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DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU
1000 ULUOHIA STREET, SUITE 308, KAPOLEI, HAWAII 96707
TELEPHONE: (808) 768-3486 • FAX: (808) 768-3487 • WEBSITE: http://envhonolulu.org

KIRK CALDWELL
MAYOR

LORI M.K. KAHIKINA, P.E.
DIRECTOR

TIMOTHY A. HOUGHTON
DEPUTY DIRECTOR

ROSS S. TANIMOTO, P.E.
DEPUTY DIRECTOR

IN REPLY REFER TO
PRO 17-048

RECEIVED
'17 MAR 28 P2:27
OFC. OF ENVIRONMENTAL QUALITY CONTROL

March 28, 2017

Scott Glenn, Director
Office of Environmental Quality Control
Department of Health
235 South Beretania, Suite 702
Honolulu, HI 96813

Dear Mr. Glenn:

The City and County of Honolulu, Department of Environmental Services has determined that an environmental impact statement (EIS) is required for the Honouliuli Wastewater Treatment Plant Facilities Plan, Honouliuli Wastewater Treatment Plant Secondary Treatment and Support Facilities; situated at the following TMK's 91013007 and 91069003 in Ewa Beach on the island of Oahu.

This letter transmits the documents required for publication in the next available edition of the Environmental Notice. The Final EIS has included copies of all written comments received during the 45-day public consultation period for the Draft EIS (published on April 27, 2016)

Also enclosed is the completed OEQC Publication Form, One Copy of the Final EIS, an Adobe Acrobat PDF file of the same, and an electronic copy of the publication form in MS Word (with a copy of the same sent via electronic mail to oeqc@doh.hawaii.gov).

If there are any questions, please contact Jack Pobuk, Section Head, CIP Program and Planning, at 768-3464, or email at jpobuk@.honolulu.gov.

Sincerely,

Lori M. K. Kahikina, P.E.
Director

Enclosures: (1) Completed OEQC Publication Form
(2) Summary description of action in electronic format

EXHIBIT "5"

17-414

AGENCY
PUBLICATION FORM

Project Name:	Honouliuli/Waipahu/Pearl City Wastewater Facilities Plan, Honouliuli Wastewater Treatment Plant Secondary Treatment and Support Facilities
Project Short Name:	Honouliuli WWTP Fac Plan
HRS §343-5 Trigger(s):	§343-5 (1), §343-5 (3), §343-5 (9A); §343-5 (9B)
Island(s):	Oahu
Judicial District(s):	Ewa
TMK(s):	91013007 and 91069003
Permit(s)/Approval(s):	Federal:

Federal:

- U.S. Army Corps of Engineers
  Department of the Army Permit (CWA Section 404; Rivers and Harbors Act Section 10)
- U.S. Coast Guard
  USCG Section 9 Permit Applicability Guidance
- U.S. Environmental Protection Agency
  NPDES Form 2A – Discharge of Municipal Wastewater from New and Existing Publicly Owned Treatment Works)
- U.S. Fish and Wildlife Service
  Section 7 Review

State of Hawaii:

- Department of Business, Economic Development and Tourism, Office of Planning
  Coastal Zone Management Consistency Determination
- Department of Health (DOH)
  Air Pollution Control Permits (Covered Source Permit and/or Noncovered Source Permit)
  Construction Plan Review and Approval
  Noise Variance Permit
  NPDES NOI Form C – Storm Water Discharges Associated with Construction Activities
  NPDES NOI Form F – Discharges Associated with Hydrotesting Waters
  NPDES NOI Form G – Discharges Associated with Construction Activity Dewatering
  Section 401 Water Quality Certificate
- Department of Land and Natural Resources Historic Preservation Division
  Chapter 6E, HRS Historic Preservation Review
- Department of Transportation (DOT)
  Highways – Permit to Perform Work Within State Highways
  Harbors – Work within the Energy Corridor

City and County of Honolulu:

- Board of Water Supply (BWS)
  Water and Water System Requirements
  Construction Plan Review and Approval
- Department of Environmental Services
  EIS Approval
- Department of Planning and Permitting (DPP)
  Building Permit
  Construction Plan Review and Approval
  Development Plan Public Facilities Map Amendment
  Dewatering Permit
  Electrical Permit
  Grading and Erosion Control Plan Review
  Grading, Grubbing, and Stockpiling Permit
  Plumbing Permit
  Shoreline Setback Variance
  Sidewalk/Driveway Work Permit
  Special Management Area Use Permit (Major)

Street Usage Permit

Proposing/Determining Agency:	City and County of Honolulu, Department of Environmental Services
Contact Name, Email, Telephone, Address	Lori Kahikina, lkahikina@honolulu.gov, 808.768.3486, 1000 Uluohia Street, Suite 308, Kapolei, HI 96707
Accepting Authority:	City and County of Honolulu, Department of Environmental Services
Contact Name, Email, Telephone, Address	Lori Kahikina, lkahikina@honolulu.gov, 808.768.3486 1000 Uluohia Street, Suite 308 Kapolei, HI 96707
Consultant:	AECOM, 1001 Bishop St. Suite 1600, Honolulu, HI 96813
Contact Name, Email, Telephone, Address	Matthew Stimpson, Matthew.Stimpson@aecom.com, 808.529.7266 1001 Bishop Street Suite 1600, Honolulu, HI 96813

Status (select one)	**Submittal Requirements**
____ DEA-AFNSI	Submit 1) the proposing agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEA, and 4) a searchable PDF of the DEA; a 30-day comment period follows from the date of publication in the Notice.
____ FEA-FONSI	Submit 1) the proposing agency notice of determination/transmittal letter on agency letterhead, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEA, and 4) a searchable PDF of the FEA; no comment period follows from publication in the Notice.
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____ Act 172-12 EISPN ("Direct to EIS")	Submit 1) the proposing agency notice of determination letter on agency letterhead and 2) this completed OEQC publication form as a Word file; no EA is required and a 30-day comment period follows from the date of publication in the Notice.
____ DEIS	Submit 1) a transmittal letter to the OEQC and to the accepting authority, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the DEIS, 4) a searchable PDF of the DEIS, and 5) a searchable PDF of the distribution list; a 45-day comment period follows from the date of publication in the Notice.
_X_ FEIS	Submit 1) a transmittal letter to the OEQC and to the accepting authority, 2) this completed OEQC publication form as a Word file, 3) a hard copy of the FEIS, 4) a searchable PDF of the FEIS, and 5) a searchable PDF of the distribution list; no comment period follows from publication in the Notice.
____ FEIS Acceptance Determination	The accepting authority simultaneously transmits to both the OEQC and the proposing agency a letter of its determination of acceptance or nonacceptance (pursuant to Section 11-200-23, HAR) of the FEIS; no comment period ensues upon publication in the Notice.
FEIS Statutory Acceptance	Timely statutory acceptance of the FEIS under Section 343-5(c), HRS, is not applicable to agency actions.
____ Supplemental EIS Determination	The accepting authority simultaneously transmits its notice to both the proposing agency and the OEQC that it has reviewed (pursuant to Section 11-200-27, HAR) the previously accepted FEIS and determines that a supplemental EIS is or is not required; no EA is required and no comment period ensues upon publication in the Notice.
____ Withdrawal	Identify the specific document(s) to withdraw and explain in the project summary section.
____ Other	Contact the OEQC if your action is not one of the above items.

Project Summary

The evaluation described in this Final Environmental Impact Statement (FEIS) is focused on the upgrade of the Honouliuli WWTP required to comply with a First Amended Consent Decree. This DEIS for the Honouliuli WWTP is intended to inform the public and various stakeholders of potential impacts the project may have on the environment and has been prepared in accordance with the Hawaii Revised Statutes Chapter 343.

This project proposes to upgrade and expand the existing Honouliuli WWTP to provide secondary treatment and accommodate projected wastewater flows.

Regardless of which treatment alternative is selected, additional improvements at the Honouliuli WWTP are proposed for the following: Central Laboratory, Ocean Team Facilities, Administration Building, Operations Building, Leeward Region Maintenance, Central Shops, Warehouse, truck wash, central supervisory control and data acquisition operations, septage receiving station, odor control, grounds keeping, janitorial service and security, and Honouliuli Water Recycling Facility. This FEIS also addresses the potential siting of new facilities at the Honouliuli WWTP to help consolidate island-wide wastewater system administrative services.

Improvements to the Honouliuli major sewer conveyance system will be the subject of separate, subsequent environmental review documents.

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DEPUTY DIRECTOR

IN REPLY REFER TO
PRO 17-046

March 28, 2017

Scott Glenn, Director
Office of Environmental Quality Control
Department of Health
235 South Beretania, Suite 702
Honolulu, HI 96813

Dear Mr. Glenn:

SUBJECT: Acceptance of the Honouliuli Wastewater Treatment Plant and Support Facilities Final Environmental Impact Statement

The Department of Environmental Services has accepted the Final Environmental Impact Statement (FEIS) for the subject project. The FEIS was prepared pursuant to Chapter 343, Hawaii Revised Statues and Chapter 11-200, Hawaii Administrative Rules. Please publish notice of this FEIS in the April 8, 2017, issue of the Environmental Notice.

Attached are the following items:

1. One (1) hardcopy of the FEIS;
2. One (1) hardcopy of the OEQC publication form;
3. One (1) FEIS distribution list; and
4. One copy of items 1 through 3 sent via electronic mail to oeqc@doh.hawaii.gov

Please do not upload the FEIS to OEQC's website until April 8, 2017. If you have any questions, please call Jack Pobuk, Section Head, CIP Program and Planning, at 768-3464, or email at jpobuk@.honolulu.gov.

Sincerely,

Lori M. K. ~~Kahikina~~, P.E.
Director

AGENCY
PUBLICATION FORM

Project Name: Honouliuli/Waipahu/Pearl City Wastewater Facilities Plan, Honouliuli Wastewater Treatment Plant Secondary Treatment and Support Facilities
Project Short Name: Honouliuli WWTP Fac Plan
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  Shoreline Setback Variance
  Sidewalk/Driveway Work Permit
  Special Management Area Use Permit (Major)

Street Usage Permit

Proposing/Determining Agency:	City and County of Honolulu, Department of Environmental Services
Contact Name, Email, Telephone, Address	Lori Kahikina, lkahikina@honolulu.gov, 808.768.3486, 1000 Uluohia Street, Suite 308, Kapolei, HI 96707
Accepting Authority:	City and County of Honolulu, Department of Environmental Services
Contact Name, Email, Telephone, Address	Lori Kahikina, lkahikina@honolulu.gov, 808.768.3486 1000 Uluohia Street, Suite 308 Kapolei, HI 96707
Consultant:	AECOM, 1001 Bishop St. Suite 1600, Honolulu, HI 96813
Contact Name, Email, Telephone, Address	Matthew Stimpson, Matthew.Stimpson@aecom.com, 808.529.7266 1001 Bishop Street Suite 1600, Honolulu, HI 96813

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Project Summary

The evaluation described in this Final Environmental Impact Statement (FEIS) is focused on the upgrade of the Honouliuli WWTP required to comply with a First Amended Consent Decree. This DEIS for the Honouliuli WWTP is intended to inform the public and various stakeholders of potential impacts the project may have on the environment and has been prepared in accordance with the Hawaii Revised Statutes Chapter 343.

This project proposes to upgrade and expand the existing Honouliuli WWTP to provide secondary treatment and accommodate projected wastewater flows.

Regardless of which treatment alternative is selected, additional improvements at the Honouliuli WWTP are proposed for the following: Central Laboratory, Ocean Team Facilities, Administration Building, Operations Building, Leeward Region Maintenance, Central Shops, Warehouse, truck wash, central supervisory control and data acquisition operations, septage receiving station, odor control, grounds keeping, janitorial service and security, and Honouliuli Water Recycling Facility. This FEIS also addresses the potential siting of new facilities at the Honouliuli WWTP to help consolidate island-wide wastewater system administrative services.

Improvements to the Honouliuli major sewer conveyance system will be the subject of separate, subsequent environmental review documents.

Summary Sheet

Project Name	Honouliuli/Waipahu/Pearl City Wastewater Facilities Plan: Honouliuli Wastewater Treatment Plant Secondary Treatment and Support Facilities
Proposing Agency	City and County of Honolulu (CCH) – Department of Environmental Services (ENV) 1000 Uluohia Street, Suite 308 Kapolei, Hawaii 96707 Lori Kahikina, P.E., Director
Accepting Authority	CCH – ENV 1000 Uluohia Street, Suite 308 Kapolei, Hawaii 96707 Lori Kahikina, P.E., Director
Location	Ewa District, Oahu, Hawaii
Project Area	The project area includes the existing Honouliuli WWTP site and the recently acquired parcel adjacent to the existing WWTP to the north and east (expansion area).
Tax Map Keys	Honouliuli WWTP: 9-1-013:007 and 9-1-069:004 Honouliuli WWTP Expansion Area: 9-1-069:003
Brief Description of the Action	The evaluation described in this Final Environmental Impact Statement (FEIS) is focused on the upgrade of the Honouliuli WWTP required to comply with a First Amended Consent Decree. This FEIS for the Honouliuli WWTP is intended to inform the public and various stakeholders of potential impacts the project may have on the environment and has been prepared in accordance with the Hawaii Revised Statutes Chapter 343. This project proposes to upgrade and expand the existing Honouliuli WWTP to provide secondary treatment and accommodate projected wastewater flows. The project may also result in a future increase in effluent discharged to Mamala Bay via the Barbers Point Deep Ocean Outfall. Regardless of which treatment alternative is selected, additional improvements at the Honouliuli WWTP are proposed for the following: Central Laboratory, Ocean Team Facilities, Administration Building, Operations Building, Leeward Region Maintenance, Central Shops, Warehouse, truck wash, central supervisory control and data acquisition operations, septage receiving station, odor control, grounds keeping, janitorial service and security, and Honouliuli Water Recycling Facility. This FEIS also addresses the potential siting of new facilities at the Honouliuli WWTP to help consolidate island-wide wastewater system administrative services. Improvements to the Honouliuli major sewer conveyance system will be the subject of separate, subsequent environmental review documents.

Significant Beneficial and Adverse Impacts and Proposed Mitigation Measures	<u>Short-Term Impacts:</u> The proposed project would result in some unavoidable short-term impacts, as described below. These potential impacts are generally minor and would be further minimized through the implementation of BMPs. • Soils – Construction activities would result in unavoidable impacts to soils in the project area due to grading and excavation activities and due to the potential for localized contamination of soils from construction activities (i.e., accidental release of construction equipment fluids). Construction methods to preserve the integrity of existing facilities would be implemented and construction equipment would be maintained in good working condition to reduce the potential for accidental spills. In addition, erosion and sedimentation controls would be implemented to reduce impacts to the natural environment. Soil which is not immediately used for backfilling would be stockpiled and covered or otherwise protected to prevent erosion or sedimentation. In addition, temporary seeding and mulching may be used to minimize soil erosion and provide soil stabilization on slopes. • Groundwater – Construction activities could potentially impact groundwater if encountered during construction. Mitigation measures would be implemented during construction activities to preserve the integrity of existing infrastructure and keep construction equipment in good working condition to prevent accidental spills. Also, dewatering may be necessary for construction below the groundwater table, if necessary, and the construction contractor would be required to include provisions for dewatering. Appropriate BMPs, monitoring of groundwater for contaminants and careful site preparation would be utilized to minimize adverse impacts. Proposed designs would comply with stormwater runoff requirements, pursuant to the Clean Water Act. • Wetlands – It is anticipated that an abandoned irrigation ditch located on the project site would need to be filled to construct the various site components in that location. All work would be performed in accordance with Federal, State, and CCH regulatory requirements including, but not limited to the Section 404 of the Clean Water Act, if applicable. The project team would consult with the Army Corps of Engineers, U.S. Fish and Wildlife, DLNR Commission on Water Resource Management, CCH, and other regulatory agencies, as necessary, to determine whether filling the former irrigation ditch is jurisdictional under current regulations. If the ditch is determined to be jurisdictional by one or more agencies, then the project team would work with the appropriate agencies to determine acceptable mitigation options. • Flora – Vegetation would need to be removed within the expansion property area for construction activities. Native Hawaiian plants are recommended for landscaping within the project area, including species such as: ko'oloa'ula, kou, 'ilie'e, and 'a'ali'i to minimize unavoidable impacts to vegetation and trees. • Air Quality - Construction-related air quality impacts would result from site preparation and earth moving activities, the movement of construction vehicles on unpaved areas of the site, emissions from construction equipment, and construction of structures. The construction contractor is responsible for complying with DOH regulations which prohibit visible dust emissions at property boundaries. Although short-term air quality impacts are anticipated to be less than significant, the presence of nearby residences and buildings near the project site suggests that open-air areas and naturally ventilated structures could be impacted by dust in spite of compliance with these regulations. BMPs to control dust emissions would be implemented to minimize visible fugitive dust emissions at the property line. The BMPs would include watering of active work areas,

Significant Beneficial and Adverse Impacts and Proposed Mitigation Measures (Continued)	using wind screens, keeping adjacent paved roads clean, and covering open-bodied trucks. Measures to control construction emissions from equipment and vehicles can also be considered if necessary, such as using newer equipment and reducing on-site truck idling time. In addition, increased vehicular emissions due to disruption of traffic by construction equipment and/or commuting construction personnel can be alleviated by moving construction materials and workers to the site during off-peak traffic hours. • Noise – Construction noise would be unavoidable during the project construction period. Short-term increases in noise levels would result from construction activities, vehicles and equipment. The use of muffled equipment, noise barriers, and restrictions on construction hours, as well as adherence to DOH regulations on noise mitigation, would minimize construction and traffic-related noise. For construction work to be performed at night or on weekends and holidays, a Community Noise Variance permit from the DOH would be required if it exceeds regulatory noise levels. • Traffic – An unavoidable slight increase in entering and exiting proposed project traffic is anticipated in some areas during construction activities. Therefore, roadway improvements, including road widening, are recommended at the affected intersections. • Visual and Aesthetic Resources – During construction activities, the presence of cranes and other heavy construction equipment would alter a portion of the viewshed from nearby buildings within the WWTP site. In addition, the proposed improvements would alter the viewshed of the surrounding area by adding new three-dimensional, man-made features. During construction, fencing surrounding the construction site may be provided as needed to provide a visual screen. Any construction impacts regarding visual aesthetics are expected to be short-term and would cease after construction. <u>Long-Term Impacts:</u> The following unavoidable long-term impacts may result from development of the proposed project • Soils – Following upgrades to the existing WWTP, the potential would still remain for wastewater spills to occur which could result in soil contamination. Soils stability inspections in the vicinity of the foundations of proposed facilities would need to be conducted periodically. • Water Quality – The proposed project will provide wastewater treatment facilities needed to comply with secondary treatment standards. It is also anticipated to have beneficial impacts due to expansion of the WWTP to handle flows from future population increases and development. . • Sludge – There will be an increase in the amount of sludge that is produced, handled, and disposed of due to the upgrade to secondary treatment. • Groundwater – The stormwater detention/infiltration basins proposed at several locations within the project area may have an effect on the local groundwater table. However, these basins would be designed as part of a larger stormwater BMP system and are therefore anticipated to enhance the quality of stormwater recharge to groundwater. In addition, localized effects on groundwater levels may occur due to the potential reduction to local groundwater recharge. • Surface and Coastal Waters – There is a potential for indirect impacts due to additional development allowed by sewered areas, including an increase in wastewater flow to the Honouliuli WWTP and effluent discharged to Mamala Bay.

Significant Beneficial and Adverse Impacts and Proposed Mitigation Measures (Continued)	• Air Quality – The primary air quality concern associated with the proposed project could be potential odor nuisances. The proposed alternatives include odor control for some of the existing facilities and all new facilities. Compliance with all applicable ambient standards, including odor in terms of H_2S concentration levels, would be demonstrated 1) during the final design stage of the project when the air permit is modified for applicable criteria pollutants and 2) after the completion of construction with an ambient monitoring program for odor. There is potential to increase on-site stationary and mobile source emissions due to an increase in the plant operational capacity. However, the possibility of nuisance odor from the Honouliuli WWTP would likely be reduced by the upgrade to the odor control system, which would help minimize nuisance odor downwind of the Honouliuli WWTP. Operation of the plant under future proposed conditions would involve installation of new standby generators to provide expanded emergency power supply, which may cause potential short-term increase in combustion source emissions. However, given their emergency usage purposes, potential air quality impacts would be short in duration and would be unlikely to cause significant air quality impacts. Thus, mitigation measures would unlikely be necessary during the operational period. If a CHP facility is incorporated at the Honouliuli WWTP, it would need to be permitted according to State and Federal air regulations, as operation of the facility has the potential to produce additional emissions over the long term. The potential air emissions from the facility cannot be defined at this time, since the design is currently conceptual, but would be specified in air quality permit applications. • Traffic – An unavoidable slight increase in entering/exiting project traffic is anticipated during peak hours as a result of the proposed project. Road improvements are proposed to minimize long term local impacts to traffic. • Noise – The adverse noise impacts resulting from the proposed activity may include increased vehicular noise due to additional vehicles traveling to and from the facilities, and increased stationary noise resulting from new equipment at the facilities. During the operation of the project, compliance with the DOH property line noise limits for fixed machinery would also be required, and it is expected that the long-term noise impacts associated with the proposed improvements would be minimized by the adherence to the DOH rules regarding noise limits for fixed machinery. Mitigation measures include soundproofing or muffling equipment noise such that noise levels remain below the maximum allowable levels. All CCH wastewater facilities must comply with the noise requirements of the DOH, pursuant to Chapter 46, Title 11, Community Noise Control, HAR. • Energy Consumption – Implementation of the proposed project would increase demand in energy consumption as all alternatives involve operation of new pumps, blowers, and other equipment required to convey and treat wastewater, which would require use of fuel and electricity. There is a potential for energy recovery from digester gas or by utilizing new emerging technology for gasification of sewage sludge. CCH is currently evaluating alternatives to use the digester gas for energy recovery.
Alternatives Considered	Alternatives considered for the WWTP upgrade include the following treatment upgrades: • No Action Alternative • Option 1 – Expand Existing Trickling Filter/Solids Contact (TF/SC) Process to Full Capacity • Option 2 – Replace Existing TF/SC Process with Activated Sludge (AS) to Full Capacity • Option 3 – Add to Existing TF/SC Process with AS to Full Capacity

Unresolved Issues	Project descriptions for every treatment option offer conceptual designs based on available information. It is likely that adjustments will need to be made as the detailed design of the selected option proceeds. As such, the conceptual designs should be regarded as estimates and approximations. The proposed site layout presented in this FEIS is intended to conceptualize the potential for land use at the Honouliuli WWTP site for the ultimate build-out in Year 2050. It is anticipated that further changes to the site layout, support structures, and buildings will occur as part of later detailed design efforts and results which may vary from those documented herein and could require additional environmental review in the future. The Honouliuli Wastewater Basin Odor Control Project is ongoing. The project scope addresses odor and corrosion concerns in both the WWTP and tributary collection system. Design of improvements is anticipated to be completed by mid to late 2016. The required environmental review associated with the Honouliuli WWTP upgrades are included in the FEIS while future improvements outside the WWTP will be the subject of additional environmental review documents to be prepared and submitted when the collection system improvements are better defined. The project assessed in this FEIS only concerns the upgrade and expansion of the Honouliuli WWTP to provide secondary treatment and accommodate projected wastewater flows, as well as addresses the potential relocation of non-process facilities that support island-wide wastewater system functions that are currently located at Sand Island WWTP to the Honouliuli WWTP site. The required environmental review associated with the Honouliuli WWTP upgrades, including estimating the flows that will be conveyed to the WWTP, is included in this FEIS. The improvements to the conveyance system will be the subject of separate environmental review documents to be prepared and submitted when the system improvements are better defined.
Compatibility with Land Use Plans and Policies	State Land Use – The project site is located in the following state land use districts: Urban and Agriculture. The proposed uses are permissible uses in the Urban district but will require a Special Use Permit or Land Use Change for construction on the Agriculture district land. Zoning – Zoning of the site is Restricted Agriculture District (AG-1) and Intensive Industrial District (I-2). The proposed uses are permissible uses in the Industrial zoning but will require a Special Use Permit or Land Use Change for construction on the Agriculture district land. Compatibility with State and Local Land Use Plans – The project alternatives generally conform with the various relevant land use plans, policies and regulatory controls, including, but not limited to, the Hawaii State Plan, Recreation State Functional Plan, Historic Preservation State Functional Plan, State Coastal Zone Management Program, Ocean Recreation Management Plan, and the CCH's General Plan, Primary Urban Center Development Plan, Central Oahu Sustainable Communities Plan, and Ewa Development Plan. Flood Insurance Rate Map – The Project Area is not located within a flood zone.

