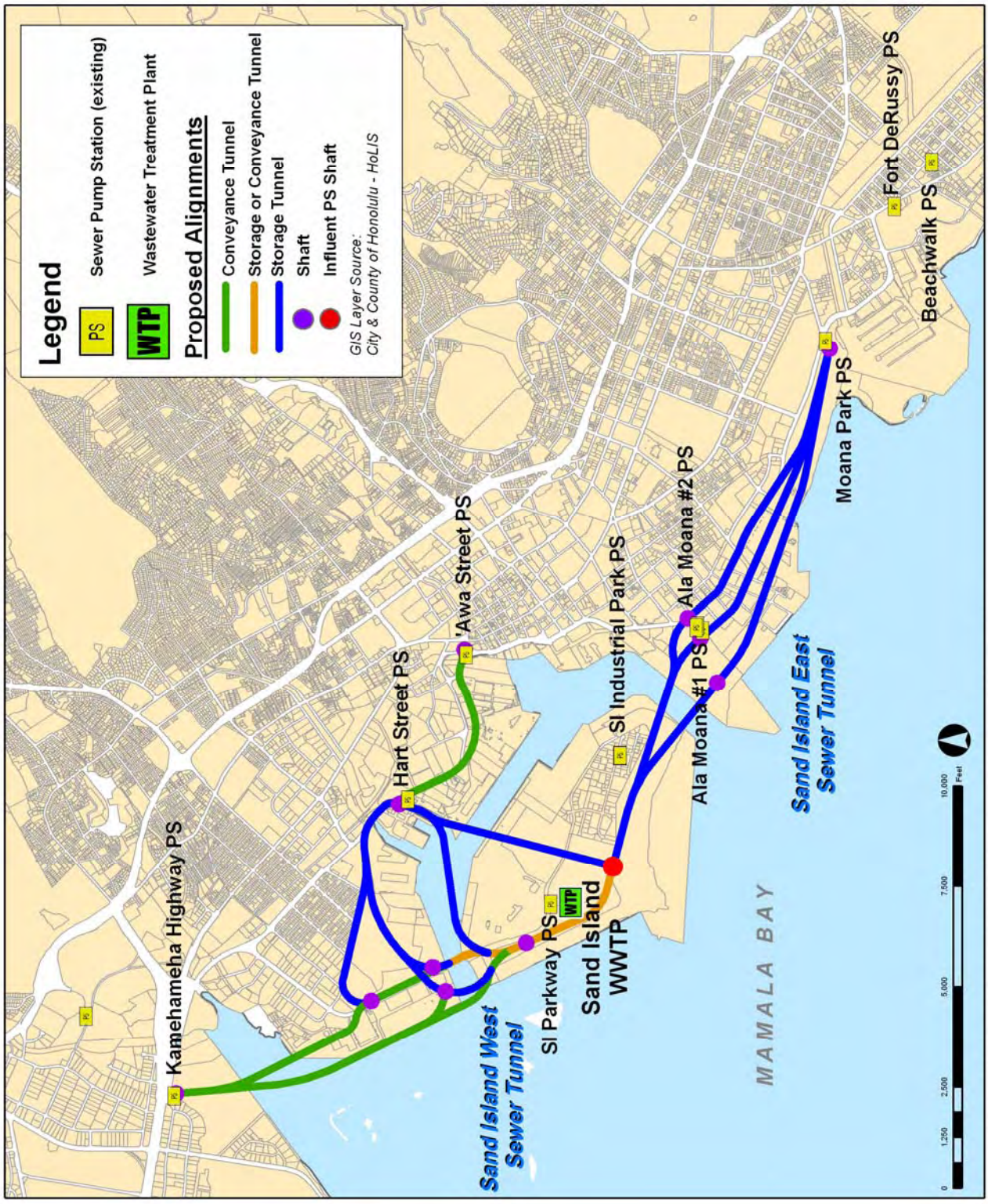

Figure 3-1. SISB Wastewater Conveyance System Alternatives

The key potential benefits of GSTs include:

1. A GST will reduce the number of WWPSs and associated FMs in the collection system. Specifically, the East Sewer Tunnel alignment would eliminate the Fort DeRussy PS, Moana Park PS, and Ala Moana PS and associated FMs. These wastewater conveyance facilities are located in close proximity to the general public and economically important areas in Ala Moana and Waikīkī. Eliminating these FMs and WWPSs would eliminate the potential risk of spills, odors and noise associated with such facilities. It would also reduce disturbance to public streets and facilities related to upgrade and repair work on the FM system. Land area used by the WWPSs can be returned to a more compatible, and often, more valuable use.
2. If used for storage, a GST system reduces the size of downstream WWTP and conveyance facilities. This is a significant benefit where the availability of land is constrained, as it is at Sand Island WWTP.
3. A GST will eliminate surface easements. With GSTs, only an underground easement is needed and surface easements are not required except at access points. Eliminating surface easements used by existing gravity mains and FMs would free up real estate for other uses.

A typical GST plan and profile for the East Basin is shown in **Figure 3-2**. A West Basin plan and profile from ʻAwa Street PS to Hart Street PS to Sand Island WWTP is shown in **Figure 3-3**.

3.4.2 East Basin Conveyance Alternatives

The major East Basin area conveyance facilities include the Ala Moana PSs and FMs, the Beachwalk PS and FMs, the Fort DeRussy PS and FM, the Moana Park PS and FM, and the Sand Island Industrial Park PS and FM (**Table 2-2**). East Basin conveyance alternatives include GST and non-GST systems. Major elements of each alternative are described below.

GST System

The GST system for the East Basin is schematically shown in **Figure 3-4**. Key elements of this alternative include:

- Construction of the Sand Island East GST.
- Construction of the Sand Island Influent Pump Station (IPS).
- Conversion of the Beachwalk PS to Ala Moana Park PS FM to a gravity sewer.
- Elimination of the Beachwalk PS and connection of the new gravity sewer to the Beachwalk PS Makai Pit.
- Elimination of the Fort DeRussy PS and connection of the influent to either the Beachwalk PS Makai Pit or to the Ala Wai field shaft of the Beachwalk to Ala Moana Park gravity sewer.
- Elimination of the Moana Park PS and connection of the influent to a new Ala Moana Park shaft.
- Connection of the Beachwalk to Ala Moana Park gravity sewer to the Sand Island East GST at a new Ala Moana Park shaft.
- Elimination of the Ala Moana PS (in the Kakaʻako makai area) and connection of the influent to a new tunnel shaft connecting to the Sand Island East GST.
- Elimination of the Sand Island Parkway PS and connection to the Sand Island junction box or to the new Influent PS via a new Sand Island Parkway Sewer Basin sewer line. If feasible, elimination of the Sand Island Industrial Park PS and connection of the influent to the Sand Island Parkway Sewer Basin sewer line.
- Possible elimination of the ʻAwa Street PS and connection to the planned Ala Moana PS shaft (in Kakaʻako makai).

In the East Basin, this system results in the elimination of at least two WWPS and FM systems in Waikīkī.

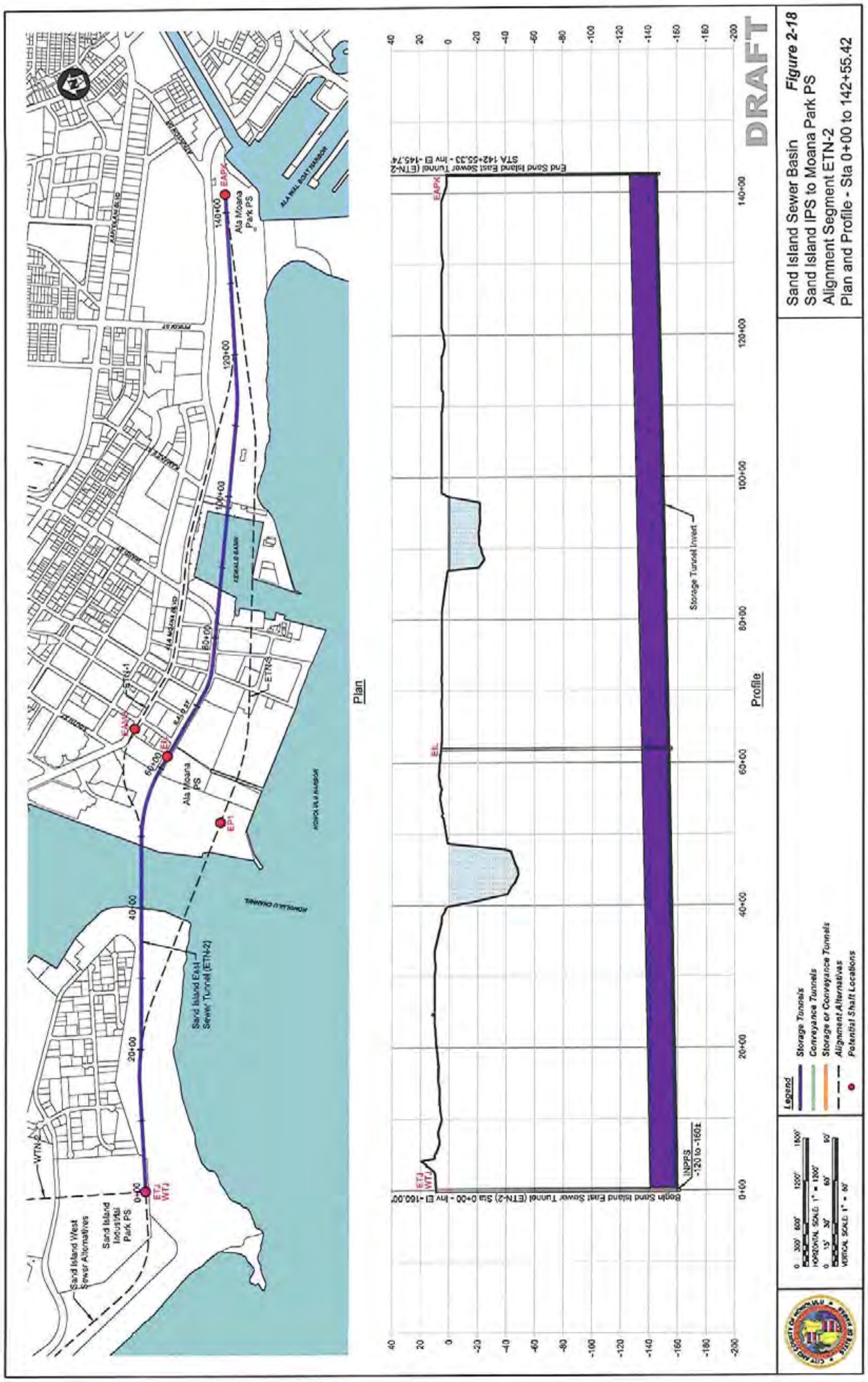

Figure 3-2. East Basin Tunnel (Typical)

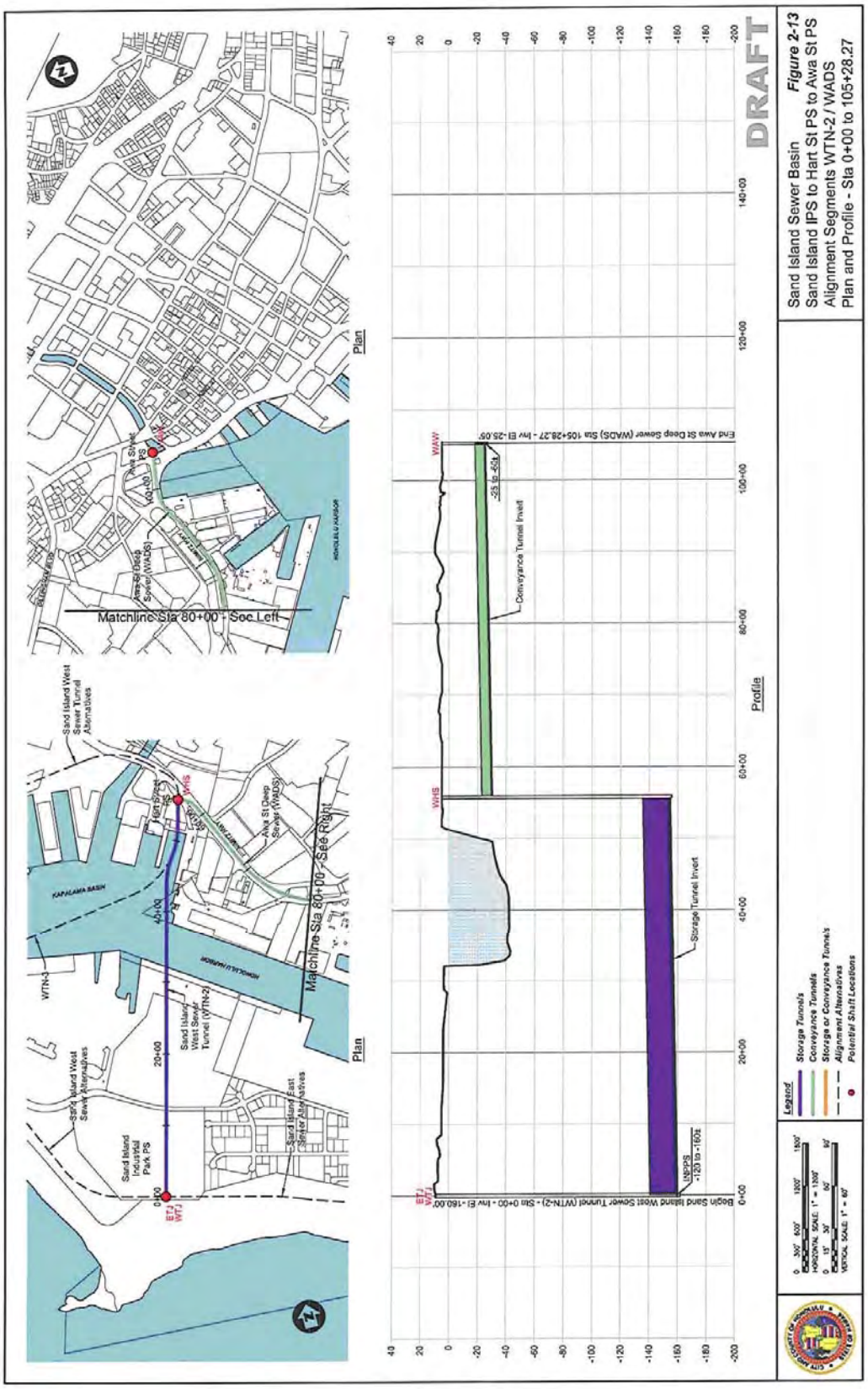

Figure 3-3. West Basin Tunnels: Hart Street PS to Sand Island WWTP – AWPS to HSPS

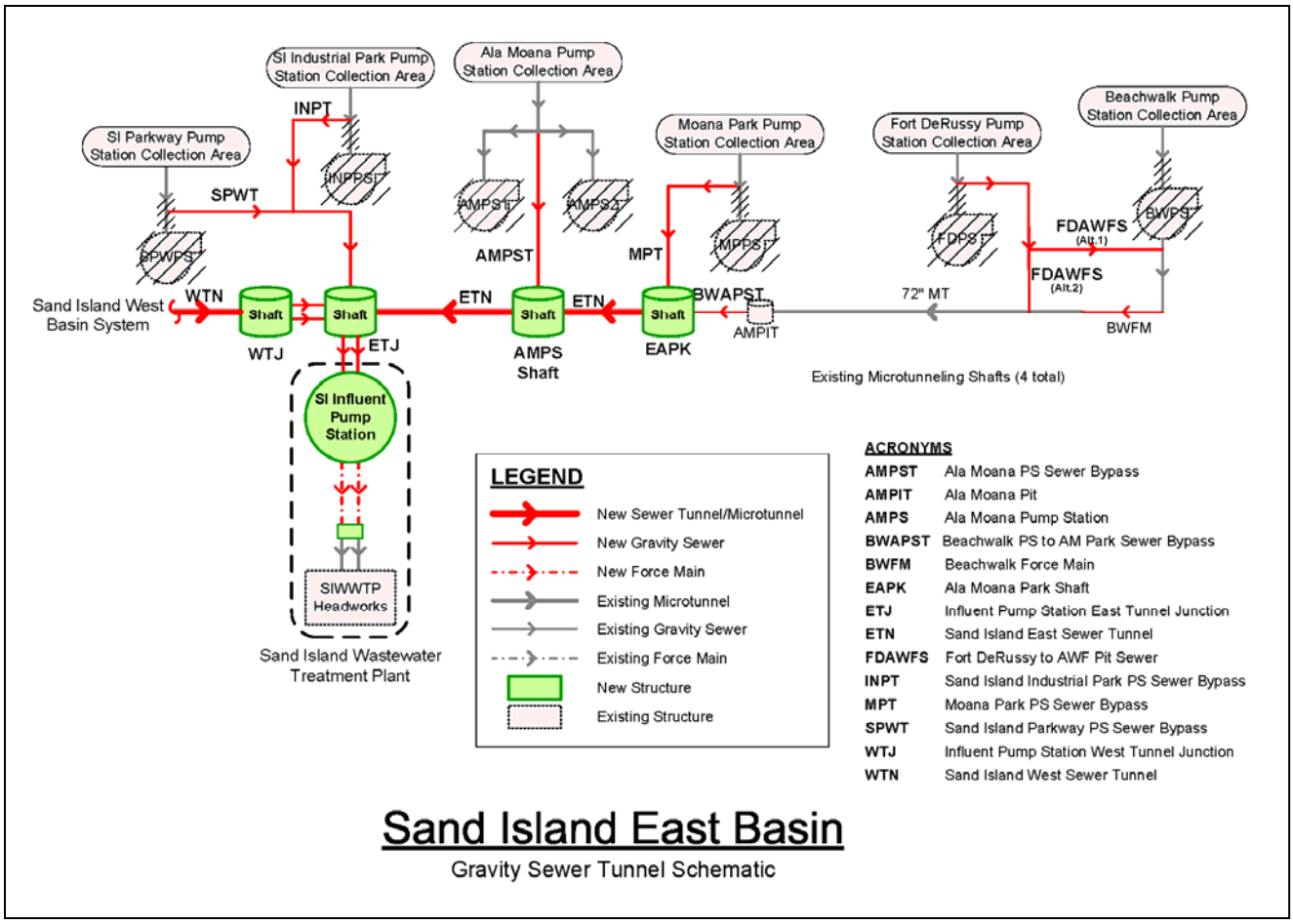

Figure 3-4. Sand Island East Basin Gravity Sewer Tunnel Schematic

Non-GST System

The non-GST System for the East Basin is schematically shown in **Figure 3-5**. Key elements of this alternative include:

- Construction of a new WWPS at Ala Moana Park, referred to as the Ala Moana Park PS (APPS).
- Conversion of the Beachwalk PS to Ala Moana Park FM to a gravity sewer.
- Elimination of the Beachwalk PS and connection of the new gravity sewer to the Beachwalk PS Makai Pit.
- Elimination of the Fort DeRussy PS and connection of the influent to a 72-inch microtunnel of the Beachwalk PS to Ala Moana Park PS gravity sewer, with alternate connections.
- Elimination of the Moana Park PS and connection to the Ala Moana Park PS.

  This system results in the elimination of three WWPS and FM systems in the East Basin, including the two in Waikīkī.

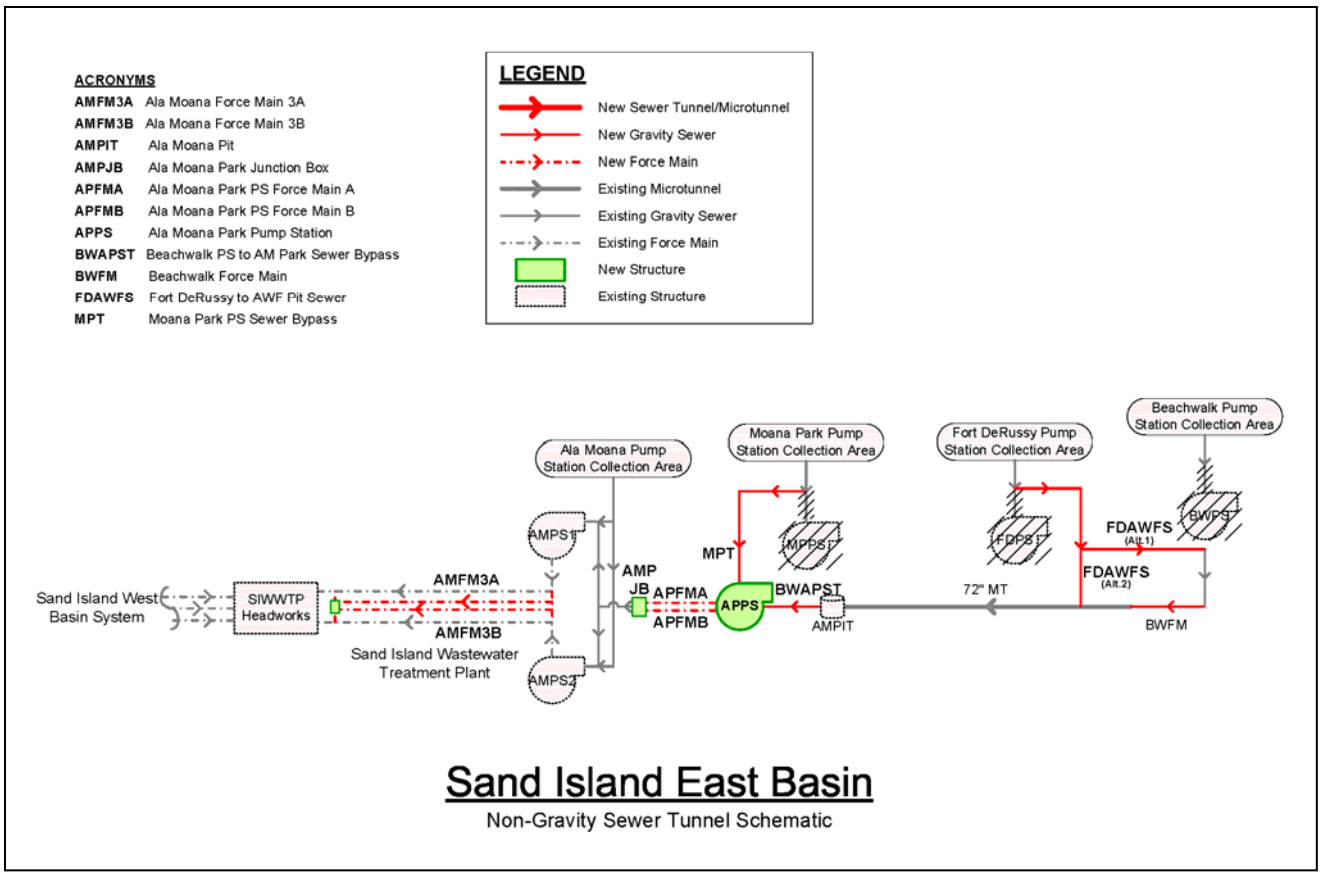

Figure 3-5. Sand Island East Basin Non-Gravity Sewer Tunnel Schematic

3.4.3 West Basin Conveyance Alternatives

The major West Basin area conveyance facilities include the Hart Street PS and FM system, the Kamehameha PS and FM system, and the ‘Awa Street PS and FM system. The Fort Shafter PS and FM system is a non-CCH facility (owned and operated by the DOD). The options for GST and non-GST conveyance systems are described on a system-by-system basis as follows:

Hart Street PS and FM GST System (GST Alternative)

All flows from the SISB West Basin eventually travel to the Hart Street PS. A GST system would consist of construction of a drop shaft at the Hart Street PS and a GST with direct connection to the Sand Island WWTP. A slight variation would place the drop shaft at an intermediate point on the GST alignment where it would collect flows from one or more of the Hart Street PS, Kamehameha Highway PS, and ‘Awa Street PS facilities.

Kamehameha Highway PS and FM System (GST or Non-GST Alternative)

The existing system can remain as is, regardless of whether the Hart Street PS and FM system remains or is converted to a GST system. If the Hart Street PS system is converted to a GST system, flows from the Kamehameha Highway PS system would discharge to the GST shaft at the Hart Street PS or at an intermediate tunnel shaft site.

Alternatively, if the Kamehameha Highway PS is phased out, a GST or microtunnel (MT) could be used to convey flows directly to a tunnel shaft at the Sand Island WWTP, or to an intermediate tunnel shaft at the Hart Street PS.

'Awa Street PS and FM System (GST or Non-GST Alternative)

In its present form, the 'Awa Street PS and FM system requires implementation of a new relief sewer (Nimitz Highway Relief Sewer (NHRS)) at the discharge end of the FM. If the 'Awa Street PS system is phased out, the Hart Street PS or the Ala Moana PS system must be converted to a GST or deep gravity sewer system. The options include:

- If Hart Street PS system is converted to a GST system, the 'Awa Street PS can be phased out by constructing a gravity sewer to the GST shaft near the Hart Street PS. Alternatives include a GST, MT or open trench constructed pipeline.
- If the Ala Moana PS system is converted to a GST system, a gravity sewer line could be diverted to the East Basin GST.
- If both the Ala Moana PS and Hart Street PS are converted to GST systems, further evaluation would be needed to assess which system the 'Awa Street PS flows should be diverted to.

The major conveyance alternatives for the West Basin are schematically presented in **Figure 3-6**.

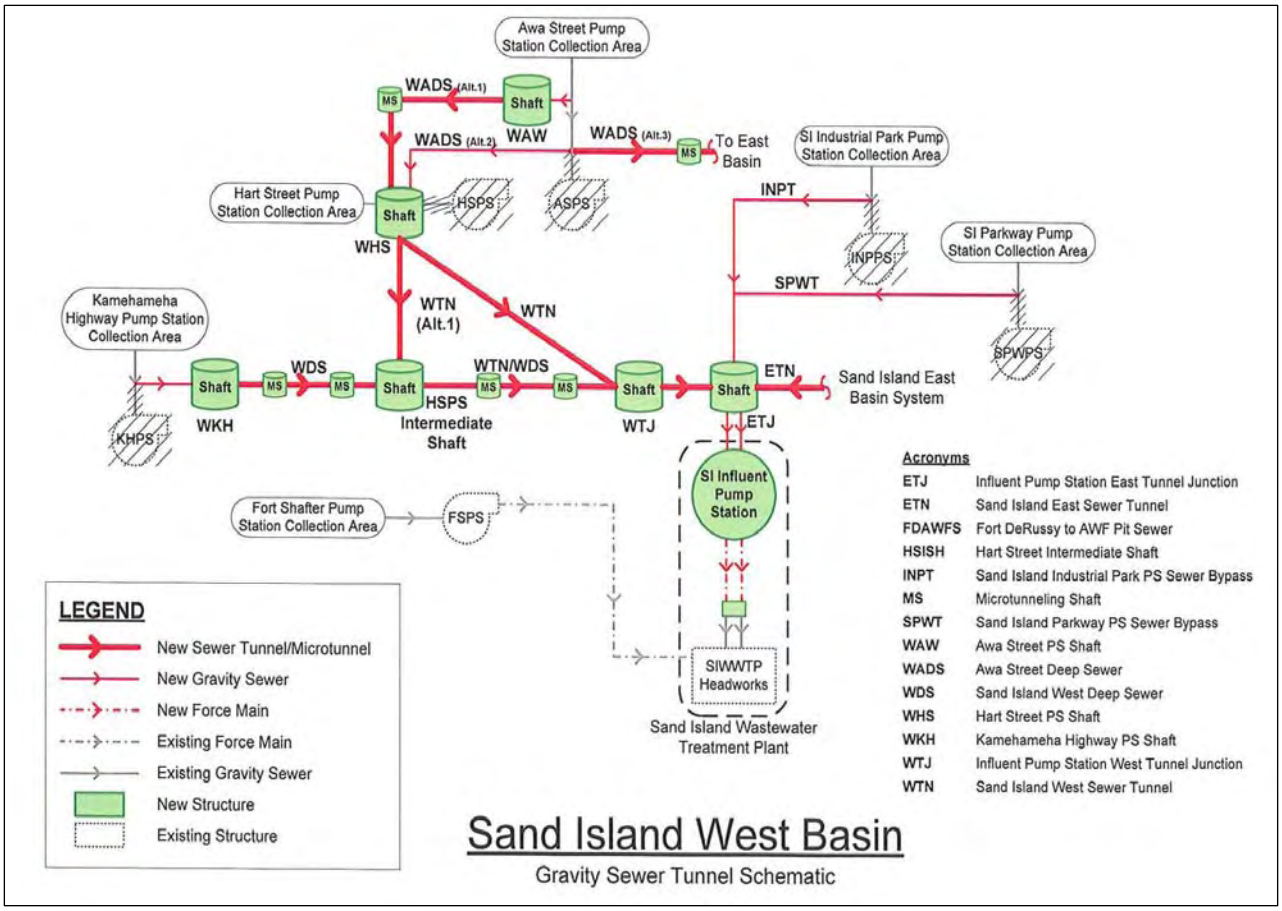

Figure 3-6. Sand Island West Basin Gravity Sewer Tunnel Schematic

3.4.4 New Sand Island Influent Pump Station (IPS) Alternative

If a GST is constructed in the SISB Phase 1 Area, wastewater flows would be conveyed directly to the Sand Island WWTP where a central WWPS, referred to as an Influent Pump Station (IPS), would be constructed to lift wastewater from the tunnel to the treatment facility.