Required and Potential Permits and Approvals	Required and potential clearances and permits needed from the various Federal, State and CCH agencies include but are not limited to the following: **<u>Federal:</u>** <u>U.S. Army Corps of Engineers</u> Department of the Army Permit (CWA Section 404; Rivers and Harbors Act Section 10) <u>U.S. Environmental Protection Agency:</u> CWA Section 301(h) Review <u>FAA</u> Air Traffic Flight Path Approval **<u>State of Hawaii:</u>** <u>Department of Business, Economic Development and Tourism, Office of Planning</u>: Coastal Zone Management Consistency Determination <u>Department of Health (DOH):</u> Air Pollution Control Permits (Covered Source Permit and/or Noncovered Source Permit) Construction Plan Review and Approval Noise Variance Permit Clean Water Branch (CWB) Individual NPDES Form – Coverage for Discharge of Municipal Wastewater from New and Existing Publicly Owned Treatment Works (Modification) CWB NOI Form – Coverage under the NPDES General Permit for Storm Water Discharges Associated with Construction Activities CWB NOI Form – Coverage under the NPDES General Permit for Discharges Associated with Construction Activity Dewatering (if required) <u>Department of Land and Natural Resources – Commission on Water Resource Management</u> Stream Channel Alteration Permit (SCAP) <u>Land Use Commission</u> Special Use Permit **<u>City and County of Honolulu (CCH):</u>** <u>Board of Water Supply (BWS):</u> Water and Water System Requirements Construction Plan Review and Approval <u>Department of Transportation</u> Street Usage Permit for Construction <u>Department of Environmental Services:</u> EIS Approval Permission to Discharge into CCH storm drain system (required for CWB NPDES stormwater permits) <u>Department of Planning and Permitting (DPP):</u> Building Permit

AECOM Water

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Honouliuli/Waipahu/Pearl City Wastewater Facilities Plan

Environmental Impact Statement

Honouliuli Wastewater Treatment Plant Secondary Treatment and Support Facilities

Environmental Impact Statement–Final
March 2017

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Glossary of Acronyms and Technical Terms

%	Percent
§	Section
°F	Degree Fahrenheit
ADF	Average Daily Flow
Admin	Administration
ALISH	Agricultural Lands of Importance to the State of Hawaii
AS	Activated Sludge
ATA	Austin Tsutsumi & Associates, Inc.
Bldg	Building
BMP	Best Management Practices
BOD	Biochemical Oxygen Demand
BWS	Board of Water Supply, City and County of Honolulu
CAA	Clean Air Act
CBOD	Carbonaceous Biochemical Oxygen Demand
CCD	Census County Divisions
CCH	City and County of Honolulu
CDP	Census-Designated Place
cfm	Cubic Feet per Minute
CFR	Code of Federal Regulations
CHP	Combined Heat and Power
CO	Carbon Monoxide
CSH	Cultural Surveys Hawai'i, Inc.
CSM	Collection System Maintenance
CWB	Clean Water Branch
CZM	Coastal Zone Management
dB	decibel
dBA	Decibel A-weighted filter (a decibel rating commonly used for measuring sound levels)
DBEDT	Hawaii Department of Business, Economic Development, and Tourism
DDC	Department of Design and Construction
DEIS	Draft Environmental Impact Statement
DEM	Department of Emergency Management
DFM	Department of Facility Maintenance
DHHL	Department of Hawaiian Home Lands
DLNR	Department of Land and Natural Resources, State of Hawaii
DNL	Day-Night Average Sound Level (a system that models the average noise levels over a 24-hour period, typically an average day over the course of a year)
DOH	Department of Health, State of Hawaii
DP	Development Plan
DPP	Department of Planning and Permitting
DPW	Department of Public Works
dtpd	dry tons per day
DWM	Department of Wastewater Management
EA	Environmental Assessment
EIS	Environmental Impact Statement
EJ	Environmental Justice
ENV	Department of Environmental Services
EPA	Environmental Protection Agency, United States
ESA	Endangered Species Act
FACD	First Amended Consent Decree
FEA-EISPN	Final Environmental Assessment-Environmental Impact Statement Preparation Notice
FEIS	Final Environmental Impact Statement

FEMA	Federal Emergency Management Agency
FHA	Federal Housing Administration
Final Sewer I/I Plan	Final Sewer Infiltration and Inflow Plan
FIRM	Flood Insurance Rate Map
FOG	Fats, Oils, and Greases
ft	Feet/Foot
FTE	Full Time Equivalent
FPPA	Farmland Protection Policy Act
GAC	Granular Activated Carbon
GBT	Gravity Belt Thickeners
GHG	Greenhouse Gas
GIS	Geographic Information System
H_2S	Hydrogen Sulfide
HAR	Hawaii Administrative Rules
HDoD	State of Hawaii Department of Defense
HECO	Hawaii Electric Company, Inc.
HEPA	Hawaii Environmental Policy Act
HFD	Honolulu Fire Department
HHCTCP	Honolulu High-Capacity Transit Corridor Project
HoLIS	Honolulu Land Information System
Honouliuli Fac Plan	Honouliuli/Waipahu/Pearl City Wastewater Facilities Plan
Honouliuli WWTP	Honouliuli Wastewater Treatment Plant
HPD	Honolulu Police Department
H-POWER	Honolulu Program of Waste Energy Recovery
HRS	Hawaii Revised Statues
HUD	Federal Department of Housing and Urban Development
HWRF	Honouliuli Water Recycling Facility
I/I	Infiltration/Inflow
I/I Study	Sewer Rehabilitation and Infiltration & Inflow Minimization Study, Volumes 1 to 9
IBC	International Building Code
IPS	Influent Pump Station
IWS	Individual Wastewater System
kWh	Kilowatt Hour
LID	Low Impact Development
LOS	Level of Service
LUC	Land Use Commission
LUO	Land Use Ordinance
MBTA	Migratory Bird Treaty Act
MG	Million Gallons
mg/L	Milligram Per Liter
mgd	Million Gallons per Day
mi.	Mile
MSL	Mean Sea Level
mph	mile per hour
NAAQS	National Ambient Air Quality Standards
NH_3	Ammonia
NOI	Notice of Intent
NO_2	Nitrogen Dioxide
NOx	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NRCS	Natural Resource Conservation Service
NTU	Nephelometric Turbidity Unit
NWI	National Wetland Inventory
O&M	Operation and Maintenance
O_3	Ozone
OEQC	Office of Environmental Quality Control

ORMP	Hawai'i Ocean Resources Management Plan
Pb	Lead
$PM_{2.5}$	Particulate Matter (diameter ≤ 2.5 micrometers)
PM_{10}	Particulate Matter (diameter ≤ 10 micrometers)
ppmV	Parts per Million by Volume
PSRP	Process to Significantly Reduce Pathogens
PUC	Primary Urban Center
PV	Photovoltaic
RAS	Return Activated Sludge
ROI	Region of Influence
RSS	Return Secondary Sludge
SC	Solids Contact
SCADA	Supervisory Control and Data Acquisition
SCAP	Stream Channel Alteration Permit
SCP	Sustainable Communities Plan
SCS	Soil Conservation Service
SFAS	Sewer Flow Analysis System
SHPD	State Historic Preservation Division
SO_2	Sulfur Dioxide
SSO	Sanitary Sewer Overflow
State	State of Hawaii
SWD	Side Water Depth
TF	Trickling Filter
TF/SC	Trickling Filter/Solids Contact
TIAR	Traffic Impact Analysis Report
TS	Total Solids
TSS	Total Suspended Solids
UA	Urbanized Area
UFC	Uniform Fire Code
UHWO	University of Hawaii at West Oahu
U.S.	United States
USCB	United States Census Bureau
USDA	United States Department of Agriculture
USFWS	United States Department of the Interior, Forestry and Wildlife Service
UV	Ultraviolet
v/c	volume to capacity
VOC	Volatile Organic Compound
WAS	Waste Activated Sludge
Wastewater Design Standards	Design Standards of the Department of Wastewater Management, Volume 1 (1993) and Design Standards of the Division of Wastewater Management, Volume 2 (1984)
WSS	Waste Secondary Sludge
WTD	Wastewater Treatment and Disposal
wtpd	wet tons per day
WWTP	Wastewater Treatment Plant

Preface

The following notation has been used to depict substantive differences between this document and the Draft Environmental Impact Statement

- Insertions are noted by a double underline
- Deletions are noted with a ~~strike-through~~

In order to maintain legibility, formatting changes (such as revised headers and footers), updates to the table of contents with new page numbers and cross-references, changes to the publication date, revisions to the title page to reflect the fact that the document is a Final EIS, pagination adjustments, and other non-substantive changes are not marked.

Edits/addition/corrections to figures and appendices that could not be depicted by the method described above are listed below.

Change	Item	Description
Revision	Reference	Updated Reference to *Reuse Guidelines* and *Hawaii Administrative Rules, Title 11 Department of Health Chapter 62 Wastewater Systems* (DOH 2016)
Revision	Table 4-1	Updated Sludge Quantities
Revision	Table 4-4	Added clarifying text to the table
Revision	Table 4-5	Replaced table with latest available data
Addition	Table 7-1	Inserted Table addressing HRS 226 Objectives

This Final Environmental Impact Statement (FEIS) was prepared pursuant to Chapter 343, Hawaii Revised Statutes (HRS), and Title 11, Chapter 200, Administrative Rules, State of Hawaii Department of Health (DOH). The City and County of Honolulu (CCH) Department of Environmental Services (ENV) proposes to upgrade the Honouliuli Wastewater Treatment Plant (WWTP) on the island of Oahu to provide full secondary treatment and expand the facility to accommodate future projected wastewater flow. This includes the potential relocation of non-process facilities (including Administrative support, central supervisory control and data acquisition operations, Laboratory, Ocean Team, Central Shops and the Central Warehouse) that support island-wide wastewater system functions that are currently located at Sand Island WWTP to the Honouliuli WWTP site. The upgrade of the Honouliuli WWTP is required by the First Amended Consent Decree (FACD) described in further detail below.

The CCH ENV is currently preparing the Honouliuli/Waipahu/Pearl City Wastewater Facilities Plan, which updates portions of the West Mamala Bay Facilities Plan (2001) for the Honouliuli sewer basin. The Honouliuli sewer basin encompasses the areas from which current wastewater flows into the Honouliuli WWTP including Halawa, Aiea, Pearl City, Waipio, Waikele, Waipahu, Ewa, Kapolei, and Mililani. The United States (U.S.) Navy facilities at Pearl Harbor and Campbell Industrial Park are excluded because their wastewater does not flow to the CCH system.

The 2010 Consent Decree (Civil No. 94–00765 DAE–KSC) between CCH, DOH, and U.S. Environmental Protection Agency (EPA), now referred to as the FACD, requires CCH to meet certain requirements with respect to its wastewater collection system and WWTPs. In the FACD the CCH agreed to implement measures in its collection system that include the following: repair and replacement of sewers, force mains, and wastewater pump stations; development of condition assessments and spill contingency plans for force mains; development of condition assessments and a systematic cleaning program for gravity mains; and development of a control program for the discharge of grease. In addition, the CCH agreed to complete improvements to the Honouliuli and Sand Island WWTPs. The Honouliuli WWTP must be upgraded to fully meet secondary treatment standards by June 1, 2024. The Sand Island WWTP (which is the subject of a separate EIS) must be upgraded to meet secondary treatment standards by December 31, 2035, with the possibility of extending the deadline to December 31, 2038. The FACD provides for interim effluent limits that both plants must meet until they achieve full secondary treatment.

The CCH ENV, the proposing agency, has determined that the proposed alternative actions for the Honouliuli WWTP require the preparation of an Environmental Impact Statement. The Final Environmental Assessment-Environmental Impact Statement Preparation Notice (FEA-EISPN) submitted for this project and published in *The Environmental Notice* in July 2010 examined potential impacts associated with proposed upgrades to and/or expansion of the Honouliuli major sewer conveyance system in addition to the Honouliuli WWTP itself. The FEA-EISPN predates the issuance of the FACD described above. Since the FEA-EISPN submittal, the focus of the Honouliuli Fac Plan has shifted to the Honouliuli WWTP improvements necessary to comply with the FACD and meet the June 1, 2024 upgrade deadline. Meanwhile, the timeline for planning and engineering efforts for the conveyance system improvements required to accommodate future wastewater flows associated with projected growth in the sewer basin is independent of the June 1, 2024 upgrade deadline, and the recommendations for the conveyance system are still under consideration.

Therefore, this FEIS only concerns the upgrade and expansion of the Honouliuli WWTP to provide secondary treatment and accommodate projected wastewater flows, as well as addresses the potential location of non-process facilities to accommodate future needs that will arise from upgrading Honouliuli and Sand Island WWTPs to secondary treatment, and other treatment and collection system support facilities improvements. The improvements to the conveyance system and other FACD requirements will be the subject of separate Hawaii Environmental Policy Act (HEPA) environmental review documents to be prepared and submitted when the system improvements are better defined. The CCH ENV communicated this HEPA review approach to the Office of Environmental Quality Control (OEQC) and received OEQC's concurrence (OEQC 2013).

Several alternatives (herein referred to as options) were considered for secondary treatment upgrades for the Honouliuli WWTP, including:

- Option 1 (includes Sub-options 1A and 1B) – Expand Existing Trickling Filter/Solids Contact (TF/SC) Process to Full Capacity
- Option 2 – Replace Existing TF/SC Process with Activated Sludge (AS) to Full Capacity
- Option 3 (includes Sub-options 3A and 3B) – Add to Existing TF/SC Process with AS to Full Capacity

A "No Action" alternative was also assessed. The proposed upgrades are sized for a projected 2050 design average daily flow (ADF) of 45 mgd. Following an evaluation of each option/sub-option, Option 2 was selected as the preferred alternative, as it meets project needs and criteria and would have the smallest footprint and lowest cost. <u>A list of potential projects covered by this FEIS is provided below.</u>

- <u>New Ingress and Egress Locations</u>
- <u>New Perimeter Fencing</u>
- <u>Bike Path/Pedestrian Walkways</u>
- <u>Modified Septage Receiving Station</u>
- <u>Influent Screens</u>
- <u>Influent Pump Station</u>
- <u>Influent Pump Station/Headworks Odor Control</u>
- <u>Plant Wide/Centralized Odor Control System</u>
- <u>Grit/Preaeration Process Buildings</u>
- <u>Aerated Grit Chambers</u>
- <u>Preaeration Tanks</u>
- <u>Blower Building</u>
- <u>Emergency Generator/Power Buildings</u>
- <u>Rehabilitation of Locker Building and other Support Buildings</u>
- <u>Grit/Primary Electrical Building</u>

- Modified Return Flow Pump Station
- Biosolids Dryers
- Upgraded Dewatering Building (Solids)
- Thermal Drying Building
- Biosolids Handling Building
- Sludge Blend Tanks No 5-8
- Secondary Sludge Gravity Belt Thickeners
- Primary Sludge Pump Station NO. 1
- Primary Clarifiers NO. 1 -4
- Primary Sludge Pump Station No. 2
- Anaerobic Digesters NO. 1-5
- High Flow Diversion Structure
- Primary Effluent Metering
- Wet Weather Storage Basins
- Shallow Storm Water Infiltration Basins
- Aeration Tanks NO. 1-4
- Flow Diversion Structure to Secondary Clarifiers
- Secondary Clarifiers NO. 1-8
- Digester Control Building NO. 2
- Anaerobic Digesters NO. 4-5
- Cogeneration Facilities
- Sludge and FOG Receiving Station
- Final Effluent Metering Station
- UV Disinfection
- Final Effluent Channel
- Operations Support Building
- Covered Parking
- Central Shops Building
- Warehouse Building
- Maintenance Building
- Main Electrical Building
- Utility (HECO) Electrical Substation
- Administration Building
- Laboratory Building
- Ocean Team Building
- Collection System Maintenance Dewatering Facility
- Collection System Maintenance Truck Wash
- Dried Solids Storage, Truck Load Out and Emergency Storage
- Sludge Receiving Station
- Cake Receiving Facility Odor Control System

The DEIS was submitted to the OEQC for publication in *The Environmental Notice* on May 8, 2016 and will bewas available to the public in addition to various Federal, State and CCH agencies. This FEIS has been prepared to assess the overall environmental impacts of the recommended alternative. This FEIS has been prepared in compliance with HRS Chapter 343. As part of the environmental process, there was a 45-day review and comment period and informational meetings after the publication of the DEIS. This FEIS was prepared after the comment period.

During preparation of the FEA-EISPN, various stakeholders and residents were consulted and notified of the proposed upgrades/expansion of the Honouliuli major conveyance system and Honouliuli WWTP from meetings and pre-assessment letters (see Appendix H for a summary of responses to comments and comment letters). Following the submittal of the DEIS, additional meetings were held to answer questions or comments the public had on the DEIS.

Summary Sheet

Project Name	Honouliuli/Waipahu/Pearl City Wastewater Facilities Plan: Honouliuli Wastewater Treatment Plant Secondary Treatment and Facilities
Proposing Agency	City and County of Honolulu (CCH) – Department of Environmental Services (ENV) 1000 Uluohia Street, Suite 308 Kapolei, Hawaii 96707 Lori Kahikina, P.E., Director
Accepting Authority	CCH – ENV 1000 Uluohia Street, Suite 308 Kapolei, Hawaii 96707 Lori Kahikina, P.E., Director
Location	Ewa District, Oahu, Hawaii
Project Area	The project area includes the existing Honouliuli WWTP site and the recently acquired parcel adjacent to the existing WWTP to the north and east (expansion area).
Tax Map Keys	Honouliuli WWTP: 9-1-013:007 and 9-1-069:004 Honouliuli WWTP Expansion Area: 9-1-069:003
Brief Description of the Action	The evaluation described in this Final Environmental Impact Statement (FEIS) is focused on the upgrade of the Honouliuli WWTP required to comply with a First Amended Consent Decree. This FEIS for the Honouliuli WWTP is intended to inform the public and various stakeholders of potential impacts the project may have on the environment and has been prepared in accordance with the Hawaii Revised Statutes Chapter 343. This project proposes to upgrade and expand the existing Honouliuli WWTP to provide secondary treatment and accommodate projected wastewater flows. The project may also result in a future increase in effluent discharged to Mamala Bay via the Barbers Point Deep Ocean Outfall. Regardless of which treatment alternative is selected, additional improvements at the Honouliuli WWTP are proposed for the following: Central Laboratory, Ocean Team Facilities, Administration Building, Operations Building, Leeward Region Maintenance, Central Shops, Warehouse, truck wash, central supervisory control and data acquisition operations, septage receiving station, odor control, grounds keeping, janitorial service and security, and Honouliuli Water Recycling Facility. This FEIS also addresses the potential siting of new facilities at the Honouliuli WWTP to help consolidate island-wide wastewater system administrative services. Improvements to the Honouliuli major sewer conveyance system will be the subject of separate, subsequent environmental review documents.