The Sand Island WWTP sits on a 50-acre parcel of land that is also occupied by the Sand Island Treatment Center (for drug addiction treatment), stormwater dewatering facility, a wetland, and a soils stockpile area. Siting of the IPS will take into consideration the location, and possible relocation, of these existing uses. The acquisition of additional land from the State of Hawai‘i for siting of the IPS and support facilities also is being considered.

The size and design of the IPS is dependent on several key factors:

- GST collection area – Four GST influent flow alternatives are being considered by the project:
    1. Sand Island West Sewer Tunnel (WTN);
    2. Sand Island East Sewer Tunnel (ETN);
    3. Both WTN and ETN; and,
    4. ETN with the ‘Awa Street PS tributary area.

  The alternative(s) selected will determine the quantity of flow that must be accommodated by the IPS.

- GST depth – Pump sizing is determined in part by the depth of the GST (invert depth) below the IPS. GST alternatives currently under consideration vary in depth from -120 feet to -160 feet below msl. The higher the lift, the greater the required pump capacity. The final depth of tunnel alignments will be established considering two main factors: the channel depth of the Honolulu Harbor crossing at the southern end of Sand Island, and the depth of the pier piles at the crossing location.

- Use of the GST for storage – In addition to conveyance, GSTs can be used to store peak flows during the wet weather season. The capacity to store wastewater in the tunnel allows IPS design flows to be reduced and smaller pumps to be used.

The IPS design capacity will be based on flow projections, which are based on population projections. Population projections to assess the GST system alternative will be provided in the Draft EIS that will be published for this project.

IPS support facilities include an instrumentation and control center, a Hawaiian Electric Company (HECo) substation (for normal power), a standby generator plant, fuel tanks, and wet well and tunnel odor control system. Site location and layouts for the three (west, central, and east) IPS site alternatives are shown in **Figure 3-7**. The site layouts shown are preliminary and will be further refined in the Draft EIS.

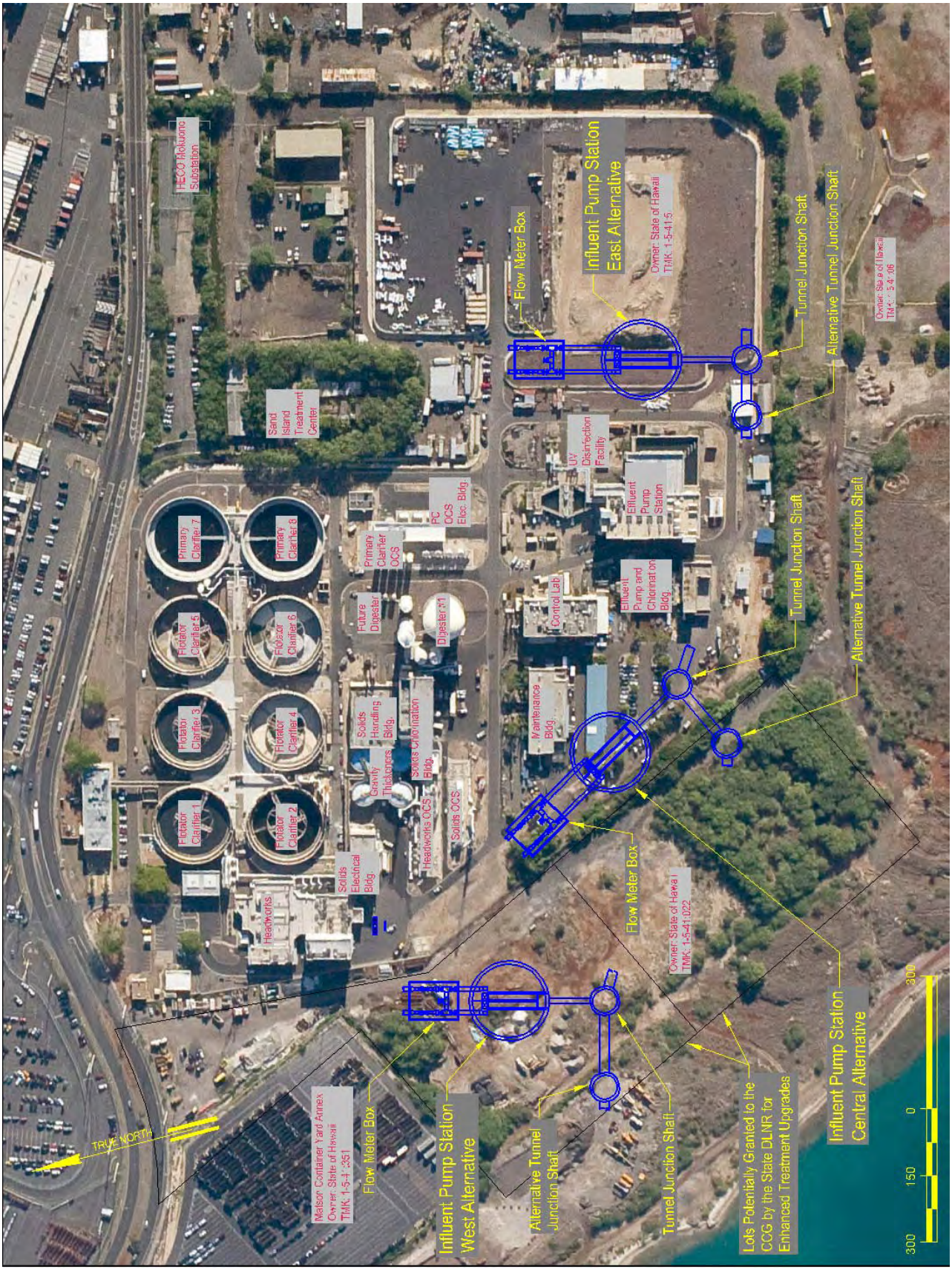

Figure 3-7. IPS Site Alternatives

3.4.5 Sand Island WWTP Hydraulic Upgrade Alternatives

The Sand Island WWTP continues to operate under the 1998 NPDES permit No. H 0020117. The permit allows for primary treatment levels of 30 percent BOD removal and 60 percent SS removal minimums. In January 2009, the EPA issued a denial of the renewal of the 1998 NPDES permit under the Clean Water Act, Section 301(h) for the Sand Island WWTP. CCH is currently appealing the denial decision. Alternatives for expanding and upgrading the treatment process at the Sand Island WWTP will vary depending on the final resolution of the Sand Island WWTP NPDES permit and will be addressed at a later date. Therefore, only future hydraulic upgrades at the Sand Island WWTP will be considered by this project.

Population projections to assess the potential need for future hydraulic upgrades at the Sand Island WWTP will be provided in the Draft EIS that will be published for this project.

3.4.6 Mōʻiliʻili – Waikīkī Conveyance System (GST and Non-GST)

The Mōʻiliʻili-Waikīkī area of Honolulu stretches from Kapahulu to McCully, through Waikīkī to Ala Moana Shopping Center and Ala Moana Beach Park. The conveyance facilities in this system include the Beachwalk PS and FMs, the Fort De Russy PS and FM and the Moana Park PS and FM. The routes of the various FMs are shown in **Figure 3-8.**

Each alternative plan for the SISB Phase I Area system calls for the elimination of the Beachwalk PS and Fort DeRussy PS, and their respective FMs from Waikīkī. The Beachwalk to Ala Moana sewer pipeline, currently under construction, is initially scheduled to serve as a new and permanent FM for the existing Beachwalk FM. In the future it will be converted to a gravity sewer and convey flows from the Beachwalk PS and Fort DeRussy PS collection area to the Diamond Head end of Ala Moana Park. The wastewater will discharge either into a new (Ala Moana Park PS (see **Section 3.4.7**) or to a GST.

A new and deeper WWPS or a GST at Ala Moana Park, also provides an opportunity for the elimination of the existing Moana Park PS. The flows to the Moana Park PS can be diverted either to the Ala Moana Park PS wetwell or to the GST shaft.

3.4.7 New Ala Moana Park PS (GST and Non-GST)

The Ala Moana Park PS is a new proposed WWPS and FM system to be located at the east end of Ala Moana Beach Park. The Ala Moana Park PS will be required without a Sand Island East GST. The new Ala Moana Park PS will allow for the decommissioning of the Beachwalk PS, Fort DeRussy PS and Moana Park PS.

Three sites are being evaluated for the new Ala Moana Park PS, as shown in **Figure 3-9**. All three sites would include a WWPS with wet well, generator building, odor control system, and underground fuel tank, and would require approximately 20,000 square foot (sf) of area. The proposed 20,000 sf area required by the new Ala Moana Park PS is preliminary and will be refined following the population and flow projection work to be completed and presented in the Draft EIS.

Portions of Ala Moana Beach Park are designated as Land and Water Conservation Fund Act (LWCFA), Section 6(f) recreational property. Use of 6(f) land for a new WWPS is considered a “conversion” under the LWCFA and will require replacement with property of equal fair market value, not already designated as park land, to be dedicated for recreational use. Construction staging area within the 6(f) boundary that is utilized longer than six months may also be considered a conversion of land.

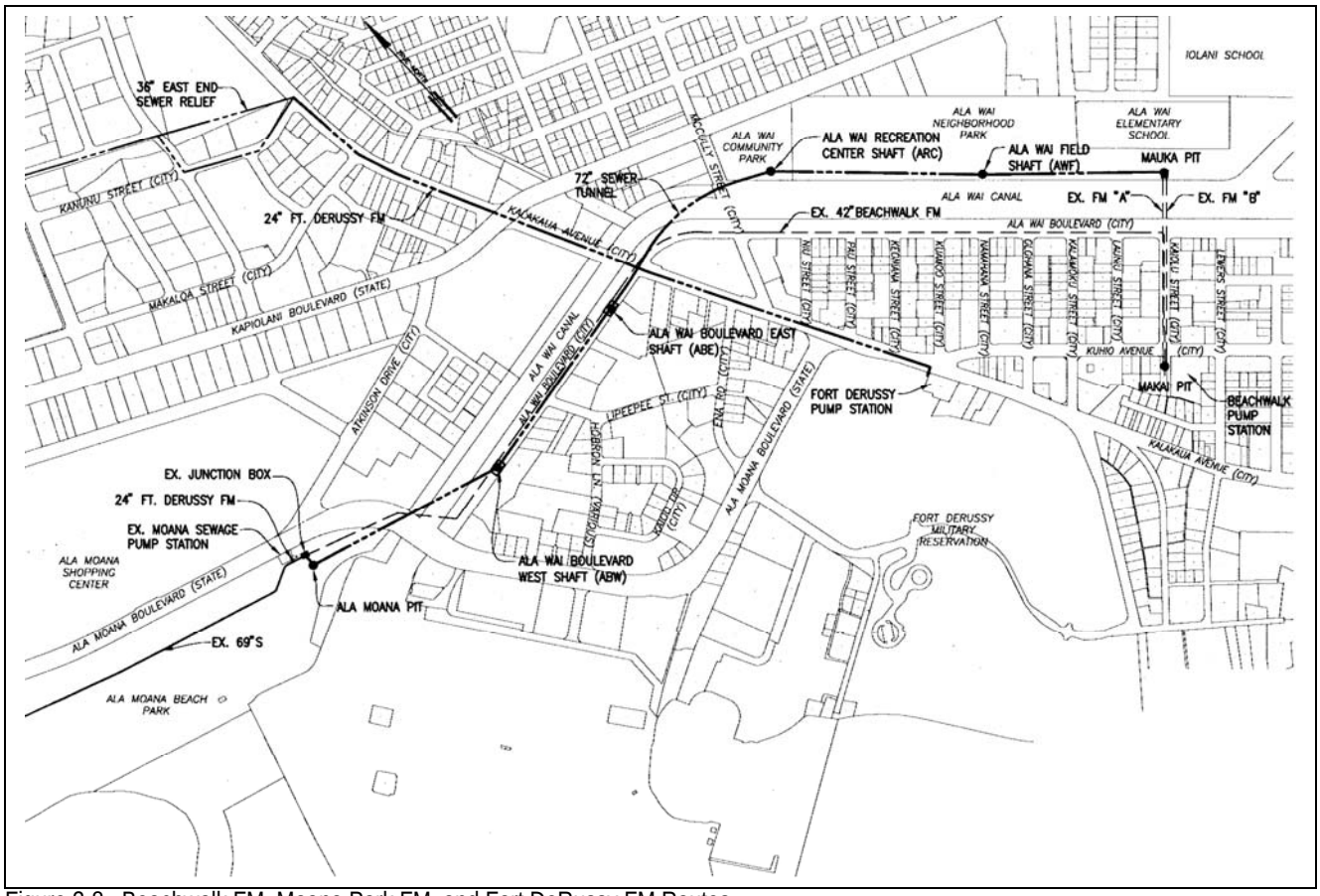

Figure 3-8. Beachwalk FM, Moana Park FM, and Fort DeRussy FM Routes

Figure 3-9. Aerial Map of Alternative Sites for New Ala Moana Park PS.

3.4.8 Ala Moana PS System Alternatives

The Ala Moana PS and FM system is located in Kakaʻako (makai) on Keawe Street. The existing project site Plan is shown in **Figure 3-10**. The system has two parallel and inter-connected WWPSs and FMs. The service area extends from the Nuʻuanu area to the west to Niu Valley at its furthest eastern boundary, and includes five other WWPSs.

The Ala Moana PS system currently provides some back-up in that there are two parallel WWPSs and FMs. The system provides back-up for the current dry weather flows. In addition, CCH has proceeded with the planning and design of a new Ala Moana FM #3.

The upgrade requirements for the Ala Moana PS systems are dependent on whether a GST is implemented for the East Basin. If the GST is implemented, only minor upgrades need be considered in the short term. With construction of a GST system, the Ala Moana PS facility would be decommissioned and a new tunnel drop shaft connection to the gravity tunnel would be constructed at or near the site.

If the GST system is not implemented, capacity and other upgrades to the WWPS are required, as well as construction of the Ala Moana FM #3. Improvements would include upgrading Ala Moana PS#2 so that in combination with Ala Moana PS#1, the facility can convey peak flows with the largest pump out of service, and utilizing various combinations of Ala Moana FM#1, FM#2 and FM#3. Upgrades would also include the addition of surge controls and improvements to the odor control system.

3.4.9 Hart Street PS Basin Alternatives

The Hart Street Wastewater PS was originally built in 1950 and is one of two major WWPSs serving the entire Honolulu metropolitan area. The other is Ala Moana PS #1 and #2. Hart Street PS is located at the intersection of Alakawa Street and Nimitz Highway on the north end of Pier 35 of Honolulu Harbor, as shown in **Figure 3-11.** It is located on TMK parcel 1-5-34:06.The site and adjacent FM easements are available to the CCH under the State of Hawaiʻi Executive Order No. 1345 which specifies certain areas of land to be used for a WWPS and FMs.

The Hart Street PS Sewer Basin extends from Moanalua/Aliamanu to Nuʻuanu. This area is served by four WWPSs, including the Kamehameha Highway PS and ʻAwa Street PS, that feed into the Hart Street facility. The Hart Street PS then pumps wastewater directly to the Sand Island WWTP through two FMs, each approximately 5,300 lf.

An evaluation of the capacity of the Hart Street PS to accommodate projected future flows is being undertaken as part of this project. Upgrades to the existing Hart Street PS may be required to meet demand over the planning period.

Alternatives with GST

One alternative to handle future flows from the Hart Street PS sewer basin would be to construct a new Sand Island West GST from the Sand Island WWTP to a drop shaft at Hart Street PS. The tunnel would be used to store peak wastewater flows from the Hart Street PS sewer basin and reduce the amount of potential future hydraulic upgrades needed at the Sand Island WWTP. Several alternative alignments from Sand Island WWTP to Hart Street PS are possible, with each featuring an intermediate drop structure that would connect to a conveyance tunnel coming from Kamehameha Highway PS. **Table 3-3** outlines the alternative alignments for the Sand Island West GST alternative.

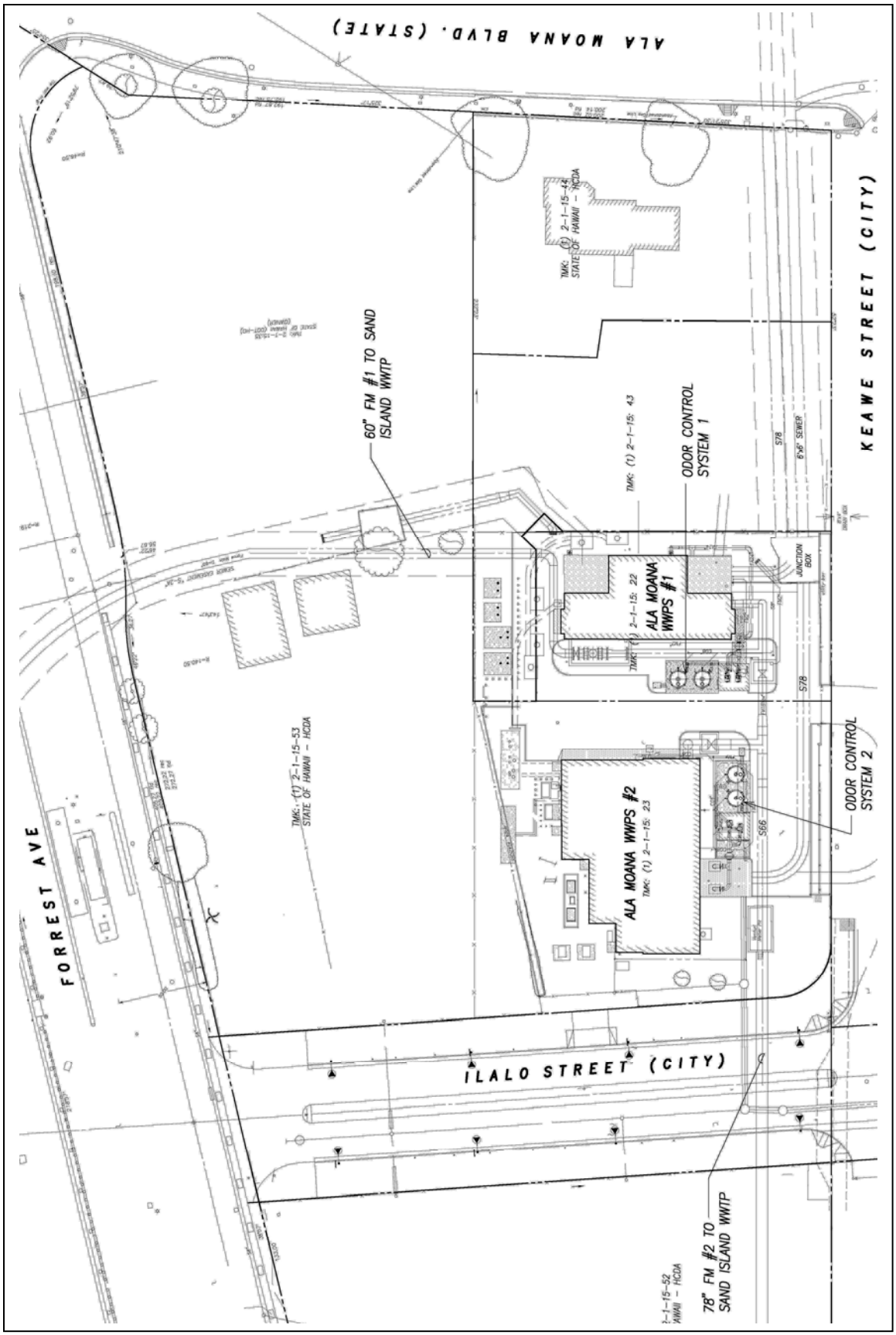

Figure 3-10. Ala Moana PS Site Plan

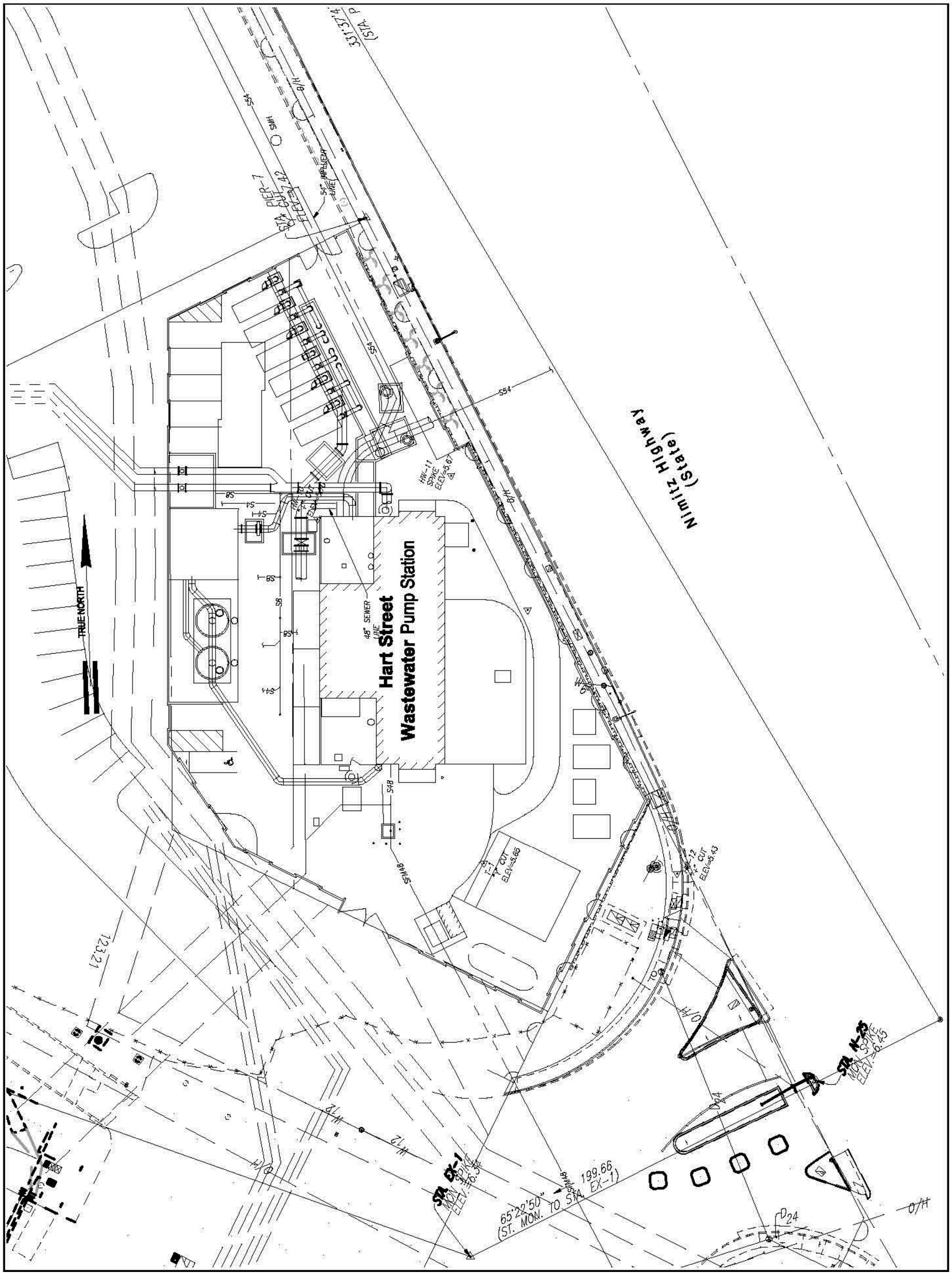

Figure 3-11. Hart Street PS Site Plan

Table 3-3.
Summary of Hart Street PS Alternatives

WWPS and FM Alternatives	
Alternative 1	New Hart St. PS with new FM system
Alternative 2	Existing Hart St. PS with new backup FM. Peak flow diversion to Ala Moana PS
GST Alternatives	
Alternative 3	Storage tunnel from SI WWTP to Hart Street PS with intermediate shaft connections to a conveyance tunnel to Kamehameha Highway PS
Alternative 4	Storage tunnel from SI WWTP to Hart Street through Kapalama Basin

Upgrades without GST

There is limited space within the existing Hart Street PS building to accommodate additional or larger wastewater pumps. Therefore, a new separate WWPS to either supplement the existing Hart Street PS or to handle future peak flows may be required. Additionally, a new FM may be needed to handle future flows.

Another option that will be further investigated is to divert at least 10 mgd of peak wastewater flows from upstream of ʻAwa Street PS at Sewer Manhole ID 3010975, located on School Street, to Sewer Manhole ID 313840. Currently, up to 6 mgd is diverted to SMH 313840 which is connected to the Ala Moana PS #2. This option would reduce the overall peak flow pumping and storage requirements at Hart Street PS.

3.4.10 Kamehameha Highway PS Basin Alternatives

The Kamehameha Highway PS and FM system is located on the west side of the SISB Phase I Area, between the Honolulu International Airport and Keʻehi Lagoon. It is located on TMK parcel (1) 1-1-003:028 in the northwest corner of Keʻehi Lagoon Park. The Kamehameha Highway PS Basin service area includes the neighborhoods of Aliamanu, Mapunapuna, Moanalua Valley, Salt Lake, and the Honolulu International Airport. The locations of the existing WWPS facility and FMs are shown in **Figure 3-12**.

The Kamehameha Highway PS collects wastewater influent from the Moanalua Trunk Sewer and the Kamehameha Highway Trunk Sewer lines and conveys it through a 42-inch FM into a gravity sewer east of Kalihi Stream on Nimitz Highway. The gravity sewer eventually discharges to the Hart Street PS.