Significant Beneficial and Adverse Impacts and Proposed Mitigation Measures	Short-Term Impacts: The proposed project would result in some unavoidable short-term impacts, as described below. These potential impacts are generally minor and would be further minimized through the implementation of BMPs. • Soils – Construction activities would result in unavoidable impacts to soils in the project area due to grading and excavation activities and due to the potential for localized contamination of soils from construction activities (i.e., accidental release of construction equipment fluids). Construction methods to preserve the integrity of existing facilities would be implemented and construction equipment would be maintained in good working condition to reduce the potential for accidental spills. In addition, erosion and sedimentation controls would be implemented to reduce impacts to the natural environment. Soil which is not immediately used for backfilling would be stockpiled and covered or otherwise protected to prevent erosion or sedimentation. In addition, temporary seeding and mulching may be used to minimize soil erosion and provide soil stabilization on slopes. • Groundwater – Construction activities could potentially impact groundwater if encountered during construction. Mitigation measures would be implemented during construction activities to preserve the integrity of existing infrastructure and keep construction equipment in good working condition to prevent accidental spills. Also, dewatering may be necessary for construction below the groundwater table, if necessary, and the construction contractor would be required to include provisions for dewatering. Appropriate BMPs, monitoring of groundwater for contaminants and careful site preparation would be utilized to minimize adverse impacts. Proposed designs would comply with stormwater runoff requirements, pursuant to the Clean Water Act. • Wetlands – It is anticipated that an abandoned irrigation ditch located on the project site would need to be filled to construct the various site components in that location. All work would be performed in accordance with Federal, State, and CCH regulatory requirements including, but not limited to the Section 404 of the Clean Water Act, if applicable. The project team would consult with the Army Corps of Engineers, U.S. Fish and Wildlife, DLNR Commission on Water Resource Management, CCH, and other regulatory agencies, as necessary, to determine whether filling the former irrigation ditch is jurisdictional under current regulations. If the ditch is determined to be jurisdictional by one or more agencies, then the project team would work with the appropriate agencies to determine acceptable mitigation options. • Flora – Vegetation would need to be removed within the expansion property area for construction activities. Native Hawaiian plants are recommended for landscaping within the project area, including species such as: ko'oloa'ula, kou, 'ilie'e, and 'a'ali'i to minimize unavoidable impacts to vegetation and trees. • Air Quality - Construction-related air quality impacts would result from site preparation and earth moving activities, the movement of construction vehicles on unpaved areas of the site, emissions from construction equipment, and construction of structures. The construction contractor is responsible for complying with DOH regulations which prohibit visible dust emissions at property boundaries. Although short-term air quality impacts are anticipated to be less than significant, the presence of nearby residences and buildings near the project site suggests that open-air areas and naturally ventilated structures could be impacted by dust in spite of compliance with these regulations. BMPs to control dust emissions would be implemented to minimize visible fugitive dust emissions at the property line. The BMPs would include watering of active work areas,

Significant Beneficial and Adverse Impacts and Proposed Mitigation Measures (Continued)	using wind screens, keeping adjacent paved roads clean, and covering open-bodied trucks. Measures to control construction emissions from equipment and vehicles can also be considered if necessary, such as using newer equipment and reducing on-site truck idling time. <u>In addition, increased vehicular emissions due to disruption of traffic by construction equipment and/or commuting construction personnel can be alleviated by moving construction materials and workers to the site during off-peak traffic hours</u>. • Noise – Construction noise would be unavoidable during the project construction period. Short-term increases in noise levels would result from construction activities, vehicles and equipment. The use of muffled equipment, noise barriers, and restrictions on construction hours, as well as adherence to DOH regulations on noise mitigation, would minimize construction and traffic-related noise. For construction work to be performed at night or on weekends and holidays, a Community Noise Variance permit from the DOH would be required if it exceeds regulatory noise levels. • Traffic – An unavoidable slight increase in entering and exiting proposed project traffic is anticipated in some areas during construction activities. Therefore, roadway improvements, including road widening, are recommended at the affected intersections. • Visual and Aesthetic Resources – During construction activities, the presence of cranes and other heavy construction equipment would alter a portion of the viewshed from nearby buildings within the WWTP site. In addition, the proposed improvements would alter the viewshed of the surrounding area by adding new three-dimensional, man-made features. During construction, fencing surrounding the construction site may be provided as needed to provide a visual screen. Any construction impacts regarding visual aesthetics are expected to be short-term and would cease after construction. <u>Long-Term Impacts:</u> The following unavoidable long-term impacts may result from development of the proposed project . • Soils – Following upgrades to the existing WWTP, the potential would still remain for wastewater spills to occur which could result in soil contamination. Soils stability inspections in the vicinity of the foundations of proposed facilities would need to be conducted periodically. • Water Quality – The proposed project will provide wastewater treatment facilities needed to comply with secondary treatment standards. It is also anticipated to have beneficial impacts due to expansion of the WWTP to handle flows from future population increases and development. . • Sludge – There will be an increase in the amount of sludge that is produced, handled, and disposed of due to the upgrade to secondary treatment. • Groundwater – The stormwater detention/infiltration basins proposed at several locations within the project area may have an effect on the local groundwater table. However, these basins would be designed as part of a larger stormwater BMP system and are therefore anticipated to enhance the quality of stormwater recharge to groundwater. In addition, localized effects on groundwater levels may occur due to the potential reduction to local groundwater recharge. • Surface and Coastal Waters – There is a potential for indirect impacts due to additional development allowed by sewered areas, including an increase in wastewater flow to the Honouliuli WWTP and effluent discharged to Mamala Bay.

Significant Beneficial and Adverse Impacts and Proposed Mitigation Measures (Continued)	• Air Quality – The primary air quality concern associated with the proposed project could be potential odor nuisances. The proposed alternatives include odor control for some of the existing facilities and all new facilities. Compliance with all applicable ambient standards, including odor in terms of H_2S concentration levels, would be demonstrated 1) during the final design stage of the project when the air permit is modified for applicable criteria pollutants and 2) after the completion of construction with an ambient monitoring program for odor. There is potential to increase on-site stationary and mobile source emissions due to an increase in the plant operational capacity. However, the possibility of nuisance odor from the Honouliuli WWTP would likely be reduced by the upgrade to the odor control system, which would help minimize nuisance odor downwind of the Honouliuli WWTP. Operation of the plant under future proposed conditions would involve installation of new standby generators to provide expanded emergency power supply, which may cause potential short-term increase in combustion source emissions. However, given their emergency usage purposes, potential air quality impacts would be short in duration and would be unlikely to cause significant air quality impacts. Thus, mitigation measures would unlikely be necessary during the operational period. If a CHP facility is incorporated at the Honouliuli WWTP, it would need to be permitted according to State and Federal air regulations, as operation of the facility has the potential to produce additional emissions over the long term. The potential air emissions from the facility cannot be defined at this time, since the design is currently conceptual, but would be specified in air quality permit applications. • Traffic – An unavoidable slight increase in entering/exiting project traffic is anticipated during peak hours as a result of the proposed project. Road improvements are proposed to minimize long term local impacts to traffic. • Noise – The adverse noise impacts resulting from the proposed activity may include increased vehicular noise due to additional vehicles traveling to and from the facilities, and increased stationary noise resulting from new equipment at the facilities. During the operation of the project, compliance with the DOH property line noise limits for fixed machinery would also be required, and it is expected that the long-term noise impacts associated with the proposed improvements would be minimized by the adherence to the DOH rules regarding noise limits for fixed machinery. Mitigation measures include soundproofing or muffling equipment noise such that noise levels remain below the maximum allowable levels. All CCH wastewater facilities must comply with the noise requirements of the DOH, pursuant to Chapter 46, Title 11, Community Noise Control, HAR. • Energy Consumption – Implementation of the proposed project would increase demand in energy consumption as all alternatives involve operation of new pumps, blowers, and other equipment required to convey and treat wastewater, which would require use of fuel and electricity. There is a potential for energy recovery from digester gas or by utilizing new emerging technology for gasification of sewage sludge. CCH is currently evaluating alternatives to use the digester gas for energy recovery.
Alternatives Considered	Alternatives considered for the WWTP upgrade include the following treatment upgrades: • No Action Alternative • Option 1 – Expand Existing Trickling Filter/Solids Contact (TF/SC) Process to Full Capacity • Option 2 – Replace Existing TF/SC Process with Activated Sludge (AS) to Full Capacity • Option 3 – Add to Existing TF/SC Process with AS to Full Capacity

Unresolved Issues	Project descriptions for every treatment option offer conceptual designs based on available information. It is likely that adjustments will need to be made as the detailed design of the selected option proceeds. As such, the conceptual designs should be regarded as estimates and approximations. The proposed site layout presented in this FEIS is intended to conceptualize the potential for land use at the Honouliuli WWTP site for the ultimate build-out in Year 2050. It is anticipated that further changes to the site layout, support structures, and buildings will occur as part of later detailed design efforts and results which may vary from those documented herein and could require additional environmental review in the future. The Honouliuli Wastewater Basin Odor Control Project is ongoing. The project scope addresses odor and corrosion concerns in both the WWTP and tributary collection system. Design of improvements is anticipated to be completed by mid to late 2016. The required environmental review associated with the Honouliuli WWTP upgrades are included in the FEIS while future improvements outside the WWTP will be the subject of additional environmental review documents to be prepared and submitted when the collection system improvements are better defined. ~~will be conducted and included in documentation for proposed improvements which are not included in this DEIS.~~ The project assessed in this FEIS only concerns the upgrade and expansion of the Honouliuli WWTP to provide secondary treatment and accommodate projected wastewater flows, as well as addresses the potential relocation of non-process facilities that support island-wide wastewater system functions that are currently located at Sand Island WWTP to the Honouliuli WWTP site. The required environmental review associated with the Honouliuli WWTP upgrades, including estimating the flows that will be conveyed to the WWTP, is included in this FEIS. The improvements to the conveyance system will be the subject of separate environmental review documents to be prepared and submitted when the system improvements are better defined.
Compatibility with Land Use Plans and Policies	State Land Use – The project site is located in the following state land use districts: Urban and Agriculture. The proposed uses are permissible uses in these districts. Zoning – Zoning of the site is Restricted Agriculture District (AG-1) and Intensive Industrial District (I-2). The proposed uses are permissible uses in the Industrial zoning but will require a Special Use Permit or Land Use Change for construction on the Agriculture district land. Compatibility with State and Local Land Use Plans – The project alternatives generally conform with the various relevant land use plans, policies and regulatory controls, including, but not limited to, the Hawaii State Plan, Recreation State Functional Plan, Historic Preservation State Functional Plan, State Coastal Zone Management Program, Ocean Recreation Management Plan, and the CCH's General Plan, Primary Urban Center Development Plan, Central Oahu Sustainable Communities Plan, and Ewa Development Plan. Flood Insurance Rate Map – The Project Area is not located within a flood zone.

Required and Potential Permits and Approvals	Required and potential clearances and permits needed from the various Federal, State and CCH agencies include but are not limited to the following: **Federal:** U.S. Army Corps of Engineers Department of the Army Permit (CWA Section 404; Rivers and Harbors Act Section 10) U.S. Environmental Protection Agency: CWA Section 301(h) Review FAA Air Traffic Flight Path Approval **State of Hawaii:** Department of Business, Economic Development and Tourism, Office of Planning: Coastal Zone Management Consistency Determination Department of Health (DOH): Air Pollution Control Permits (Covered Source Permit and/or Noncovered Source Permit) Construction Plan Review and Approval Noise Variance Permit Clean Water Branch (CWB) Individual NPDES Form – Coverage for Discharge of Municipal Wastewater from New and Existing Publicly Owned Treatment Works (Modification) CWB NOI Form – Coverage under the NPDES General Permit for Storm Water Discharges Associated with Construction Activities CWB NOI Form – Coverage under the NPDES General Permit for Discharges Associated with Construction Activity Dewatering (if required) Department of Land and Natural Resources – Commission on Water Resource Management Stream Channel Alteration Permit (SCAP) Land Use Commission Special Use Permit **City and County of Honolulu (CCH):** Board of Water Supply (BWS): Water and Water System Requirements Construction Plan Review and Approval Department of Transportation Street Usage Permit for Construction Department of Environmental Services: EIS Approval Permission to Discharge into CCH storm drain system (required for CWB NPDES stormwater permits) Department of Planning and Permitting (DPP): Building Permit Conditional Use Permit Construction Plan Review and Approval Public Infrastructure Map Revision Dewatering Permit Electrical Permit Flood Certification Grading and Erosion Control Plan Review Grading, Grubbing, and Stockpiling Permit Height Variance Plumbing Permit

	Shoreline Setback Variance Sidewalk/Driveway Work Permit Special Use Permit Trenching Permit **Other:** Utility Companies Utility Service Requirements Permit Regarding Work on Utility Lines OR&P RR Crossing Traffic Control Plans

1 INTRODUCTION

The City and County of Honolulu (CCH) Department of Environmental Services (ENV) is conducting a planning and engineering study for improvements to the Honouliuli sewer basin wastewater conveyance and treatment facilities required to meet service demands for the year 2035 and beyond. The CCH ENV is undertaking the study to confirm that public investment in essential wastewater infrastructure is directed toward system improvements that provide the greatest benefit to current and future users.

The Honouliuli/Waipahu/Pearl City Wastewater Facilities Plan (Honouliuli Fac Plan) updates the existing West Mamala Bay Facilities Plan (2001). The updating process involves reviewing and evaluating the alternatives and recommendation of the West Mamala Bay Facilities Plan to identify alternatives for the current Honouliuli Fac Plan.

The 2010 Consent Decree (Civil No. 94–00765 DAE–KSC) between CCH, DOH, and U.S. Environmental Protection Agency (EPA), now referred to as the First Amended Consent Decree (FACD), requires CCH to update its wastewater collection system and WWTPs. In the FACD, the CCH agreed to implement measures in its collection system that include the following: repair and replacement of sewers, force mains, and wastewater pump stations; development of condition assessments and spill contingency plans for force mains; development of condition assessments and a systematic cleaning program for gravity mains; and development of a control program for the discharge of grease. In addition, the CCH agreed to complete improvements to the Honouliuli and Sand Island WWTPs. One of the key FACD requirements is that the Honouliuli WWTP be upgraded to a full secondary treatment facility by 2024. Therefore, the Honouliuli Fac Plan evaluates and recommends the necessary improvements to upgrade the Honouliuli WWTP to full secondary treatment to comply with the FACD.

The CCH ENV, the proposing agency, has determined that the proposed alternative actions require the preparation of an Environmental Impact Statement (EIS). The Final Environmental Assessment-Environmental Impact Statement Preparation Notice (FEA-EISPN) submitted for this project and published in *The Environmental Notice* in July 2010 examined potential impacts associated with proposed upgrades to and/or expansion of the Honouliuli major sewer conveyance system in addition to the Honouliuli WWTP itself. The FEA-EISPN predates the issuance of the FACD referenced above. Since the FEA-EISPN submittal, the focus of the Honouliuli Fac Plan has shifted to the Honouliuli WWTP improvements necessary to comply with the FACD and meet the June 1, 2024 upgrade deadline. Meanwhile, the timeline for planning and engineering efforts for the conveyance system improvements required to accommodate future wastewater flows associated with projected growth in the sewer basin is independent of the June 1, 2024 upgrade deadline, and the recommendations for the conveyance system are still under consideration.

Therefore, the project assessed in this Final Environmental Impact Statement (FEIS) only concerns the upgrade and expansion of the Honouliuli WWTP to provide secondary treatment and accommodate projected wastewater flows, as well as addresses the potential relocation of non-process facilities (including Administrative support, Central Supervisory Control and Data Acquisition [SCADA] operations, Laboratory, Ocean Team, Central Shops and the Central Warehouse) that support island-wide wastewater system functions that are currently located at Sand Island WWTP to the Honouliuli WWTP site. The improvements to the conveyance system and other FACD requirements will be the subject of separate HEPA environmental review documents to be prepared and submitted when the system improvements are better defined. The CCH ENV communicated this HEPA review approach to OEQC and received OEQC's concurrence (OEQC 2013).

1.1 Background

The Honouliuli WWTP was originally built in 1978 as a primary plant and became operational in 1984. As of December 16, 1993, the Honouliuli WWTP operated under NPDES No. HI0020877. The CCH applied to the U.S. Environmental Protection Agency (EPA) to renew the permit before it expired on June 5, 1996. In 2009, the EPA denied reissuing the permit. The Honouliuli WWTP operated under an administrative extension of the permit after it expired in 1996. The NPDES permit was then reissued by the DOH for the Honouliuli WWTP, which became effective March 30, 2014.

The WWTP provides primary treatment to all flow received. In 2013, the average daily flow (ADF) was approximately 26.1 million gallons per day (MGD). Planning for the existing secondary treatment system began in 1990 as a first step toward reclamation of effluent for reuse through irrigation. The existing secondary treatment system was constructed in 1996, in preparation for future water reclamation purposes. Approximately 13 mgd (or about 50 percent [%] of the ADF) receives secondary treatment. The Honouliuli Water Recycling Facility (HWRF) was constructed in 2000 specifically for water reclamation purposes. It is now owned by the Board of Water Supply (BWS) and operated by Veolia. The Facility has a capacity of 12 MGD and produces two grades of recycled water, R1 Water is used for irrigation and Reverse Osmosis (RO) is used for industrial purposes. The facility is currently capable of supplying 10 MGD of R1 water and 2 MGD of RO water.

ADF includes the flow generated by the population in the service area, including residential, commercial, and industrial uses. In addition to these flows, ADF includes water that may enter the system through infiltration, where pipes and mains lie below the water table during normal dry weather. The Honouliuli WWTP serves one of the fastest growing areas in the state; therefore, wastewater flow to the WWTP is projected to increase based on the high potential for population growth, as discussed further in Section 3, and improvements are required to the WWTP to accommodate this additional flow.

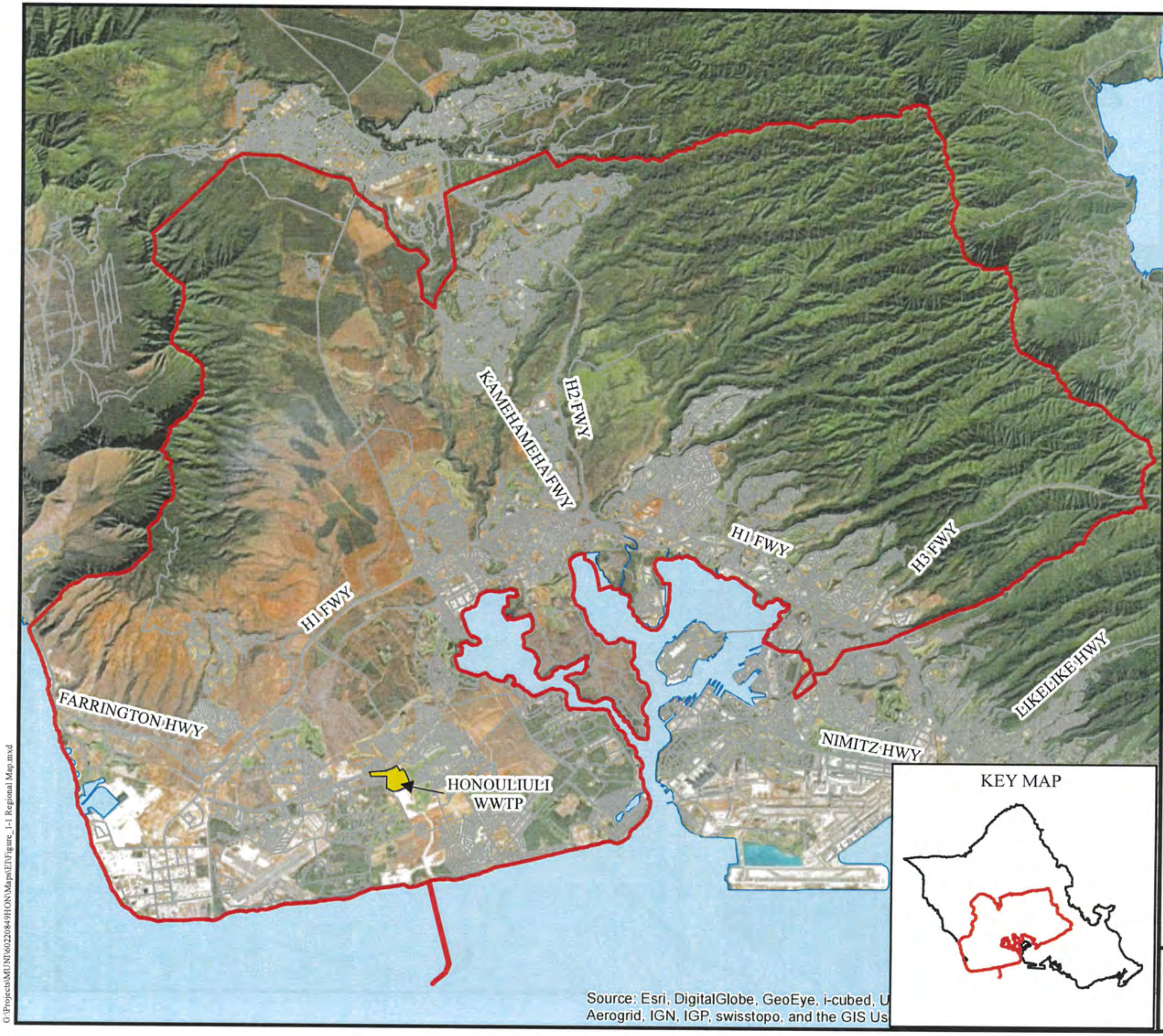
As previously noted, in 2010 the CCH, State, and EPA entered into an agreement currently referred to as the FACD (Civil No. 94-00765 DAE-KSC) that requires the CCH to meet certain established milestones for improving its wastewater collection system and WWTPs. The FACD requires the Honouliuli WWTP to be upgraded to a full secondary treatment facility by 2024. The Honouliuli Fac Plan recommends the necessary improvements to upgrade the Honouliuli WWTP to full secondary treatment to comply with the FACD.

In 2011, CCH acquired 48.4 acres of land abutting the north and east boundaries of the existing Honouliuli WWTP (herein referred to as the expansion property) to provide sufficient space for treatment facilities to comply with the FACD mandates. The Honouliuli WWTP site area, including the expansion property, is currently 100.5 acres.

A detailed description of the existing Honouliuli WWTP is included in Section 1.3 of this FEIS. Alternatives considered for upgrading the Honouliuli WWTP (both hydraulic expansion and expansion to full secondary treatment) and the potential relocation of non-process facilities to the Honouliuli WWTP site are the focus of this FEIS.

1.2 Project Location

The study area includes the existing Honouliuli WWTP located at 91-1000 Geiger Road and expansion property to the north and east, adjacent to the Coral Creek Golf Course. The Honouliuli WWTP project site is identified on Figures 1-1 and 1-2.