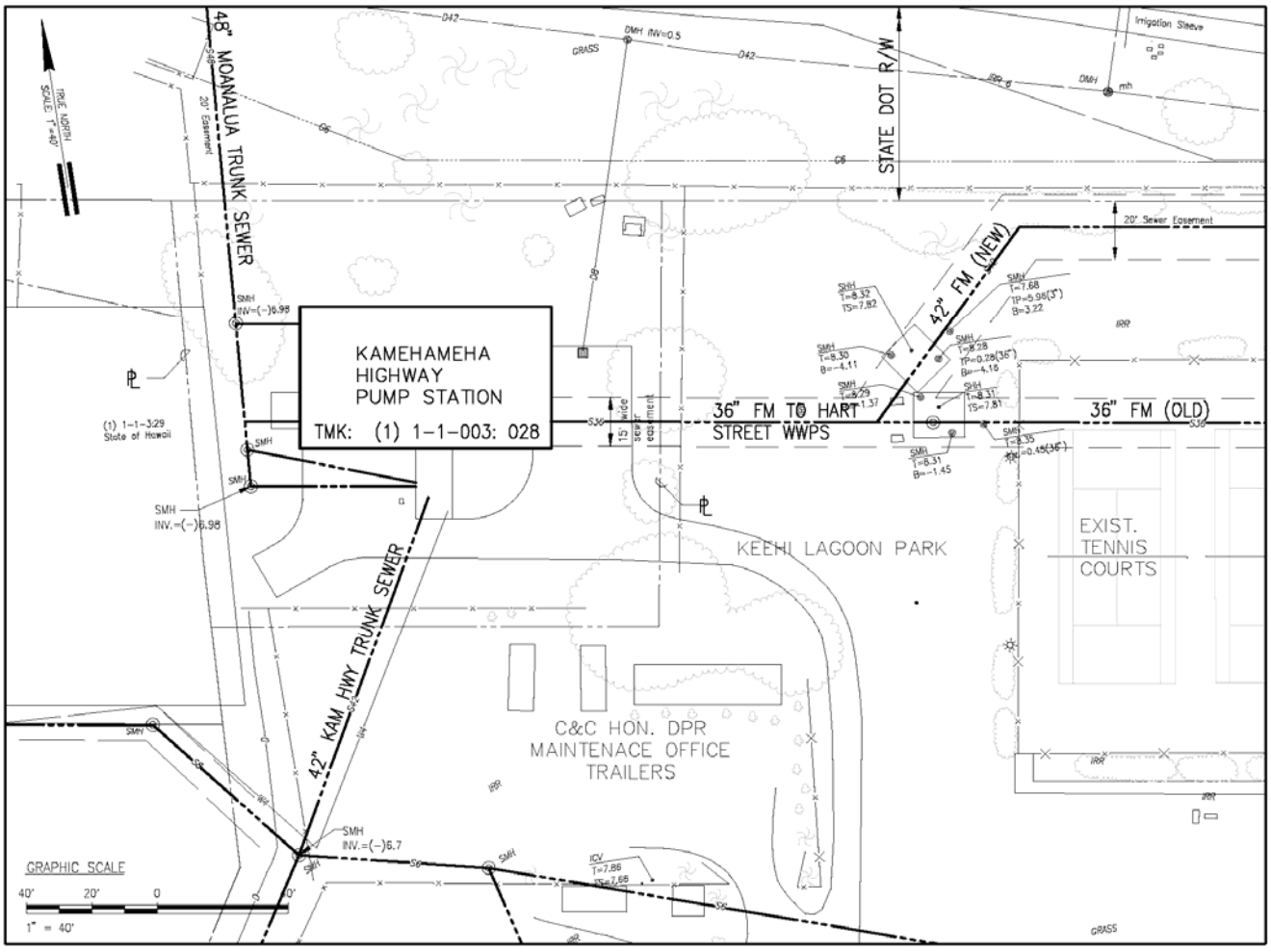

Figure 3-12. Existing Kamehameha Highway PS Site Plan

The future of the Kamehameha Highway PS is based on two alternative concepts to convey wastewater flows from the Kamehameha Highway PS basin to the Sand Island WWTP, as summarized in **Table 3-4.**

Gravity Sewer Based Systems Alternatives

Gravity sewer based systems include two subcategories, GST and Non-GST systems. The concept of the GST option is discussed previously in Section 3.4.1. The non-GST gravity system would involve microtunneling a gravity sewer line from Kamehameha Highway PS to the Hart Street PS, or to an intermediate drop shaft to a new storage tunnel. Both alternatives would eliminate the need for the Kamehameha Highway PS and FM to remain in operation.

WWPS/FM Based System Alternatives

The existing WWPS capacity may not meet the existing peak design flows, and a new WWPS may be required. Construction of a back-up FM may also be required.

NOTE: Peak design flows are currently being evaluated under the Wet Weather I/I Update project.

Table 3-4.
Kamehameha Highway PS and FM System Alternatives

Gravity Sewer Based System		
GST Alternative		
Alt 1:	Conveyance GST	Conveyance GST from Kamehameha Highway PS to Sand Island WWTP
Alt 2:	Conveyance/Storage GST	Conveyance GST from Kamehameha Highway PS to Hart Street Intermediate Shaft, then connect the storage tunnel from the intermediate shaft to Sand Island WWTP
Non-GST Alternative		
Alt 3:	Microtunnel to Sand Island WWTP	Microtunnel from Kamehameha Highway PS to Sand Island WWTP
Alt 4:	Microtunnel to Hart Street Intermediate Shaft	Microtunnel from Kamehameha Highway PS to Hart Street Intermediate Shaft, then connect to the storage tunnel
WWPS/FM Based System		
Alt 5:	Construct new WWPS, back-up FM, and sewer relief line on Republican Street.	

3.4.11 ʻAwa Street PS Basin

The ʻAwa Street PS and FM system is located on a traffic island on Nimitz Highway, just west of the Nuʻuanu Stream, between Iwilei and Chinatown, on TMK parcel (1) 1-5-040: 003. The WWPS service area includes portions of the following neighborhoods: Nuʻuanu, Palama, Alewa Heights, Kalihi, and Kapalama. The site plan for the existing WWPS facility and FMs is shown in **Figure 3-13**.

The ʻAwa Street PS conveys its wastewater through a 20-inch FM into the 54-inch gravity Kapalama Relief Sewer Line along Nimitz Highway. The sewer discharges to the Hart Street PS. The facility consists of a WWPS with four constant speed pumps, wet well, and emergency generator. There is no odor control system.

The future of ʻAwa Street PS is based on two alternative concepts to convey wastewater flows from the ʻAwa Street PS tributary area to the Sand Island WWTP: gravity sewer based systems and WWPS/FM system.

Gravity Sewer Based Systems

Gravity sewer based systems include two subcategories, the GST and the Non-GST gravity system. The concept of the GST option is discussed previously in Section 3.4.1. The non-GST gravity system would either involve microtunnelling or open trenching a gravity sewer line from the ʻAwa Street PS to the Hart Street PS. Both alternatives would eliminate the need for the ʻAwa Street PS and FM to remain in operation.

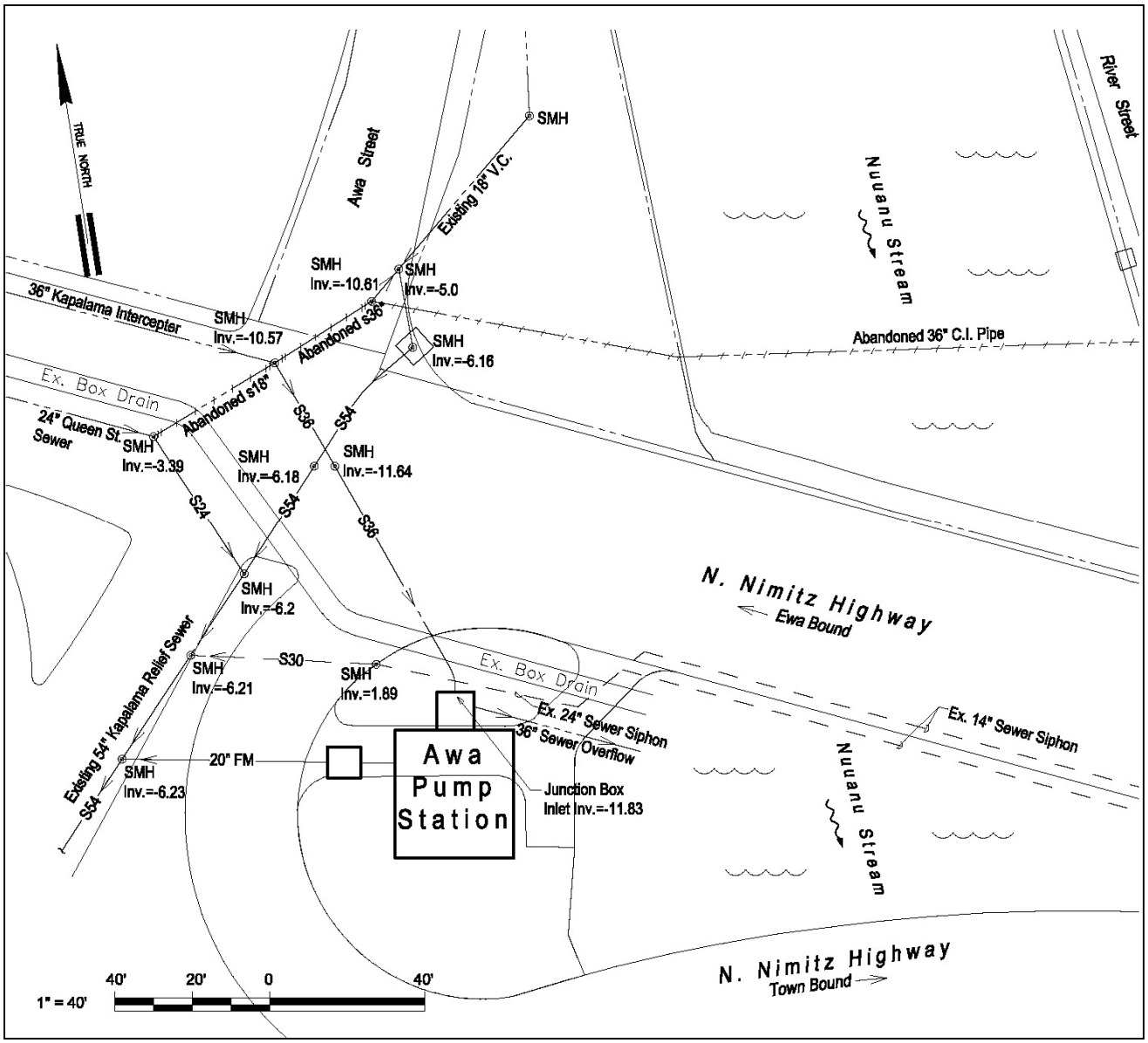

Figure 3-13. Existing ‘Awa Street PS Site Plan

WWPS/FM Based Systems

The WWPS/FM based system may require upgrades to ʻAwa Street PS to handle future flows. Transferring flows from the Hart Street PS basin to the Ala Moana PS basin is another alternative that would affect the ʻAwa Street PS/FM improvements. Alternatives for a WWPS/FM based system require further analysis of the future capacity of the Hart Street PS, and an assessment of potential upgrades to the facility. The options for each alternative are presented in **Table 3-5**.

Table 3-5.
ʻAwa Street PS and FM System Alternatives

Gravity Sewer Based System		
GST		
Alt 1:	Conveyance GST	Conveyance GST from ʻAwa Street PS to Hart Street PS
Non-GST System		
Alt 2:	Microtunnel to Hart Street Shaft	Microtunnel from ʻAwa Street PS to Hart Street PS GST Shaft
Alt 3:	Microtunnel to East Mālama Bay Shaft	Microtunnel from ʻAwa Street PS to Ala Moana PS GST Shaft
Alt 4:	Open Trench to Hart Street Shaft	Install gravity sewer line by open trench from ʻAwa Street PS to Hart Street PS GST Shaft
Alt 5:	Open Trench to East Mālama Bay Shaft	Install gravity sewer line by open trench from ʻAwa Street PS to Ala Moana PS GST Shaft
WWPS/FM Based System		
* Alt 6:	Upgrade ʻAwa Street PS and Open Trench to Hart Street PS	Upgrade ʻAwa Street PS and install 48-inch relief sewer line along Nimitz Highway to Hart Street PS
* Alt 7:	Transfer Flow to Ala Moana PS at School Street	Upgrade ʻAwa Street PS and transfer flows from Hart Street PS Basin to Ala Moana PS by diverting flows at School Street
* Alt 8:	Transfer Flow to Ala Moana PS at Nimitz Highway	Upgrade ʻAwa Street PS and transfer flows from Hart Street PS Basin to Ala Moana PS by diverting flows near downtown near ʻAwa Street PS

* Subject to the capacity of Hart Street PS, since it is currently undergoing modifications, is inconclusive.

3.4.12 Sand Island Area Pump Stations

Sand Island is served by two small WWPSs, Sand Island Parkway PS and Sand Island Industrial Park PS. Effluent from these WWPSs is conveyed to the nearby Sand Island WWTP.

Sand Island Parkway PS

The Sand Island Parkway PS and FM system is located on the northwestern corner of the Sand Island WWTP, adjacent to Sand Island Parkway on TMK parcel (1) 1-5-041: 005. The facility services the western half of the Sand Island Industrial Park development area. Influent is conveyed by an 18-inch wastewater line from Sand Island Parkway, then pumped through a 14-inch FM to the Sand Island WWTP Headworks Influent Receiving Area. The site plan of the existing Sand Island Parkway PS and FM system is shown in **Figure 3-14**.

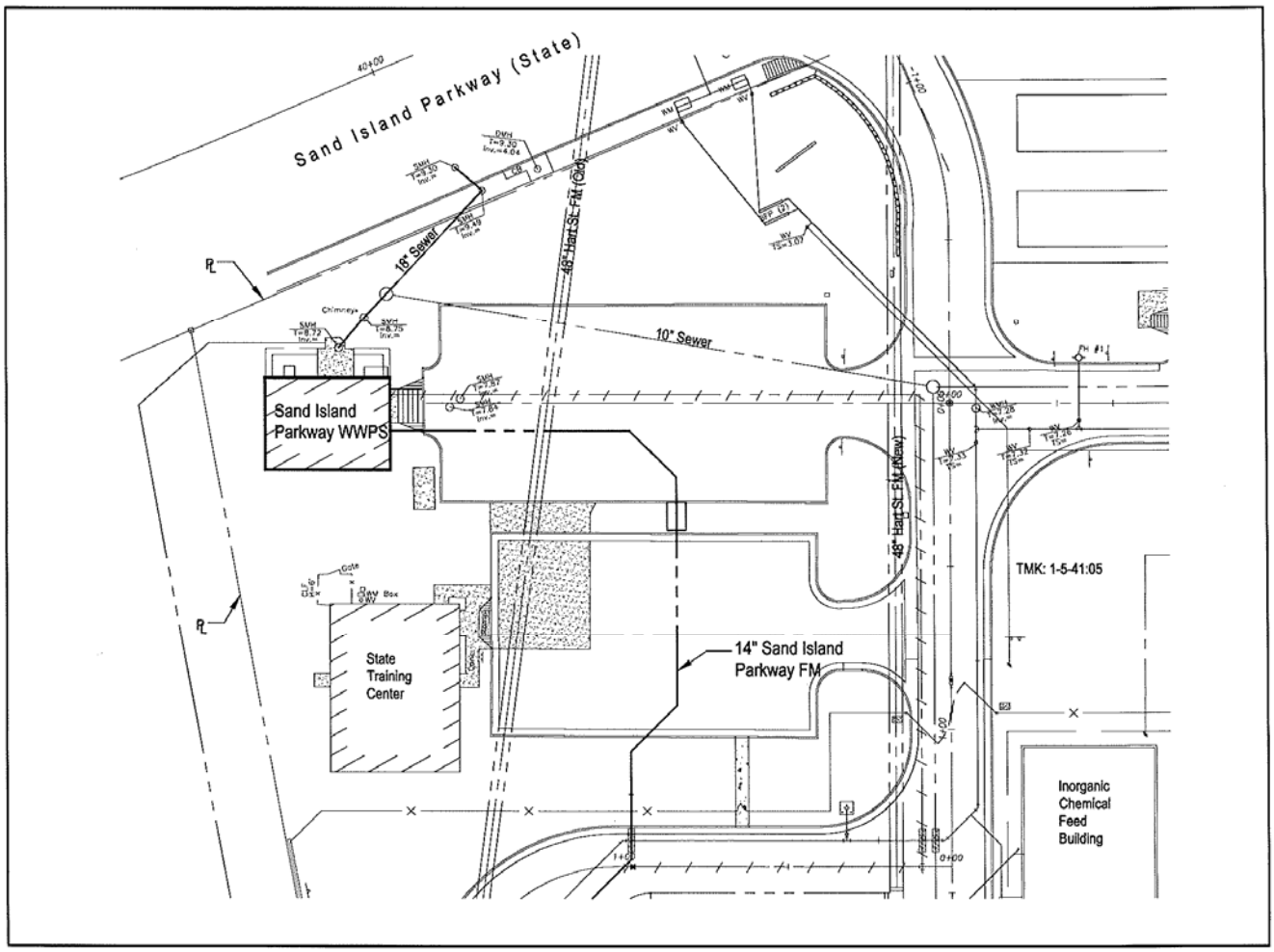

Figure 3-14. Existing Sand Island Parkway PS Site Plan

Sand Island Industrial Park PS

The Sand Island Industrial Park PS and FM system is located in the middle of the Sand Island Industrial Park development area at the corner of Mikole and Pa‘apu Street on TMK parcel (1) 1-5-041: 093. The facility services the eastern half of the Sand Island Industrial Park development area. Influent is collected by a 12-inch wastewater line from Mikole Street, then pumped through an 8-inch FM to a gravity line along Sand Island Parkway to Sand Island Parkway PS. The site plan of the Sand Island Industrial Park PS and FM system is shown in **Figure 3-15.**

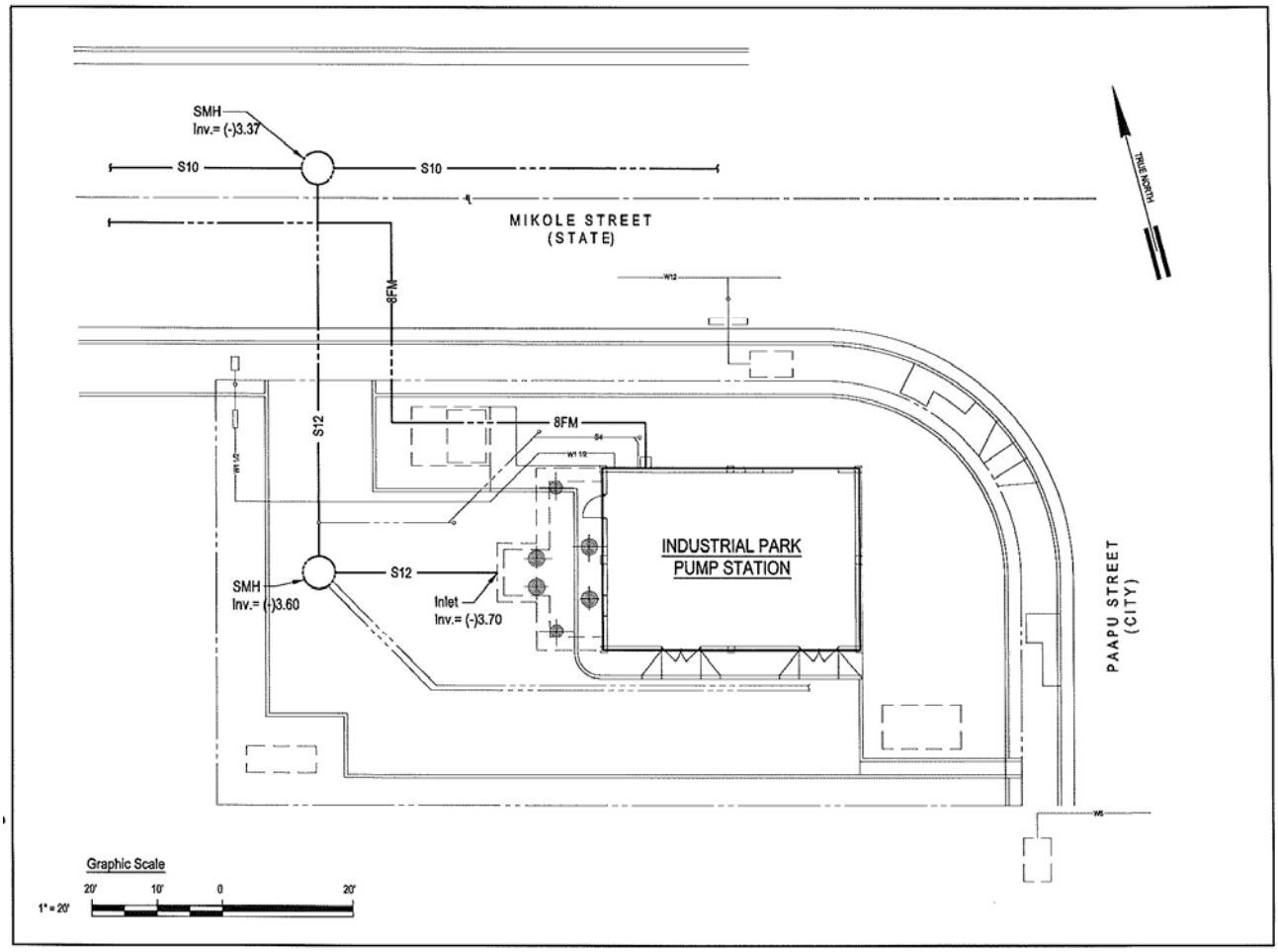

Figure 3-15. Existing Sand Island Industrial Park PS Site Plan

3.5 Alternatives Considered

3.5.1 No Action and Delayed Action

State law requires that a "no-action" alternative be considered to serve as a baseline against which potential actions can be measured. The "no-action" alternative would involve no effort to implement improvements to the SISB Phase I Area wastewater conveyance or treatment system. Given the time required for planning, entitling and developing new wastewater facilities, the delayed action alternatives would have a similar effect by failing to initiate improvements to the SISB Phase I Area wastewater system.

Under this alternative, environmental impacts resulting from development activities would be averted and project costs would be spared. However, the "no-action" alternative would result in the failure of CCH to meet its mandate under the City Charter, Article 6, Chapter 8. Section 6-803 states:

> *Section 6-803. Powers, Duties and Functions -- The director of the department of environmental services shall:*
>
> > *(a) Advise the director of design and construction concerning the planning and design of wastewater facilities.*
> >
> > *(b) Oversee the operation and maintenance of sewer lines, treatment plants and pumping stations.*

(c) Monitor the collection, treatment and disposal of wastewater.

(d) Provide chemical treatment and pumping of defective cesspools.

(e) Develop and administer solid waste collection, processing and disposal systems.

(f) Promulgate rules and regulations as necessary to administer and enforce requirements established by law.

(g) Perform such other duties as may be required by law.

The "no-action" and delayed action alternative would result in the following outcomes:

- Failure to ensure that adequate wastewater conveyance and treatment facilities are provided for Honolulu's current and projected population, which would result in increased risks and adverse effects to public health and safety.
- Failure to comply with the 309 Consent Decree and EPA enforcement stipulations, which could result in substantial financial penalties to CCH.
- Increased risk of system failures, with resulting increased spill hazard, impacts from odor, increasing repair expense, and service disruptions.

For these reasons, the "no-action" and delayed action alternatives were rejected. More comprehensive analysis of alternatives other than the "no-action" and delayed action alternatives will be presented in the Draft EIS that will be prepared for the project.

3.5.2 GST Alternative

SISB Phase I Area wastewater facility improvements based on GST alternatives are summarized in **Table 3-6**.

3.5.3 Non-GST Alternative

SISB Phase I Area wastewater facility improvements based on conventional pump alternatives are summarized in **Table 3-6**.

3.6 Alternatives Evaluation Criteria

Project alternatives will be evaluated and preferred alternative(s) selected during the EIS process. Evaluation criteria will include the following:

- Environmental effects and mitigation
- Public benefits
- Technical feasibility and constraints
- Regulatory requirements
- Land acquisition
- Initial capital costs
- Long-term operation and maintenance costs

Table 3-6.
SISB Wastewater Facility Alternatives Being Considered

	ACTIONS UNDER GRAVITY SEWER TUNNEL (GST) ALTERNATIVE		***ACTIONS UNDER NON-GRAVITY SEWER TUNNEL (GST) ALTERNATIVE***	
EXISTING FACILITIES	**MODIFICATIONS TO EXISTING FACILITY**	**NEW FACILITY / NEW CONNECTION**	**MODIFICATIONS TO EXISTING FACILITY**	**NEW FACILITY / NEW CONNECTION**
EAST BASIN FACILITIES				
Beachwalk PS/FM System				
Beachwalk PS	**Eliminate** Beachwalk PS.	**Connect** influent to Beachwalk PS Makai Pit (existing).	**Eliminate** Beachwalk PS.	**Connect** influent to Beachwalk PS Makai Pit (existing).
Beachwalk Emergency Temporary Line	**Eliminate** Beachwalk Temporary Line.	n/a	**Eliminate** Beachwalk Temporary Emergency Line	n/a
Beachwalk PS to Ala Moana Park FM	**Convert** Beachwalk PS to Ala Moana Park FM into a gravity sewer line.	**Connect** influent to Sand Island East Sewer Tunnel (new) at Ala Moana Park Shaft (new).	**Convert** Beachwalk PS to Ala Moana Park FM into a gravity sewer line.	n/a
Fort DeRussy PS/FM System				
Fort DeRussy PS	**Eliminate** Fort DeRussy PS.	**Connect** influent to Beachwalk PS Makai Pit (existing) OR To Ala Wai Field Shaft (existing) of Beachwalk to Ala Moana Park gravity sewer.	**Eliminate** Fort DeRussy PS.	n/a
Fort DeRussy FM	**Eliminate** Fort DeRussy FM.	n/a	**Eliminate** Fort DeRussy FM.	n/a
Moana Park PS/FM System				
Moana Park PS	**Eliminate** Moana Park PS.	**Connect** influent to Ala Moana Park tunnel shaft (new).	**Eliminate** Ala Moana Park PS.	**Construct** new Ala Moana Park PS to replace existing.
Moana Park FM	**Eliminate** Moana Park FM.	n/a	**Eliminate** Moana Park FM.	n/a
Ala Moana PS/FM System				
Ala Moana PS #1	**Eliminate** Ala Moana Park PS #1.	**Connect** influent to Sand Island East GST shaft (new).	No modifications.	n/a
Ala Moana FM #1	**Eliminate** Ala Moana Park FM #1.	n/a	No modifications.	n/a

Table 3-6.
SISB Wastewater Facility Alternatives Being Considered

	ACTIONS UNDER GRAVITY SEWER TUNNEL (GST) ALTERNATIVE		***ACTIONS UNDER NON-GRAVITY SEWER TUNNEL (GST) ALTERNATIVE***	
EXISTING FACILITIES	**MODIFICATIONS TO EXISTING FACILITY**	**NEW FACILITY / NEW CONNECTION**	**MODIFICATIONS TO EXISTING FACILITY**	**NEW FACILITY / NEW CONNECTION**
Ala Moana PS #2	**Eliminate** Ala Moana Park PS #2.	**Connect** influent to Sand Island East GST shaft (new).	**Increase** capacity of Ala Moana PS #2; add surge controls and improve odor control system.	n/a
Ala Moana FM #2	**Eliminate** Ala Moana Park FM #1.	n/a	No modifications.	n/a
N/A	No existing facility.	n/a	No existing facility.	**Construct** Ala Moana FM #3 (new). **Connect** influent from Ala Moana FM #3 (new) to Ala Moana PS.
Ala Moana Park PS/FM System (Refer also to Beachwalk PS, Fort DeRussy PS, and Moana Park PS above)				
N/A	No existing facility.	No action.	No existing facility.	**Construct** Ala Moana Park PS (new).
N/A	No existing facility.	No action.	No existing facility.	**Construct** Ala Moana Park FM (new).
WEST BASIN FACILITIES				
Sand Island Industrial Park PS/FM System				
Sand Island Industrial Park PS	**Eliminate** Sand Island Industrial Park PS (if feasible).	**Connect** influent to Sand Island East GST.	To be determined.	To be determined.
Sand Island Industrial Park FM	**Eliminate** Sand Island Industrial Park FM (if feasible). Properly abandon facility.	n/a	To be determined.	To be determined.

Table 3-6.
SISB Wastewater Facility Alternatives Being Considered

	ACTIONS UNDER GRAVITY SEWER TUNNEL (GST) ALTERNATIVE		***ACTIONS UNDER NON-GRAVITY SEWER TUNNEL (GST) ALTERNATIVE***	
EXISTING FACILITIES	**MODIFICATIONS TO EXISTING FACILITY**	**NEW FACILITY / NEW CONNECTION**	**MODIFICATIONS TO EXISTING FACILITY**	**NEW FACILITY / NEW CONNECTION**
Sand Island Parkway PS	**Eliminate** Sand Island Parkway PS.	**Connect** influent to Sand Island East GST. OR **Connect** to Sand Island Parkway Sewer Basin sewer line (new).	Not included in PER.	Not included in PER.
Sand Island Parkway FM	**Eliminate** Sand Island Parkway FM.	Facility properly abandoned.	Not included in PER.	Not included in PER.
'Awa Street PS	**Construct** Nimitz Highway Relief Sewer (new). **Phase out and eliminate** 'Awa Street PS. Requires diversion to Hart Street PS OR Ala Moana PS.	…… **With conversion of Hart Street PS/FM to GST System:** **Connect** influent to gravity sewer (new) leading to GST shaft near Hart Street PS. **With conversion of Ala Moana PS/FM to GST System:** **Connect** influent to a gravity sewer line (new) that is diverted to the Sand Island East GST. **With conversion of <u>both</u> Hart Street PS and Ala Moana PS to GST Systems:** **Connect** influent to GST (method requires further study).	**Construct** Nimitz Highway Relief Sewer (new). *<u>Gravity Sewer System (non-GST)</u>* **Phase out and eliminate** 'Awa Street PS. Requires diversion to Hart Street PS OR Ala Moana PS. *<u>PS/FM Based System</u>* **Increase capacity** of existing 'Awa Street PS.	*<u>Gravity Sewer System (non-GST)</u>* **Connect** influent via gravity sewer line (new) to Hart Street PS (via microtunneling or open trenching).

Table 3-6.
SISB Wastewater Facility Alternatives Being Considered

	ACTIONS UNDER GRAVITY SEWER TUNNEL (GST) ALTERNATIVE		***ACTIONS UNDER NON-GRAVITY SEWER TUNNEL (GST) ALTERNATIVE***	
EXISTING FACILITIES	**MODIFICATIONS TO EXISTING FACILITY**	**NEW FACILITY / NEW CONNECTION**	**MODIFICATIONS TO EXISTING FACILITY**	**NEW FACILITY / NEW CONNECTION**
'Awa Street FM	**Eliminate** 'Awa Street FM only if influent can be diverted to a GST or deep gravity sewer system.	**Connect** influent to a GST or deep gravity sewer system.	*Gravity Sewer System (non-GST)* **Eliminate** 'Awa Street FM.	**Construct** new gravity sewer line by means of microtunnel or open trench to connect to Hart Street or Ala Moana PS.
Hart Street PS/FM System				
Hart Street PS	No modifications.	**Connect** influent to drop shaft (new) and Sand Island GST West (new) from Hart Street PS to Sand Island WWTP. OR **Connect** influent to drop shaft at an intermediate point on the GST (new) to collect flows from one or more of Hart Street PS, Kamehameha Highway PS, and 'Awa Street PS.	No modifications if new PS supplements current PS. OR **Eliminate** existing Hart Street PS (if new PS replaces current PS).	**Construct** separate Hart Street PS to supplement capacity at current PS (new). OR **Construct** separate Hart Street PS to replace the current PS (new).
	Eliminate Hart Street FM New.	Facility properly abandoned.	No modifications.	n/a
	Eliminate Hart Street FM Old.	Facility properly abandoned.	No modifications.	n/a
	n/a	n/a	n/a	**Construct** FM (new) to increase system reliability.

Table 3-6.
SISB Wastewater Facility Alternatives Being Considered

	ACTIONS UNDER GRAVITY SEWER TUNNEL (GST) ALTERNATIVE		***ACTIONS UNDER NON-GRAVITY SEWER TUNNEL (GST) ALTERNATIVE***	
EXISTING FACILITIES	**MODIFICATIONS TO EXISTING FACILITY**	**NEW FACILITY / NEW CONNECTION**	**MODIFICATIONS TO EXISTING FACILITY**	**NEW FACILITY / NEW CONNECTION**
Kamehameha Highway PS/FM System				
Kamehameha Highway PS	No modifications. OR **Eliminate** Kamehameha Highway PS.	No change. OR **Connect** influent to a conveyance gravity sewer tunnel (new) from Kamehameha Highway PS to Sand Island WWTP. OR **Connect** influent to conveyance / storage gravity sewer tunnel (new) Hart Street Intermediate Shaft to Sand Island WWTP.	*Gravity Sewer System (Non-GST)* **Upgrade** Kamehameha Highway PS. *PS/FM Based System* **Upgrade** Kamehameha Highway PS.	*Gravity Sewer System (Non-GST)* Needs further analysis. *PS/FM Based System* **Construct** Kamehameha Highway PS (new).
Kamehameha Highway FM	**Eliminate** Kamehameha Highway FM.	**Connect** influent to drop shaft (new) at Hart Street PS. OR **Connect** influent to drop shaft at an intermediate point on the GST (new).	*Gravity Sewer System (Non-GST)* **Upgrade** Kamehameha Highway FM. *PS/FM Based System* **Repair or replace** existing Kamehameha Highway FM.	*Gravity Sewer System (Non-GST)* Needs further analysis. *PS/FM Based System* **Increase capacity** of existing Kamehameha Highway FM.
Sand Island WWTP				
Sand Island WWTP	To be determined.	**Construct** new Influent Pump Station (IPS). **Connect** new IPS to GST. **Construct** enhanced treatment facilities.	To be determined.	**Construct** expanded wastewater storage facilities (new). **Construct** new enhanced treatment facilities.

3.7 Project Alternatives Cost Estimates

Cost estimates have not yet been generated for the project alternatives. Preliminary cost estimates will be provided in the Draft EIS that will be published for this project. In addition to consideration of capital improvement costs, the financial feasibility of GST systems is dependent to a large degree on avoided costs and intangible benefits under the various alternatives. Examples of avoided costs include the potential for reduced operation and maintenance costs, avoided or eliminated costs associated with land acquisition and easements, and potential for reduced Sand Island WWTP facility requirements related to tunnel storage function. Examples of intangible benefits include reduced potential risk of wastewater spills at eliminated WWPS and FM systems, reduced incidence of odors, and reduced disruptions from construction activities.

3.8 Project Funding

Capital improvement costs for improvements to SISB Phase I Area wastewater conveyance and treatment facilities will be funded by sewer revenue bonds issued by the CCH. At present, no state or federal funding is proposed for the project improvements.

3.9 Project Schedule

The planning and engineering studies for the SISB Phase I Area project will be conducted throughout 2010 and completed by early 2011. Upgrades and maintenance to the existing system of WWPSs and FMs will be conducted on an ongoing basis as needed. If use of GST technology is selected as the preferred alternative, construction of the tunnels is estimated to begin in 2014 and last approximately five years.

4. Natural Environment

The following is a discussion of natural environment which provides the physical setting for the proposed project. The area of focus is bounded by Kapahulu Avenue to the east, the terminus of Dillingham Boulevard to the west, and north to south from Beretania Street to the coastline.

4.1 Climate

The climate of urban Honolulu is characterized by abundant sunshine, persistent trade winds, relatively constant temperatures, and moderate humidity. Mean annual rainfall is approximately 23 inches, with most of the rainfall in urban Honolulu occurring between November and April. Average monthly rainfall is 0.43 inches in June, during the dryer summer period, ranging to an average of 2.85 inches in December which is usually the wettest month. Average mean temperature ranges from 69 degrees in February to 89 degrees in September. Relative humidity ranges from 56 to 72 percent. Cooling trade winds from the northeast prevail throughout most of the year; occasionally Kona winds from the southwest bring warm, humid air.

Potential Effects and Mitigation Measures

The proposed project is not anticipated to have an effect on climate in the project area or region. While the scope and scale of the project are not in and of themselves sufficient to significantly influence the climate, energy generation to power wastewater pumps and facility operations will generate greenhouse gases (GHG). Energy demand for the GST and Non-GST Alternatives will be evaluated in the DEIS. Under the GST alternative, energy demand to operate the IPS will depend on the quantity of peak flow that can be stored in the sewer tunnel, and the related sizing of the IPS pumps. IPS energy demand will be offset to some degree by the elimination of WWPSs from the SISB East service area. However, IPS energy demand may be higher than the WWPSs that would be eliminated due the large pumps that would be required to draw influent from the GST system.

4.2 Topography

The Island of Oʻahu consists of two roughly parallel mountain ranges extending generally from the northwest to southeast and joined by a central plateau. The project area lies on the Honolulu coastal plain, an emerged fossil reef formed approximately 120,000 years ago (McDonald and Abbott, 1970). In general, the topography of the study area consists of flat shoreline areas to gentle slopes. The general character of the topography is interrupted by two prominent volcanic craters, Lēʻahi (Diamond Head) and Pūowaina (Punchbowl).

All of the wastewater facilities within the SISB Phase 1 Area are located on sites that are relatively flat with little topographic variation. Site elevations are listed in **Table 4-1**.

Potential Effects and Mitigation Measures

All of the alternatives under consideration will have short- and long-term effects on topographic conditions at the various job sites depending on the alternative or combination of alternatives selected. However, it is anticipated that mitigation measures can be developed to prevent any adverse effects from changes to topography.

Under the non-GST alternative, long-term effects to topographic conditions may result from construction of additional WWPSs and equalization basins required to accommodate future flows. Under the GST alternative, new wastewater conveyance and pump facilities will be constructed largely underground. Thus, they are not anticipated to result in significant long-term effects to topographic conditions at the various project sites. Tunnel boring activities would result in a substantial quantity of excavated material in need of disposal. Methods for disposal of material excavated from tunnel boring activities will be determined during preparation of the DEIS. Methods may include reuse of the excavated soils for fill material in other projects

on O‘ahu, temporary stockpiling, or permanent landfill. Each of these alternatives would have localized effects on topographic conditions.

Table 4-1.
SISB Phase I Area Facility Elevations

Facility Name	Elevation (ft. above msl)
East Basin	
Ala Moana PS#1	5
Ala Moana PS#2	5
Beachwalk PS	6
Fort DeRussy PS	6
Moana Park PS	5
Sand Island Industrial Park PS	8.5
Sand Island Parkway PS	9
West Basin	
Hart St. PS	4 to 5
Kamehameha Highway PS	7 to 8
‘Awa St. PS	6
Sand Island WWTP	8

4.3 Geology and Soils

O‘ahu consists of two volcanoes: the older, Wai‘anae Volcano, in the west and the larger Ko‘olau Volcano in the east. The geologic history can be summarized as follows:

- The Pliocene-age Wai‘anae Volcanics is divided into four members: Lualualei (shield-stage), Kamaileunu (shield- and postshield-stage), and the upper Palehua and Kolekole.
- The shield-stage tholeiitic rocks of the younger Ko‘olau Volcano are named the Ko‘olau Basalt. The Pliocene-age Ko‘olau Basalt is the most widespread geologic unit exposed on Oahu.
- Rejuvenated-stage eruptions from about 50 vents scattered on the southeastern part of Ko‘olau Volcano form the Honolulu Volcanics, which ranges in age from Pleistocene to Holocene.
- The largest rift zones in the Ko‘olau and Wai‘anae Volcanoes are on a nearly parallel northwest-southeast trend: other rift zones trend north and northeast.
- O‘ahu has larger areas of sedimentary deposits than any other island, and these deposits contain coralline limestone in coastal areas.
(USGS, 1999).

The soils within the project area consist of fill material, beach sand and a periphery of other soil types including the Makiki, ‘Ewa and Kawaihāpai series (USDA, 1972).

Beaches – Beaches (BS) occur as light-colored sand, gravelly, or cobbly areas that are washed and rewashed by the ocean waves.

Fill Land – Fill Land Mixed (FL) occurs mostly near Pearl Harbor and in Honolulu adjacent to the ocean. This land type consists of areas filled with material from dredging, excavation from adjacent uplands and solid waste.

‘Ewa Series – This type of soil occurs mainly on the coastal plain and is characterized by deep, nearly level to moderately sloping, well-drained soils that have a fine textured or moderately fine texture subsoil,

and areas of fill land. ‘Ewa silty clay loam (EmA) is characterized by 0-2 percent slopes, very slow runoff and no more than slight erosion hazard.

Jaucus Series – Jaucus soils are excessively drained, calcareous soils on coastal plans adjacent to the ocean. Jaucas sand (JaC) has slopes generally under 7 percent and was developed in wind- and water-deposited sand from coral and seashells. Permeability is rapid, and runoff is very slow to slow. Although the water erosion hazard is slight, wind erosion is a severe hazard where vegetation has been removed.

Kawaihāpai Series – These soils are well-drained and found in drainageways and on coastal plains of O‘ahu. Kawaihāpai clay loam (KIA) has 0-2 percent slopes with slow runoff and moderate permeability.

Makiki Series – Soils in this series are well-drained and found on alluvial plains and terraces in Honolulu. Makiki clay loan (MkA) has 0-2 percent slopes and occurs in smooth areas and terraces with soil approximately 20 inches thick. Permeability is moderately rapid, runoff is slow and erosion hazard is no more than slight.

Pearl Harbor Series – These soils, including Pearl Harbor clay (Ph), are found on low coastal plains and are poorly drained. The soils developed in alluvium overlying organic material. They are level or nearly level (USDA, 1972).

See **Figure 4-1.**

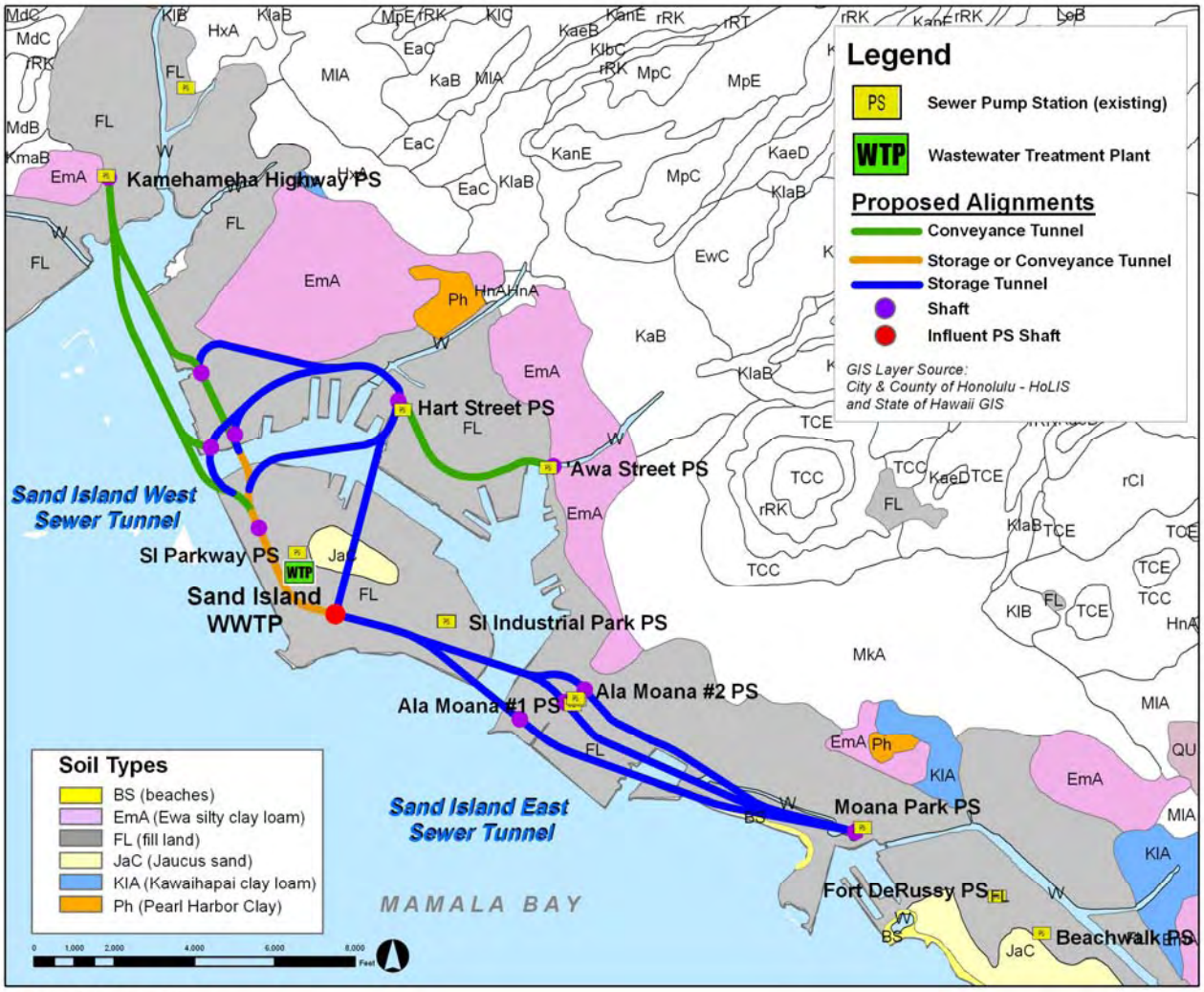

Figure 4-1. Soils Map

Potential Effects and Mitigation Measures

Potential for impacts associated with the project involve the loss of soils and ground stability for buildings, structures, and open areas of ground that lie above the proposed project alternatives. Mitigation to address the potential for loss of stability will be addressed through the conduct of technical studies of the site's soils, geology and hydrogeology. The studies will examine the underlying geology and soils quality of the site and, where required, mitigative measures will be identified by the respective professional disciplines undertaking the studies to maintain safety and security of the project site and surrounding vicinity during construction, and during the operational period of the selected project alternative.

At this time the specific mitigative measures to maintain public safety and security of the SISB Phase 1 Areas wastewater facility sites and surrounding areas are in the preliminary stages of investigation. This information will be provided in the forthcoming Draft EIS to be prepared for this project.

Secondary or cumulative impacts associated with the project include the need for long-term periodic inspection of the geology and soils for the selected project alternative. Further discussion concerning secondary or cumulative impacts and any associated mitigative measures will be provided in the forthcoming Draft EIS to be prepared for this project.

4.3.1 Sand Island WWTP Soil Management Area

A 9-acre portion of the land on the east portion of the Sand Island WWTP parcel is designated as a Soil Management Area. The area is surrounded by a concrete reinforced geomembrane wall which is a semi-permanent containment structure for the on-site containment of contaminated soils. The area contains approximately 80,000 cubic yards of contaminated soils which are primarily contaminated with low level concentrations of polychlorinated biphenyls (PCBs). No source has been identified for the PCB contamination; however, the PCBs are believed to be widespread throughout the Sand Island WWTP. As a soil management strategy for the on-site management of the contaminated soils, ground excavations from various improvement projects which contain PCB concentrations less than 25 mg/Kg are to be "reused" by storing them in the Soil Management Area. Portions of the area have been capped with an asphalt or gravel cover and are 10 to 12 feet higher in elevation than the rest of the Sand Island WWTP. Other portions of the area are still open and exposed for acceptance of additional contaminated soil.

Potential Effects and Mitigation Measures

In the event new Sand Island WWTP facilities are to be constructed in the area with hazardous soils identified, several options for managing the hazardous soil issue are possible. The new facilities may be constructed on top of the material in the Soil Management Area, or the material may be relocated on-site (possibly to TMK parcel (1) 5-41:22 if acquired from the State). Alternatively, the material may be disposed of at an off-site location. Although human health risk assessments have indicated that exposure of the known contaminants to WWTP operators are permissable under the current EPA and State Department of Health (DOH) standards, additional sampling and investigation of the soil in the area of construction is recommended for the safety of the construction workers and for the more defined characterization of the soil to be encountered. In addition, any soil management measures proposed must be approved by the DOH.

4.4 Water Resources

4.4.1 Ground Water

An important source of water supply for the Island of O'ahu is an exceptional lens of basal ground water in the Honolulu-Pearl Harbor area (USDA, 1972). Southern O'ahu's coastal plain is underlain by sedimentary deposits that form a caprock which retards the seaward movement of fresh ground water from the basal aquifer. The caprock extends along the coastline from 800 to 900 feet below sea level (HCDA, 2005).

O'ahu has been divided into seven major ground-water areas, primarily on the basis of geologic or hydrologic differences (**Figure 4-2).** The entire project area is located within the designated Southern O'ahu Ground-

Water Area. Water levels in the Southern Oahu Ground-Water Area generally range from about 25 to 30 feet above sea level inland to about 15 to 20 feet above sea level near the shore where the water is under artesian pressure because it is confined by caprock. The caprock impedes the seaward movement of fresh ground water. In the eastern part of the area, thick valley fill and underlying weathered rocks form partial barriers to ground-water flow. In the western part of the area, the weathered zone near the unconformity separating Koʻolau Basalt from underlying Waiʻanae Volcanics impedes the flow of water between the two volcanic-rock aquifers (USGS, 1999).

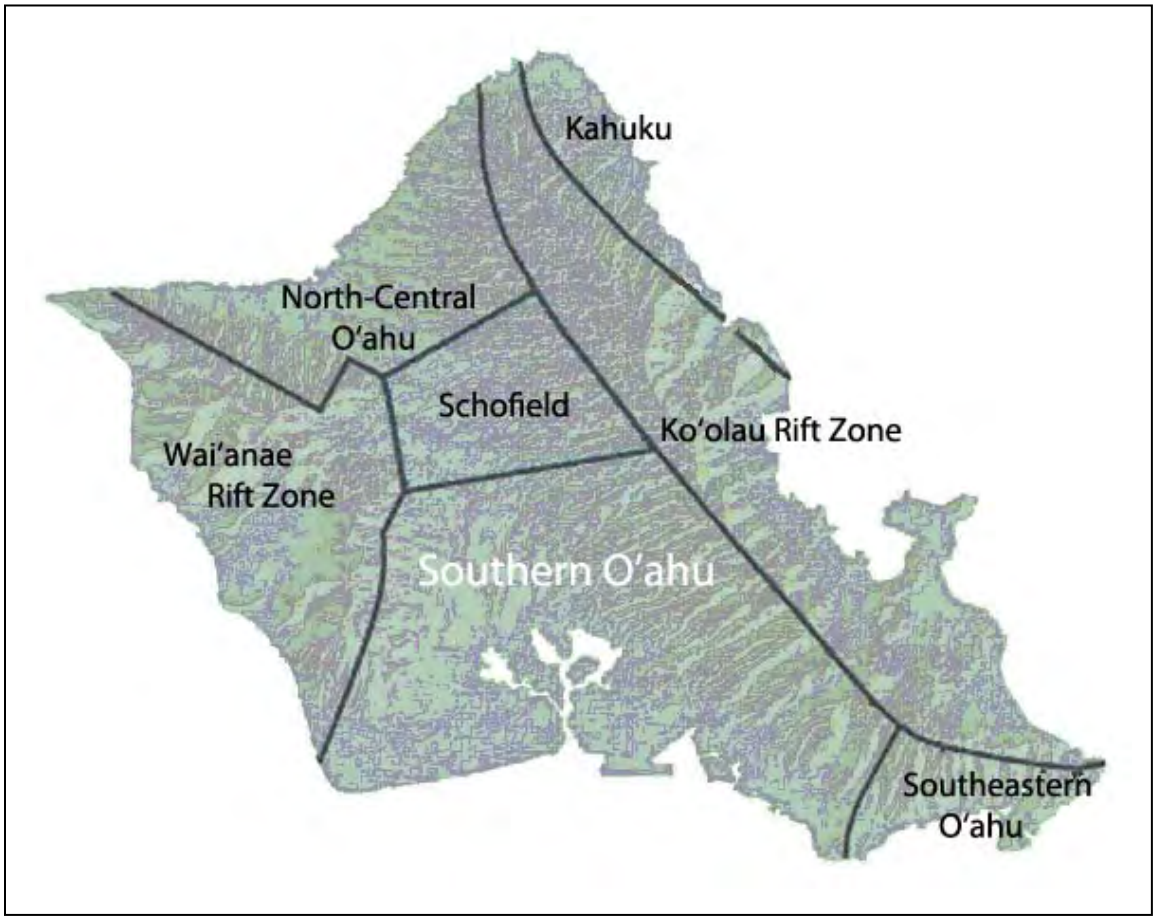

Figure 4-2. Oʻahu Ground-Water Areas (USGS, 1999)

Potential Effects and Mitigation Measures

The potential for adverse impacts to groundwater and hydrogeological resources are not anticipated. Appropriate and sufficient mitigative measures and controls will be applied consistent with sound engineering and operating practices.

At this time the specific ground water related mitigative measures are in the preliminary stages of investigation. This information and information related to secondary or cumulative impacts will be provided in the forthcoming Draft EIS to be prepared for this project.

4.4.2 Inland Waters

The inland waters within the project area are comprised of natural and channelized perennial streams and the Ala Wai Canal. They include, from east to west:

- Mānoa-Pālolo Stream (perennial)

- Ala Wai Stream (intermittent)
- Ala Wai Canal (non-perennial, man-made)
- Nu‘uanu Stream (perennial)
- Kapalama Stream (perennial)
- Kalihi Stream (perennial)
- Moanalua Stream (perennial)

Classification of water uses in the State of Hawai‘i’s for inland waters, marine waters and marine bottom ecosystems is defined in Hawai‘i Administrative Rules (HAR) 11-54-3. The inland waters listed above are all Class 2 inland waters. There are no estuaries in the project area.

> *“The objective of class 2 [inland] waters is to protect their use for recreation purposes, the support and propagation of aquatic life, agricultural and industrial water supplies, shipping and navigation.*
>
> *The uses to be protected in class 1.b. waters are all uses compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters.*
>
> *These waters shall not act as receiving waters for any discharge which has not received the best degree of treatment or control compatible with the criteria established for this class.*
>
> *No new untreated sewage discharges shall be permitted within estuaries”*
> (HAR 11-54-3, DOH).

Potential Effects and Mitigation Measures

The primary potential impact to surface waters involves the release of construction related storm water and non-storm water runoff from construction job sites. These pollutants may include both suspended soils sediments and construction-related pollutants that may include petroleum, oil, and lubricant (POL) based constituents, and other sources such as concrete that has contacted or commingled with stormwater runoff. Mitigation of pollutants in storm and non-stormwater runoff will be through the use of site-specific Best Management Practices (BMPs) Plans that will be prepared as a part of the project’s NPDES permit applications for construction stormwater, dewatering and hydrotesting. All discharges will be required to adhere to the water quality standards of the State of Hawai‘i, promulgated in HAR, Chapter 11-54, Water Quality Standards.

Additional detailed information will be provided in the project’s forthcoming Draft EIS to be prepared for this project.

4.4.3 Marine Waters

Marine waters along the O‘ahu coastline within the project area are classified “Class A marine waters” “Class A embayments.”

- Pacific Ocean (Class A marine water)
- Honolulu Harbor (Class A embayment)
- Kewalo Basin (Class A embayment)
- Ke‘ehi Lagoon (Class A embayment)

Classification of marine waters is found in Hawai‘i Administrative Rules (HAR) 11-54-3. The marine waters listed above are all Class 2 inland waters.

> *“It is the objective of Class A [marine] waters that their use for recreational purposes and aesthetic enjoyment be protected.*
>
> *Any other use shall be permitted as long as it is compatible with the protection and propagation of fish, shellfish, and wildlife, and with recreation in and on these waters. These waters shall not act as receiving waters for any discharge which has not received the best degree of treatment of control compatible with the criteria established for this class. No new industrial discharges shall be permitted within embayments (with exceptons as noted by rule.”*
> (HAR 11-54-3, DOH).

Sand Island State Park is the only State of Hawai‘i-owned park designated on the O‘ahu Water Quality Standards Map (DOH, 1988).

Potential Effects and Mitigation Measures

The potential for impacts to marine coastal waters is similar to the discussion provided in Section 4.4.2., Inland Waters. Discharges of pollutants in storm and non-stormwater runoff will be addressed through adherence to site-specific BMP Plans that will prepare through the NPDES permit applications for construction stormwater, dewatering, and hydrotesting as required by the State in HAR, Chapter 11.54, Water Quality Standards.

4.4.4 Wetlands

A man-made wetland located near the northeast border of the Sand Island WWTP has been formed from a drainage ditch that was constructed as part of the Sand Island WWTP facilities. The U.S. Army Corps of Engineers (USACE) uses three criteria to define a wetland: (1) hydrophytic vegetation, (2) standing water within 18 inches of the surface for at least three weeks of the growing season, and (3) the presence of hydric soils. A study conducted by Botanical Consultants in September of 2000 found that the drainage ditch met at least two of the three criteria: (1) hydrophytic vegetation is present in all parts of the canal, and (2) standing water is present the full length of the canal at depths ranging from a few inches to several feet. Soils were not tested for hydric conditions due to topographic conditions and the fact that the canal is constructed on old fill soils. However, the study did observe that soils were saturated almost to the top of the ditch embankment, indicating wetland conditions. None of the vegetation identified in the study is native to the Hawaiian Islands, nor were any proposed or listed threatened or endangered species found at the site (Brown and Caldwell, 2000). No other wetlands have been identified on the sites potentially affected by project activities.