City and County of Honolulu

HONOULIULI/ WAIPAHU/ PEARL CITY WASTEWATER FACILITIES PLAN

Legend

Honouliuli Sewershed

Street

0 12,000
Feet
1 inch = 12,000 feet

FIGURE 1-1

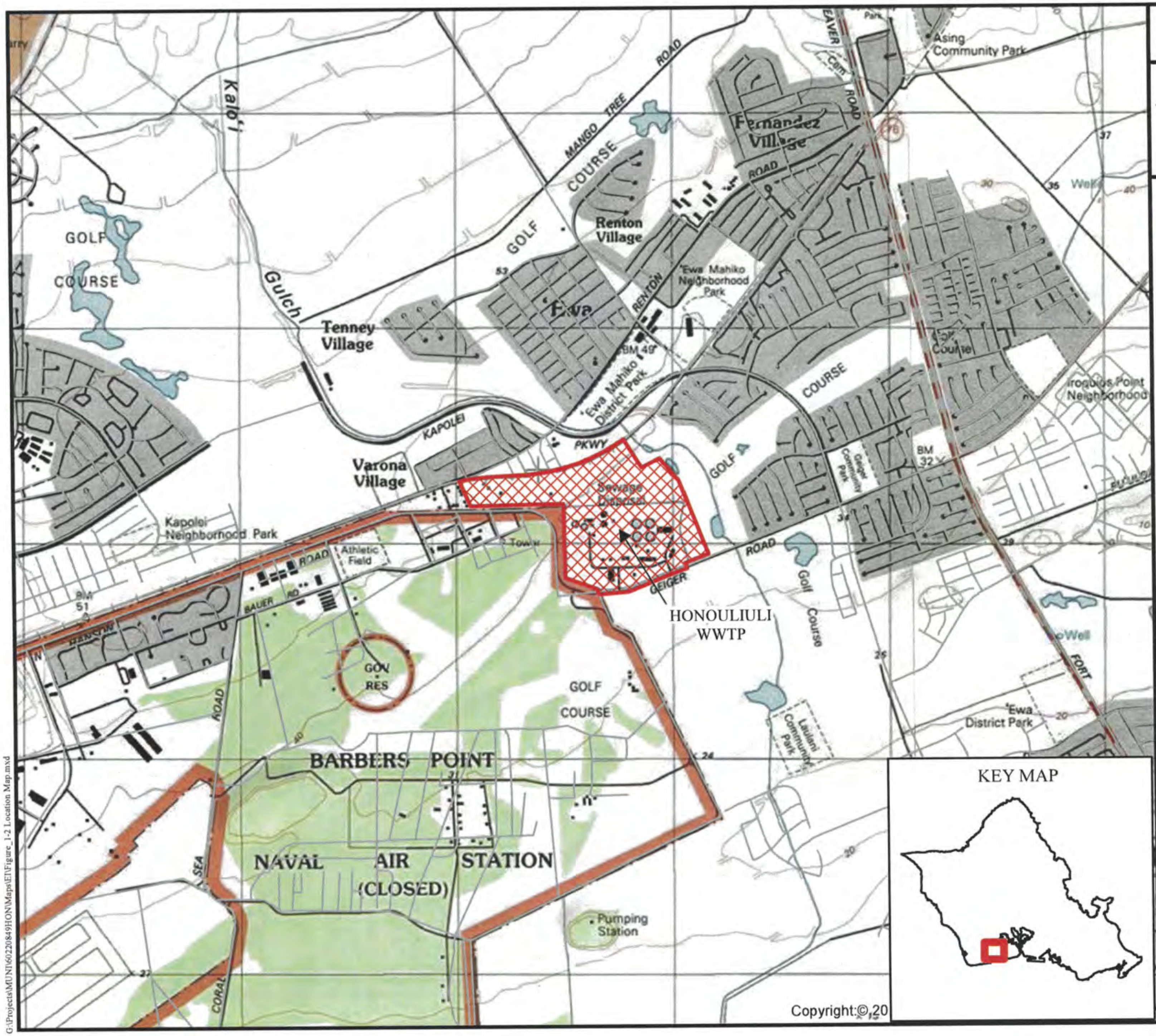
REGIONAL MAP

December 2014

AECOM

1001 BISHOP ST, STE 1600
HONOLULU, HAWAII 96813

G:\Projects\MUNI\60220849HON\Maps\EI\Figure_1-1 Regional Map.mxd



City and County of Honolulu

HONOULIULI/ WAIPAHU/ PEARL CITY WASTEWATER FACILITIES PLAN

Legend

Honouliuli WWTP

— Street

0 — 2,000 Feet

1 inch = 2,000 feet

FIGURE 1-2

PROJECT LOCATION MAP

December 2014

AECOM

1001 BISHOP ST, STE 1600
HONOLULU, HAWAII 96813

G:\Projects\MUNI\60220849HON\Maps\EI\Figure_1-2 Location Map.mxd

1.3 Project Need

This project is being undertaken to address the following needs:

- Protect public health and safety through the development and maintenance of municipal wastewater treatment facilities
- Meet secondary treatment requirements set by EPA under the Clean Water Act
- Accommodate projected wastewater flows from the Honouliuli sewer basin through 2050
- Relocate non-process facilities to accommodate future needs that will arise from upgrading Honouliuli and Sand Island WWTPs to secondary treatment
- Implement certain requirements of federal and state permits and mandates

This project focuses on providing hydraulic and treatment upgrades to the Honouliuli WWTP in order to comply with the FACD. The objective of this project is to comply with regulatory mandates from the State of Hawaii Department of Health (DOH) and EPA, and to provide a basis to meet future wastewater management needs.

1.3.1 Regulatory Mandates

In accordance with the Hawaii Revised Statutes (HRS) Chapter 343, an Environmental Assessment (EA) and/or EIS is required since the project involves the following actions:

- Propose the use of County and State lands and County funds.
- Propose any wastewater facility, except an individual wastewater system or a wastewater facility serving fewer than 50 single-family dwellings or the equivalent.
- Propose any waste-to-energy facility.

The proposing and accepting agency for this project is the CCH ENV. The DEIS was submitted to the Office of Environmental Quality Control for publication in *The Environmental Notice* on May 8, 2016 and was available to various Federal, State, and CCH agencies. The intent of the DEIS was to notify interested parties of the project of the potential impacts and mitigation measures and to solicit comments from stakeholders including government agencies, community organizations, private businesses, and the general public.

Following the DEIS, this FEIS has been prepared to assess the overall environmental impacts of the recommended alternative, including any written comments received during the public review of the DEIS. The DEIS and the FEIS have been prepared in compliance with the HRS Chapter 343. As part of the environmental process, there was a 45-day review and comment period and informational meetings after the DEIS was published.

2 EXISTING FACILITIES

The Honouliuli WWTP was originally built in 1978 as a primary plant and became operational in 1984. The rated design capacity is 38 mgd with one unit on standby and 51 mgd with all units in service, according to the Honouliuli WWTP Facility-Wide Operations Manual (Fukunaga and Associates, Inc. and HDR Engineering, Inc. 2011) herein referred to as the O&M Manual. The WWTP provides primary treatment to all flow received. Approximately 13 mgd undergoes further secondary treatment. A portion of the secondary effluent is treated for water reuse at the CCH Board of Water Supply (BWS) HWRF. The solids stream has a rated design capacity of solids generated from 42 mgd of primary treatment and 26 mgd of secondary treatment according to the O&M Manual. The existing Honouliuli WWTP is shown on Figure 2-1.

This section describes the major components of the Honouliuli WWTP system including: collection system, liquid treatment system, effluent disposal system, solids handling system, odor control system, and electrical.

2.1 Collection System

The Honouliuli sewer basin is the second largest on Oahu, serving a population of over 300,000. It includes 17 CCH-operated wastewater pump stations excluding the Honouliuli Influent Pump Station (IPS). The Honouliuli WWTP provides primary treatment to all flow, and secondary treatment to a portion of the total flow received. Approximately half of the influent is further treated to secondary treatment.

The Honouliuli gravity collection system is mainly made up of approximately 83% vitrified clay pipes and approximately 9% reinforced concrete pipes. The most common pipe size in the sewer basin is 8-inch diameter pipes which make up approximately 65% of the total length of pipes. A summary of the gravity collection system pipe diameter and material are provided in Table 2-1 and Table 2-2.

2.2 Liquid Treatment System

The existing system includes preliminary treatment, primary treatment, and secondary treatment.

2.2.1 Preliminary Treatment

Preliminary treatment is a physical process in which large items such as rags, sticks, grit, grease, and other items are removed from the wastewater. The primary treatment equipment includes the septage receiving station, influent screens, the IPS, influent flow measurements, preaeration tanks, aerated grit chambers, and Blower Building (No. 1).

2.2.1.1 Septage Receiving Station

The septage receiving station is located at the southeastern end of the WWTP (Figure 2-1) shows the existing WWTP site plan). Currently permitted private haulers and CCH ENV haulers discharge septage or liquid sludge at a manhole upstream of the influent screens. There is no odor control facility for the septage receiving station. There is no pump station at the septage receiving station as the septage or liquid sludge flows by gravity via a 12-inch sewer that connects to the 21-inch sewer from Kalaeloa prior to entering the influent junction box.

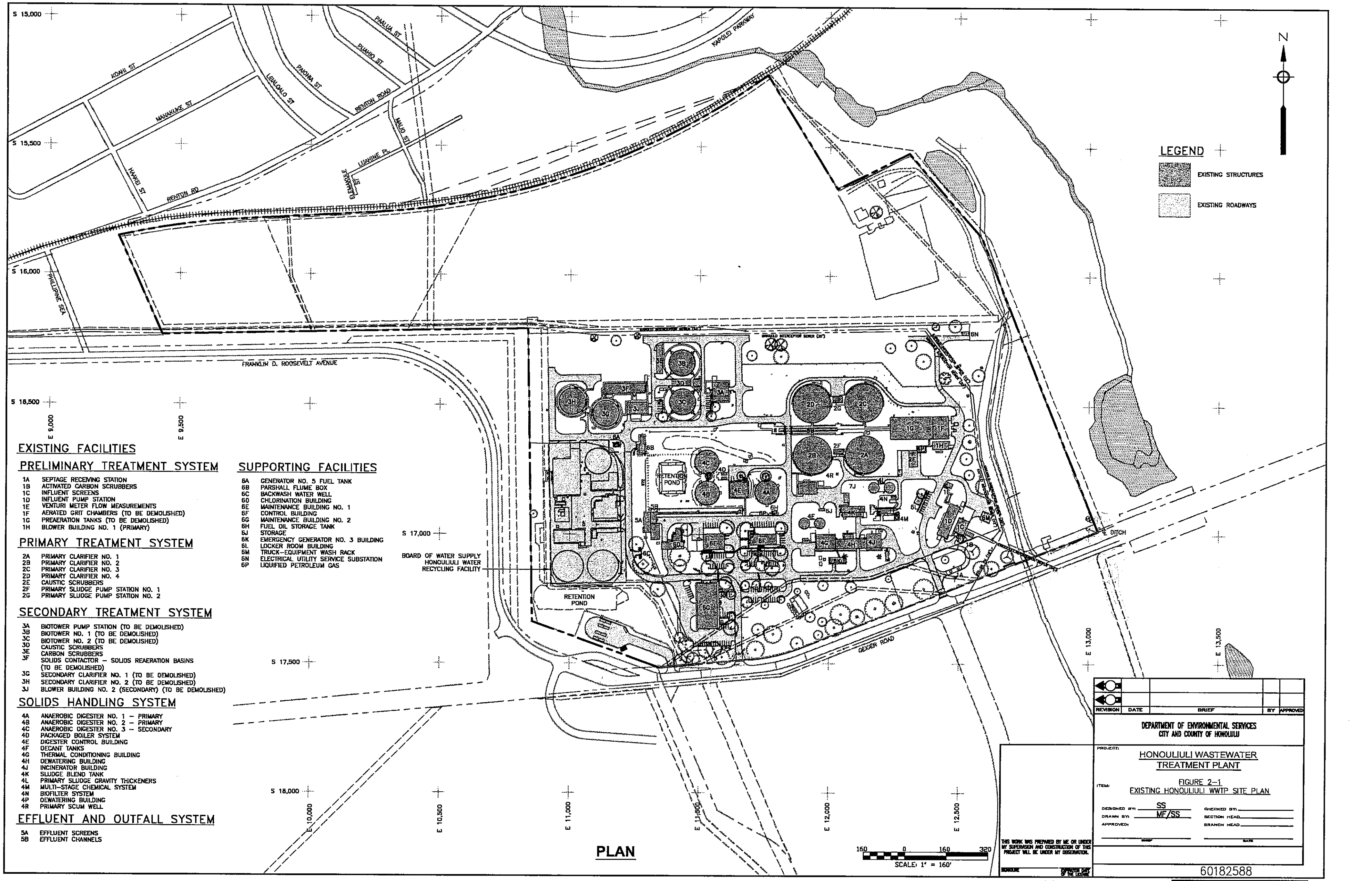

LEGEND
EXISTING STRUCTURES
EXISTING ROADWAYS
N
EXISTING FACILITIES
PRELIMINARY TREATMENT SYSTEM
1A SEPTAGE RECEIVING STATION
1B ACTIVATED CARBON SCRUBBERS
1C INFLUENT SCREENS
1D INFLUENT PUMP STATION
1E VENTURI METER FLOW MEASUREMENTS
1F AERATED GRIT CHAMBERS (TO BE DEMOLISHED)
1G PREAERATION TANKS (TO BE DEMOLISHED)
1H BLOWER BUILDING NO. 1 (PRIMARY)
PRIMARY TREATMENT SYSTEM
2A PRIMARY CLARIFIER NO. 1
2B PRIMARY CLARIFIER NO. 2
2C PRIMARY CLARIFIER NO. 3
2D PRIMARY CLARIFIER NO. 4
2E CAUSTIC SCRUBBERS
2F PRIMARY SLUDGE PUMP STATION NO. 1
2G PRIMARY SLUDGE PUMP STATION NO. 2
SECONDARY TREATMENT SYSTEM
3A BIOTOWER PUMP STATION (TO BE DEMOLISHED)
3B BIOTOWER NO. 1 (TO BE DEMOLISHED)
3C BIOTOWER NO. 2 (TO BE DEMOLISHED)
3D CAUSTIC SCRUBBERS
3E CARBON SCRUBBERS
3F SOLIDS CONTACTOR – SOLIDS REAERATION BASINS (TO BE DEMOLISHED)
3G SECONDARY CLARIFIER NO. 1 (TO BE DEMOLISHED)
3H SECONDARY CLARIFIER NO. 2 (TO BE DEMOLISHED)
3J BLOWER BUILDING NO. 2 (SECONDARY) (TO BE DEMOLISHED)
SOLIDS HANDLING SYSTEM
4A ANAEROBIC DIGESTER NO. 1 – PRIMARY
4B ANAEROBIC DIGESTER NO. 2 – PRIMARY
4C ANAEROBIC DIGESTER NO. 3 – SECONDARY
4D PACKAGED BOILER SYSTEM
4E DIGESTER CONTROL BUILDING
4F DECANT TANKS
4G THERMAL CONDITIONING BUILDING
4H DEWATERING BUILDING
4J INCINERATOR BUILDING
4K SLUDGE BLEND TANK
4L PRIMARY SLUDGE GRAVITY THICKENERS
4M MULTI-STAGE CHEMICAL SYSTEM
4N BIOFILTER SYSTEM
4P DEWATERING BUILDING
4R PRIMARY SCUM WELL
EFFLUENT AND OUTFALL SYSTEM
5A EFFLUENT SCREENS
5B EFFLUENT CHANNELS
SUPPORTING FACILITIES
6A GENERATOR NO. 5 FUEL TANK
6B PARSHALL FLUME BOX
6C BACKWASH WATER WELL
6D CHLORINATION BUILDING
6E MAINTENANCE BUILDING NO. 1
6F CONTROL BUILDING
6G MAINTENANCE BUILDING NO. 2
6H FUEL OIL STORAGE TANK
6J STORAGE
6K EMERGENCY GENERATOR NO. 3 BUILDING
6L LOCKER ROOM BUILDING
6M TRUCK–EQUIPMENT WASH RACK
6N ELECTRICAL UTILITY SERVICE SUBSTATION
6P LIQUIFIED PETROLEUM GAS
BOARD OF WATER SUPPLY HONOULIULI WATER RECYCLING FACILITY
RETENTION POND
FRANKLIN D. ROOSEVELT AVENUE
GEIGER ROAD
KAPOLEI PARKWAY
DITCH
PLAN
SCALE: 1" = 160'
DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU
HONOULIULI WASTEWATER TREATMENT PLANT
FIGURE 2-1
EXISTING HONOULIULI WWTP SITE PLAN
DESIGNED BY: SS
DRAWN BY: MF/SS
60182588
DRAWINGOO C-173
SHEET X OF XX

Table 2-1. Summary of Gravity Sewers in the Honouliuli Sewer Basin

Diameter (in)	Number of Reaches	Total Length (ft)	% by Length
6	726	94,709	4
8	10,229	1,692,502	65
10	938	160,498	6
12	876	157,458	6
14	6	1,936	<1
15	620	115,543	4
16	8	14,965	1
18	338	67,387	3
20	7	11,727	<1
21	193	41,462	2
24	279	57,369	2
27	77	14,190	1
30	204	62,272	2
33	18	5,468	<1
36	135	42,645	2
42	88	41,421	2
48	11	12,931	<1
60	1	201	<1
84	26	12,290	<1
Total	14,782	2,606,687	100

Source: DPP 2010.

Table 2-2. Summary of Gravity Sewer Materials in the Honouliuli Sewer Basin

Pipe Material	Number of Reaches	Total Length (ft)	Average Age of Pipes (yr)	% by Length
ACP - Asbestos Cement Pipe	1	2,020	40	<1
CIP - Cast Iron Pipe	44	22,748	44	<1
DIP - Ductile Iron Pipe	54	68,004	29	3
HDPE - High Density Polyethylene	2	538	11	<1
PVC - Polyvinyl Chloride Pipe	631	115,165	15	4
RCP - Reinforced Concrete Pipe	1,000	228,776	33	9
TCP - Terra Cotta Pipe	28	3,402	56	<1
VCP - Vitrified Clay Pipe	12,934	2,150,820	32	83
UNK - Pipe Diameter <8-inch	88	15,210	41	1
Total	14,782	2,606,687	33	100

Source: DPP 2010.

2.2.1.2 *Influent Screens*

The wastewater from the Honouliuli sewer basin, along with septage from the septage receiving station, flows through the influent screens. Three mechanically cleaned bar screens are located upstream of the IPS wet well. The screens are located within reinforced concrete channels. Each screen is 5 ft wide with an operating water depth ranging from 3 to 6 ft upstream of the screens. The openings for the bar screens are 0.75-inch to prevent large objects that may cause damage to downstream equipment from entering the WWTP. The screenings are mechanically removed, conveyed via a conveyor belt to a grinder and screenings washer/compactor, then discharged into a hopper. The compacted screenings hopper is then lifted by crane out of a below grade concrete pit that houses the screens, grinder, screenings compactor, and hopper. The compacted screenings are transported to a landfill for disposal.

2.2.1.3 Influent Pump Station

After the influent screens, wastewater is collected in a divided IPS wet well. The existing IPS consists of six extended shaft centrifugal pumps (four 20 mgd electric variable speed pumps and two 36 mgd electric and diesel [dual drive] variable speed pumps). These pumps are located in the basement of the IPS and are vertical non-clog centrifugal pumps with extended shafts connected to motors located at ground level. Each wet well compartment serves three pumps (two 20 mgd and one 36 mgd). The pumps convey the wastewater through two 42-inch diameter force mains. Each force main receives flow from three dedicated pumps: one 36 mgd electric and diesel variable speed pump (dual drive) and two 20 mgd electric variable speed pumps. In the event of a power outage, on-site standby power (located in a trailer adjacent to the IPS building) is able to operate two 20 mgd pumps (one for each force main). In addition, the two 36 mgd dual drive electric/diesel engine units can operate on their diesel engines during power outages. During normal conditions, two or three pumps are in service.

The influent flow is measured in the IPS force mains. There are two venturi flow meters (one on each force main) that measure the flow. The wastewater flows through the IPS force mains to the aerated grit chambers and preaeration tanks.

2.2.1.4 Grit Chambers and Preaeration Tanks

There are four aerated grit chambers and preaeration tanks. Each grit chamber and preaeration tank is 20 ft wide by 210 ft long. The grit chamber portion is 60 ft long and the preaeration tank portion is 150 ft long. The influent flow passes through a rectangular open channel that is 5 ft wide, then through a series of sluice gates into the aerated grit chambers, and then directly into the preaeration tanks. The effluent flow passes out of the preaeration tanks through a series of slide gates connected to a rectangular open channel that is 6 ft wide. The wastewater is then conveyed from the preaeration tanks to the primary clarifiers.

During normal conditions, three trains are in operation, with one train rotated out of service quarterly for maintenance or to be used as a standby train. The aerated grit chambers and preaeration tanks are designed for an average flow of 51 mgd and peak flow of 112 mgd.

2.2.2 Primary Treatment

Primary treatment is a physical process that removes suspended solids and organic material by physical settling. The primary treatment system consists of the primary clarifiers and two primary sludge pump stations.

2.2.2.1 Primary Clarifiers

The four primary clarifiers are each 145 ft in diameter with a minimum sidewater depth of 10 ft. Flow enters the tanks from a splitter box at the end of the rectangular open channels from the aerated grit chamber and preaeration tanks. Flow enters each tank via a 42-inch diameter influent pipe that is connected to the bottom of the splitter box. The pipe drops down below the bottom of the clarifier and is encased in a concrete jacket attached to the bottom of the clarifier floor. Each 42-inch pipe is connected to the clarifier center column. The clarifiers are provided with inboard effluent troughs outfitted with 3-inch v-notch weir plates to convey the effluent to the two primary effluent channels. Each rectangular primary effluent channel services two clarifiers and is 6 ft wide. During normal conditions, three clarifiers are in service and one unit is on standby.

2.2.3 Secondary Treatment

The secondary treatment system at the Honouliuli WWTP was completed in 1996. The Honouliuli WWTP secondary treatment process uses a biological fixed film trickling filter (TF) process to remove biodegradable organic matter and a suspended growth solids contact process for enhanced suspended solids removal. The trickling filter/solids contact (TF/SC) process provides secondary treatment for a constant wastewater flow of 13 mgd (approximately one-half of the current total flow to the Honouliuli WWTP). The secondary treatment system consists of a biotower pump station, biotowers, solids contacts/reaeration basins, secondary clarifiers, Blower Building No. 2, and Parshall flumes.

2.2.3.1 Trickling Filter Pump Station

A constant 13 mgd of primary effluent flows through two 5.5-ft wide screening channels to the TF pump station. In addition to primary effluent, the TF pump station receives recycle flow (TF effluent) from the recycle distribution box. The primary effluent and the TF recycle flows are conveyed by 36-inch diameter pipes into a mixing chamber and then flow into two wet wells, one on either side of the mixing chamber. The pump station, which sits above the mixing chamber and wet wells, has eight vertical turbine pumps. Four pumps (two 6.5 mgd and two 3.25 mgd constant speed vertical turbine pumps) are located over both wet wells. One of the large pumps for each TF is a standby unit (a total of two standby pumps are provided).The station pumps the mixture of primary effluent and TF recycle through two 36-inch pipes to the TFs. Each pipe is equipped with a 36-inch magnetic flow meter to measure the flow.

The biotower pump station conveys a constant flow of 13 mgd to each TF (6.5 mgd of primary effluent and 6.5 mgd of TF recycle flow). By design, the quantity of wastewater receiving secondary treatment is constant and the quantity of recycle flow is constant so adjustments to the gate positions are not required.

2.2.3.2 Trickling Filters

There are two TFs; each unit is 100 ft in diameter with a plastic media depth of 20 ft. The two TFs are designed to treat constant primary effluent flow of 13 mgd (6.5 mgd each). The TF secondary treatment process provides fixed film biological treatment to remove soluble organics in the wastewater thereby reducing soluble BOD_5. The TFs use plastic media to support the growth of bacteria (biofilm) that consume the organic pollutants in the primary effluent. The primary effluent and TF recycle are evenly distributed across the surface of the attached-growth media with a rotating assembly with four distribution arms called a rotary distributor. The hydraulic design of each rotary distributor is based on a constant flow of 13 mgd (6.5 mgd primary effluent and 6.5 mgd TF recycle). The TF pump station provides a constant wetting rate that promotes sloughing of the biofilm that attaches to the plastic media, and prevents organic overloading that would cause odors/septic conditions at the top of the TF towers. During normal conditions, both TFs are in service.

2.2.3.3 Solids Contact and Sludge Reaeration Basins

Settled sludge (return secondary sludge [RSS]) from the two secondary clarifiers is reaerated in four reaeration basins. Each basin is 8 ft wide by 24 ft long with a sidewater depth of 12 ft. The reaerated sludge is discharged into the mixing/distribution chamber where it is mixed with the TF effluent and is distributed equally into the SC basins. The mixture then flows into the solids contactor basins. Each basin is 8 ft wide by 105 ft long with a sidewater depth of 12 ft and volume of 75,000 gallons. The total SC volume is approximately 300,000 gallons. The four SC basins are designed to treat a constant flow of 13 mgd (3.25 mgd in each tank). The SC process is a biological treatment process designed to improve the settleability of the suspended solids through flocculation. Flow from the SC basins is conveyed to two secondary clarifiers. During normal operations, all four solids contact and sludge reaeration basins are in service.

2.2.3.4 Secondary Clarifiers

Effluent from the SC basins is conveyed by gravity to the secondary clarifiers. There are two secondary clarifiers designed to treat a constant flow of 13 mgd (6.5 mgd each). Each secondary clarifier is 100 ft in diameter with a sidewater depth of 16 ft. Flow enters each secondary clarifier via a 36-inch diameter influent pipe that is encased below the floor and connected to the clarifier center column. An inboard effluent trough, outfitted with 3-inch v-notch weir plates, is provided in each clarifier. Flow exits each secondary clarifier via a 36-inch diameter pipe connected to a Parshall flume. During normal conditions, both secondary clarifiers are in operation.

2.3 Effluent Disposal System

The facilities that make up the effluent and outfall system include the effluent channel, effluent screens, effluent flow measurement, ocean outfall, and HWRF. Primary effluent, excess secondary effluent, and reverse osmosis brine are combined in the effluent channel and discharged to the ocean via the outfall. The Barbers Point Deep Ocean Outfall was constructed in 1979 and has a peak flow capacity of 112 mgd. The 84-inch diameter outfall extends approximately 8,760 ft into the ocean and discharges treated effluent approximately 200 ft below the surface through a 1,750-ft long diffuser pipe. The water reclamation processes associated with the HWRF include sand filtration, reverse osmosis, and ultraviolet (UV) disinfection.

2.4 Solids Handling System

The Honouliuli WWTP was recently upgraded under the *Honouliuli Wastewater Treatment Plant New Solids Handling Facility* project (GMP 2004), herein referred to as the *New Solids Handling Facility*. The existing Honouliuli WWTP solids unit processes include gravity thickeners, gravity belt thickeners (GBTs), blend tanks, anaerobic digesters, and centrifuge dewatering. The solids capacity is based on solids removed from 42 mgd of primary treatment and 26 mgd from secondary treatment.

Solids residues from the Honouliuli WWTP are either disposed of at the Waimanalo Gulch Landfill in Kahe Valley, Kapolei or disposed of at the H-Power Facility. Use of the landfill is being phased out. The solids loading to the Honouliuli WWTP is augmented by solids from the Wahiawa and Paalaa Kai WWTPs, which are trucked to the Honouliuli WWTP for further processing and disposal.

2.4.1 Primary Sludge Thickening

There were two gravity thickeners at the Honouliuli WWTP prior to the solids handling upgrades. After the heat treatment system and decant tanks were decommissioned in 2010, the two decant tanks were converted into gravity thickeners, giving the WWTP a total of four gravity thickeners. The sidewall heights of the converted decant tanks were extended to essentially match the existing gravity thickeners. Each gravity thickener is 40 ft in diameter with a side water depth of 10 ft for the original gravity thickeners and 9 ft 4 inches for the converted decant tanks. The thickened primary sludge is conveyed to the sludge blending tanks to be mixed with thickened secondary sludge. During normal operations, only primary sludge is pumped to the gravity thickeners and one gravity thickener is in operation.

2.4.2 Secondary Sludge Thickening

There are two GBTs to thicken secondary sludge from the TF/SC process. The GBTs use porous polyester belts that travel along a series of rollers. The sludge is conditioned with a cationic polymer and is distributed across the surface of the moving belt on the top of the unit. As the belt moves forward, the sludge passes through a series of polyester plows that enhance the drainage of water from the sludge solids. A significant amount of water is drained away from the sludge through the porous belt. The concentrated solids are dropped off the discharge end of the unit into a hopper or chute. During normal conditions, one GBT is in service.

2.4.3 Sludge Blend Tanks

The Honouliuli WWTP currently has four blending tanks. Each blending tank is 20 ft square, with a sidewater depth of 16.5 ft and an effective volume of approximately 49,000 gallons. Thickened sludge from both the gravity thickeners (primary sludge) and the GBTs (secondary sludge) is combined and mixed in the sludge blend tanks. Mixed sludge is then pumped to the anaerobic digesters. Odor is controlled by routing foul air to the Primary Sludge Odor Control System. During normal conditions, three sludge blend tanks are in service.

2.4.4 Anaerobic Digesters

The Honouliuli WWTP currently uses anaerobic digesters to stabilize solids produced by the primary and secondary treatment systems. There are three anaerobic digesters (two primary and one secondary) that receive a mixture of thickened primary and thickened waste secondary sludge (WSS) from the sludge blend tanks. The anaerobic digester process produces digested sludge and digester gas. Digested sludge is pumped to the dewatering centrifuges. A portion of the digester gas is used as fuel in the boiler to provide heat to the digesters. Excess digester gas is flared using the waste gas burner. During normal conditions, one primary and one secondary digester are in service.

2.4.5 Dewatering

The dewatering process at the Honouliuli WWTP is the final stage in the solids treatment process. Digested primary and secondary sludge is pumped from the anaerobic digesters to the three centrifuges located in the dewatering building. The centrifuges further dewater the sludge to 25 to 28% total solids (TS) concentration. Dewatered cake is trucked from the WWTP site to a landfill for disposal and centrate (liquid) is routed back to the WWTP headworks for liquid treatment.

2.5 Odor Control System

The Honouliuli WWTP has six separate odor control systems that collect and treat air emissions from the WWTP. The existing Honouliuli WWTP odor control systems are presently being evaluated under a separate CCH project entitled *Honouliuli Wastewater Basin Odor Control*. The odor control facilities at the WWTP include:

- *Preliminary Odor Control System.* Collects and treats foul air from the influent sewers, influent screens, and IPS wet well. This foul air is conveyed to two activated carbon scrubbers, which are run in parallel. The total capacity of the activated carbon scrubbers is 7,000 cubic feet per minute (cfm).
- *Primary Odor Control System.* Collects and treats foul air from the aerated grit chambers, preaeration tanks, and primary clarifier weirs. This system consists of two-stage treatment that includes two catalytic scrubbers that have been converted into caustic scrubbers, followed by five dual-bed activated carbon scrubbers. The total capacity of the system is 24,000 cfm.
- *Secondary Odor Control System.* Collects and treats foul air from the secondary treatment processes including the biotower pump station and TF/SC process. The Secondary Odor Control System consists of a two-stage treatment system that includes two catalytic scrubbers that have been converted into caustic scrubbers, followed by five dual-bed activated carbon scrubbers. The total capacity of the secondary odor control system is 25,000 cfm.
- *Primary Sludge Odor Control System.* Consists of a four-cell stone media biofilter system that collects and treats foul air from the gravity thickeners and sludge blend tanks. The total capacity of the Primary Sludge Odor Control System is 16,400 cfm.
- *Secondary Sludge Odor Control System.* Consists of an activated carbon system with two units that collect and treat foul air from the GBTs. The capacity of the Secondary Sludge Odor Control System is 3,000 cfm.
- *Solids Dewatering Odor Control System.* Consists of a multistage chemical unit that collects and treats foul air from the centrifuge dewatering building. The Solids Dewatering Odor Control System has a treatment capacity of 22,000 cfm.

2.6 Electrical

While there is limited existing electrical metering at the existing WWTP, the utility bills provide information on the overall electrical demand. Table 2-3 shows the maximum and minimum WWTP electrical demand for data collected from September 2008 to September 2011.

The measured maximum (peak) demand of 1,757 kilowatts (kW) was used as the representative peak demand for the existing WWTP operating with the existing flows.

Table 2-3. Facility Electrical Demand Data

Parameter	Electrical Demand (kW)	Reported Date
Maximum Measured Demand	1,757	Jan 26, 2011
Minimum Measured Demand	1,536	Dec 26, 2009

Legend: kW = kilowatt.
Source: Honouliuli Fac Plan Work Task 12 – Alternative Energy, Electrical Supply, and Distribution Strategy, Item 12.E Technical Memorandum (AECOM 2014a)

2.7 Summary

Table 2-4 summarizes the existing processes at the Honouliuli WWTP.

Table 2-4. Existing Honouliuli WWTP Process Units

Process Unit	No. of Units	Length (ft)	Width (ft)	Diameter (ft)	SWD (ft)	Surface Water Elev. at Avg Flow (ft MSL)	Surface Water Elev. at Peak Flow (ft MSL)	Volume Per Unit (gal)
Influent Screens	3	—	5	—	3 to 6	15.2 (1)	18.5 (1)	—
IPS	6	Extended-shaft centrifugal pumps, four 20-mgd, variable-speed electric, two 36-mgd electric and diesel driven: 92 ft x 11 ft wet well.						
Aerated Grit Chamber	4	60	20	—	13.76	43.2	45.2	123,510
Pre-aeration Tanks	4	150	20	—	14.5	43.2	45.2	325,380
Primary Clarifiers	4	—	—	145	9.96	42.6	42.7	1,230,230 (2)
Biotower Pump Station	8	Vertical turbine, constant-speed pumps (four for each biotower; two 6.5-mgd and two 3.25-mgd capacity pumps) (3)						
Biotowers (3)	2	—	—	100	20	49.3 (4)	49.3 (4)	—
Sludge Re-aeration Tanks (3)	4	24	8	—	12	46.5	46.5	17,230
Solids Contact Tank (3)	4	105	8	—	12	46.5	46.5	75,400
Secondary Clarifiers (3)	2	—	—	100	16	43.1	43.1	939,960 (2)
Effluent Screens	3	—	5.5	—	7.5	30.4 (5)	34.7 (5)	—
Barbers Point Deep Ocean Outfall: 8,760 ft into the ocean to a diffuser section; 1,750 ft in length, approximately 200 ft below surface								
Gravity Thickener	4	—	—	40	10	52.4	—	94,000
GBTs	2	—	6.5	—	—	—	—	—
Blend Tanks	4	20	20	—	16	62.8	—	47,870
Anaerobic Digesters	3	—	—	90	30	69.5	—	1,427,570
Centrifuges	3	Sludge feed rate = 150 gpm at 2% solids each, maximum solids loading = 1,800 lb/hr						

Legend: Avg. = average; Elev. = elevation; gal = gallon; gpm = gallons per minute, lb/hour = pounds per hour; MSL = mean sea level; SWD = side water depth.
Sources: GMP Hawaii, Inc. (2004); R. M. Towill (1997).
Notes:
(1) Upstream of Mechanical Screens
(2) Volume does not include the cone section of the tank.
(3) Secondary Treatment is a constant 13 mgd
(4) TF Underdrain Trough
(5) Upstream of Effluent Screens

3 BASIS OF DESIGN CRITERIA USED TO DEVELOP SECONDARY TREATMENT AND EXPANSION ALTERNATIVES

The following sections describe the basis of design criteria used to develop alternatives for secondary treatment and expansion of the facility to accommodate future projected wastewater flow. The basis of design criteria was determined based on existing and anticipated standards. In addition, the criteria include consideration for effluent reuse.

3.1 Previous Basin Planning

The *Final Sewer Infiltration and Inflow Plan* (*Final Sewer I/I Plan*) was completed in 1999 in compliance with requirements of a Consent Decree (Civ. No. 94-00765 DAE dated May 15, 1995) between the CCH, DOH, and EPA. The *Final Sewer I/I Plan* established infiltration and inflow rates for each wastewater sewer basin (including the Honouliuli sewer basin).

The flow information gathered as part of the *Final Sewer I/I Plan* was used to populate the Sewer Flow Analysis System (SFAS) Flow Model. The SFAS model has been used to estimate existing and future wastewater flows. The *West Mamala Bay Facilities Plan* (Wilson Okamoto & Associates, Inc. and Brown and Caldwell Consultants 2001) used the SFAS model to project the 2020 peak wet weather flow to the WWTP to be 174 mgd. In addition to the flow at the WWTP, the model showed that a number of the sewers and force mains would have insufficient capacity.

The *West Mamala Bay Facilities Plan* (Wilson Okamoto & Associates, Inc. and Brown and Caldwell Consultants 2001) provided recommendations for upgrades to the Honouliuli WWTP, including odor control, preliminary and primary treatment expansion, effluent pump station, and solids handling modification. The Plan recommended that upgrading to secondary treatment (beyond the 13 mgd in 1999) would not be necessary; however, the Consent Decree requirements superseded this recommendation. The recommendations for odor control and sludge management are being evaluated as part of the Honouliuli Fac Plan.

The CCH has completed the *Final Sewer I/I Plan* with the *Sewer I/I Assessment and Rehabilitation Program Update* project. The first phase of this project installed flow meters and rain gauges throughout the island of Oahu. The flow metering was conducted from 2009 to 2011. The flow data collected was entered into an InfoWorks Model that was used to route flows through the collection and transport system to generate projected flows at the Honouliuli WWTP. The projected 2050 peak wet weather flow from this effort was 126 mgd, which is lower than the projected peak flows derived from the preceding studies. The *Wet Weather I/I Assessment Update Report* (AECOM 2013) summarizes the second phase of the project, which included some additional intensive monitoring conducted from 2011 to 2012 and provided future project recommendations based on monitoring and modeling.

3.1.1 Sludge Management Plan

The Island-wide Sludge Management Plan was completed in 2015. With respect to Honouliuli WWTP, the plan recommended a final sludge processing, hauling, and beneficial use strategy. Key aspects of the plan include accommodating the following:

- Waimanalo Gulch landfill's goal of eventual elimination of sludge receiving
- Future expansion of Honouliuli WWTP from partial secondary to full secondary
- Anticipated growth in the Honouliuli wastewater basin

3.1.2 Odor Control

The Honouliuli Wastewater Basin Odor Control Project is ongoing. The project scope addresses odor and corrosion concerns in both the WWTP and tributary collection system. Planning was completed by October 2015. Areas of concern and potential alternatives have been identified in the Preliminary Engineering Report (AECOM 2014b). Pilot testing for collection system and WWTP controls has been completed and design of improvements was completed by March 2017.

3.2 Population Projections

The Honouliuli WWTP provides service to the developed areas in the region around Pearl Harbor, from Halawa in the east to Ko Olina in the west, and extending to Mililani in the north. Figure 1-1 identifies the Honouliuli sewer basin boundary. The Honouliuli WWTP services the communities of Halawa, Aiea, Waimalu, Pearl City, Pacific Palisades, Waiawa, Waipahu, Mililani, Waipio, Village Park, Crestview, Waikele, Kunia, Kapolei, West Loch, Ewa Beach, Makakilo, and Ko Olina. The total service area includes approximately 22,000 acres of developed land and 54,000 acres of undeveloped land.

To determine system capacity requirements within the planning period, Honouliuli sewer basin population projections were developed for the year 2035 and year 2050. Conducting the population projections entailed a substantial data collection effort. Key agencies contacted include the Hawaii Department of Business, Economic Development, and Tourism (DBEDT) and CCH Department of Planning and Permitting (DPP), which are responsible for conducting socioeconomic projections for Hawaii and the island of Oahu, respectively. In addition, numerous planning reports and data were reviewed, including the following (listed chronologically):

- *General Plan: Objectives and Policies*, Amended October 2002 (CCH DPP) (according to the DPP website, this plan is in the process of being updated)
- Central Oahu Sustainable Communities Plan, December 2002 (CCH DPP)
- Primary Urban Center Development Plan, June 2004 (CCH DPP)
- Population and Economic Projections for the State of Hawaii to 2035, July 2009 (Hawaii DBEDT)
- CCH Socioeconomic Projections to 2035, September 2009 (CCH DPP)
- Honouliuli High-Capacity Transit Corridor Project Final Environmental Impact Statement/Section 4(f) Evaluation, June 2010 (CCH and US Department of Transportation)
- Annual Report on the Status of Land Use on Oahu: Fiscal Year 2009, August 2010 (CCH DPP)
- Get on Board! Transit Oriented Development Handbook, Spring 2011 (CCH DPP)
- *Oahu Regional Transportation Plan 2035*, April 2011 (Oahu Metropolitan Planning Organization)
- Proposed Revised Ewa Development Plan, May 2011 (CCH DPP)
- 2010 Census Summary File 1 for Hawaii, June 2011 (US Census Bureau)
- *2010 Annual Visitor Research Report*, September 2011 (Hawaii Tourism Authority)

The projections consider long-term, historic trends for the sewer basin, as well as available data and projections released by CCH and large-scale developments and proposed projects in the area. Previously conducted population and employment projections were also referenced to assist with the effort. The source most relied on was the CCH DPP socioeconomic projections to 2035, which are generally used and accepted for county infrastructure planning efforts (AECOM 2011a).

Based on the range of data available at the start of the analysis, the year 2010 was chosen as the current design year. In 2010, a population of over 300,000 was served by the Honouliuli sewer basin. Year 2035 and the corresponding population estimates were used in the evaluation and comparison of alternatives. Population projections to year 2050 were used in reference to the projected build-out of the Honouliuli WWTP. Population projections are provided in Table 3-1. The "population equivalent" values reflect an adjustment of the population projections based on average wastewater use by population category. These values were used to facilitate computation of per capita sanitary flows/loadings. The population projections methodology and detailed results are provided in Appendix A.

Table 3-1. Population Projections

Sewered Area [1]	Projection Update								
	2010 [1]			2035			2050		
	Res	Non-Res	Visitor	Res	Non-Res	Visitor	Res	Non-Res	Visitor
Total	306,417	102,857	1,902	408,234	201,302	11,359	449,424	241,720	14,989
Population Equivalent	325,976 [2]			452,938 [2]			504,239 [2]		

Source: Honouliuli Fac Plan Work Task 4.F.1 – Updated Basis of Design Population, Flows, and Loads Technical Memorandum (AECOM 2012a).

Notes:

[1] Results do not include the following estimated population not served by sewer (based on comparison of aerial photographs and limits of existing collection system): 9,177 Residential; 17,095 Non-Residential.

[2] The following equation was used to arrive at a population value to facilitate computation of per capita sanitary flows/loadings: Population Equivalent = Res Pop. + (11/63) × Non-Res Pop. + (53/63) × Visitor Pop. (63, 11, and 53 are gallons per capita per day wastewater generation values for residential, non-residential, and visitor, respectively).

3.3 Flow Projections

Flows at the Honouliuli WWTP were projected to assist in determining the design capacity for the proposed improvements. Development of flow projections for the intermediate design year of 2035 and design year of 2050 involved development of projections for each of three components of the flow (sanitary flow, dry weather infiltration, and wet weather infiltration/inflow (I/I)). Flow projections were based initially on measurements of actual flows from flow metering conducted in the 2009-2012 period as part of the *Sewer I/I Assessment and Rehabilitation Program Update* project. Projections of future flows were then based on population projections (described above) and anticipated areas of new development within the sewer basin. A calibrated InfoWorks model was used to route flows through the collection and transport system to generate projected flows at the Honouliuli WWTP.

Table 3-2 shows typical year (dry and wet days that make up a "typical" year) flow projections and Table 3-3 shows flow projections for years 2010, 2035, and 2050 that would occur during a 2-year, 6-hour design storm. The flow projections methodology and detailed results are provided in Appendix A.

Table 3-2. Flow Projections from the Honouliuli System Model

Location	Typical Year (MGD)								
	Peak 1 Hour			Maximum 24 Hour			Annual Average		
	2010	2035	2050	2010	2035	2050	2010	2035	2050
WWTP	49.5	69.7	79.5	33.8	50.3	57.0	27.5	39.6	44.4

This table shows total flow (i.e., sanitary flow, dry weather infiltration, and wet-weather infiltration/inflow).
Source: Honouliuli Fac Plan Work Task 4.F.1 – Updated Basis of Design Population, Flows, and Loads Technical Memorandum (AECOM 2012a).

Table 3-3. Storm Flow Projections from the Honouliuli System Model

Location	2 Year, 6 Hour Storm (MGD)					
	Peak 1 Hour			Maximum 24 Hour		
	2010	2035	2050	2010	2035	2050
WWTP	82.2	114.2	126.4	45.0	65.4	73.5

This table shows total flow (i.e., sanitary flow, dry weather infiltration, and wet-weather infiltration/inflow).
Source: Honouliuli Fac Plan Work Task 4.F.1 – Updated Basis of Design Population, Flows, and Loads Technical Memorandum (AECOM 2012a).

The following design storm intervals were then evaluated as part of the *Sewer I/I Assessment and Rehabilitation Program Update* to identify capacity constraints in order to help define and prioritize proposed improvements, which are summarized in Table 3-4.