If construction activities occur near the drainage canal / wetlands, then construction plans and potential effects on the wetlands would need to be reviewed and approved by the USACE. As an alternative, it may be possible to relocate the wetlands to a new location along the southern boundary of the property at the back of the Sand Island State Recreation Area. This alternative would free up land area for proposed treatment plant upgrades, provide for the establishment of a replacement wetland at a site with more suitable conditions, and create a buffer between recreational activities and WWTP operations. The relocation would require construction of a new drainage system for the property, and preparation of a wetland relocation plan subject to USACE approval. A bulk of the storm water runoff can be rerouted from the existing wetlands/drainage ditch to the new wetland location. The remaining storm water can be piped to the CCH’s SDS resulting in a reduction in the amount of storm water that would enter the SDS.

Potential Effects and Mitigation Measures

The potential for impacts to wetlands will be based on the location of the project’s final design alternative. The existing wetland located along the northeastern border of the Sand Island WWTP may be potentially impacted if the WWTP site requires modification. As noted, the USACE will be consulted to review the potential effect to the wetland. This assessment will also be extended to a review of additional wetlands sites that may be identified with the projects final design alternative.

4.5 Air Quality

4.5.1 General

The DOH, in its assessment of statewide air quality, has noted, "Air quality in the State of Hawai‘i continues to be one of the best in the nation, and criteria pollutant levels remain well below state and federal ambient air quality standards." (DOH, 2006). Air quality in the Honolulu area is generally good.

To ensure that state and federal air quality standards are met, the DOH, Clean Air Branch, Air Surveillance and Analysis Section, collects measurements of ambient level pollutants in the air through a statewide monitoring network. Federal and state ambient air quality standards are shown in **Table 4-2** below.

Ambient Air Quality Standards

Air Pollutant	Hawaii Standard	Federal Primary Standard	Federal Secondary Standard
Carbon Monoxide			
1-hour average	9 ppm	35 ppm	None
8-hour average	4.4 ppm	9 ppm	
Lead			
3-month average	1.5 µg/m^3 (calendar quarter)	0.15 µg/m^3 (rolling 3-month)	Same as primary
Nitrogen Dioxide			
Annual average	0.04 ppm	0.053 ppm	Same as primary
Particulate Matter (PM_{10})			
24-hour block average	150 µg/m^3	150 µg/m^3	Same as primary
Annual average	50 µg/m^3	None	None
Particulate Matter ($PM_{2.5}$)			
24-hour block average	None	35 µg/m^3	Same as primary
Annual average	None	15 µg/m^3	Same as primary
Ozone			
8-hour rolling average	0.08 ppm	0.075 ppm	Same as primary
Sulfur Dioxide			
3-hour block average	0.5 ppm	-	0.5 ppm
24-hour block average	0.14 ppm	0.14 ppm	-
Annual average	0.03 ppm	0.03 ppm	-
Hydrogen Sulfide			
1-hour average	0.025 ppm	None	None

ppm = parts per million by volume
µg/m^3 = micrograms per cubic meter of air

Table 4-2. Ambient Air Quality Standards

DOH has established two air quality monitoring stations within the project area, in Honolulu and on Sand Island. The Honolulu monitoring station is located at the DOH building on Punchbowl Street at Beretania Street. The Sand Island monitoring station is located near Sand Island Access Road (DOH, 2009a).

At the Honolulu monitoring station in December 2009, the measurement of particulate matter (PM-10) was 12 µg/m^3 which is well below the Hawai‘i State Standard and the Federal and Primary and Secondary Standard of 50 µg/m^3 (annual average) (DOH, 2009a). **See Figure 4-3.**

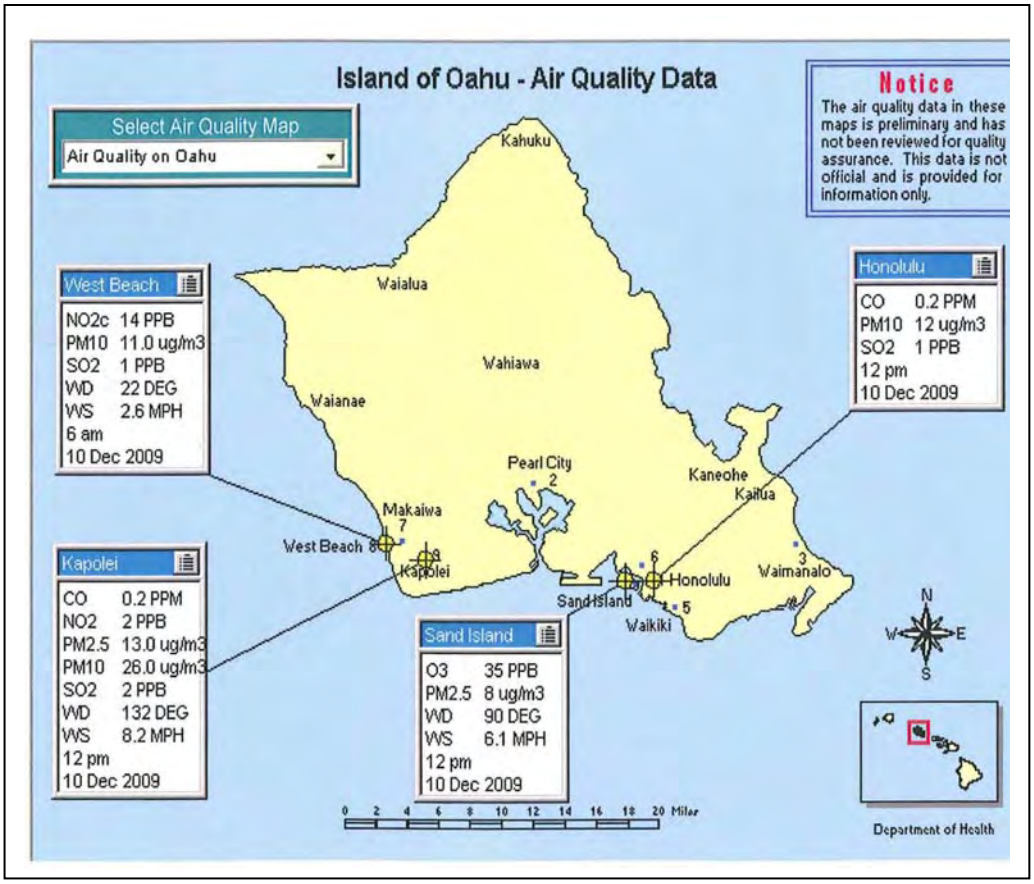

Figure 4-3. Island of O'ahu – Air Quality Data (December 10, 2009) (DOH, 2009b)

Potential Effects and Mitigation Measures

The potential for impacts to general air quality are not anticipated. The proposed project will be operated with sufficient odor controls to manage potential sources of nuisance odors.

4.5.2 Odor from Above-Ground WW Facilities

Above-ground wastewater facilities, including treatment and conveyance equipment, are naturally susceptible to emitting foul odors. The following section describes the status of odor control measures at SISB Phase 1 Area wastewater facilities. It is important to note that compliance with the Ambient Air Quality Standards presented in Section 4.5.1 is only applicable to the fence line/property line of the Sand Island WWTP and not to the WWPSs, FMs, and collection system included in this project.

Ala Moana PS #1 and #2

Both Ala Moana PSs have redundant carbon adsorption odor control systems.

Hart Street PS

The existing odor control system uses carbon to remove hydrogen sulfide and other odorous gases. The systems consists of three components: mist eliminator, phoenix unit, and deep bed carbon unit.

Kamehameha Highway PS

There is no odor control system installed at this WWPS.

‘Awa Street PS

There is no odor control system installed at this WWPS.

Sand Island PSs

There is no odor control system installed at the Sand Island Parkway PS or at the Sand Island Industrial Park PS.

Potential Effects and Mitigation Measures

Significant effects to air quality in the SISB Phase 1 Area are not anticipated to result from wastewater facility improvements being evaluated by this project. A detailed study of the primary odor control systems is being undertaken and will be further described in the forthcoming Draft EIS to be prepared for this project.

4.6 Flora and Fauna

The SISB Phase 1 Area is a highly developed and urbanized environment. Flora and fauna known from the region are typical of urbanized areas and consist of common introduced and native species. The project corridors and facility sites are not known to provide habitat for rare, threatened or endangered plant or animal species. No designated critical habitat is around the project sites. A man-made wetland identified at the Sand Island WWTP contains common wetland plant species, including red mangrove and pickle weed.

Potential Effects and Mitigation Measures

The project is not expected to have significant adverse effects on plant or animal resources at the various project sites or within the SISB Phase 1 Area in general. Wherever feasible, native plant species will be used for landscaping. Changes in land use could produce some localized changes in the populations of common animal species, primarily bird species. Construction activities may temporarily disrupt routine behavior of common fauna, but will not result in permanent impacts. Once project activities are complete, faunal activity is expected to return to current conditions. As a part of the project’s EISPN and Draft EIS, further detail and discussion regarding the potential for effects to native and indigenous, and listed state and federal threatened and endangered species will be provided.

4.7 Natural Hazards

In addition to flooding, other natural hazards include volcanic, seismic activity, storms, tsunamis, and high waves. The overall hazard assessment for the coastal section of the project is moderate according to The United States Geological Survey, *Atlas of Natural Hazards in the Hawaiian Coastal Zone***.**

4.7.1 Hurricane

The Hawaiian Islands are seasonally affected by Pacific hurricanes from the late summer to early winter months. The State has been affected twice since 1982 by significant hurricanes, ‘Iwa in 1982 and ‘Iniki in 1992. It is difficult to predict these natural occurrences, but it is reasonable to assume that future events will occur. The project area and facility sites are, however, no more or less vulnerable than the rest of the island to the destructive winds and torrential rains associated with hurricanes.

Potential Effects and Mitigation Measures

The primary concern for adverse effects from hurricanes is expected to be present primarily during construction of the selected design alternative for the project. Open areas of ground could be subject to inundation from heavy hurricane related stormwater. Heavy wind damage could also result during the construction phase, although wind damage would not be as major a concern during operation of the completed system.

Mitigation to protect the construction site during a potential hurricane would involve early preparation upon notification of an impending hurricane event. Work crews would cease operations and prepare the construction site by removing or securing equipment, machinery, and construction materials susceptible to loss or damage. Other preventative measures would be applied in the event of a hurricane after the project is completed and is operational. Further discussion of design solutions to protect against hurricane damage and facility response plans for hurricane events will be provided in the project's EISPN and Draft EIS.

4.7.2 Tsunami

Tsunami hazard is endemic to all of Hawai'i, including O'ahu. A tsunami involves the generation of a series of destructive ocean waves that can affect all shorelines. These waves can occur at any time with limited or no warning. Since 1946, there have been four significant tsunami run-up events, in 1946, 1957, 1960 and 1964. The run-up heights varied from 1 foot to 14 feet. Though rare, it is prudent to assume that future events will occur.

According to the O'ahu Civil Defense Agency, the evacuation boundary for the project area runs along the Nimitz Highway, Ala Moana Boulevard, and Sand Island Parkway corridor. **Figure 4-4** shows the tsunami evacuation zones within the project area (HoLIS, 2009). The existing Moana Park PS is located within the tsunami evacuation zone. All other existing WWPS and FM facilities, as well as the Sand Island WWTP, are outside of the tsunami evacuation zone.

Potential Effects and Mitigation Measures

The SISB Phase 1 project corridor is generally located mauka of the evacuation line, where there is some protection from wave action, although the corridor is still potentially vulnerable to inundation by a tsunami.

Under the non-GST alternative, the existing Moana Park PS, located within the tsunami evacuation zone, would be replaced with a new WWPS facility to be located in generally the same area. Under the GST alternatives, most of the facilities will be underground and therefore not significantly affected by surface tsunami action. During the construction phase workers will be required to evacuate the site in the event of a tsunami event.

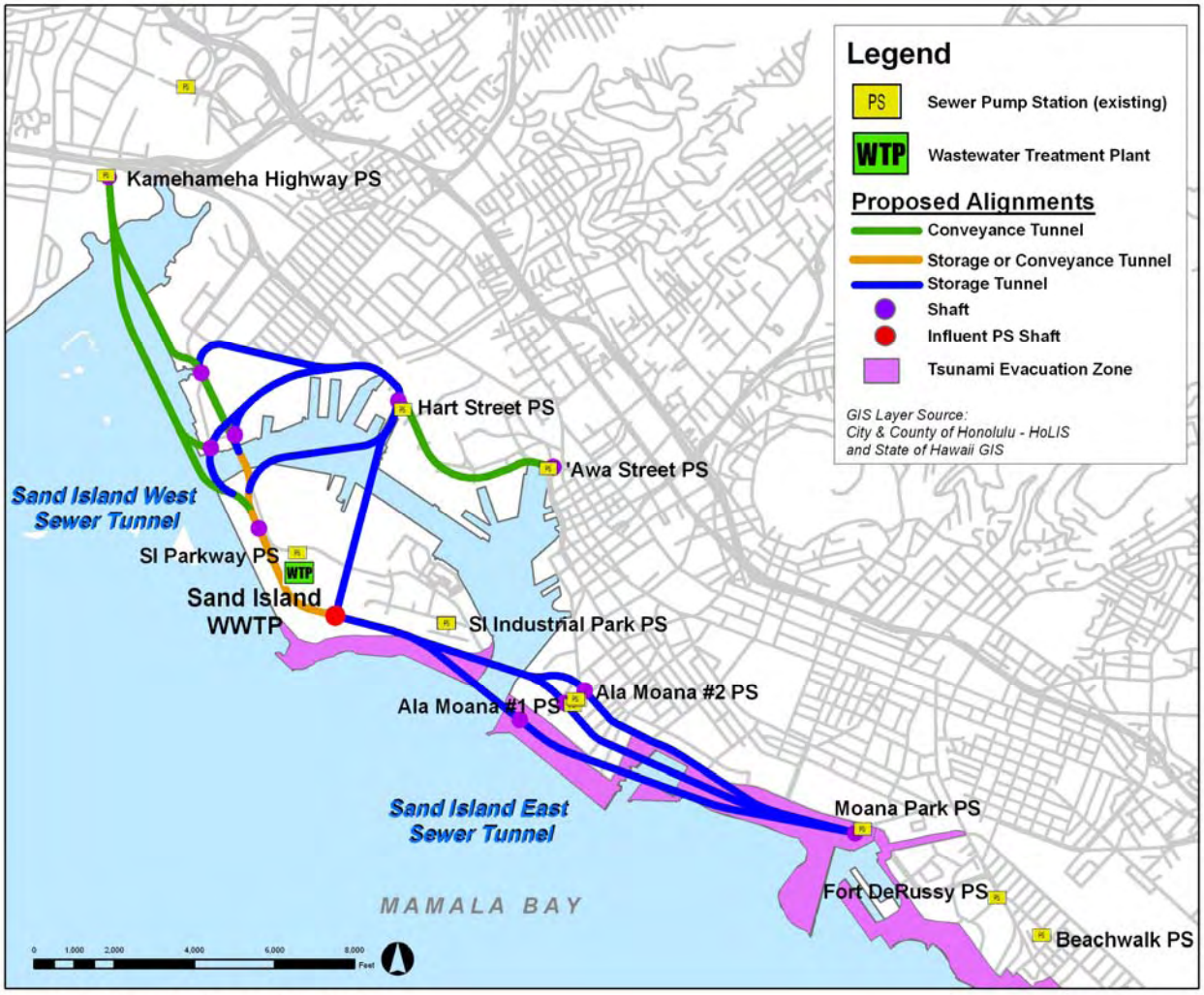

Figure 4.4. Tsunami Evacuation Zones

4.7.3 Earthquake

During the past 50 years, there has been increasing awareness of the need to raise building standards in seismically-active areas to increase the safety of occupants. The 2006 International Building Code (IBC) provides minimum design criteria to address potential for damages due to seismic disturbances. The IBC scale is rated from Seismic Zone A through Zone E, with A the lowest level for potential seismic induced ground movement. O‘ahu has been designated within Seismic Zone 2A.

Potential Effects and Mitigation Measures

The potential for adverse effects due to a seismic event is present, but is considered minimal. As required, proposed facilities will be constructed to seismic standards in accordance with the 2006 IBC providing minimal design criteria to address the potential damage due to seismic disturbances.

4.7.4 Flood Hazard

The Flood Insurance Rate Maps for the project area indicate that the SISB Phase 1 Area lies within Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) panels 353F, 354F, 365F, 370F and 390F. **Figure 4-5** provides an overview of the regional flood maps. Descriptions of localized flood conditions at various SISB facilities follow.

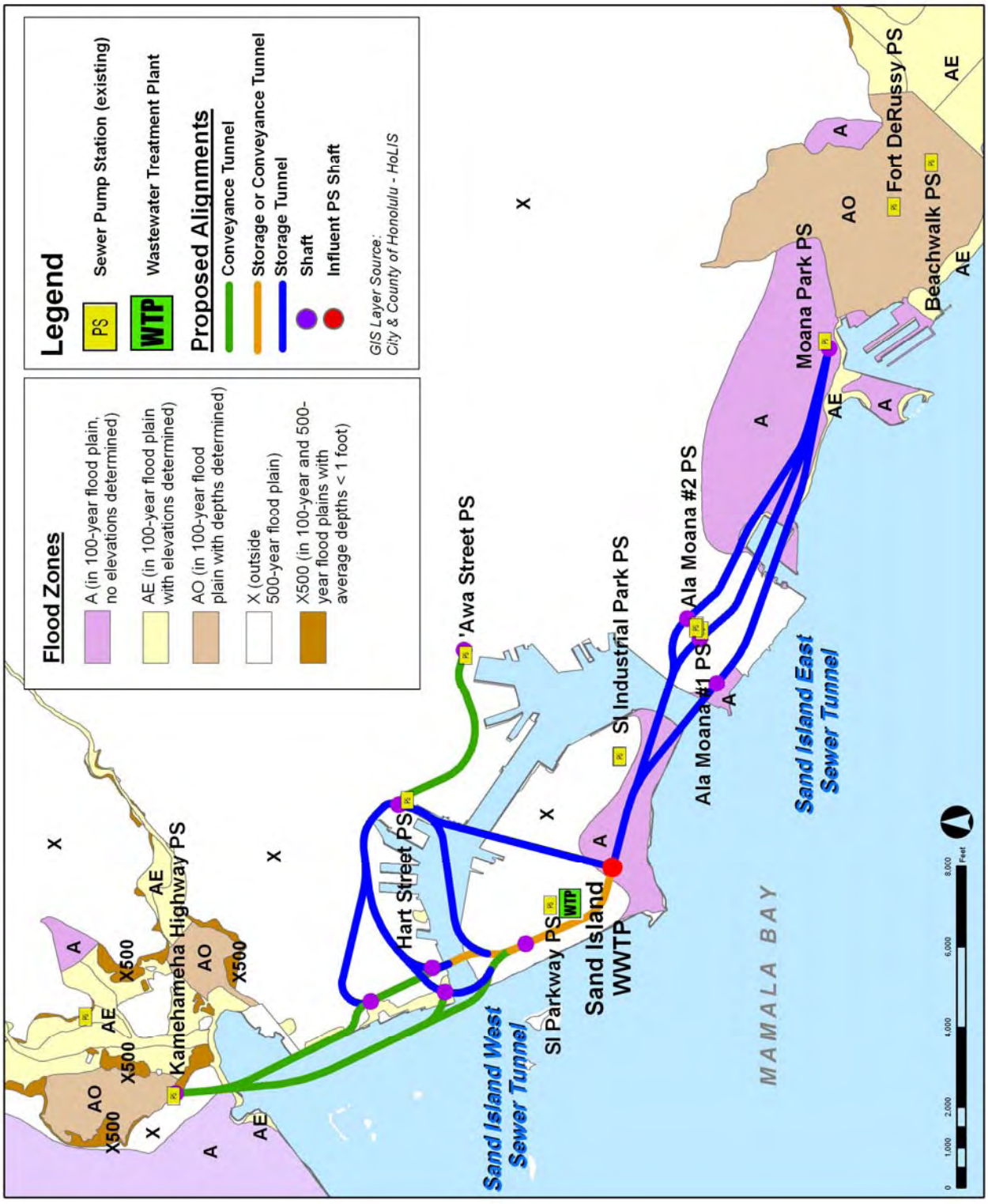

Figure 4-5. Flood Zones (FEMA FIRM)

Sand Island WWTP

The FIRM for CCH, dated September 30, 2004 indicates that a majority of the Sand Island WWTP is situated in Zone X with a small portion in Zone A **(Figure 4-6)**. Zone X is defined as areas outside of the 500-year floodplain. Zone A is defined as special flood areas subject to inundation by the 100-year flood but with no base flood elevations determined.

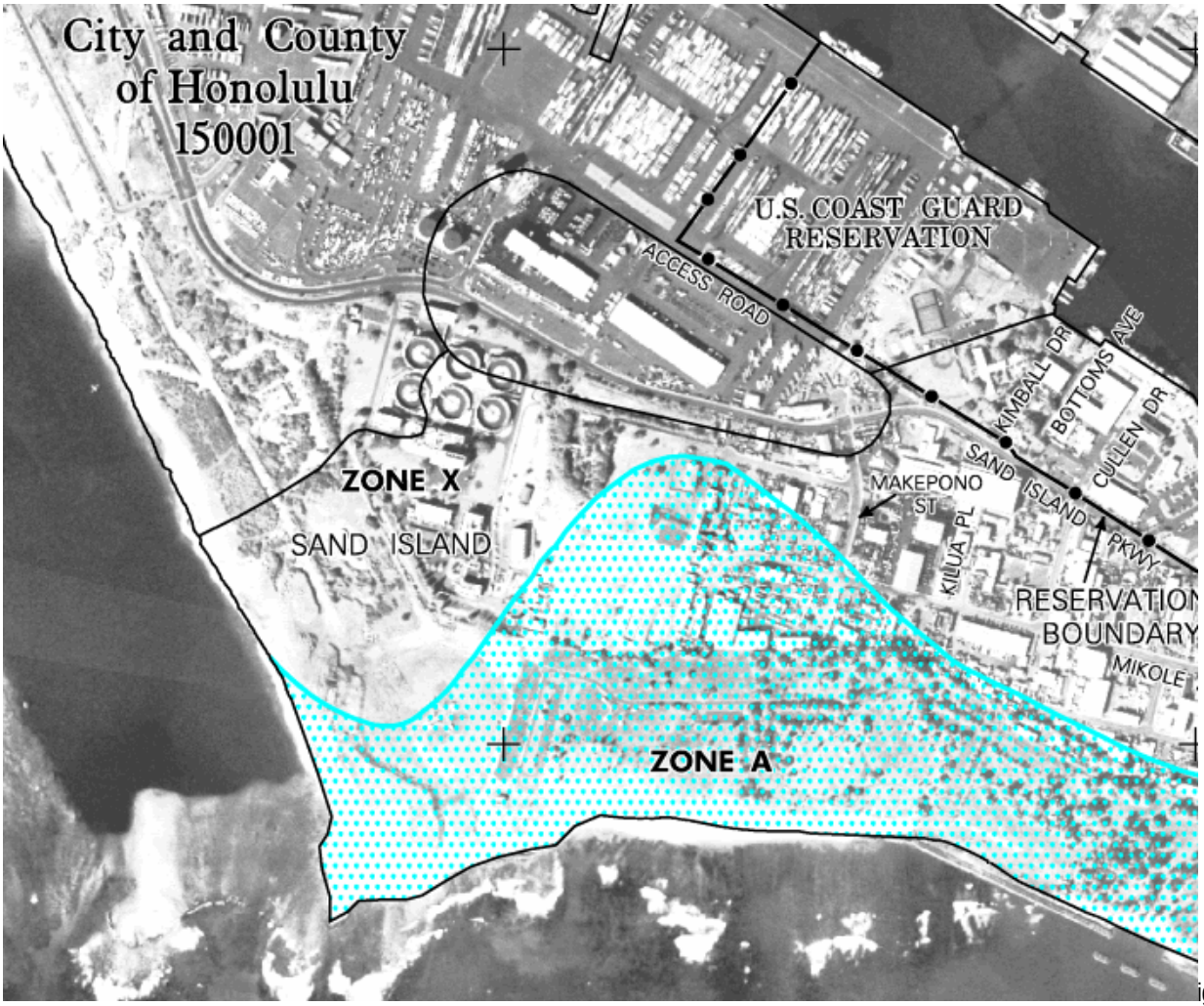

Figure 4-6. Flood Insurance Rate Map (September 30, 2004)

A Flood Insurance Study for CCH (study number 15003CV001B) is currently underway (**Figure 4-7**). The FIRM maps are being revised to reflect updated flood hazard information from the State of Hawai'i Hurricane Study. Preliminary Flood Insurance Study report and maps, dated July 22, 2009, are currently under review by CCH. This set of maps indicates minor revisions in the flood elevations for the Sand Island area. Two parcels of land on the south end of the site will be in Zone AE and subject to a 7 ft. (1.0 acres) and 8 ft. (1.2 acres) flood elevations. Additionally, approximately 4.1 acres in Lots E-2 and E-3 (State Department of Land and Natural Resources (DLNR) land) will be in Zone AE and subject to an 8 ft. flood elevation. Zone AE is defined as special flood areas subject to inundation by the 100-year flood with determined base flood elevations. The remaining land will remain in Zone X (flood risk undetermined). Should the proposed new flood elevations be approved, then portions of the site may need to be raised above the new flood elevations.

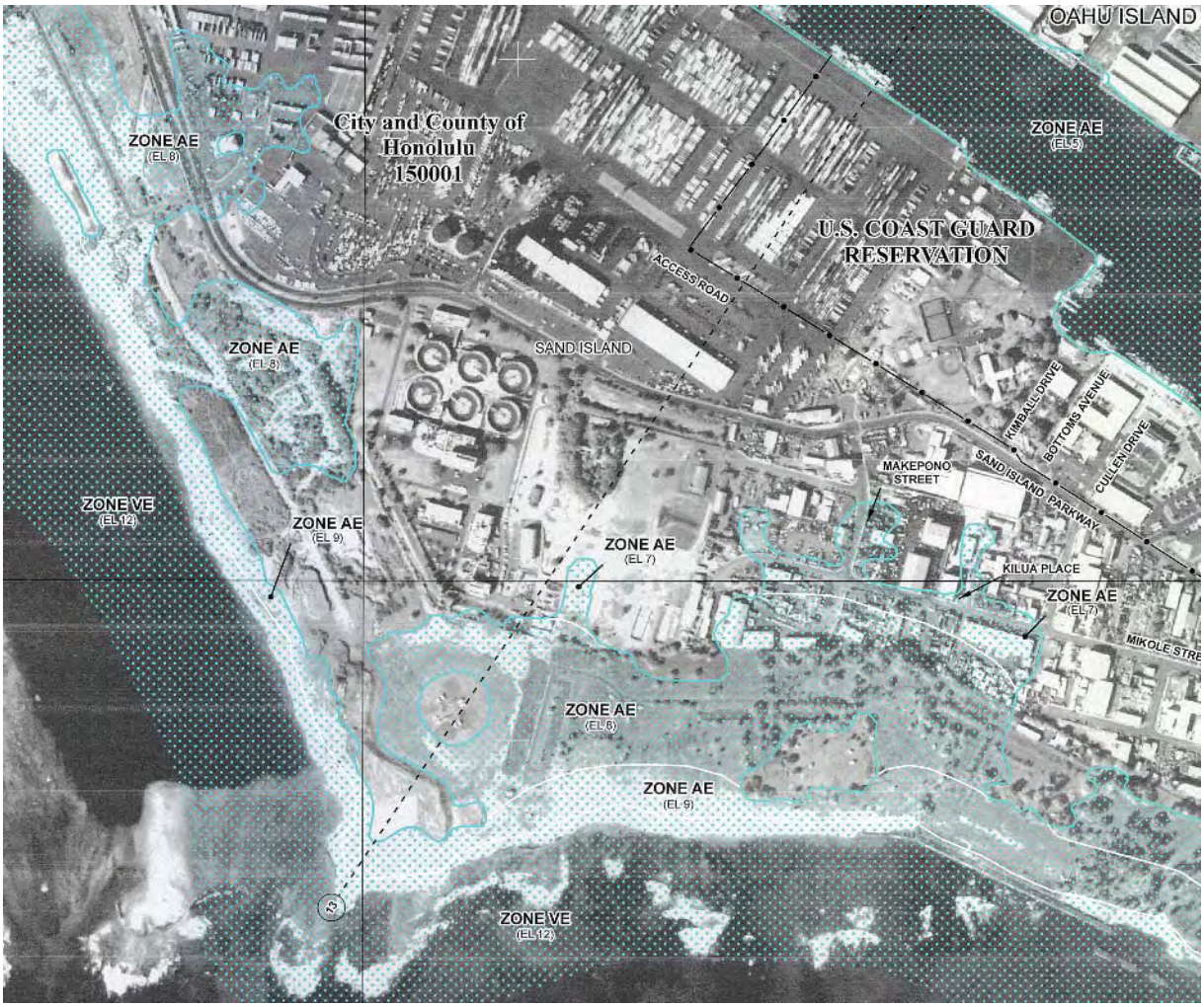

Figure 4-7. Preliminary Flood Insurance Rate Map (July 22, 2009)

Hart Street PS

According to the FIRM Community Panel Number 15000101015C, dated July 22, 2009, the Hart Street PS site is determined to be outside of the 100-year flood zone.