- 1-year, 6-hour
- 2-year, 6-hour
- 5-year, 6-hour
- 10-year, 6-hour
- 1-year, 24-hour
- 2-year, 24-hour
- 5-year, 24-hour
- 10-year, 24-hour

Table 3-4. Honouliuli Basin Proposed Improvements, Modeling Results

Description	Units	1-Year	2-Year	5-Year	10-Year
Gravity Pipes					
No. of Gravity Pipes	(Count)	N/A	9	42	100
Length of Gravity Pipes	(LF)	N/A	490	7,632	18,634
Force Mains					
No. of Force Mains	(Count)	0	0	0	0
Length of Force Mains	(LF)	0	0	0	0
WWPS					
Waimalu WWPS (23.82 MGD)	MGD	N/A	N/A	N/A	27.01

Source: Sewer I/I Assessment and Rehabilitation Program Update – Final Peak Flow Cost-Effective Analysis Report (AECOM 2012b)

3.4 Anticipated Ocean Discharge Permit Requirements

The Honouliuli WWTP needs to be upgraded to a secondary treatment facility by Year 2024, in accordance with the FACD. Table 3-5 presents the anticipated secondary effluent requirements after the WWTP has been upgraded. These requirements are set by the EPA.

Table 3-5. Anticipated Secondary Effluent Requirements

Parameter [1]	30-day Average Concentration (mg/L)	7-day Average Concentration (mg/L)
BOD_5 [2]	30	45
TSS [2]	30	45

Legend: BOD_5 = biochemical oxygen demand of wastewater during decomposition occurring over a 5-day period; CBOD = carbonaceous biochemical oxygen demand; TSS = total suspended solids.
Source: 40 Code of Federal Regulations (CFR) Section 133.102 Secondary Treatment (2011).
Notes:
(1) Required effluent pH between 6 to 9.
(2) The 30-day average percent removal shall not be less than 85 percent (57 mg/L and 59 mg/L for BOD_5 and TSS, respectively, based on 2011 average daily values). Therefore, the 30 mg/L limit is more stringent for both BOD_5 and TSS.

3.5 Basis of Design Influent and Effluent Quality and Quantity

The proposed Honouliuli WWTP sizing is based on Year 2050 flows and loads, although phasing for construction of structures was also considered. The peak wet weather flows, used in conjunction with representative wastewater concentrations to compute loads, and for design of the facilities, are based on the InfoWorks model identified in the previous section using a 2-year, 6-hour storm. Table 3-6 presents basis of design criteria for Years 2010, 2024 (initial year of new plant operation), 2035, and 2050 influent flows and corresponding loads. Additional detail regarding the load projections is provided in Appendix A.

Table 3-6. Basis of Design Influent Flows and Loads

Year	Avg. Day (mgd)	Max Day (mgd)	Peak Hr (mgd)	BOD_5 (lb/day)	TSS (lb/day)	TKN (lb/day)	NH_3 (lb/day)	TP (lb/day)
2010	27.5 [2]	33.8 [2]	82.2 [2]	78,000	81,000	7,900	5,800	1,000
2010 without Import Sludge [1]	27.5 [2]	33.8 [2]	82.2 [2]	74,000 (347 mg/L)	77,000 (360 mg/L)	7,500 (35 mg/L)	5,400 (25 mg/L)	900 (4.1 mg/L)
2024	36	45	101	91,000 [3]	94,000 [3]	9,300 [3]	6,500 [3]	1,100 [3]
2035	40	50	114	102,000 [3]	106,000 [3]	10,500 [3]	7,300 [3]	1,200 [3]
2050	45	57	126	114,000 [3]	118,000 [3]	11,600 [3]	8,100 [3]	1,400 [3]

Legend: NH_3 = Ammonia; TKN = Total Kjeldahl Nitrogen; TP = total phosphorus.
Source: Honouliuli Fac Plan Work Task 4.F.1 – Updated Basis of Design Population, Flows, and Loads Technical Memorandum (AECOM 2012).
Notes:
(1) Import sludge refers to sludge hauled from Paalaa Kai and Wahiawa WWTPs.
(2) 2010 flows shown are the calibrated flows from the InfoWorks model and are slightly higher than the actual flow.
(3) Based on 2010 without Import Sludge Concentrations.

The primary effluent quality will have an impact on the sizing of the proposed secondary treatment processes required for the upgrade and expansion of the Honouliuli WWTP for Year 2035 and 2050 conditions. With no additional primary clarifiers, it is anticipated that the removal efficiencies will decline as the flows and loads to the primary clarifiers increase. For Year 2050 conditions, used as the basis for sizing secondary treatment options, primary treatment removal efficiencies of 40 percent for BOD5 and 60 percent for total suspended (non-filterable) solids (TSS) were assumed. The basis of design effluent criteria is the anticipated secondary effluent requirements as shown in Table 3-5.

Additional secondary treated effluent will be available following the secondary treatment upgrade, which will provide an opportunity for additional water reuse including groundwater recharge. Currently, effluent reuse limits are presented in the *Reuse Guidelines* and *Hawaii Administrative Rules, Title 11 Department of Health Chapter 62 Wastewater Systems* (DOH 2016).

3.6 Design Standards

Alternative upgrades to the existing wastewater treatment system will be in accordance with the CCH's Design Standards of the Department of Wastewater Management, Volume 1 (DWM 1993), Design Standards of the Division of Wastewater Management, Volume 2 (DPW 1984), collectively referred to as the Wastewater Design Standards, and subsequent updates to these standards. Where supplemental standards are required, the *Recommended Standards for Wastewater Facilities* (commonly referred to as the Ten States Standards) (Health Research, Inc. 2004) and typical standards of practice will be used.

4 ALTERNATIVES CONSIDERED

In compliance with the provisions of Title 11, DOH, Chapter 200, Environmental Impact Statement Rules, Section 11-200-10(6), the alternatives considered are limited to those that would satisfy the objectives of the proposed project, while minimizing the potential for adverse environmental impacts.

Alternatives are considered for secondary treatment upgrades and modifications to the Honouliuli WWTP to meet future flow and water quality requirements. The following three major alternatives (herein referred to as options) for the secondary treatment upgrades are evaluated to achieve the project objectives:

- Option 1 – Expand Existing Trickling Filter/Solids Contact (TF/SC) Process to Full Capacity
- Option 2 – Replace Existing TF/SC Process with Activated Sludge (AS) to Full Capacity
- Option 3 – Add to Existing TF/SC Process with AS to Full Capacity

The “No Action” alternative is also evaluated.

Consideration for phasing was evaluated for the preferred alternative. Phasing is discussed in Section 4.7.

4.1 Common Components to Secondary Treatment Alternatives

The following describes the project activities and upgrades for components that are common to each of the secondary treatment options described in Section 4.2.

4.1.1 Preliminary Treatment System

The influent screens do not have capacity to handle the design peak hour flow of 126 mgd. The units are over 30 years old and nearing the end of their useful life; therefore, replacement of the influent screens is recommended. Space is available within the existing structure to construct two additional flow channels (one on either side of the three existing flow channels). The two new channels and two of the three existing channels would be outfitted with new mechanically cleaned screens. The remaining channel could be left empty (without a screen) to serve as an emergency bypass or could be fit with a new mechanically cleaned screen. Screenings washer-compacters and conveyors would be provided to dewater and discharge the material into a container at grade adjacent to the existing structure. The material would then be hauled off-site for disposal.

Four of the six pumps in the IPS are over 30 years old and nearing the end of their useful life. The remaining two other pumps are approximately 15 years old. These pumps do not provide enough capacity to handle the design peak flow of 126 mgd. Therefore, the influent pumps are proposed to be replaced to handle the design peak flow. The entire IPS structure would be rehabilitated to extend its useful life.

The existing aerated grit chamber/aeration tanks are in need of rehabilitation to address condition and performance issues. The four aerated grit chamber/preaeration tanks would be rehabilitated with concrete, new coatings, covers, diffusers, and a collector mechanism, or refurbished and repurposed to become High Rate Biological Contact (HRBC) tanks. A new flow control channel and divider walls would be constructed between the grit and preaeration zones to facilitate the isolation of individual grit and preaeration zones as well as to allow bypass of the preaeration system. The existing chain and flight grit collector mechanisms would be replaced with new screw collectors. The existing chain and bucket grit conveyors would be replaced with recessed impeller grit pumps to convey the collected grit slurry to a grit washing and dewatering system in the new Grit Building.

The system would both remove grit and strip hydrogen sulfide (H_2S) from the flow prior to entering the clarifiers. The existing preaeration process is known to improve the operating efficiency of the primary clarifiers. The option to preaerate would therefore remain with the option to bypass preaeration added for flexibility of future operation. A fifth grit chamber, preaeration tank or HRBC would be constructed to treat the projected increased flow.

Alternative methods of grit removal will also be considered including use of the vortex removal type systems. Elimination of the preaeration facility would also be considered since with the implementation of secondary treatment, the necessity for optimizing primary clarifier performance would be diminished.

A new Grit Building would be provided to house the grit pumping, washing and dewatering equipment. The below grade level of the building would contain the grit pumps and influent magnetic flow meters. Once the grit slurry is collected it would be pumped to the upper level of the building, washed, and dewatered to remove and separate the heavy particles of grit and solids from organic matter. Grit would then be deposited in a container and the liquid from the grit washing and dewatering process returned to the wastewater stream for treatment. The building would be enclosed and ventilated to the Odor Control System.

4.1.2 Primary Treatment System

The existing primary clarifiers have the capacity to treat future flows through the end of the Year 2050 planning period. However, rehabilitation is required to address the condition and performance issues. The existing primary clarifiers and scum pumping equipment would be rehabilitated (portions replaced) or repurposed to become wet weather storage tanks to address condition and performance issues. Additional HRBC's may become the primary treatment process. The primary clarifier collector mechanisms, scum beaches, and weir troughs would be replaced due to age and deterioration. The tank structure would receive concrete and coating repairs as needed. Portions or the entire primary clarifier surface may be covered for containment of odors.

4.1.3 Wet Weather Management

The WWTP is proposed to be designed to hydraulically pass the peak flow of 126 mgd through all treatment systems during wet weather events with one unit out of service. Wet Weather storage is proposed to reduce peak flows impact on downstream processes; however hydraulic modeling confirmed the capacity assuming that the storage has been filled and the peak continues to flow. The wet weather storage volume necessary was determined by modeling, which was described in Section 3.2. Rectangular wet weather storage tanks are illustrated in the proposed facility plan. The rectangular configuration facilitates clean-up, is simpler to cover if odors occur, and could be converted to primary clarifiers if additional primary clarifier capacity is required in the future. The number and size of tanks would vary depending on the secondary treatment option selected. Therefore, the off-line storage tank volume requirements are described with each of the secondary treatment options in Section 4.2.

Alternative configurations could be considered depending on the final facility configuration. Determination of the final size and configuration would be the result of an iterative process as the project progresses to final design.

4.1.4 Effluent Disposal System

The existing effluent structure, located on the Honouliuli WWTP property, is in poor structural condition; therefore, a new effluent structure is proposed to be constructed and old components demolished. In addition, since the Honouliuli WWTP does not presently disinfect effluent that is discharged to the Barbers Point Ocean Outfall, provisions would be made to incorporate UV disinfection into the secondary treatment option in the event that effluent disinfection is required in the future. The overall UV disinfection structure footprint would include the inlet channel, UV channels, outlet channel, flow control weir and walkway between channels. In addition, with the upgrade of the influent screens, effluent screening would not be necessary. Flow measurement requirements will also need to be addressed in the effluent disposal system as the configuration progresses to final design.

4.1.5 Solids Handling System

The discussion provided below addresses the additional sludge production from the secondary treatment process using the sludge handling approach currently employed at the Honouliuli WWTP (thickening, blending, anaerobic digestion, and centrifuge dewatering). This approach is considered appropriate for budgeting and space planning purposes, while actual sizes and locations may change during the project development. Concurrent to this effort, the Island-wide Sludge Planning and future efforts have recommended sludge processing technologies for implementation at Honouliuli WWTP. The quantity and quality of sludge being processed, and biogas available for beneficial use, depends to an extent on the island-wide sludge planning effort and factors such as on-site processing methods and importation of sludge. Detailed analysis of the sludge treatment, handling and disposal is included in Honouliuli Fac Plan Work Task 11.E – Detailed Evaluation of Shortlisted Alternatives – Honouliuli WWTP Biosolids - Technical Memorandum (AECOM 2015).

The existing gravity thickeners have sufficient capacity to handle the projected 2050 primary sludge flows and loads; therefore, no upgrades to the gravity thickeners would be required. However, the equipment would be replaced at the end of its design life or replaced with a new process.

The secondary sludge flow, regardless of the secondary treatment alternative selected, is estimated to be 757,000 gpd for the 2050 flows (0.8% Total Solids). Based on the estimated flow, three 3.0 meter Gravity Belt Thickener units are proposed and would fit within the existing secondary sludge thickening building; however, other types of equipment can be considered. Polymer feed equipment would be moved outside the existing building into a new, separate structure.

During the project development there may be an option to keep the existing blend tanks or build four new sludge blend tanks, which are proposed to be located south of the existing primary clarifiers and west of the existing gravity thickeners.

Depending on the selected sludge conditioning option, up to two additional primary anaerobic digesters or thermal hydrolysis processes would also be constructed as well as a cake handling and storage facility with odor control systems, a pellet storage silo and truck load out, and an emergency pellet storage in the case that H-power was down to meet the year 2050 flows and loads. The two digesters would be 90 ft in diameter to match the existing units. The digesters would be located within the site west of the existing digesters. A new Digester Control Building would be constructed to support anaerobic digesters operations. Estimated sludge quantities are listed in Table 4-1. The volume of sludge is larger than existing due to the projected growth in population as well as the additional amount of solids removed in secondary treatment. Undigested dewatered and dried quantities would likely not be produced at the WWTP and are therefore not included in this table. Dewatering performance is anticipated to be 25% TS.

Table 4-1. Year 2050 Estimated Avg. Sludge Quantities

Parameter	Value
Influent Flow	45 mgd
Thickened Primary Sludge Flow, @ 5% TS	170,000 gpd
Thickened Secondary Sludge Flow, @ 5% TS	118,000 gpd
Digested Sludge Flow, @ 2.7% TS	313,000 gpd

The digested sludge is anticipated to have the following qualities:

- TS = 2.7%
- Volatile Solids/TS = 64%
- Digester Volatile Solids Reduction = 55%

Immediately after digestion, the digested biosolids would still be in a liquid, free-flowing form. The anaerobic digestion process is considered a Process to Significantly Reduce Pathogens (PSRP) by the EPA 40 Code of Federal Regulations (CFR) Part 503 regulation. The anaerobically digested biosolids are considered "Class B" by the EPA. Application of Class B Biosolids involves site use restrictions to minimize the potential for human or animal exposure. Following digestion, it would then be pumped to the centrifuges for dewatering.

The dewatered cake would be similar in composition to how it is today, which is a moist, semi-solid, soil-like material. It would require specialized pumps or conveyors for transporting, and it is not typically stored in tanks unless the tank contains a specialized "live bottom" consisting of screw feeders or hydraulic rams.

Thermally dried biosolids would be granular or in a pellet-like form, and would contain little moisture. Thermal drying is considered a “Process to Further Reduce Pathogens” by the EPA 40 CFR Part 503 regulation. The dried biosolids would be considered “Class A” if bacterial counts met Class A standards at the time of distribution.

More information on solid waste disposal is located in Section 5.13.3.3 *Solid Waste Disposal – Operational Impacts and Mitigation Measures.*

4.1.6 Odor Control System

The Honouliuli Wastewater Basin Odor Control Project evaluated and recommended improvements to the odor control systems at the Honouliuli WWTP. The existing Preliminary Odor Control System is overloaded; therefore, it is recommended that the existing granulated activated carbon (GAC) absorbers be replaced with biological odor control systems.

Replacing the existing Primary Odor Control System with new biological odor control systems, in addition, to the new treatment facilities is recommended. The odor control improvements can be centralized or decentralized.

The estimated odor control air flows are provided in Table 4-2.

Table 4-2. Estimated Odor Control Air Flows

Odor Source	Existing Capacity (cfm)	After Honouliuli Basin Odor Control Project (cfm)	After Honouliuli Fac Plan Phase 1 Improvements (cfm)	After Honouliuli Fac Plan Phase 2 Improvements (cfm)	After Honouliuli Fac Plan Phase 3 Improvements (cfm)
IPS and Sewers	7,000 (1)	14,304	14,304	14,304	14,304
Grit/Preaeration and Primary Clarifiers	24,000 (2)	24,000 (2)	26,684 (3)	28,154 (4)	28,154
Grit Building	—	—	5,994	5,994	5,994
Primary Influent/Effluent Channels	—	—	2,016	2,016	2,016
Septage Receiving	—	—	1,500	1,500	1,500
TF Pump Station, TFs, and Sludge Reaeration and Solids Contact Tanks (5)	25,000	25,000	25,000	25,000	25,000
Wet Weather Tanks	—	—	—	6,165	32,880
Aeration Tank Influent Channels	—	—	4,665	4,665	6,995
Overflow Structure	—	—	680	680	680
Aeration Tank Anoxic Zones	—	—	19,710	19,710	29,565
Aeration Tank Aerobic Zones	—	—	—	—	59,130
Gravity Thickeners and Sludge Blend Tanks (6)	16,400	16,400	16,400	16,400	16,400
Sludge Blend Tanks (new)	—	—	1,200	1,200	1,200
Gravity Belt Thickeners (7)	3,000	3,000	3,000	3,000	3,000
Centrifuge Building (8)	22,000	22,000	22,000	22,000	22,000
Sludge/FOG Receiving Building	—	—	15,000	15,000	15,000
Total Airflow	97,400	104,704	158,153	165,788	263,818
Incremental Airflow	—	7,304	53,449	7,635	98,030

Legend: — = Data not available.
Notes:
(1) Existing Preliminary Odor Control capacity is 7,000 cfm and existing flow is 14,304 cfm. This system would be replaced with new odor control system.
(2) Existing Primary Odor Control capacity is 24,000 cfm and existing air flow is 13,804 cfm. This system would remain in service until the Honouliuli Fac Plan Phase 1 Improvements. Phases are described in Section 4.7 Project Phasing and Schedule.
(3) Following Honouliuli Fac Plan Phase 1 Improvements to the grit/preaeration system and installation of flat covers for the primary clarifiers. Phases are described in Section 4.7 Project Phasing and Schedule.
(4) Following Honouliuli Fac Plan Phase 2 Improvements –addition of 5th grit/preaeration train and installation of flat covers for the primary clarifiers. Phases are described in Section 4.7 Project Phasing and Schedule.
(5) Secondary Odor Control System would remain.
(6) Primary Sludge Odor Control System would remain.
(7) Secondary Sludge Odor Control System would remain.
(8) Dewatering Odor Control System would remain.

In addition to the new biological odor control systems, grit covers, primary clarifier covers, and primary effluent channel covers are recommended for odor containment. Odor control processes, sizes, and configurations would be refined as the project progresses to final design

4.1.7 Electrical

Table 4-3 presents the estimated electrical loads at the WWTP in Year 2050. HECO substation upgrades may be required to handle the new secondary power requirements.

Table 4-3. Estimated Electrical Load

Item	Rating	Unit	Rating	Unit
Existing	4,050	hp	3,020	kW
Process Loads Removed	3,630	hp	2,710	kW
Secondary Treatment Process Loads Added[1]	1,700 to 4,000	hp	1,270 to 2,980	kW
Common Treatment Process Loads Added	4,300	hp	3,210	kW
Sum of Building Loads Added	-	-	1,200	kW
Net Additional Loads Added [2]	-	-	5,990 to 7,700	kW

Notes:
[1] Range of electrical load for the secondary treatment options
[2] "Net Additional Loads Added" is the difference in process loads, which is the net additional process loads, added to the building loads.

Section 5.13.4.1 provides information on the construction impacts, electrical and communication services, existing setting services. Section 5.13.4.2 describes electrical and communication services, construction impacts and mitigation measures.

4.1.8 Perimeter Access, Security and Fence

The existing perimeter chain link fence would be removed and replaced with a new combination of walls, ornamental fence, and chain link fence. The selection of fence type would be determined based on location on the property. Fences or walls along roadways and the perimeter would be improved to provide an aesthetically pleasing view to replace the industrial look that currently exists, including linear landscape elements along the fences/walls. The landscaping elements could be irrigated with reclaimed water or they could be drought-tolerant plants, grasses, and native species. Additional considerations are as follows:

- Security cameras would be located at entrances, fuel stations, selected perimeter locations and other locations where safety or security is a concern.
- The height and setback of the walls would be considered to minimize impacts to the surrounding neighborhoods but provide security and safety for the WWTP. At a minimum a fence of six feet in height, and berms and/or landscaping shall be required around the WWTP.
- At least 10 ft of clear space would be provided on both sides of fences for vehicle access, which would support air quality monitoring as well as fence maintenance.
- The main gate is currently kept open during the day and is locked with access via automated card reader after hours. A pressure plate opens the gate for vehicles leaving the plant. The gate may be closed 24/7 in the future and a method of observation and control would need to be incorporated.

4.1.9 Stormwater Quantity and Quality Control

Honouliuli WWTP drainage design will incorporate best management practices (BMPs) and Low Impact Development (LID) principles to minimize the volume and improve the quality of stormwater runoff from the facility and to comply with NPDES permit requirements and CCH drainage standards. New CCH drainage standards requiring LID strategies went into effect in June 2013 (DPP 2012). Unless infeasible, the design storm runoff volume of 1 inch must be retained onsite using Post-Construction Treatment Control BMPs. In addition, designs must incorporate Source Control BMPs to prevent and control pollutants at their source and Site Design Strategies to minimize runoff volume and reduce the hydrologic impact of the development. Stormwater BMPs for

Honouliuli WWTP will be selected during final design based on the location and potential for stormwater pollutants within the facility.

Stormwater from areas of the facility that do not generate large levels of pollutants will be retained onsite and allowed to infiltrate through shallow stormwater basins. The facility plan site layout drawings show more than the needed area of stormwater infiltration basins to infiltrate the required design storm runoff volume. Surface flow conveyance features, such as vegetated swales and vegetated buffer zones, will also be incorporated to address constructability issues and provide additional treatment. Discharge from the swales and basins will be provided into existing storm drainage facilities for overflows produced by storms in excess of the design storm. Consideration will be given to implementation of other BMPs from the new drainage standards that can serve as demonstration-type installations for future developments.

Areas of the facility with the potential to generate a high level of pollutants in stormwater runoff will drain to the WWTP for treatment. This includes areas with high potential for spills or which are subject to frequent wash-down, such as headworks and septage receiving facilities. Site drainage design will utilize grading, contouring, and curbs to prevent mixing of drainage from clean areas, and will consider roofs or other coverings to minimize the volume of polluted runoff that would need to be routed to the treatment plant. During final design of the WWTP, the use of containment or gates will be considered in strategic locations to contain any possible spills within the process area of the WWTP and prevent spills from leaving the site or entering the administrative areas. It is recommended that these operational and non-LID structural BMPs be incorporated into the design process with input from WWTP staff.