Ala Moana PS #1 and #2

The flood elevation for the site is at 5 feet above msl.

Kamehameha Highway PS

According to preliminary FIRM 15003C0353G, dated July 22, 2009, the WWPS site is located in Zone AE with base flood elevation of 9 feet above msl. Zone AE is a special flood hazard area subjected to inundation by the 1 percent annual chance flood with determined base flood elevations. Revised Ordinances of Honolulu (ROH), Chapter 21, Article 9, Section 10-5, "Floodway District" states:

> "Any temporary or permanent encroachment, including fill, structures, storage of material or equipment, or other development within the floodway, shall be prohibited unless certification and supporting data, including hydrologic and hydraulic analyses performed in accordance with standard engineering practice, are provided by a licensed engineer demonstrating that the proposed encroachment will not cause any increase in regulatory flood elevations during the occurrence of the regulatory flood."

However, since the Kamehameha Highway PS was previously constructed prior to establishment of the current flood hazard district, Kamehameha Highway PS is exempt from conforming to the ROH "Floodway district" requirements referenced above.

ʻAwa Street PS

According to FIRM 15003C0354G, dated July 22, 2009, the ʻAwa Street PS site is located in Zone X, which is an area determined to be outside the 0.2 percent annual chance floodplain. Zone X is not considered a flood hazard district by CCH, and is not subjected to any flood zoning constraints. On-site runoff sheet flows into the Nuʻuanu Stream.

Sand Island PSs

According to FIRM 15003C0361G, dated July 22, 2009, both the Sand Island Parkway PS and Sand Island Industrial Park PS are located in Zone X, which is an area determined to be outside the 0.2 percent annual chance floodplain. Zone X is not considered a flood hazard district by CCH, and is not subjected to any flood zoning constraints. Site drainage runoff either percolates into the surrounding area or sheet flows into the adjacent drainage system servicing Sand Island.

Potential Effects and Mitigation Measures

Drainage controls to handle storm events will be implemented for the project. These controls will be designed to be consistent with the requirements for control of storm water runoff by the State of Hawaiʻi and CCH. With the mitigation measures proposed, the potential for adverse impacts associated with flooding are not anticipated.

4.8 Visual and Scenic Resources

Ocean views are limited within the project area by the relatively flat topography and shoreline development. Views of the Koʻolau Mountains, Punchbowl and Diamond Head are partially obstructed by high-rise development. Existing ocean views accessible to the public are illustrated in the Primary Urban Center Development Plan **(Figure 4-8)** and are listed below.

- Mapunapuna to Diamond Head
- Mapunapuna to Kaimukī
- Sand Island to Punchbowl and Kapalama Heights
- Honolulu International Airport to Diamond Head and Punchbowl
- Kakaʻako to Downtown Honolulu and Punchbowl
- Punchbowl to Kaimukī and Diamond Head
- Ala Moana to Punchbowl, Diamond Head and Kapalama Heights
- Diamond Head to Punchbowl
- Waikīkī to Tantalus, Mānoa and Kaimukī

Potential Effects and Mitigation Measures

The potential for significant adverse effects to viewplanes and visual resources is not anticipated. Improvements to above-ground facilities, such as expansion or upgrades to WWPSs, conversion of WWPSs to drop shafts, and possible hydraulic improvements at the Sand Island WWTP, including construction of a new IPS, will occur substantially within the existing boundaries of or immediately adjacent to the existing facilities. In such cases, the new improvements will be substantially similar in appearance and character to the existing structures and are thus not likely to detract from existing visual resource values. Under the GST Alternative, improvements and construction activities will occur primarily below ground and will have limited to no impact on scenic viewplanes and resources. In addition, if the GST Alternative is selected, several existing WWPSs would be decommissioned and removed from the landscape.

During construction activities, work crews operating equipment and machinery will be visible. However, this will be of limited and temporary duration that will last only for the construction period. Upon completion of work all construction equipment, materials, and personnel no longer essential to the project will be demobilized.

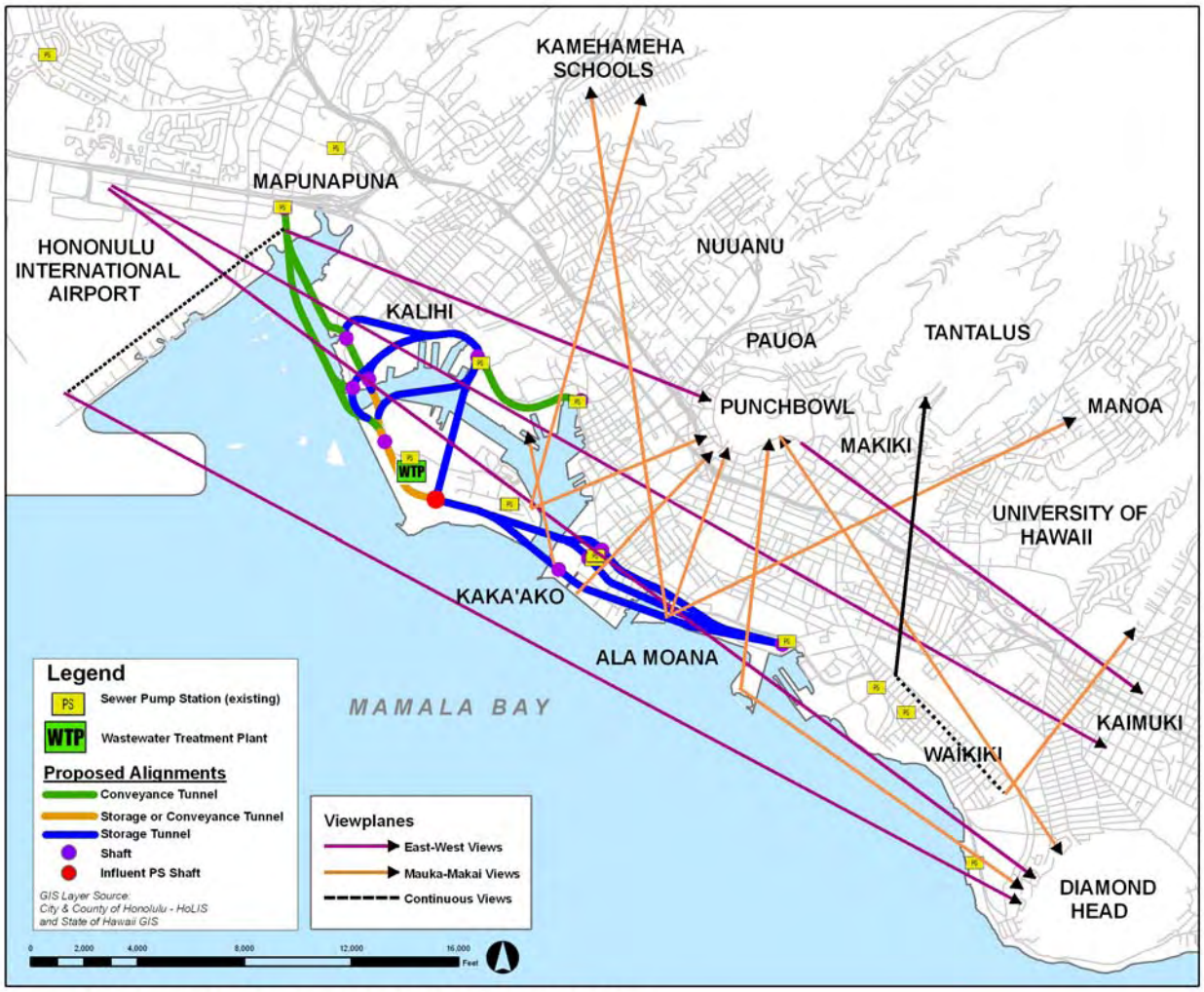

Figure 4-8. Viewplanes - Primary Urban Center Development Plan

5. Public Services

5.1 Traffic and Roadways

The project service area is within O‘ahu’s most densely populated area. Roadway traffic is generated by the central business district, Honolulu International Airport, Honolulu Harbor, and major retail centers such as the Ward-Ala Moana retail complex and high-rise apartment buildings.

Wastewater facilities are not considered significant traffic generators. However, traffic impacts, and the need for traffic control measures, are likely to occur during demolition and/or construction of wastewater facilities in areas such as parks and neighborhoods. Specific construction activities within rights of way could include trenching, directional drilling, tunneling, excavating, staging, construction traffic to staging areas for mobilization, demobilization, delivery of supplies and construction materials, and removal of excavated material and construction waste from staging sites.

If the GST alternative is selected, boring activities would generate significant amounts of excavated materials that would be transported on surface streets for possible disposal off-site or possible reuse. Methods for disposal of excavated material and the potential effect on traffic will be presented in the Draft EIS that will be prepared for this project.

Table 5-1 associates the various wastewater facilities under this project with streets owned by the State of Hawai‘i or CCH. WWPSs are located at a specific place while the FMs supporting the WWPSs are pipes extending longitudinally. Construction at the stationary (WWPS) or longitudinal (FM) facilities could potentially affect traffic along the primary location and cross streets.

Table 5-1. Streets Associated with Wastewater Facilities

Facility		**Associated Streets**	**Street Ownership** State = State of Hawai‘i City = City & County of Honolulu
East Basin PSs	**East Basin FMs**		
Ala Moana PS #1		Ala Moana Blvd Keawe St Ilalo St	State (DOT) City State (HCDA)
	Ala Moana FM #1	Forrest Ave Ilalo St Pu‘uwai St Mikole St Sand Island State Park Access Rd	State City State (HCDA) State (DOT) State (DLNR)
Ala Moana PS #2		Ala Moana Blvd Ilalo St	State (DOT) State (HCDA)
	Ala Moana FM#2	Ilalo St Pu‘uwai St Mikole St Sand Island State Park Access Rd	State (DOT) State (HCDA) State (DOT) State (DLNR)
Beachwalk PS		Kaiolu St Kūhiō Ave	City / Private City
	Beachwalk FM	Kaiolu St Ala Wai Blvd Ala Moana Blvd	City / Private City State

Table 5-1. Streets Associated with Wastewater Facilities

Facility		**Associated Streets**	**Street Ownership** State = State of Hawai‘i City = City & County of Honolulu
	Emergency Temporary Line	Kaiolu St Ala Wai Blvd Ala Wai Canal Ala Moana Blvd	City City City City
	Beachwalk PS to Ala Moana Park FM	Ala Wai Blvd Kaiolu St	City City
Ft. DeRussy PS		Kalākaua Ave	City
	Ft. DeRussy FM	Kalākaua Ave	City
Moana Park PS		Ala Moana Blvd Ala Moana Park Dr	State (DOT) City
	Moana Park FM	Ala Moana Blvd Ala Moana Park Dr	State (DOT) City
Sand Island Industrial Park PS		Mikole St Pa‘apu St	State (DOT) State (DOT)
	Sand Island Industrial Park FM	Mikole St Ulupono St	State (DOT) City
Sand Island Parkway PS		At Sand Island WWTP	City
	Sand Island Parkway FM	At Sand Island WWTP	City
West Basin PSs	**West Basin FMs**		
Hart Street PS		N. Nimitz Hwy	State (DOT)
	Hart Street FM Old	Sand Island Pkwy	State (DOT)
	Hart Street FM New	Sand Island Pkwy	State (DOT)
Kamehameha Highway PS		Ke‘ehi Lagoon Park Access Road N. Nimitz Hwy	State (DOT) State (DOT)
	Kamehameha Highway FM New	Ke‘ehi Lagoon Park Access Road N. Nimitz Hwy	State (DOT) State (DOT)
‘Awa Street PS		‘Awa St S. Nimitz Hwy N. Nimitz Hwy	Private (maintained by City) State (DOT) State (DOT)
	‘Awa Street FM	‘Awa St N. Nimitz Hwy S. Nimitz Hwy	Private (maintained by City) State (DOT) State (DOT)

5.2 Parks and Recreational Resources

Facilities that may be affected by this project include:

- Sand Island State Park – located close to the Sand Island Wastewater Treatment Plant.
- Ala Moana Beach Park – owned and operated by CCH. Contains the Moana Park PS.
- Kakaʻako Waterfront Park – located close to the Ala Moana PSs #1 and #2.
- Keʻehi Lagoon Beach – across Honolulu Harbor from Sand Island.
- Recreational boating out of Kewalo Basin and Keʻehi Lagoon.
- Pacific Ocean beaches in Waikīkī.

In addition, DLNR is considering plans for recreational uses on its land on Sand Island (see section 6.3.3).

Consultation with the CCH, Department of Parks and Recreation (for City-owned parks), and State DLNR, Division of State Parks (for Sand Island State Park), will be conducted to assess the specific impacts and recommend mitigation measures as needed. These will be reflected in subsequent environmental documents for this project.

5.3 Schools

The John A. Burns School of Medicine's two mid-rise buildings in Kaka'ako house the school's education and research activities. In addition, the University of Hawaiʻi Ocean Sciences facilities occupy areas around Honolulu Harbor. Various public schools are scattered throughout the project area but are not located in close proximity to the facilities to be upgraded under this project. As required, consultation will be initiated with area schools to coordinate the work required. Mitigation measures will be developed and further discussed in the Draft EIS that will be prepared for the project.

5.4 Fire, Police and Medical Services

Fire protection for project facilities is provided by the Honolulu Fire Department (HFD) through its network of fire stations. Consultation with HFD will be pursued to determine if the project will result in any changes in demand for fire protection services, and identify any needed mitigation.

Police services are provided by the Honolulu Police Department. Emergency medical services are provided within the project area by the State of Hawaiʻi, CCH, and private emergency services vendors.

5.5 Water System

Potable water is provided to all project facilities by the CCH Board of Water Supply (BWS). Consultation with the BWS will be conducted regarding existing water system facilities, as well as any required modifications of water requirements or water system improvements resulting from the project. The results will be published in subsequent environmental documentation for this project.

5.6 Drainage System

For the project facilities on Sand Island WWTP, Sand Island Parkway PS and Sand Island Industrial Park PS, site drainage runoff either percolates into the surrounding area or sheet flows into the adjacent drainage system servicing Sand Island.

Storm water runoff from all other SISB wastewater system facilities typically discharges to CCH Storm Drain System (SDS) or State SDS and is conveyed via subsurface drain lines to various discharge points into waters of the State. All facility improvements will be designed and constructed in accordance with CCH standards and undertaken in compliance with Revised Ordinances of Honolulu (ROH) Chapter 13, Articles 12 to 16 governing drainage, flood, grading, erosion, and sedimentation control.

All construction activities will be undertaken in compliance with Hawai‘i Administrative Rules (HAR) Chapter 11-54, Water Quality Standards, and Chapter 11-55, Water Pollution Control.

5.7 Wastewater System

Please refer to Section 2.

5.8 Electrical Power

Electrical systems used by the wastewater facilities in the SISB Phase 1 Area are summarized below.

Sand Island WWTP

Electricity serving the Sand Island WWTP is provided by overhead service lines which are metered by HECo at the Switchgear Building or the plant. In the event of a utility power outage, existing generators will automatically start and provide power to the essential equipment of the plant.

Ala Moana PS #1 and #2

The existing WWPSs are powered by one 2,250-kW and one 2,000-kW generator, both located at Ala Moana PS #2.

Hart Street PS

The existing Hart Street WWPS is currently served by two HECo pad-mounted transformers to step down 11.5kV power to a 480V system. A 2000kW generator unit is able to power 4 of the 5 pumps with 3 pumps operating on VFDs and 1 pump operating on a bypass autotransformer starter.

There is an existing 15,000 gallon underground double-walled fiberglass fuel storage tank that provides fuel to the generator. The tank is designed to run the generator for 2 days under peak load conditions.

Kamehameha Highway PS

According to the East Mamala Bay Facility Plan Report, “One 300 kVA HECo transformer is located on site. From the transformer a single 277/480 volt, 3-phase, 4-wire feeder is extended to the Kamehameha Highway PS equipment.”

KHPS has a 300 kwW, 375kWA; 277/480 Volt, 3-phase, 4-wire turbine diesel emergency generator. A 2,000 gallon underground fuel tank stores diesel fuel for the turbine generator.

‘Awa Street PS

According to the East Mamala Bay Facility Plan Report, “Awa Street WWPS is serviced directly from HECo’s secondary electrical system with 240 volt, 3-phase, 3-wire power.”

AWPS has an emergency generator and a 1,000 gallon underground diesel fuel tank for the turbine generator.

Sand Island Parkway PS

The electrical system was installed in 1981, and modifications were completed in 2007. An mergency generator was replaced in 2007. According to the East Mamala Bay Report, a 277/480 volt, 3-phase, 4-wire power is extended to the Sand Island Parkway WWPS from Load Center Number 1 in the Floatation Clarifier Building of the Sand Island WWTP.

Sand Island Industrial Park PS

According to the design report, the Sand Island Industrial Park PS is equipped with a standby generator which should be able to provide power to operate the 2 pumps and all of the auxiliary loads in the stations. An underground 1,000 gallon capacity tank is located on site to provide diesel fuel for the generator to operate for 48 hours of peak load, or 5 days of pumping average flow conditions. The generator size is estimated at 50 kW.

5.9 Communications (Cable, Internet, Telephone)

Communications facilities are provided to the service area by the following utilities:

- Cable – Oceanic Time-Warner
- Telephone (traditional) – Hawaiian Telcom
- Cellular phone service – various providers
- Internet – various providers

Subground communications facilities may be affected by construction activities related to excavation, trenching, and/or directional boring or tunneling. In order to address the potential for impacts to service providers, coordination with communications vendors will be undertaken to review as-built plans and to properly locate service lines.

6. Socio-Economic and Social Environment

6.1 Demographics

6.1.1 Service Area Definition

The study area for this project is the sewer drainage basin served by the Sand Island WWTP, which extends from the Kamehameha Highway PS Basin in the west to the Paiko Drive PS sub-basin in the east.

6.1.2 Population Characteristics

Population and flow projections have been developed for the year 2030 and for the "tunnel life" scenario. "Tunnel life" is in reference to the possibility of implementation of a GST and related facilities that are expected to have a life of up to 150 years. Various methods are utilized to develop the "tunnel life" projections. Wasteload projections are provided only for the 2030 planning period.

Population estimates for the year 2000 were obtained through analysis of Traffic Analysis Zone (TAZ) data provided by the City and County of Honolulu (CCH) Department of Planning and Permitting (DPP). The year 2000 TAZ data set is based on the 2000 census and is therefore reflective of the actual population of that year. The TAZ data includes 764 zones on Oahu and various residential and occupational categories of people that make up the entire population. The categories were grouped into three distinct population types – residential, commercial, and resort. The TAZ boundaries were overlaid with the WWPS tributary boundaries to determine the population of each tributary area. Results of the 2000 population analysis are presented in **Table 6-1**.

Table 6-1
2000 Population Summary

	- - - 2000 POPULATION - - -			
Tributary Area	Residential	Commercial	Hotel	Totals
Aliamanu #2	3,382	117	0	3,499
Aliamanu #1	705	24	0	729
Kamehameha Hwy	35,947	31,342	1,550	68,839
Awa Street	15,750	15,500	0	31,250
Hart Street	59,400	36,201	54	95,654
Ala Moana	139,816	152,871	3,780	296,466
Moana Park	312	4,027	0	4,339
Fort DeRussy	6,356	12,372	15,618	34,345
Beachwalk	48,074	42,025	51,769	141,868
Public Baths	1,377	1,056	506	2,940
Kahala	16,638	7,532	798	24,968
Niu Valley	2,628	633	0	3,262
Paiko Drive	339	65	0	403
SI Industrial Park	75	802	0	877
SI Parkway	109	1,172	0	1,281
Ft. Shafter	3,229	6,779	0	10,008
TOTAL	334,136	312,518	74,074	720,728

6.2 Archaeological, Historic, and Cultural Resources

The study area encompasses lands that have been the setting for some of the most intensive pre-contact and historic human activity in the Hawai‘ian islands, and contains a wide array of historic and archaeological resources reflecting the successive periods of human use and development. Numerous historic sites are known to exist, including cultural sites and historic structures. Several of the existing WWPSs are more than 50 years old, and therefore potentially qualify as significant historic properties.

Potential Effects and Mitigation Measures

Based on the proposed project description and available background information from previous archaeological studies conducted in the project corridor that are on file at the DLNR, State Historic Preservation Division (SHPD), the SISB Phase I Area project has the potential for inadvertent archaeological discoveries including, but not limited to, human skeletal remains and/or historic properties such as funerary objects and other Hawaiian artifacts.

The potential for such finds is largely limited to ground-disturbing activities. Under the non-GST alternative, ground disturbing activities include clearing, trenching, and excavation associated with the WWPSs, FMs, and gravity sewer mains. Under the GST alternative, ground disturbance will result from clearing and excavation associated with construction of drop shafts, odor control facilities, the IPS at Sand Island WWTP, and microtunneling staging sites. Because the GST alternative would not require trenching and would involve fewer surface sites compared to the non-GST alternative, the GST conveyance system has less potential for encountering and adversely effecting historic and archaeological resources.

The Sand Island WWTP is located on soils classified as Fill Land, mixed (FL), and has been previously disturbed during construction of the existing WWTP facilities. Based on the historical construction of Sand Island from fill land and mixed fill land, improvements to the WWTP facility and potential adjacent expansion area are not expected to result in adverse effects to archaeological resources. Previous consultation with the SHPD, conducted in 2001 for improvements to the WWTP, also indicated that there were no known historic sites at the project location (RMTC, 2001a).

As part of the EIS, an Archaeological Literature Review and Sensitivity Zone Map will be prepared to provide an overview of existing archaeological and historical conditions and to identify areas with known or anticipated high, medium, or low impact to cultural resources. These maps, and the documentation that will accompany them, will be used in the selection of the preferred alignments for wastewater conveyance systems and related facilities.

In addition to the archaeological study, a Cultural Impact Assessment will be undertaken for the project. Potential cultural issues include the China Town Historic District, potential burial sites in Urban Honolulu, and potential fishponds in the Kalihi area.

7. Relationship to Land Use Regulations, Policies, Controls, and Plans

7.1 Relationship to Federal Regulations, Policies and Controls

7.1.1 Federal Water Pollution Control Act [a.k.a. Clean Water Act or CWA]

The EPA is responsible for administering the Clean Water Act. States can use their water quality standards in Section 401 certifications to review and approve, condition, or deny all federal permits or licenses that might result in a discharge to state waters, including wetlands. States and tribes make their decisions to deny, certify, or condition permits or licenses primarily by ensuring the activity will comply with State water quality standards. In addition, states and tribes look at whether the activity will violate effluent limitations, new source performance standards, toxic pollutants, and other water resource requirements of state/tribal law or regulation.

CWA Section 301(h) was passed as part of the 1972 amendments to the CWA and requires municipal WWTPs to achieve secondary treatment capability by 1988. Some facilities, including the Sand Island WWTP, were granted variances from the secondary treatment requirement provided they could meet environmentally stringent criteria delineated in Section 301(h). After a number of revisions since the original amendments in 1972, the current regulations pertaining to WWTPs are as follows:

- Protect and propagate a balanced indigenous population of shellfish, fish, and wildlife.
- Meet water quality standards (or water quality criteria for pollutants without WQS).
- Establish a monitoring program to assess impacts.
- Provide a minimum of primary or equivalent treatment.
- Have an approved pretreatment program and establish toxic controls.
- Provide enhanced urban area pretreatment, for publicly owned treatment works serving greater than a population of 50,000.
- Protect water supplies.
- Meet water quality requirements to allow recreational activities.
- Prohibit waivers in stressed estuaries

CWA Section 303 relates to Water Quality Standards (WQS) that are applicable to all interstate waters. In addition to setting national water quality standards, under the CWA any state-level WQS must be approved on the federal level under the CWA, Section 303. Specifically:

> *(a)(1) In order to carry out the purpose of this Act, any water quality standard applicable to interstate waters which was adopted by any State and submitted to, and approved by, or is awaiting approval by, the Administrator pursuant to this Act as in effect immediately prior to the date of enactment of the Federal Water Pollution Control Act Amendments of 1972, shall remain in effect unless the Administrator determined that such standard is not consistent with the applicable requirements of this Act as in effect immediately prior to the date of enactment of the Federal Water Pollution Control Act Amendments of 1972. If the Administrator makes such a determination he shall, within three months after the date of enactment of the Federal Water Pollution Control Act Amendments of 1972, notify the State and specify the changes needed to meet such requirements. If such changes are not adopted by the State within ninety days after the date of such notification, the Administrator shall promulgate such changes in accordance with subsection (b) of this section.*

CWA Section 404 requires a permit before dredged or fill material may be discharged into waters of the United States including wetlands. In Hawai‘i, Section 404 is administered by the USACE Honolulu District.

Discussion

CWA Section 301(h): Discharge from the Sand Island WWTP is regulated under NPDES Permit HI 0020117, issued on 20 February 1990 and renewed in 1998.

CWA Section 303: The project will conform to all applicable water quality standards under CWA, Section 303. Delegation of water quality standards implementation to the State of Hawai‘i is discussed further in section 7.2.2 of this document.

CWA Section 401: The USACE Regulatory Branch, and the DOH Clean Water Branch will be consulted to identify permitting requirements pertaining to their jurisdiction under to the CWA, Section 401. In addition, NPDES permits will be required for construction stormwater discharges, hydrotesting discharges, and discharges involving construction dewatering.

CWA Section 404: Tailings from the proposed GST Alternative will be removed and stored on land and therefore will not involve discharge of dredged or fill material into waters of the United States including wetlands.

7.1.2 Clean Air Act

The EPA has determined that various manufacturing and production processes associated with wastewater storage, transfer, and treatment equipment are significant sources of air emissions. As a result, regulations developed and promulgated under the Clean Air Act Amendments of 1990 have resulted in wastewater treatment plant modifications, control of emissions from wastewater processes, newly implemented management practices and monitoring of wastewater content (Wittry, et al, 2002).

Foul air emissions for the Sand Island WWTP are governed by Non-covered Source Permit (NSP) No. 0216-05-N Application for Renewal No. 0216-13, issued on August 13, 2009. The permit is scheduled to expire August 12, 2014.

Since the foul air control systems are in transition with a number of odor control facilities under construction, the permit governs existing systems as of the date of issuance, a transition period, and the final configuration after scheduled construction is completed.

Discussion

The existing odor control systems (OCS) at the Sand Island WWTP include the following:

1. Lo-Cat OCS – Treats foul air from the Primary Flotator Clarifiers Influent Channels, Effluent Launders and Sludge Thickener Tanks.
2. Clarifier OCS – Treats foul air from the Influent Channels and Primary Clarifiers 7 and 8. This system is also referred to as the “Interim Odor Control System”.
3. Headworks OCS – Treats foul air from various areas of the New Headworks Facility.

New OCS facilities currently under construction (as of 2009) include the following:

1. Primary Clarifier OCS
2. Solids OCS

When the Primary OCS and Solids OCS are completed, the Lo-Cat OCS and Clarifier OCS will be permanently shut down. During the transition period the Lo-Cat OCS is required to run at a reduced flow rate of 10,000 standard cubic feet per minute (scfm) until the new OCS facilities are fully operational. A summary of the emission requirements is presented in **Table 7-1**.