4.1.10 Alternative Energy

As part of CCH's Sustainability and Climate Protection Strategy, current technologies and practices to make the WWTP more energy efficient and sustainable were examined. Digester gas is available at the facility. As a result, a combined heat and power (CHP) installation makes the most sense as the first investment in alternative energy, as it uses a resource available specifically at this facility. If a CHP facility is incorporated at Honouliuli WWTP to make beneficial use of digester biogas, it would need to be permitted according to local, state and federal air regulations. If the CHP cannot meet the yearly electrical energy demand, it would then make sense to augment the CHP system with energy from another alternative source. The following technologies were considered feasible to support some of the energy demands at the Honouliuli WWTP based on this evaluation:

- Solar Photovoltaic (PV)
  - Converts energy from the sun to electricity.
- Solar Thermal – Hot Water
  - Extracts thermal energy from the sun to heat potable water for domestic uses.
- Biosolids – Digestion/CHP Near Term
  - Utilizes anaerobic digester gas to generate electricity and heat for use at the generating location or off-site.
- Biosolids – Fluid Bed Incineration
  - Produces an inert ash from a combustion reaction that occurs in the presence of excess oxygen. The digestion/CHP option is preferred due to high capital, O&M costs.
- Biosolids – Gasification
  - Converts coal and other biomass to a fuel gas (syngas). The digestion/CHP option is preferred due to high capital, O&M costs and a potential need for supplemental fossil fuel consumption.

The following technologies would not be feasible:

- Wind Power
  - Not recommended due to lack of wind at the Honouliuli WWTP site.
- Solar Thermal – Process Hot Water

  - Not necessary if the CHP unit is installed, which would supply primary process heat needs at the Honouliuli WWTP.
- Solar Thermal – Sludge Drying (land area and sludge quantity dependent)
  - Utilizes energy from the sun to dry biosolids without the use of supplemental fossil fuels. Includes a drying bed inside a greenhouse that maximizes solar energy while protecting biosolids from precipitation. Requires a large area of land and is applicable to smaller treatment facilities with lower cost land availability.
- Solar Thermal – Electricity Generation
  - Not recommended as this system is still in the development stage, works best at large scales, and requires significant maintenance.
- Biosolids – Digestion/Gas Cleaning/Biomethane Production

Biomethane can be added to existing natural gas pipelines or used in fleet vehicles that are configured to operate on natural gas. High costs of electricity, petroleum and synthetic natural gas locally have competing financial considerations for CHP or cleaning for biomethane use.

Thermal systems may be the most feasible option, depending on the location and thermal output of the CHP system. Although a net zero energy demand may be feasible, emergency power and reliability considerations would require back-up power generators and maintaining electrical utility service connection.

4.2 Secondary Treatment Alternatives

The following sections describe the alternatives considered for secondary treatment upgrades for the Honouliuli WWTP. The proposed upgrades are sized for the 2050 design ADF of 45 mgd. With the exception of the "No Action" alternative, all of the secondary treatment upgrade alternatives would meet the basis of design criteria. Table 4-4 compares the secondary treatment options.

In the following comparison of alternatives, it was recognized that the effluent quality of the Activated Sludge (AS) systems would normally exceed that of the TF/SC systems due to the nitrification and denitrification options available with the AS processes. In order to have an even comparison of alternatives the effluent quality should be approximately equal. Therefore, in the TF/SC options below additional add-on facilities for nitrification and denitrification were included in the analysis.

Differences between the secondary treatment alternatives include:

- Option 1 has a large footprint and a high capital cost. This option requires add on facilities for nitrification and denitrification.
- Option 2 has the smallest footprint and the lowest capital cost. This treatment process would be able to produce effluent to meet the design criteria. In addition, phasing could allow for the use of existing TF/SC.
- Option 3 is similar to Option 2 with the exception that tank sizes are slightly different. This option requires add on facilities for nitrification and denitrification for the TF/SC effluent portion.

As stated above, all options would meet the basis of design criteria.

Table 4-4. Comparison of Secondary Treatment Options

Facilities	Sub-option 1A	Sub-option 1B	Option 2	Sub-option 3A	Sub-option 3B
Required Major Treatment Units					
Reuse existing TF/SC process (two TFs, four SC basins and two secondary clarifiers)	x	x	Decommission existing process	x	x
Add new TFs	Add 4 TFs	Add 6 nitrifying TFs with alkalinity storage and feed systems	—	—	Add 2
Add new SC basins	Add 4	Add 6	—	—	Add 4
Add new AS aeration basins	—	—	Add 6	Add 6	Add 6
Add new secondary clarifiers	Add 4	Add 6	Add 6	—	Add 2
Add new nitrification filters with alkalinity storage and feed systems	Add 10	—	—	Add 4	Add 6
Add new denitrification filters with methanol storage and feed systems	Add 16	Add 16	—	Add 6	Add 8
Ancillary Facilities					
One new TF IPS with new TF ventilation fans	x	x	—	—	x
One new SC blower building	x	x	—	—	x
New RAS and WSS or WAS pumping systems	RAS and WSS	RAS and WSS	RAS and WAS	RAS and WAS	RAS, WSS, and WAS
Add new nitrification/denitrification pump building	x	Denitrification building only	—	x	x
Additional pumping to the nitrification and denitrification filters	x	To denitrification filters only	—	—	—
Bypassing TF/SC secondary effluent peak flows above 67 mgd around the nitrification and denitrification filters	x	Denitrification filters only	—	—	—
New electrical power and control equipment	—	—	x	x	x
Add AS pump and blower building	—	—	—	x	x
Treatment level achieved	Secondary	Secondary	Secondary	Secondary	Secondary

Legend: — = Not included in Option; x = Included in Option; RAS = return activated sludge; WAS = waste activated sludge.

4.2.1 No Action Alternative

The "No Action" alternative would not address any of the project objectives as it involves no upgrades to the existing treatment systems, hydraulics of the disposal system or improvements to the Honouliuli WWTP. The "No Action" Alternative would fail to fulfill requirements of the FACD. Failure to comply with this Consent Decree requirement by December 2024 could result in the imposition of monetary fines for each day thereafter that the WWTP does not provide secondary treatment to all flow that enters the site and is discharged via the outfall to the ocean.

4.2.2 Option 1 – Expand Existing TF/SC Process to Full Capacity

Option 1 for the secondary treatment alternatives would involve maintaining the existing 13 mgd of TF/SC capacity and adding 32 mgd of additional TF/SC capacity to attain full secondary treatment of Year 2050 design average flow of 45 mgd. Nitrification and denitrification would be assumed to be needed and are included for purposes of an even comparison of alternatives. There are two options to provide nitrification and denitrification:

- Sub-option 1A: Maintains the existing 13 mgd of TF/SC capacity; constructs 32 mgd of additional TF/SC, and provides nitrification and denitrification filters. Figure 4-1 shows a preliminary site layout for Sub-option 1A.
- Sub-option 1B: Modifies the existing TF/SC process and provides nitrifying TFs, and denitrification filters. Figure 4-2 shows a preliminary site layout for Sub-option 1B.

4.2.3 Option 2 – Replace Existing TF/SC Process with AS to Full Capacity

Option 2 would involve construction of a 45 mgd AS process and the subsequent decommissioning of the existing 13 mgd TF/SC process. All secondary treatment at the Honouliuli WWTP would be provided by the AS process. This option does not require the addition of nitrification and denitrification filters. Figure 4-3 shows a preliminary site layout for Option 2.

AS effluent would be supplied to HWRF and TF/SC effluent would be disposed of through the ocean outfall (during Phase 1, as described in Section 4.7 Project Phasing and Schedule). AS effluent would be higher quality than TF/SC effluent, which is expected to be of benefit to the HWRF and its customers. The HWRF brine water along with excess reverse osmosis water would continue to be discharged through the outfall. A new 84-inch pipeline would be installed to convey the AS secondary treatment effluent to a point of connection with the existing 84-inch ocean outfall.

4.2.4 Option 3 – Add to Existing TF/SC Process with AS to Full Capacity

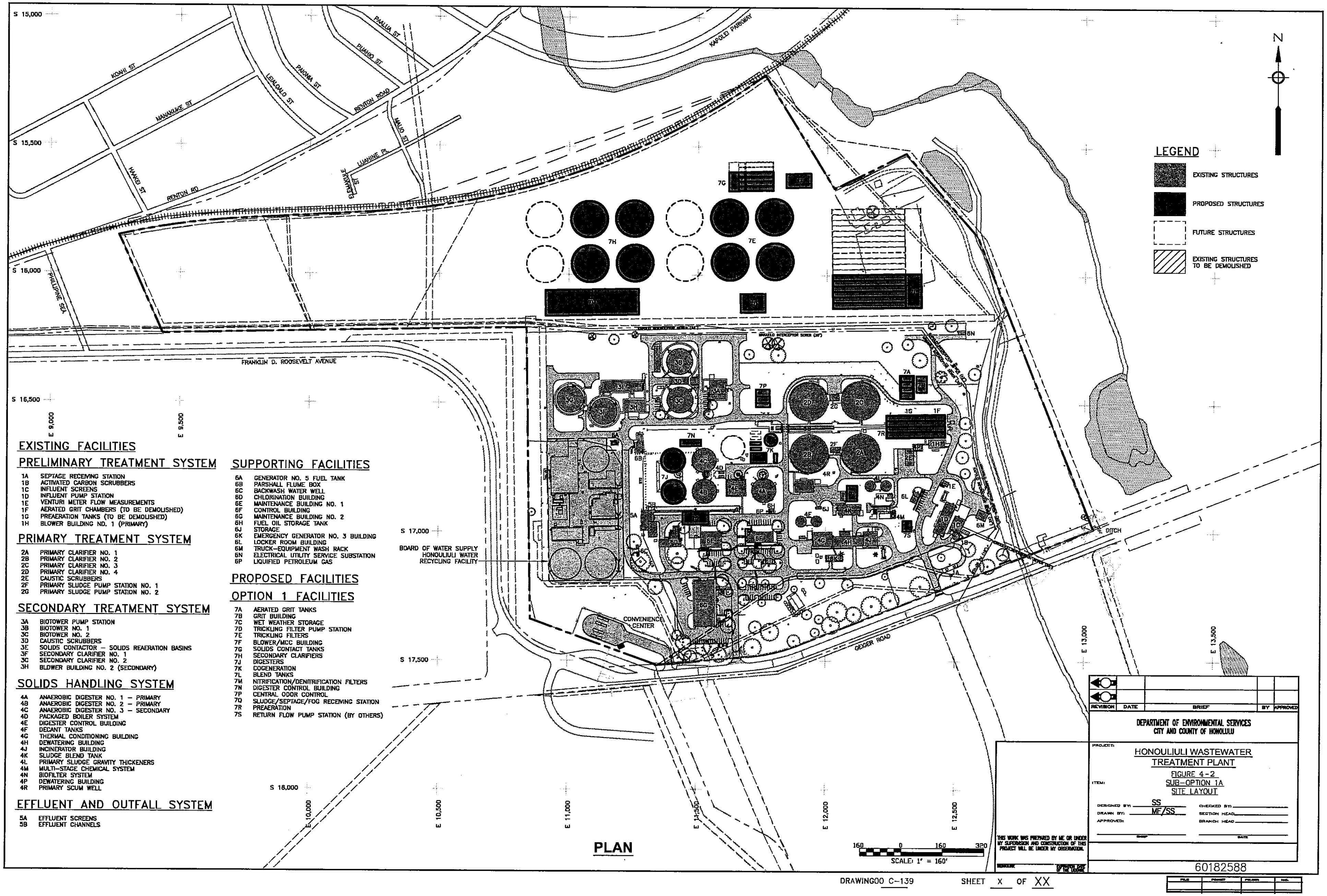
Option 3 would maintain the existing 13 mgd TF/SC process in operation and add additional TF/SC and/or AS capacity. There are two sub-options for Option 3:

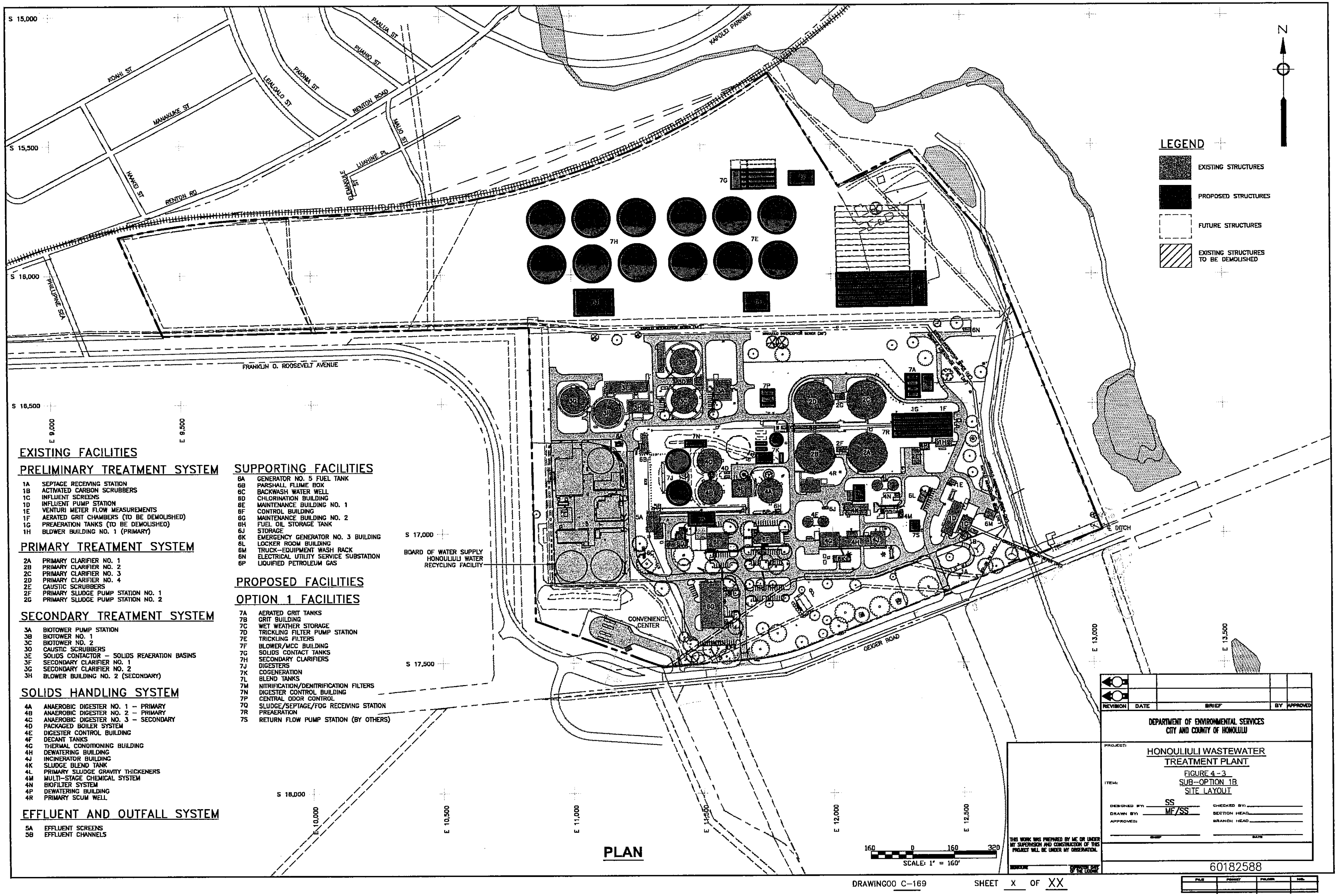
- Sub-option 3A: The existing TF/SC process has a capacity of 13 mgd and would remain in service following appropriate rehabilitation to continue operation through Year 2050. A new 32 mgd AS process would be constructed to provide the required total secondary treatment capacity of 45 mgd through the Year 2050. For this option, the TF/SC would treat a constant flow of 13 mgd and the AS process would be sized to handle peak flows.

  Sub-option 3A would require nitrification and denitrification for the existing TF/SC process. Figure 4-4 shows a preliminary site layout for Sub-option 3A.

- Sub-option 3B: The existing 13 mgd capacity TF/SC process was designed and constructed in a manner to facilitate the doubling of treatment capacity through construction of identically sized treatment units in a symmetrical "butterfly" manner to the existing. This would result in a total of 26 mgd TF/SC treatment process capacity.

  For this Sub-option, the existing 13 mgd TF/SC process would remain in service following appropriate rehabilitation to continue operation through Year 2050. An additional 13 mgd of TF/SC capacity would be constructed as outlined above. A new 19 mgd capacity AS process would be constructed to provide the required total secondary treatment capacity of 45 mgd through the Year 2050. For this option, the TF/SC would treat a constant flow of 26 mgd and the AS process would be sized to handle peak flows. Nitrification and denitrification filters would be required for the TF/SC effluent. Figure 4-5 shows a preliminary site layout for Sub-option 3B.


N
LEGEND
EXISTING STRUCTURES
PROPOSED STRUCTURES
FUTURE STRUCTURES
EXISTING STRUCTURES TO BE DEMOLISHED
KOAHI ST
MANAKUKE ST
HAAKEI ST
LEIALOALO ST
PAIOMA ST
PUAHIO ST
PAALUA ST
RENTON ROAD
RENTON RD
MALIO ST
LUAHINE PL
ELEMAKULE ST
PHILLIPINE SEA
KAPOLEI PARKWAY
FRANKLIN D. ROOSEVELT AVENUE
GEIGER ROAD
DITCH
CONVENIENCE CENTER
BOARD OF WATER SUPPLY HONOULIULI WATER RECYCLING FACILITY
S 15,000
S 15,500
S 16,000
S 16,500
S 17,000
S 17,500
S 18,000
E 9,000
E 9,500
E 10,000
E 10,500
E 11,000
E 11,500
E 12,000
E 12,500
E 13,000
E 13,500
EXISTING FACILITIES
PRELIMINARY TREATMENT SYSTEM
1A SEPTAGE RECEIVING STATION
1B ACTIVATED CARBON SCRUBBERS
1C INFLUENT SCREENS
1D INFLUENT PUMP STATION
1E VENTURI METER FLOW MEASUREMENTS
1F AERATED GRIT CHAMBERS (TO BE DEMOLISHED)
1G PREAERATION TANKS (TO BE DEMOLISHED)
1H BLOWER BUILDING NO. 1 (PRIMARY)
PRIMARY TREATMENT SYSTEM
2A PRIMARY CLARIFIER NO. 1
2B PRIMARY CLARIFIER NO. 2
2C PRIMARY CLARIFIER NO. 3
2D PRIMARY CLARIFIER NO. 4
2E CAUSTIC SCRUBBERS
2F PRIMARY SLUDGE PUMP STATION NO. 1
2G PRIMARY SLUDGE PUMP STATION NO. 2
SECONDARY TREATMENT SYSTEM
3A BIOTOWER PUMP STATION
3B BIOTOWER NO. 1
3C BIOTOWER NO. 2
3D CAUSTIC SCRUBBERS
3E SOLIDS CONTACTOR – SOLIDS REAERATION BASINS
3F SECONDARY CLARIFIER NO. 1
3G SECONDARY CLARIFIER NO. 2
3H BLOWER BUILDING NO. 2 (SECONDARY)
SOLIDS HANDLING SYSTEM
4A ANAEROBIC DIGESTER NO. 1 – PRIMARY
4B ANAEROBIC DIGESTER NO. 2 – PRIMARY
4C ANAEROBIC DIGESTER NO. 3 – SECONDARY
4D PACKAGED BOILER SYSTEM
4E DIGESTER CONTROL BUILDING
4F DECANT TANKS
4G THERMAL CONDITIONING BUILDING
4H DEWATERING BUILDING
4J INCINERATOR BUILDING
4K SLUDGE BLEND TANK
4L PRIMARY SLUDGE GRAVITY THICKENERS
4M MULTI-STAGE CHEMICAL SYSTEM
4N BIOFILTER SYSTEM
4P DEWATERING BUILDING
4R PRIMARY SCUM WELL
EFFLUENT AND OUTFALL SYSTEM
5A EFFLUENT SCREENS
5B EFFLUENT CHANNELS
SUPPORTING FACILITIES
6A GENERATOR NO. 5 FUEL TANK
6B PARSHALL FLUME BOX
6C BACKWASH WATER WELL
6D CHLORINATION BUILDING
6E MAINTENANCE BUILDING NO. 1
6F CONTROL BUILDING
6G MAINTENANCE BUILDING NO. 2
6H FUEL OIL STORAGE TANK
6J STORAGE
6K EMERGENCY GENERATOR NO. 3 BUILDING
6L LOCKER ROOM BUILDING
6M TRUCK-EQUIPMENT WASH RACK
6N ELECTRICAL UTILITY SERVICE SUBSTATION
6P LIQUIFIED PETROLEUM GAS
PROPOSED FACILITIES
OPTION 1 FACILITIES
7A AERATED GRIT TANKS
7B GRIT BUILDING
7C WET WEATHER STORAGE
7D TRICKLING FILTER PUMP STATION
7E TRICKLING FILTERS
7F BLOWER/MCC BUILDING
7G SOLIDS CONTACT TANKS
7H SECONDARY CLARIFIERS
7J DIGESTERS
7K COGENERATION
7L BLEND TANKS
7M NITRIFICATION/DENITRIFICATION FILTERS
7N DIGESTER CONTROL BUILDING
7P CENTRAL ODOR CONTROL
7Q SLUDGE/SEPTAGE/FOG RECEIVING STATION
7R PREAERATION
7S RETURN FLOW PUMP STATION (BY OTHERS)
PLAN
160 0 160 320
SCALE: 1" = 160'
REVISION DATE BRIEF BY APPROVED
DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU
PROJECT: HONOULIULI WASTEWATER TREATMENT PLANT
FIGURE 4-2
ITEM: SUB-OPTION 1A
SITE LAYOUT
DESIGNED BY: SS
DRAWN BY: MF/SS
APPROVED:
CHECKED BY:
SECTION HEAD:
BRANCH HEAD:
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION.
60182588
DRAWINGOO C-139
SHEET X OF XX