Table 7-1.
Noncovered Source Permit Foul Air Requirements

System	Requirement
Existing Systems:	
1. Lo-Cat OCS	≤ 3 ppm by volume
2. Clarifier OCS	≤ 3 ppm by volume
3. Headworks OCS	≤ 7 ppm by volume
New Systems	
a. Primary Clarifier OCS	≤ 3 ppm by volume
b. Solids OCS	≤ 3 ppm by volume
3. Headworks OCS	≤ 3 ppm by volume
Property Lines	25 ppb by volume in any one–hour period

The four 2000 brake horsepower (bhp) combination electric / diesel engine effluent pumps are also governed by the same noncovered source permit governing the foul air systems. Limits on operational hours and emission opacity are included in the permit.

Discussion

The project will conform with all requirements of the Clean Air Act. Further details concerning existing and proposed permits under the Clean Air Act will described in the Draft EIS.

7.1.3 National Historic Preservation Act (NHPA)

The National Historic Preservation Act (NHPA) became law in 1966, and was last amended in 2000. The NHPA requires government agencies to evaluate the impact of government-funded construction projects through the process known as Section 106 Review. The goal of the process is to identify historic properties potentially affected by the proposed project, assess its impacts and seek ways to minimize or mitigate adverse effects. The NHPA is administered by the U.S. Department of Interior, National Park Service (NPS) and the Advisory Council on Historic Preservation (ACHP).

Discussion

At the State level, the NHPA is implemented by the State Historic Preservation Officers. In Hawai‘i, responsibility on the state level rests with the DLNR, SHPD.

7.1.4 Coastal Zone Management Act (CZMA)

The CZMA, enacted in 1972, provides states with financial incentives for the development and implementation of coastal zone management practices, and limited review power over federal actions affecting the State’s coastal zone. Projects needing federal permits are required by the CZMA to be consistent with Hawai‘i’s CZM Program objectives and policies. The national CZM program is administered by the Office of Ocean and Coastal Resources Management (OCRM), an office within the National Oceanic and Atmospheric Administration (NOAA), under the U.S. Department of Commerce.

Discussion

The proposed project is located within the Coastal Zone as defined by the State of Hawai‘i. As such, the proposed improvements will be designed and constructed in conformance with the goals, policies, and objectives of the Hawai‘i CZM Program. The project will undergo review through a CZM Federal Consistency Determination by the State Office of Planning and process a SMA Permit application with the CCH, Department of Planning and Permitting (DPP).

7.1.5 Endangered Species Act (ESA)

The Endangered Species Act of 1973 (ESA) is administered by the U.S. Department of Interior through the U. S. Fish and Wildlife Service (USFWS), and the U.S. Department of Commerce through the National Marine Fisheries Service (NMFS), NOAA. The purpose of the ESA is to protect and conserve ecosystems upon which endangered and threatened species are dependant, and to provide for the conservation of endangered and threatened species.

Discussion

Consultation with the USFWS and NMFS will be conducted in compliance with Section 7(a)(2) of the ESA. Any mitigation measures developed through the informal consultation process will be described in the forthcoming D to be prepared for this project.

7.1.6 Land and Water Conservation Fund Act (LWCFA)

Section 6(f) of the LWCFA concerns projects proposing actions which will result in impacts to outdoor recreation properties acquired or developed with LWCFA grant assistance. Passed by Congress in 1965, the act established the Land and Water Conservation Fund (LWCF), a matching assistance program that provides grants which pay half the acquisition and development cost of outdoor recreation sites and/or facilities. Section 6(f) of the act prohibits the conversion of property acquired or developed with these grants to a non-recreational purpose without the approval of the Department of Interior's National Park Service (NPS).

Discussion

Ala Moana Beach Park, a CCH recreational facility, and Sand Island State Park, owned by the State of Hawai'i, have received funding assistance from Section 6(f) of the LWCFA. Therefore consultation will be required to determine the effects and any mitigation measures for any actions affecting these LWCFA-supported park facilities.

7.1.7 Native American Grave Protection and Repatriation Act (NAGPRA)

This federal act is intended to protect places of religious importance to Native American Indians, Eskimos and Hawaiians.

Discussion

Excavation for the project could occur in areas with sandy (Jaucus or Beach Sand) soil and could result in the discovery of human remains. In the event that unknown or unexpected historic or cultural features, deposits, or burials are discovered during project activities, all work in the area will be halted temporarily until a qualified archaeologist evaluates the significance of the findings and notifies the SHPD to determine the appropriate course of action. See Section 6.2 of this document for additional discussion.

7.2 Relationship to State of Hawai'i Regulations, Policies and Controls

7.2.1 State-Level Land Use Regulation

The Hawai'i State Land Use Law, entitled "State Land Use Commission," Chapter 205, HRS, was adopted in 1961. The law is meant to preserve and protect Hawai'i lands, and encourage the uses to which the lands are best suited. All lands in Hawai'i are classified one of the four districts: Urban, Rural, Agricultural or Conservation.

Current wastewater facilities included in this project are all located within the Urban District under the Hawai‘i State Land Use law. See **Figure 7-1.**

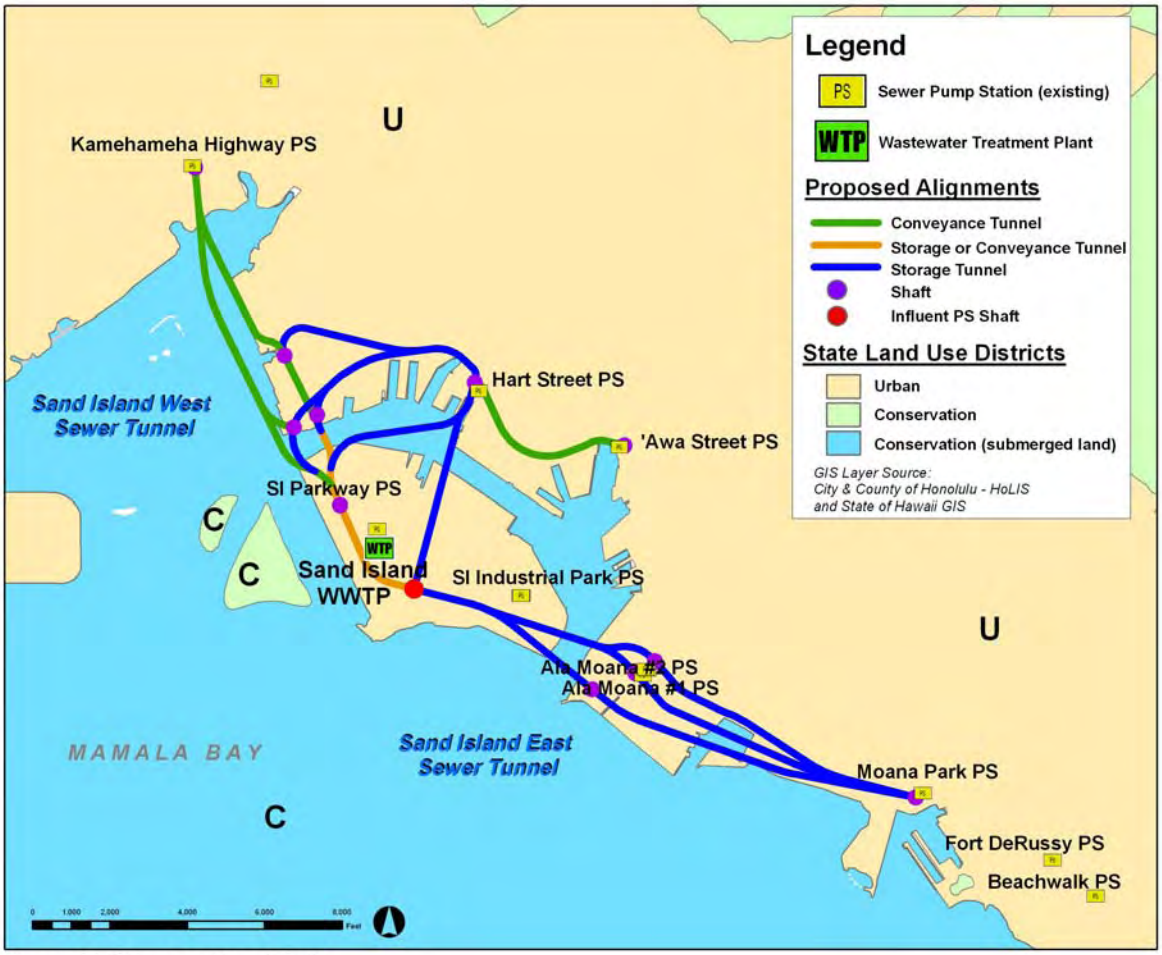

Figure 7.1. State Land Use District

Discussion

As stated in Section 205-2(b), “Urban districts shall include such activities or uses as provided by ordinances or regulations of the county within which the urban district is located.” See Section 7.4.2 of this document for discussion of CCH regulations affecting the Urban District.

Although the existing wastewater system is within the state Urban District, underground easements may be required to implement the project in Conservation District (submerged) lands. If so, all applicable permits and approvals for use of Conservation District land will be obtained prior to construction.

7.2.2 State-Level Implementation of Clean Water Act, Clean Air Act and Safe Drinking Water Act

The Environmental Management Division (EMD) of the State of Hawai‘i, DOH, is responsible for implementing and maintaining statewide programs for controlling air and water pollution, for assuring safe drinking water, and for the proper management of solid and hazardous waste. The EMD also regulates wastewater. The regulatory controls administered by three branches of the EMD are especially relevant to this project.

Clean Water Branch – The Clean Water Branch administers and enforces statewide water pollution laws and rules.

Clean Air Branch – The Clean Air Branch is responsible for the implementation of a statewide air pollution control program.

Wastewater Branch – The Wastewater Branch assists in financing construction projects for county wastewater facilities by providing low-interest loans from the State Revolving Fund. The Branch has been involved in a number of other regulatory and financing issues (underlines added for emphasis).

- *The Wastewater Branch administers the statewide engineering and financial functions relating to water pollution control, municipal and private wastewater treatment works program, individual wastewater systems program and the water pollution control revolving fund program.*
- *The various program activities include:*
    - *Review and approval of all new wastewater systems including septic tanks, monitoring of all existing wastewater systems including cesspools, implementation of the planning, design and construction of several major wastewater treatment works projects annually including review for approval of facilities plans, construction plans and specifications, engineering contracts, payment requests, construction contract change orders;*
    - *Preparation of environmental assessments, grant awards, loan agreements, engineering and scientific contracts, construction, final project and operation and maintenance inspection reports and audit resolutions; and*
    - *Tracking the repayment of loans.*

Discussion

Discharges of treated wastewater effluent from the Sand Island WWTP are regulated under the NPDES Permit HI 0020117, issued 20 February 1990, and renewed in 1998. As required, all discharges must comply with state law.

Control of air pollution is regulated under HAR Chapter 11-60.1, Air Pollution Control, which will be complied with during construction activities. Requirements include, but are not limited to the following:

- *The planning of project construction phasing should focus on: minimizing the amount of dust-generating materials and activities; centralizing material transfer points and on-site vehicular traffic routes; and, locating potentially dusty equipment in areas of least impact.*
- *An adequate water source at the site should be provided prior to start-up of construction activities.*
- *The project site should be landscaped with rapid covering of bare areas, including slopes, starting from the initial grading phase.*
- *Dust should be controlled from shoulders, project entrances, and access roads.*
- *Adequate dust control measures should be provided on weekends, after hours, and prior to daily start-up of construction activities.*

Vehicle and construction equipment exhausts also will be a source of air pollution. Mitigation of potential adverse impacts associated with use of construction equipment, fuel tanks, and vehicle exhausts will be handled through adherence to HAR, Chapter 11-60.1 and applicable federal and county regulations. All machinery and vehicles will be required to be in proper working order with appropriate use of mufflers.

Other provisions to maintain compliance with HAR, Chapter 11-60.1, are addressed in Non-Covered Source Permit (NSP) No. 0216-05-N Application for Renewal No. 0216-13, described in Section 7.1.2., Clean Air Act.

7.2.3 State-Level Implementation of the National Historic Preservation Act

The State of Hawai‘i, through the DLNR SHPD, is responsible for implementation of the NHPA.

Discussion

NHPA, Section 106 Review will be initiated for this project. Organizations and individuals that have an interest in the project area will be contacted during project planning and asked to identify historic or cultural sites that may be impacted by the project. Further, these organizations and individuals will be asked if the proposed project would curtail traditional access or cultural practices that may be present within the project's Area of Potential Effect (APE). Results of this consultation will be published in the forthcoming Draft EIS to be prepared for this project.

7.2.4 State-Level Implementation of Coastal Zone Management Program

The State of Hawai‘i has designated the Coastal Zone Management Program (CZMP) to manage the intent, purpose and provisions of Chapter 205A, HRS, as amended, for the areas from the shoreline to the seaward limit of the State's jurisdiction, and any other area which a lead agency may designate for the purpose of administering the CZMP.

Discussion

The project will be developed on public and private lands with CCH funds. Because the project will required federal permits, an application for a CZM Federal Consistency Determination will be filed with the State Office of Planning, CZM Program.

7.2.5 State-Level Land Use Jurisdiction in Kaka‘ako: Hawai‘i Community Development Authority, HRS, Chapter 206E

The 1976 State Legislature created the HCDA to plan for and to revitalize urban areas in the state which lawmakers found to be in need of timely redevelopment. These areas, designated as "Community Development Districts", were determined to be underused and deteriorating, but with the potential, once redeveloped, to address the needs of Hawai‘i's people and to provide economic opportunities for the State (HCDA, 2009).

In creating the HCDA, the legislature designated the Kaka‘ako area of Honolulu as the HCDA's first Community Development District, recognizing its potential for increased growth and development and its inherent economic importance to Honolulu and the State. Lawmakers found that Kaka‘ako was significantly underdeveloped and underutilized relative to its central location in urban Honolulu.They also recognized the area's potential to address the need for more housing, parks, and open areas, as well as new commercial and industrial space near downtown Honolulu.

The 600-acre Kaka'ako Community Development District is bounded by Pi‘ikoi, King, and Punchbowl Streets and Ala Moana Boulevard. The District also includes the waterfront area from Kewalo Basin to Forrest Avenue. See **Figure 7-2** below for a map of the area (HCDA, 2006).

Discussion

Two WWPSs (Ala Moana #1 and Ala Moana #2) are located within the HCDA Kaka‘ako Community Development District. In addition, all of the alternative alignments of the GST would be located beneath HCDA property. Consultation and negotiation will be ongoing between the project proponent and HCDA regarding effects, benefits, and mitigation measures for the various alternatives under consideration.

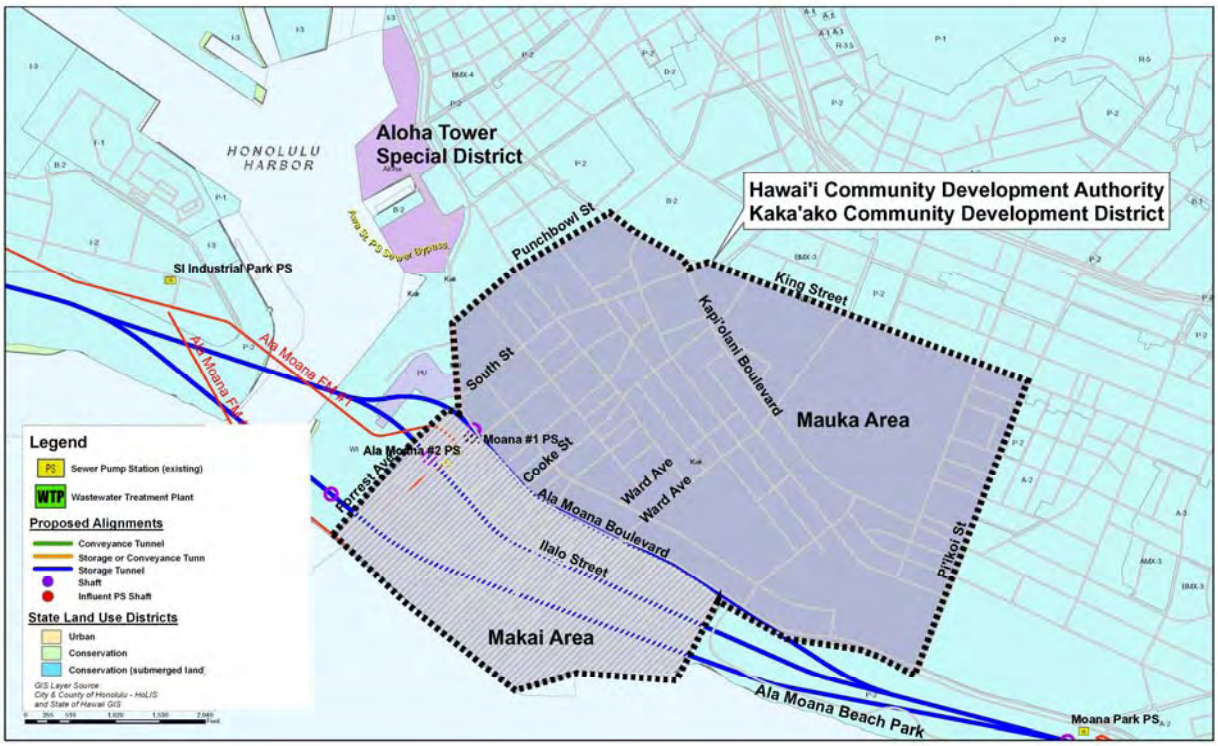

Figure 7-2. Kaka‘ako Community Development District Boundary

7.3 Relationship to State of Hawai‘i Plans

7.3.1 Hawai‘i State Planning Act

The purpose of the Hawai‘i state planning process, as defined in HRS, Chapter 226, is to:

- *Guide the future long-range development of the State;*
- *Identify the goals, objectives, policies, and priorities for the State;*
- *Provide a basis for determining priorities and allocating limited resources;*
- *Improve coordination of federal, state, and county plans, policies, programs, projects, and regulatory activities; and,*
- *Establish a system for plan formulation and program coordination to integrate major state, and county activities.*

Of note for wastewater facility planning are the objectives and policies relating to liquid waste facility systems quoted below, with particularly relevant passages underlined:

> ***§226-14 Objective and policies for facility systems--in general.***
> *(a) Planning for the State's facility systems in general shall be directed towards achievement of the objective of water, transportation, waste disposal, and energy and telecommunication systems that support statewide social, economic, and physical objectives.*
> *(b) To achieve the general facility systems objective, it shall be the policy of this state to:*
> *(1) Accommodate the needs of Hawai‘i's people through coordination of facility systems and capital improvement priorities in consonance with state and county plans.*
> *(2) Encourage flexibility in the design and development of facility systems to promote prudent use of resources and accommodate changing public demands and priorities.*

(3) Ensure that required facility systems can be supported within resource capacities and at reasonable cost to the user.
(4) Pursue alternative methods of financing programs and projects and cost-saving techniques in the planning, construction, and maintenance of facility systems.

§226-15 Objectives and policies for facility systems--solid and liquid wastes.
(a) Planning for the State's facility systems with regard to solid and liquid wastes shall be directed towards the achievement of the following objectives:
(1) Maintenance of basic public health and sanitation standards relating to treatment and disposal of solid and liquid wastes.
(2) Provision of adequate sewerage facilities for physical and economic activities that alleviate problems in housing, employment, mobility, and other areas.
(b) To achieve solid and liquid waste objectives, it shall be the policy of this State to:
(1) Encourage the adequate development of sewerage facilities that complement planned growth.
(3) Promote research to develop more efficient and economical treatment and disposal of solid and liquid wastes.

Discussion

This project is in consonance with the above objectives and policies of HRS, Chapter 226, *Hawai'i State Planning Act*. The project will enable CCH to maintain basic sanitation standards relating to wastewater collection and treatment in O'ahu's largest wastewater service area. The plan will result in adequate sewerage facilities to support both current and future economic activities. The wastewater improvements will support the sanitation needs of the most densely populated communities as well as the important economic "engines", namely downtown Honolulu and Waikīkī.

7.3.2 Hawai'i Community Development Authority: Kaka'ako Mauka Area Plan and Makai Area Plan

HCDA has completed multiple plans for the two major segments of its jurisdictional area in Kaka'ako, the Mauka Area (north of Ala Moana Boulevard) and the Makai Area (shoreward of Ala Moana Boulevard). Plans for Kaka'ako under HCDA are relevant to this project because major facilities within the plan – Ala Moana PSs #1 and #2, and the possible alignments for the GST Alternative – lay on or beneath HCDA lands.

7.3.3 DLNR – Sand Island Ocean Recreation Park Concept Plan

DLNR created the "Sand Island Ocean Recreation Park Concept Plan" in 2008 as part of the department's "Recreation Renaissance" planning initiative. This plan concerns lands that are either adjacent to, or may be considered for expansion of, the Sand Island WWTP. Elements of the Sand Island Ocean Recreation Park Concept Plan are shown as numbered in **Figure 7-3** and include:

1. Marina (25 acres) – 500 to 600 wet slips, docks, floating breakwater structure and boat moorings.
2. Marina Support Facilities (16 acres) – parking, comfort stations, recreation center, security facilities, storage and boat haul out area.
3. Ocean Recreation Area (11 acres) – canoe pavilion, kayak storage area, launch ramp, pavilion, activity center and automobile and trailer parking.
4. Makai Ocean Park (13 acres) – picnic areas, accessible fishing platform, automobile parking.
5. Administrative Support Area (3 acres) – administration office, maintenance facilities, marina office, convenience store, boat and material storage area.
6. Ocean Park Infrastructure (5 acres) – electrical, water, sewer, access roadways, connecting shoreline access trail, security lighting, irrigation system, drainage improvements.

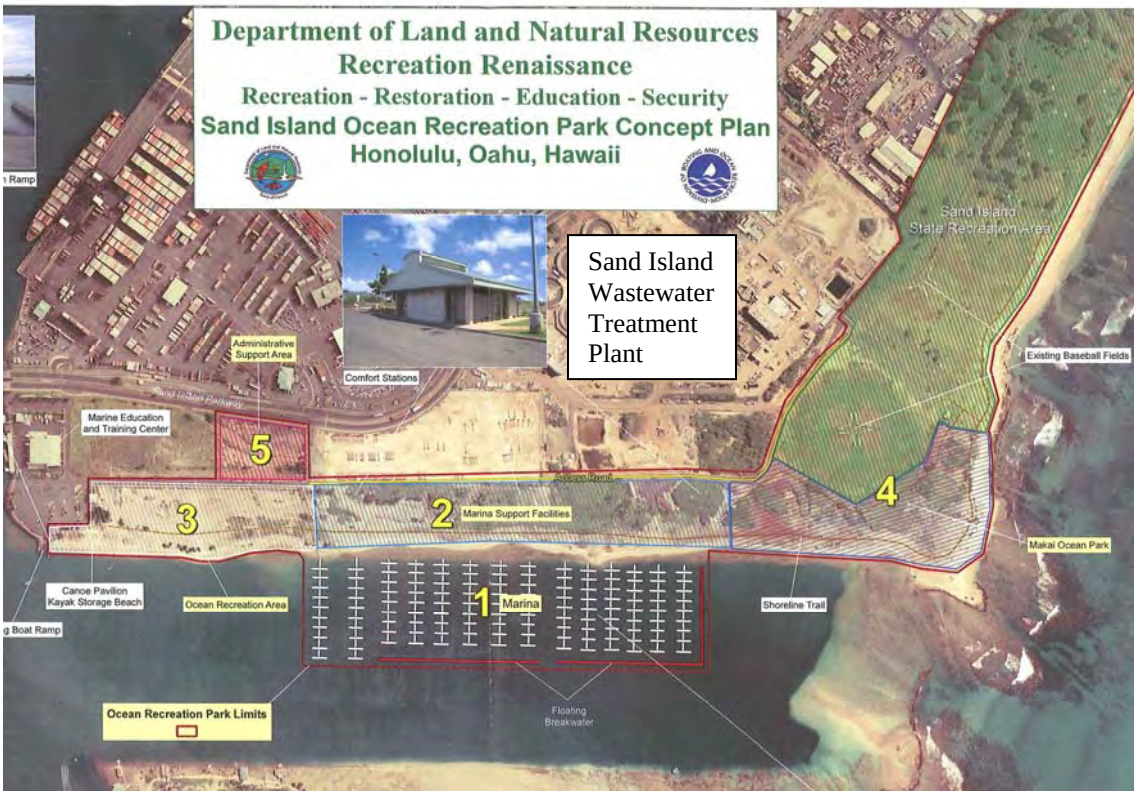

Figure 7-3. Sand Island Ocean Recreation Park Concept Plan (DLNR, 2008)
Note: See Section 7.3.3 for a description of the numbered components shown in the plan.

7.4 Relationship to City and County of Honolulu (CCH) Regulations, Policies and Controls

7.4.1 City Charter

The Revised Charter of Honolulu 2000 Edition, 2003 Supplement (Charter), sets forth the powers of the CCH government. Under "Purposes," Section 2-102, the Charter states that "All city powers shall be used to serve and advance the general welfare, health, happiness, safety and aspirations of its inhabitants, present and future, and to encourage their full participation in the process of governance."

The responsibility for the wastewater systems owned and administered by CCH is set forth in Article VI, Chapter 8, entitled *Department of Environmental Services.* Section 6-803 names the Director of ENV as responsible for the following:

> *Section 6-803. Powers, Duties and Functions -- The director of the department of environmental services shall:*
>
> *(a) Advise the director of design and construction concerning the planning and design of wastewater facilities.*
>
> *(b) Oversee the operation and maintenance of sewer lines, treatment plants and pumping stations.*
>
> *(c) Monitor the collection, treatment and disposal of wastewater.*
>
> *(d) Provide chemical treatment and pumping of defective cesspools.*
>
> *(e) Develop and administer solid waste collection, processing and disposal systems.*

(f) Promulgate rules and regulations as necessary to administer and enforce requirements established by law.

(g) Perform such other duties as may be required by law.

Discussion

The ENV Director is the individual responsible for preparation of the SISB Phase I Area feasibility analysis. In addition, ENV is the accepting agency for the environmental documentation which includes this Final EA/EISPN, and the subsequent Draft EIS, and Final EIS.

7.4.2 County-Level Land Use Regulation: Honolulu Land Use Ordinance

Land uses within CCH jurisdiction are regulated under Chapter 21, ROH, the Land Use Ordinance (LUO). The purpose of the LUO, as stated in section 21.1.20 of the LUO, is to *"regulate land use in a manner that will encourage orderly development in accordance with adopted land use policies, including the O'ahu general plan and development plans, and to promote and protect the public health, safety and welfare."*

Section 21.3.30 of the LUO lists zoning maps containing the latest County land use classifications. The adopted zoning maps associated with this project include: 2 (Kalaha-Kuliouou); 3 (Mō'ili'ili-Kaimukī); 4 (Nu'uanu-McCully); and 5 (Kalihi-Nu'uanu).

With the exception of the lands in Kaka'ako which are under the jurisdiction of the HCDA (see sections 6.2.5 and 6.3.2), lands to be used for this project are subject to CCH zoning regulations under the LUO. Article 2, Table 21.3, *Master Use Table*, associates various land uses and structures with use categories and zoning regulations. Under the *Master Use Table* heading "Social and Civil Service", the proposed project falls under "Public uses and structures" and therefore is a "permitted use" in all zoning classifications.

See **Figure 7-4.**

Discussion

The project plan is consistent with the purpose and uses of the land's associated urban district classifications under the LUO.

7.4.3 County-Level Implementation of the Coastal Zone Management Act: Special Management Area

Areas of the project are located within the SMA boundary established by the State CZM Law (Chapter 205A, Hawai'i Revised Statutes, see Section 7.2.4 of this document). See **Figure 7-5**. The CCH regulations regarding these coastal lands are contained in ROH, Chapter 25, Special Management Area.

Discussion

A SMA Permit will be required from CCH for proposed "development" within the coastal portions of the project depicted in **Figure 7-5**.

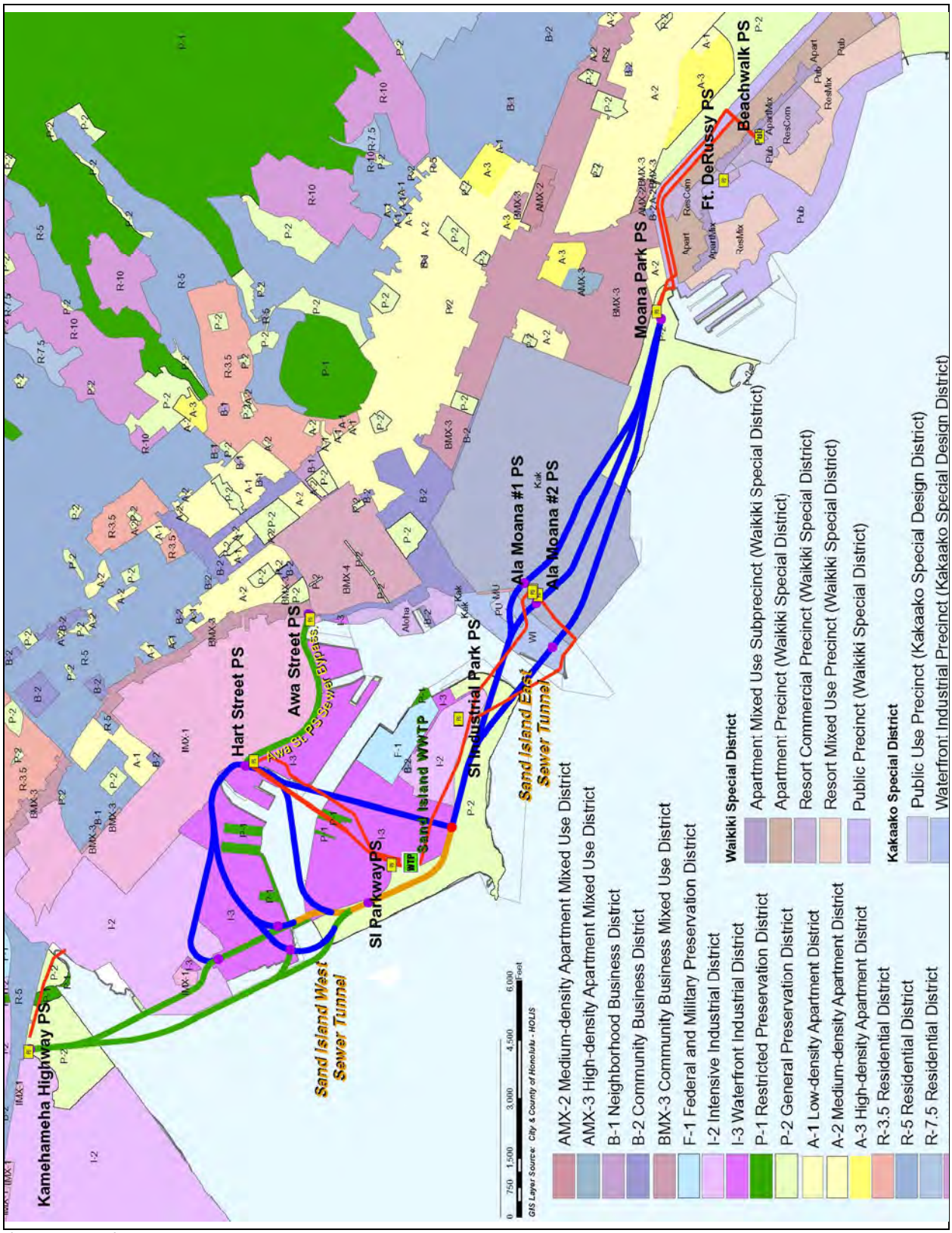

Figure 7-4. Zoning Map

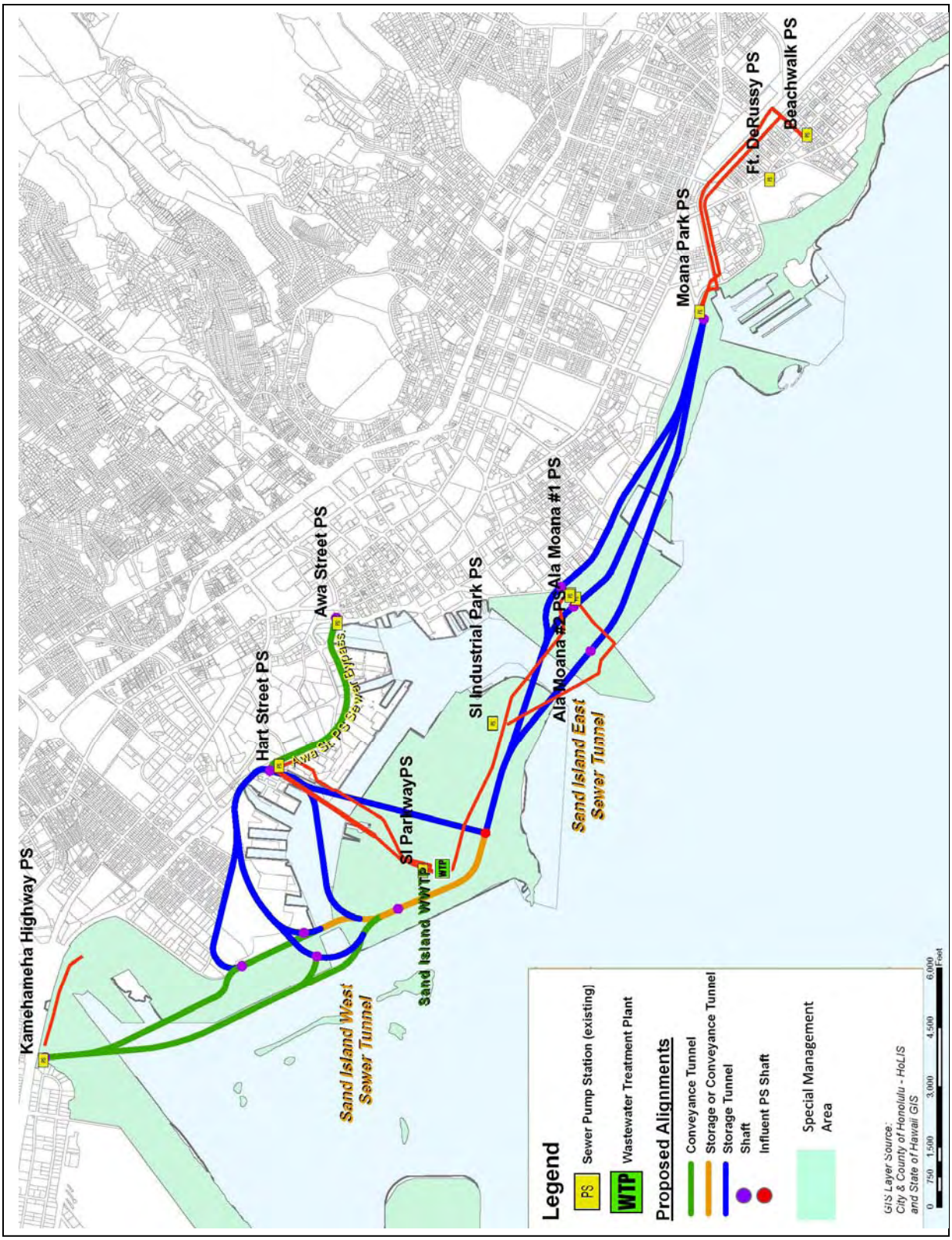

Figure 7-5. SMA Map

7.4.4 County-Level Implementation of the Coastal Zone Management Act:

Shoreline Setbacks

Chapter 23, ROH, concerns shoreline setbacks that regulate development within a certain proximity to the "certified" shoreline. The certified shoreline is determined using a current (one year or less) shoreline survey. The ordinance states:

> *(a) It is a primary policy of the city to protect and preserve the natural shoreline, especially sandy beaches; to protect and preserve public pedestrian access laterally along the shoreline and to the sea; and to protect and preserve open space along the shoreline. It is also a secondary policy of the city to reduce hazards to property from coastal floods.*
>
> *(b)To carry out these policies and to comply with the mandate stated in HRS Chapter 205A [Coastal Zone Management], it is the specific purpose of this chapter to establish standards and to authorize the department of land utilization to adopt rules pursuant to HRS Chapter 91, which generally prohibit within the shoreline area any construction or activity which may adversely affect beach processes, public access along the shoreline, or shoreline open space.*

Discussion

In compliance with Chapter 23, ROH, consultation with CCH, DPP will be undertaken to determine requirements for a shoreline setback variance for proposed project activities.

7.5 Relationship to City and County of Honolulu Plans

7.5.1 *General Plan of the City and County of Honolulu* (General Plan)

The General Plan, a requirement of the CCH Charter, is a written commitment by CCH to a future for the Island of O'ahu. The current plan, approved in 2006, is a statement of the long-range social, economic, environmental, and design objectives and a statement of broad policies which facilitate the attainment of the objectives of the plan.

Wastewater facilities are considered utilities. Therefore, the most relevant section of the General Plan is Section V, entitled "Transportation and Utilities".

Section V, Transportation and Utilities

Objective B: *To meet the needs of the people of Oahu for an adequate supply of water and for environmentally sound systems of waste disposal.*

Policy 3 - Encourage the development of new technology which will reduce the cost of providing water and the cost of waste disposal.

Policy 5 - Provide safe, efficient, and environmentally sensitive waste-collection and waste-disposal services.

Objective C: *To maintain a high level of service for all utilities.*

Policy 1 - Maintain existing utility systems in order to avoid major breakdowns.

Policy 2 - Provide improvements to utilities in existing neighborhoods to reduce substandard conditions.

Policy 3 - Plan for the timely and orderly expansion of utility systems.

Objective D: *To maintain transportation and utility systems which will help O'ahu continue to be a desirable place to live and visit.*

Policy 1- Give primary emphasis in the capital-improvement program to the maintenance and improvement of existing roads and utilities.

Policy 2 - Use the transportation and utility systems as a means of guiding growth and the pattern of land use on O'ahu.

Policy 4 - Evaluate the social, economic, and environmental impact of additions to the transportation and utility systems before they are constructed.
Policy 5 - Require the installation of underground utility lines wherever feasible.

Discussion

The project is consistent with Section V, *Objective B,* concerning environmentally-sound utility systems. The planning process is concerned with improving the safety, efficiency and environmental sensitivity of wastewater collection and treatment services. Implementation of the GST is anticipated to improve efficiency and environmental sensitivity by being placed underground.

Objective C is aimed at maintaining a high level of service for all utilities under the jurisdiction of CCH, including wastewater collection and treatment. Planned improvements will benefit the urban communities within the Sand Island WWTP service area as well as critical facilities such as Honolulu International Airport and Honolulu Harbor. Maintaining a high level of service and reliability in this service area is consistent with CCH's emphasis on retaining the population concentration within the Primary Urban Center. The environmental documentation in this Final EA/EISPN, as well as the subsequent Draft EIS, will evaluate the social, economic and environmental impact of the proposed improvements.

With regard to Objective D, concerning maintaining utility systems, the planned improvements are intended not only to maintain, but to significantly improve, wastewater facilities that will enable O'ahu to continue to be a desirable place to live and visit. The proactive, advanced technology involved with the underground GST Alternative will reduce the increasing maintenance demands of the sewer collection system.

7.5.2 Primary Urban Center (PUC) Development Plan

The PUC Development Plan, most recently updated in 2004, implements the objectives and policies of the General Plan for the PUC, which is described as the "cultural, governmental and economic center of both O'ahu and the State." The PUC Development Plan is incorporated into Ordinance 04-14 by reference.

The proposed project is consistent with the implementation strategies described in the PUC Development Plan, Chapter 5. Particularly pertinent areas are quoted below, with underlines added for emphasis.

5.1 Public Facility Investment Priorities
The vision for the Primary Urban Center requires the cooperation of both public and private agencies in planning, financing, and improving infrastructure. The City must take an active role in planning infrastructure improvements, such as… improvements to wastewater and stormwater management systems. Of particular importance is the need to achieve a balanced transportation system and upgrade the wastewater system in older, in-town Honolulu neighborhoods. These improvements are needed in order to accommodate new housing and other needed facilities.

5.2 Development Priorities
Projects to receive priority in the approval process are those that:
- *Involve land acquisition and improvements for public projects which are consistent with the Development Plan vision, policies and guidelines; and*
- *Involve applications for zoning and other land use permits that are consistent with the Development Plan vision, policies, and guidelines.*

5.4 Functional Planning
Functional planning is the process through which various City agencies determine needs, assign priorities, phase projects, and propose project financing to implement the vision articulated in

the Development Plan. This process may take a variety of forms, depending upon the missions of the various agencies involved, as well as upon requirements imposed from outside the City structure, such as federal requirements for wastewater management planning. Typically, functional planning occurs as a continual or iterative activity within each agency.

Through the functional planning process, City agencies are responsible for development and maintenance of infrastructure and public facilities, and the provision of City services review existing functional planning documents and programs. As a result of these reviews, the agencies then update existing plans or prepare new long-range functional plans that address facilities and service system needs. Updates of functional planning documents are also conducted to assure that agency plans will serve to implement the Development Plan as well as to provide for coordination of plans and programs among the various agencies. A typical agency may develop a set of core documents such as:

- *A resource-constrained long-range capital improvement program. A long-range financing plan, with identification of necessary new revenue measures or opportunities.*
- *A development schedule with top priorities for areas designated for earliest development.*
- *Service and facility design standards, including level of service guidelines for determining adequacy.*

Discussion

This project is in line with the PUC Development Plan. With regard to the General Plan's Section 5.1, Public Facility Investment Priorities, this project reflects ENV's active role in planning infrastructure improvements for wastewater systems. Regarding Section 5.2, Development Priorities, investment in the improvements proposed in this project is consistent with the PUC Development Plan emphasis on proactive infrastructure planning. Finally, this project implements Section 5.4, Functional Planning, by determining wastewater needs, assigning priorities and phasing requirements of this project. The long term plans developed under this project include capital improvement plans, a development schedule and detailed service and facility standards for the envisioned wastewater system.

7.5.3 East Māmala Bay Facility Plan

The most recent major wastewater facility plan prepared for the SISB Phase 1 area is the *East Māmala Bay Facility Plan* (Belt Collins, 1993a), for which an EIS was also prepared (Belt Collins, 1993b). The plan provides a systematic evaluation of alternatives and guidance for upgrading and expanding the wastewater collection and treatment facilities to accommodate anticipated flows to the year 2015.

Subsequent to completion of the *East Māmala Bay Facility Plan*, a supplemental study was conducted to set infiltration / inflow rates for the SISB Phase 1 Area. The *Final Sewer Rehabilitation and Infiltration & Inflow Minimization Plan* (Fukunaka and Associates, 1999), provides a key basis for developing design flows throughout the region.

Discussion

ENV plans to update the *East Māmala Bay* Facility Plan following the evaluation of the GST alternative for the SISB Phase 1 area.

8. List of Required Permits and Approvals

8.1 Federal

Environmental Protection Agency

- CWA Section 301(h) review
- Southern O‘ahu Basal Aquifer review

U.S. Fish & Wildlife Service

- Section 7 review

National Park Service

- 6(f) approval

U.S. Army Corps of Engineers

- Department of the Army Permit (CWA Section 404 and 303; Rivers and Harbors Act Section 10)

U.S. Coast Guard

- USCG Section 9 Permit Applicability Guidance

8.2 State of Hawai‘i

Department of Health

- CWA Section 401
- CWA Section 402, National Pollutant Discharge Elimination System (NPDES) permits (construction storm water discharges, hydrotesting discharges, and discharges involving construction dewatering)
- Community Noise Permit / Community Noise Variance
- Air Quality Permit
- Construction plan review and approval

Department of Transportation

- Harbors Division – Right-of-entry for construction activities within DOT-H facilities; possible easements
- Highways Division – highway easements; permit to discharge into State highway drainage system (required for NPDES permits)

State of Hawai‘i, Department of Land and Natural Resources

- “No effect” determination from State Historic Preservation Division

Hawai‘i Community Development Authority

- Plan review for lands under HCDA

Office of Planning

- Coastal Zone Management Consistency Determination
- Special Management Permit (Minor) for geotechnical borings on HCDA lands

8.3 City and County of Honolulu

Department of Environmental Services

- EIS approval
- Permission to discharge into CCH storm drain system (required for NPDES permits)

Department of Planning and Permitting

- Special Management Area Permit
- Shoreline Setback Variance (if required)
- Construction plan review and approval
- Grading and erosion control plan review
- Building Permit
- Grading, Grubbing, and Stockpiling Permit
- Dewatering Permit
- Flood Certification

Honolulu Board of Water Supply

- Plan Review and Approval

9. Agencies, Organizations and Individuals Consulted During the Final EA/EISPN Preparation and Review Period

9.1 City and County of Honolulu

Department of Design and Construction

Department of Planning and Permitting

Department of Transportation Services

Honolulu Board of Water Supply

9.2 State of Hawai‘i

Department of Business, Economic Development and Tourism

Department of Health

Department of Land and Natural Resources

Department of Transportation

Disability and Communication Access Board

Hawai‘i Community Development Authority

Office of Environmental Quality Control

Office of Hawaiian Affairs

9.3 Federal

U. S. Army Corps of Engineers

National Marine Fisheries Service

U. S. Coast Guard

U. S. Fish & Wildlife Service

9.4 Elected Officials and Boards

9.4.1 State of Hawai‘i

Senator Will Espero

Senator Mike Gabbard

Senator Brickwood Galuteria

Senator Les Ihara

Senator Donna Mercado Kim

Senator Norman Sakamot

Representative Tom Brower

Representative Lynn Finnegan

Representative Faye Hanohano

Representative Joey Manahan

Representative John Mizuno

Representative Hermina Morita

Representative Scott Nishimoto

Representative Karl Rhoads

Representative Scott Saiki

Senator Brian Taniguchi

Representative Glenn Wakai

9.4.2 City and County of Honolulu

Mayor Mufi Hannemann

Councilman Romy Cachola

Councilman Donovan Dela Cruz

Councilman Charles Djou

Councilwoman Ann Kobayashi

Councilman Gary Okino

Councilman Rod Tam

9.4.3 Neighborhood Boards

Ala Moana – Kakaʻako Neighborhood Board

Aliamanu – Salt Lake Neighborhood Board

Downtown Neighborhood Board

Kalihi Palama Neighborhood Board

McCully-Mōʻiliʻili Neighborhood Board

Waikīkī Neighborhood Board

9.5 Private Organizations and Individuals

Earth Justice

General Growth Properties

Hawaiʻi Hotel Industry Association

Hawaiʻi Tourism Authority

Hawaiʻi Visitor Convention Bureau

Honolulu Harbor User Group

Kalihi Business Association

Kamehameha Schools

Oʻahu Visitor Bureau

Outdoor Circle

Sand Island Business Association

Sierra Club

Visitor Aloha Society of Hawai‘i

Waikīkī Improvement Association

9.6 Utility Companies

Hawaiian Electric Company, Inc.

Hawaiian Telcom Incorporated

10. Significance Determination

The potential effects of the proposed project are evaluated based on the significance criteria in section 11-200-12, HAR. The following is a summary of the potential effects of the action.

Criterion 1 - Involves an irrevocable commitment to loss or destruction of any natural or cultural resources

Proposed improvements to the SISB Phase I Area wastewater conveyance and treatment system will require irrevocable commitment of land for conveyance corridors and wastewater facilities. Project improvements will take place within developed corridors where effects on natural resources, including flora and fauna, water, and soils, are anticipated to be minimal.

An archaeological study consisting of sensitivity mapping and literature research, and a cultural impact assessment will be prepared as part of the EIS process to identify existing and potential historic, archaeological, and cultural resources and recommend mitigation measures. Many of the proposed improvements will occur in conditions of fill land, including Ala Moana Beach Park, Kakaʻako Makai Area, and Sand Island, and thus are not anticipated to encounter cultural or historic resources. Should any archaeologically significant artifacts, or other indicators of previous on-site activity be uncovered during the construction phase, their treatment will be conducted in strict compliance with the requirements of Chapter 6E, HRS.

The potential for adverse effects will be addressed through adherence to the mitigation measures and practices that will be further described in the forthcoming Draft EIS to be prepared for this project.

Criterion 2 - Curtails the range of beneficial uses of the environment

The potential development of new and/or expanded wastewater conveyance and treatment facilities would curtail other uses on the various facility site(s). Proposed new and/or expanded facilities are described in Section 3 of this document. While the proposed project and alternatives would primarily involve the below-ground use of land, such use is not anticipated to significantly detract from the function or use of the environment. The potential for adverse effects will be addressed through adherence to the mitigation measures and practices that will be further described in the forthcoming Draft EIS to be prepared for this project.

Criterion 3 - Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 344, HRS

The proposed upgrades and expansion to the SISB Phase I Area wastewater conveyance and treatment system will be undertaken in a manner that conforms with Chapter 344, HRS, State Environmental Policy. The project is required to meet the needs of Honolulu's existing and future population for reliable wastewater conveyance and treatment to ensure public health and maintain safety.

The project is being undertaken in conformance with the environmental policies, goals, and guidelines expressed in Chapter 344, HRS. An EIS will be prepared for the project to identify potential adverse effects and develop appropriate measures to either mitigate or minimize impacts.

Criterion 4 - Substantially affects the economic or social welfare of the community or state;

The SISB Phase I Area wastewater conveyance and treatment facility improvements under consideration will benefit the community within the service area and the larger population of O‘ahu, by protecting public health and safety through the environmentally responsible management and treatment of wastewater. The planned upgrades will ensure that the municipal wastewater system will continue to provide reliable service and meet future service demands.

The proposed project is not expected to have any adverse economic impacts. A primary project objective is to ensure that public investment is directed toward wastewater system improvements that provide the greatest benefit to current and future users in terms of both initial capital expenditure and long-term operation and maintenance costs. Short-term economic benefits will result from construction jobs, services, and procurements in the form of construction supplies and equipment. In addition, reuse of excavated material under the GST Alternative offers a potential economic benefit through the sale of the material, or by offsetting costs of fill material used on public works projects. These benefits will be limited in scope however, and will cease when the project is complete.

Criterion 5 - Substantially affects the public health

No substantial adverse effects to public health are anticipated to result from the facility improvements under consideration. Short-term effects to noise, air, water quality, and traffic that could result from construction activities will be limited to the construction phase and will be mitigated through best management practices (BMPs) and adherence to the requirements of regulations as described in Section 7 of this document. Long-term effects from planned expansion and upgrades to the SISB Phase I Area wastewater facilities are expected to be beneficial to the maintenance of public health.

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

Development of the proposed project will not result in substantial secondary or cumulative impacts to the natural or built environment or to the social and economic community. The planned SISB Phase I Area wastewater facility expansion and upgrades will be designed to accommodate projected population growth within the service area based on consideration of land use density constraints. The project itself is therefore not anticipated to stimulate unexpected changes in population, but will accommodate the current and anticipated future needs of the SISB Phase 1 service area.

Criterion 7 - Involves a substantial degradation of environmental quality

The SISB Phase I Area wastewater facility improvements under consideration do not involve substantial degradation of environmental quality. Project activities will be conducted in compliance with federal, State, and CCH rules and regulations governing environmental quality and public health.

A number of the environmental studies undertaken for the proposed project will be provided as appendices to the EIS documentation. Where the analyses are not provided as appendices, documents cited as references will be publicly available.

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

The SISB Phase I Area wastewater collection, conveyance and treatment system is an essential public facility. Facility improvements are under development by CCH to provide for the safe and efficient

handling of municipal wastewater. Necessary upgrades and expansion of the SISB Phase I Area wastewater system are being developed and evaluated on the basis of a long-range, comprehensive facility plan. The cumulative effects of the system are explicitly addressed in the facility design standards and performance criteria. The development of municipal wastewater facilities involves a long-term commitment to maintain and upgrade the system to meet the current and projected needs of O‘ahu’s population. The facilities will not result in a cumulative adverse effect upon the environment.

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

The project study area and wastewater facility corridors involve highly urbanized lands and are not known to provide habitat for any rare, threatened or endangered plant or animal species. Construction of SISB Phase I Area wastewater facility improvements is not expected to result in substantial adverse impacts to any such species. A more thorough assessment of potential effects to biological resources, and recommended mitigation measures if necessary, will be prepared as part of the EIS process.

Criterion 10 - Detrimentally affects air or water quality or ambient noise levels

The SISB Phase I Area wastewater facility improvements under consideration will not detrimentally affect air or water quality or ambient noise levels. SISB Phase I Area wastewater facility improvements are being undertaken in accordance with Federal Clean Water Act and Clean Air Act requirements to ensure the long-term protection of O‘ahu’s water and air resources, and public health and safety.

Mitigation measures and BMPs will be employed during construction activities to mitigate temporary air, noise, and water pollution. Runoff from construction areas will be regulated under NPDES permit conditions. BMPs will be employed to prevent soil loss and sediment discharges from work sites. Project activities will comply with DOH regulations as set forth in HAR, Title 11 Chapter 54 – *Water Quality Standards*, and Chapter 55 – *Water Pollution Controls*.

Construction-related exhaust emissions and dust generation will be mitigated by requiring that construction activities comply with HAR Chapter 11-59 and 60 – *Air Pollution Control*. Construction related impacts to air quality will be temporary and will cease when construction is completed.

Criterion 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

The project study area includes the coastline between Ala Moana Beach Park and Sand Island. Areas along the coastline, including the sites of several existing and proposed SISB Phase I Area wastewater facilities, are susceptible to inundation from flooding and tsunami. As required, facility improvements will be developed in compliance with ROH, Section 21-9.10-1 through 21-9.10-14, relating to development within the flood hazard districts.

Various segments of this coastline are also subject to shoreline erosion, while other segments are experiencing accretion (SOEST, 2008a, 2008b). Planned surface facilities will occur outside of the 40-foot shoreline setback and away from erosion prone segments of the shoreline and are not expected to suffer damage from or contribute to coastal erosion.

The project is not located in a seismically hazardous area.

Planned project improvements are not anticipated to affect or suffer damage by being located in environmentally sensitive areas. Additional assessment of SISB Phase I Area wastewater facilities’

effects on environmentally sensitive areas will be undertaken during preparation of the EIS as more details about facility design and operations are developed.

Criterion 12 - Substantially affects scenic vistas and view planes identified in County or State plans or studies

Adverse effects to scenic vistas and view planes are not anticipated to result from SISB Phase I Area facility improvements under consideration. The project principally involves the construction of sub-surface facilities that when completed will have limited to no impact on scenic viewplanes and resources. Improvements to surface facilities, such as expansion or upgrades to WWPSs, conversion of WWPSs to drop shafts, and possible hydraulic improvements at the Sand Island WWTP, including construction of a new IPS, will occur substantially within the existing boundaries of or immediately adjacent to the existing facilities. The new improvements will be substantially similar in appearance and character to the existing structures and are thus not likely to detract from existing visual resource values. In addition, if the GST Alternative is selected, several existing WWPSs would be decommissioned and removed from the landscape.

During construction activities, work crews operating equipment and machinery will be visible. However, these activities will be of limited scope and temporary duration that will last only for the construction period. Upon completion of work, all construction equipment, materials, and personnel no longer essential to the project will be demobilized.

Criterion 13 - Requires substantial energy consumption

Project construction activities will require high, short-term energy use, primarily in the form of petroleum fuel and electricity used by heavy equipment, vehicles, and power tools, and in the manufacture of construction materials.

SISB Phase I Area wastewater conveyance and treatment facilities will require substantial energy consumption for the operation of pumps, odor control units, and treatment processes, in addition to the relatively nominal energy consumption required for facility controls, lighting, office machinery, and communication utilities. If the GST Alternative is selected, it will result in the elimination of several existing WWPSs with related savings in energy. However, the GST Alternative will require construction of a centralized IPS that will have a significant energy demand. The Sand Island WWTP includes waste to energy conversion facilities that are currently used to capture energy from the wastewater treatment process. Planned facility upgrades include expansion of energy capture technologies. For the foreseeable future, these technologies will provide only a nominal amount of the energy required by the facility.

More accurate estimates of energy requirements, and opportunities for energy savings, will be developed during the EIS process. Energy requirements should be viewed in consideration of the essential nature of the wastewater system to public health and safety.

11. Findings

In accordance with the content requirements of Chapter 343, HRS, and the significance criteria set forth in Section 11-200 of Title 11, Chapter 200, HAR, the proposing agency has determined that this project may have significant environmental effects and will require the preparation of an EIS.

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