N
LEGEND
EXISTING STRUCTURES
PROPOSED STRUCTURES
FUTURE STRUCTURES
EXISTING STRUCTURES TO BE DEMOLISHED
KAPOLEI PARKWAY
KOHAI ST
MANAKUKE ST
HAAKEI ST
RENTON RD
PAALUA ST
PUAHIO ST
PAIOHA ST
LEIALOALO ST
RENTON ROAD
MAUIO ST
LUAHINE PL
ELEWAKUE ST
PHILLIPINE SEA
FRANKLIN D. ROOSEVELT AVENUE
GEIGER ROAD
DITCH
CONVENIENCE CENTER
BOARD OF WATER SUPPLY HONOULIULI WATER RECYCLING FACILITY
S 15,000
S 15,500
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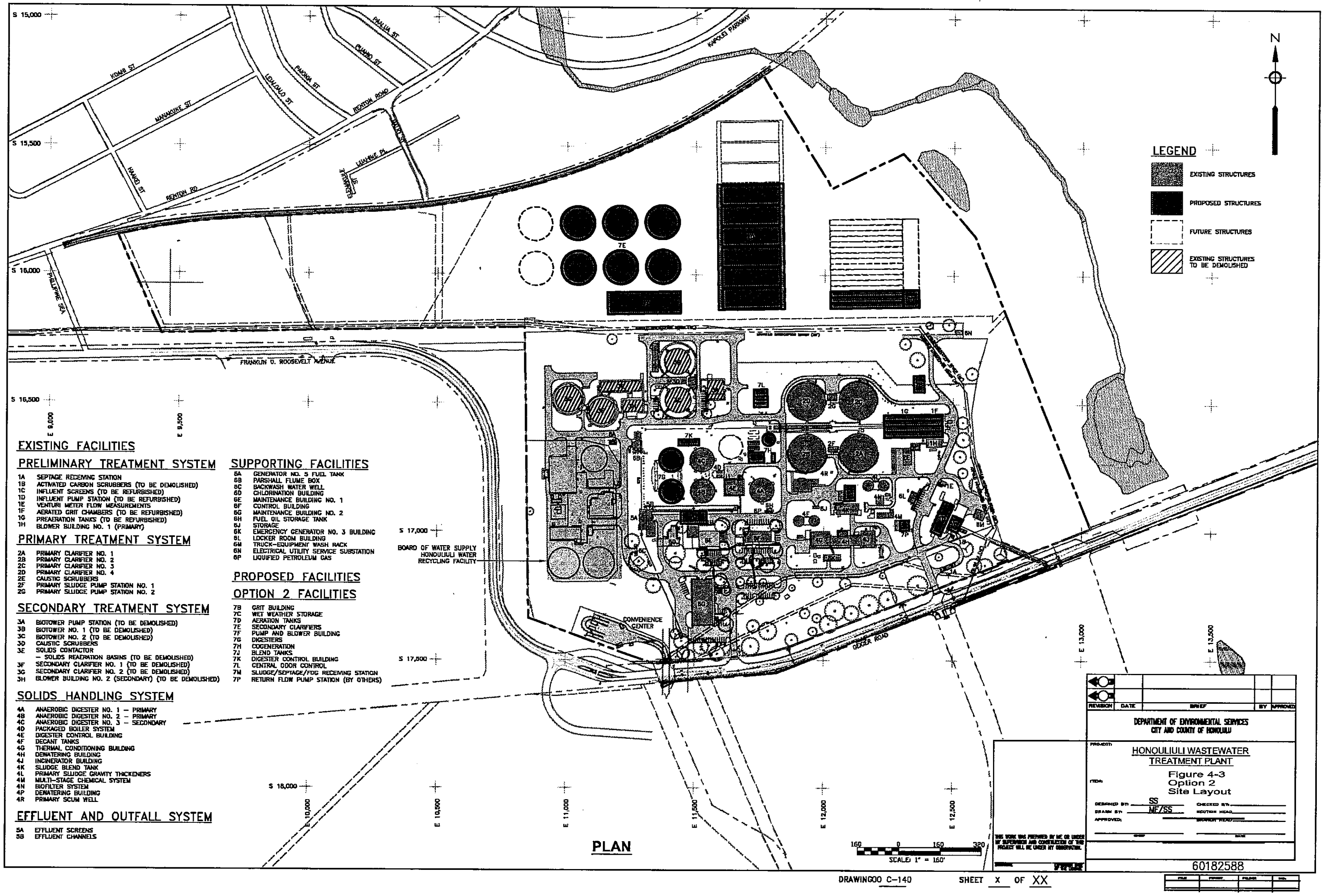
E 13,000
E 13,500
EXISTING FACILITIES
PRELIMINARY TREATMENT SYSTEM
1A SEPTAGE RECEIVING STATION
1B ACTIVATED CARBON SCRUBBERS
1C INFLUENT SCREENS
1D INFLUENT PUMP STATION
1E VENTURI METER FLOW MEASUREMENTS
1F AERATED GRIT CHAMBERS (TO BE DEMOLISHED)
1G PREAERATION TANKS (TO BE DEMOLISHED)
1H BLOWER BUILDING NO. 1 (PRIMARY)
PRIMARY TREATMENT SYSTEM
2A PRIMARY CLARIFIER NO. 1
2B PRIMARY CLARIFIER NO. 2
2C PRIMARY CLARIFIER NO. 3
2D PRIMARY CLARIFIER NO. 4
2E CAUSTIC SCRUBBERS
2F PRIMARY SLUDGE PUMP STATION NO. 1
2G PRIMARY SLUDGE PUMP STATION NO. 2
SECONDARY TREATMENT SYSTEM
3A BIOTOWER PUMP STATION
3B BIOTOWER NO. 1
3C BIOTOWER NO. 2
3D CAUSTIC SCRUBBERS
3E SOLIDS CONTACTOR – SOLIDS REAERATION BASINS
3F SECONDARY CLARIFIER NO. 1
3G SECONDARY CLARIFIER NO. 2
3H BLOWER BUILDING NO. 2 (SECONDARY)
SOLIDS HANDLING SYSTEM
4A ANAEROBIC DIGESTER NO. 1 – PRIMARY
4B ANAEROBIC DIGESTER NO. 2 – PRIMARY
4C ANAEROBIC DIGESTER NO. 3 – SECONDARY
4D PACKAGED BOILER SYSTEM
4E DIGESTER CONTROL BUILDING
4F DECANT TANKS
4G THERMAL CONDITIONING BUILDING
4H DEWATERING BUILDING
4J INCINERATOR BUILDING
4K SLUDGE BLEND TANK
4L PRIMARY SLUDGE GRAVITY THICKENERS
4M MULTI-STAGE CHEMICAL SYSTEM
4N BIOFILTER SYSTEM
4P DEWATERING BUILDING
4R PRIMARY SCUM WELL
EFFLUENT AND OUTFALL SYSTEM
5A EFFLUENT SCREENS
5B EFFLUENT CHANNELS
SUPPORTING FACILITIES
6A GENERATOR NO. 5 FUEL TANK
6B PARSHALL FLUME BOX
6C BACKWASH WATER WELL
6D CHLORINATION BUILDING
6E MAINTENANCE BUILDING NO. 1
6F CONTROL BUILDING
6G MAINTENANCE BUILDING NO. 2
6H FUEL OIL STORAGE TANK
6J STORAGE
6K EMERGENCY GENERATOR NO. 3 BUILDING
6L LOCKER ROOM BUILDING
6M TRUCK–EQUIPMENT WASH RACK
6N ELECTRICAL UTILITY SERVICE SUBSTATION
6P LIQUIFIED PETROLEUM GAS
PROPOSED FACILITIES
OPTION 1 FACILITIES
7A AERATED GRIT TANKS
7B GRIT BUILDING
7C WET WEATHER STORAGE
7D TRICKLING FILTER PUMP STATION
7E TRICKLING FILTERS
7F BLOWER/MCC BUILDING
7G SOLIDS CONTACT TANKS
7H SECONDARY CLARIFIERS
7J DIGESTERS
7K COGENERATION
7L BLEND TANKS
7M NITRIFICATION/DENITRIFICATION FILTERS
7N DIGESTER CONTROL BUILDING
7P CENTRAL ODOR CONTROL
7Q SLUDGE/SEPTAGE/FOG RECEIVING STATION
7R PREAERATION
7S RETURN FLOW PUMP STATION (BY OTHERS)
PLAN
160 0 160 320
SCALE: 1" = 160'
REVISION
DATE
BRIEF
BY
APPROVED
DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU
PROJECT:
HONOULIULI WASTEWATER TREATMENT PLANT
ITEM:
FIGURE 4-3
SUB-OPTION 1B
SITE LAYOUT
DESIGNED BY: SS
DRAWN BY: MF/SS
APPROVED:
CHECKED BY:
SECTION HEAD
BRANCH HEAD
DATE
60182588
DRAWINGOO C-169
SHEET X OF XX



LEGEND
EXISTING STRUCTURES
PROPOSED STRUCTURES
FUTURE STRUCTURES
EXISTING STRUCTURES TO BE DEMOLISHED
N
EXISTING FACILITIES
PRELIMINARY TREATMENT SYSTEM
1A SEPTAGE RECEIVING STATION
1B ACTIVATED CARBON SCRUBBERS (TO BE DEMOLISHED)
1C INFLUENT SCREENS (TO BE REFURBISHED)
1D INFLUENT PUMP STATION (TO BE REFURBISHED)
1E VENTURI METER FLOW MEASUREMENTS
1F AERATED GRIT CHAMBERS (TO BE REFURBISHED)
1G PREAERATION TANKS (TO BE REFURBISHED)
1H BLOWER BUILDING NO. 1 (PRIMARY)
PRIMARY TREATMENT SYSTEM
2A PRIMARY CLARIFIER NO. 1
2B PRIMARY CLARIFIER NO. 2
2C PRIMARY CLARIFIER NO. 3
2D PRIMARY CLARIFIER NO. 4
2E CAUSTIC SCRUBBERS
2F PRIMARY SLUDGE PUMP STATION NO. 1
2G PRIMARY SLUDGE PUMP STATION NO. 2
SECONDARY TREATMENT SYSTEM
3A BIOTOWER PUMP STATION (TO BE DEMOLISHED)
3B BIOTOWER NO. 1 (TO BE DEMOLISHED)
3C BIOTOWER NO. 2 (TO BE DEMOLISHED)
3D CAUSTIC SCRUBBERS
3E SOLIDS CONTACTOR
– SOLIDS REAERATION BASINS (TO BE DEMOLISHED)
3F SECONDARY CLARIFIER NO. 1 (TO BE DEMOLISHED)
3G SECONDARY CLARIFIER NO. 2 (TO BE DEMOLISHED)
3H BLOWER BUILDING NO. 2 (SECONDARY) (TO BE DEMOLISHED)
SOLIDS HANDLING SYSTEM
4A ANAEROBIC DIGESTER NO. 1 – PRIMARY
4B ANAEROBIC DIGESTER NO. 2 – PRIMARY
4C ANAEROBIC DIGESTER NO. 3 – SECONDARY
4D PACKAGED BOILER SYSTEM
4E DIGESTER CONTROL BUILDING
4F DECANT TANKS
4G THERMAL CONDITIONING BUILDING
4H DEWATERING BUILDING
4J INCINERATOR BUILDING
4K SLUDGE BLEND TANK
4L PRIMARY SLUDGE GRAVITY THICKENERS
4M MULTI-STAGE CHEMICAL SYSTEM
4N BIOFILTER SYSTEM
4P DEWATERING BUILDING
4R PRIMARY SCUM WELL
EFFLUENT AND OUTFALL SYSTEM
5A EFFLUENT SCREENS
5B EFFLUENT CHANNELS
SUPPORTING FACILITIES
6A GENERATOR NO. 5 FUEL TANK
6B PARSHALL FLUME BOX
6C BACKWASH WATER WELL
6D CHLORINATION BUILDING
6E MAINTENANCE BUILDING NO. 1
6F CONTROL BUILDING
6G MAINTENANCE BUILDING NO. 2
6H FUEL OIL STORAGE TANK
6J STORAGE
6K EMERGENCY GENERATOR NO. 3 BUILDING
6L LOCKER ROOM BUILDING
6M TRUCK-EQUIPMENT WASH RACK
6N ELECTRICAL UTILITY SERVICE SUBSTATION
6P LIQUIFIED PETROLEUM GAS
PROPOSED FACILITIES
OPTION 2 FACILITIES
7B GRIT BUILDING
7C WET WEATHER STORAGE
7D AERATION TANKS
7E SECONDARY CLARIFIERS
7F PUMP AND BLOWER BUILDING
7G DIGESTERS
7H COGENERATION
7J BLEND TANKS
7K DIGESTER CONTROL BUILDING
7L CENTRAL ODOR CONTROL
7M SLUDGE/SEPTAGE/FOG RECEIVING STATION
7P RETURN FLOW PUMP STATION (BY OTHERS)
BOARD OF WATER SUPPLY HONOULIULI WATER RECYCLING FACILITY
CONVENIENCE CENTER
FRANKLIN D. ROOSEVELT AVENUE
KAPOLEI PARKWAY
GEIGER ROAD
RENTON RD
PLAN
SCALE: 1" = 160'
DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU
HONOULIULI WASTEWATER TREATMENT PLANT
Figure 4-3
Option 2
Site Layout
DESIGNED BY: SS
DRAWN BY: MF/SS
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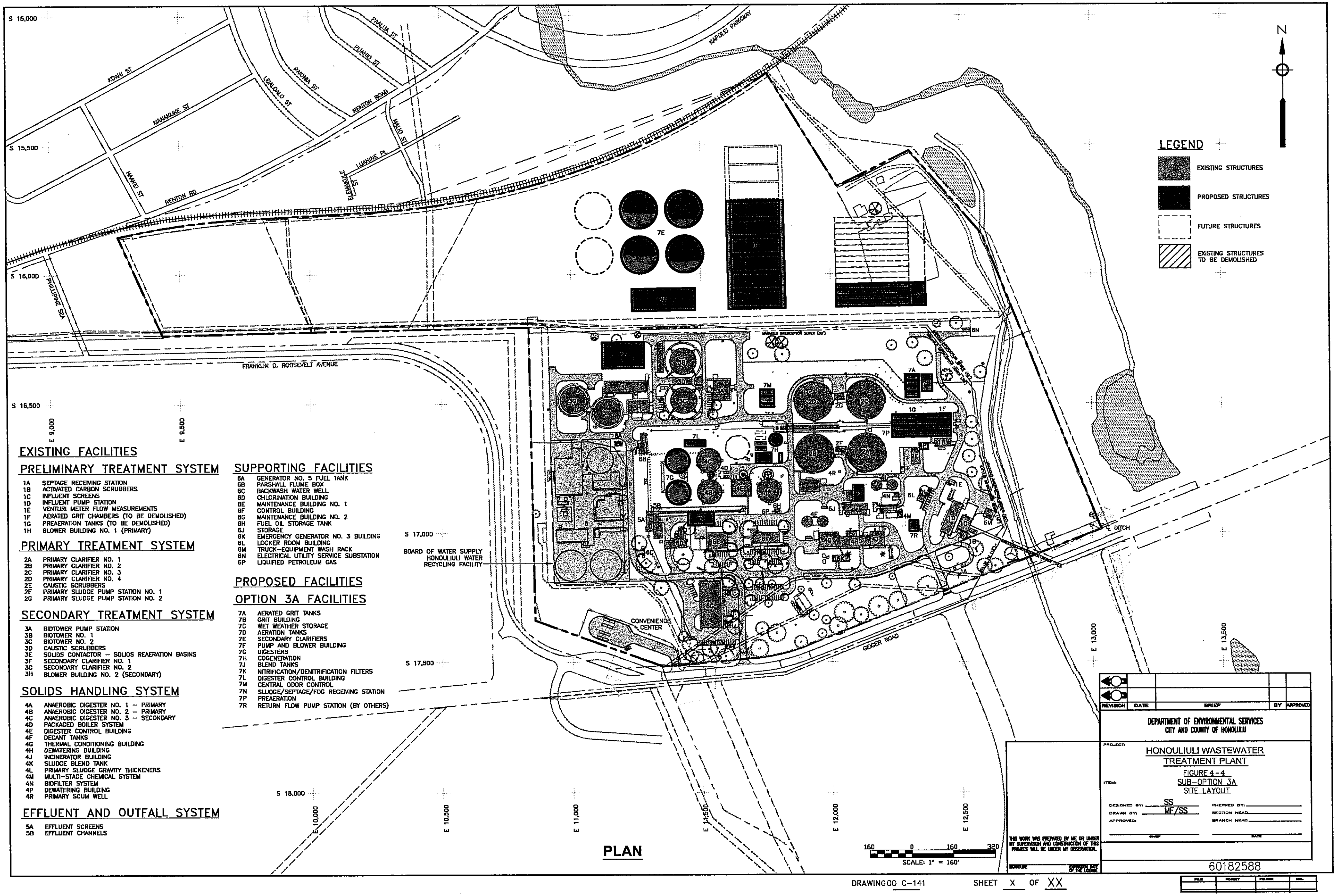
DRAWING00 C-140
SHEET X OF XX



LEGEND
EXISTING STRUCTURES
PROPOSED STRUCTURES
FUTURE STRUCTURES
EXISTING STRUCTURES TO BE DEMOLISHED
N
KOAHI ST
MAHAKUKE ST
HAAKEI ST
RENTON RD
RENTON ROAD
LEIALOALO ST
PAIOMA ST
PUANIO ST
PAALUA ST
MALIO ST
LUAHINE PL
ELEWAHINE ST
PHILLIPINE SEA
KAPOLEI PARKWAY
FRANKLIN D. ROOSEVELT AVENUE
GEIGER ROAD
DITCH
CONVENIENCE CENTER
BOARD OF WATER SUPPLY HONOULIULI WATER RECYCLING FACILITY
S 15,000
S 15,500
S 16,000
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S 17,000
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E 9,000
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E 10,000
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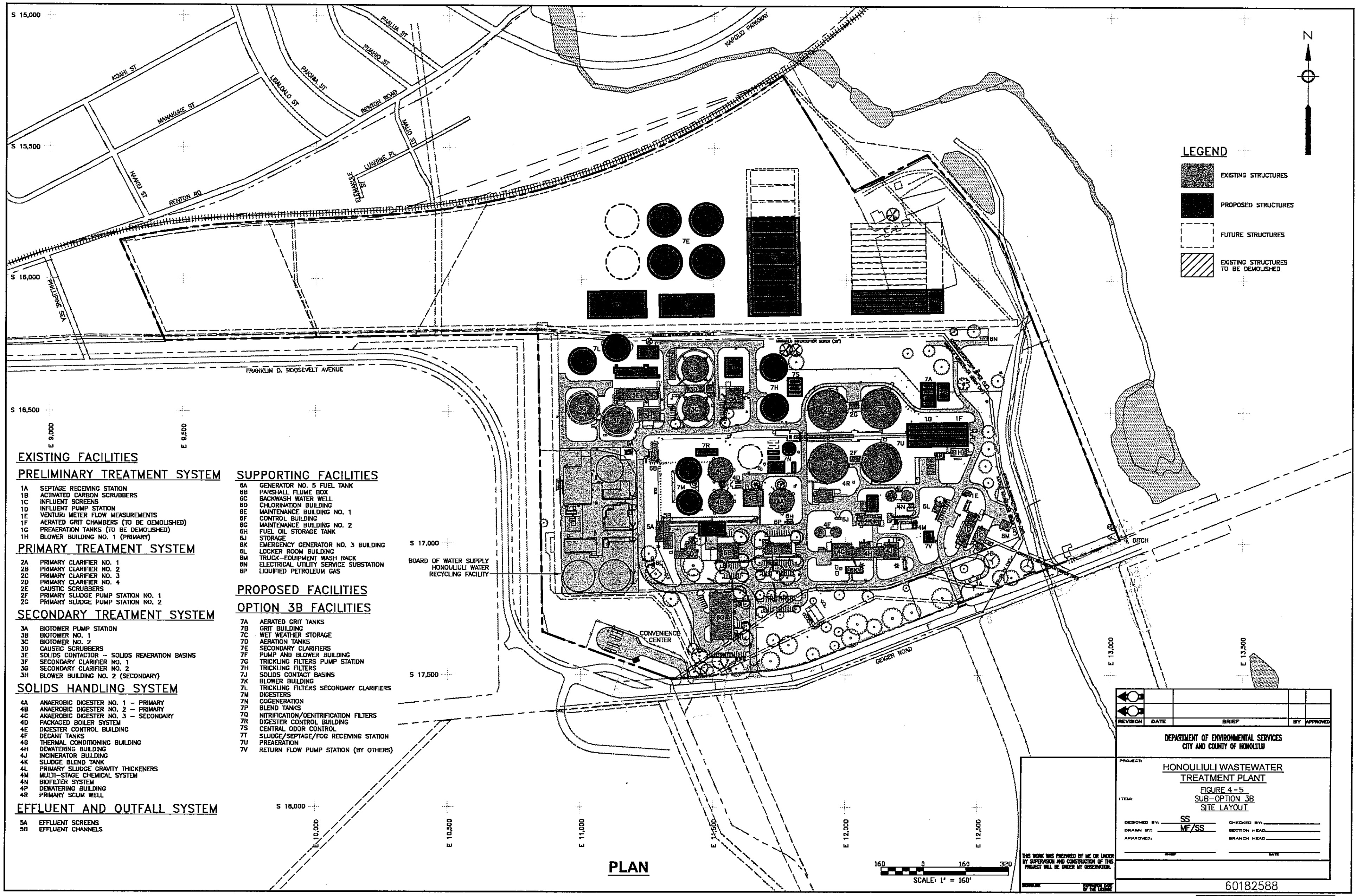
E 13,500
EXISTING FACILITIES
PRELIMINARY TREATMENT SYSTEM
1A SEPTAGE RECEIVING STATION
1B ACTIVATED CARBON SCRUBBERS
1C INFLUENT SCREENS
1D INFLUENT PUMP STATION
1E VENTURI METER FLOW MEASUREMENTS
1F AERATED GRIT CHAMBERS (TO BE DEMOLISHED)
1G PREAERATION TANKS (TO BE DEMOLISHED)
1H BLOWER BUILDING NO. 1 (PRIMARY)
PRIMARY TREATMENT SYSTEM
2A PRIMARY CLARIFIER NO. 1
2B PRIMARY CLARIFIER NO. 2
2C PRIMARY CLARIFIER NO. 3
2D PRIMARY CLARIFIER NO. 4
2E CAUSTIC SCRUBBERS
2F PRIMARY SLUDGE PUMP STATION NO. 1
2G PRIMARY SLUDGE PUMP STATION NO. 2
SECONDARY TREATMENT SYSTEM
3A BIOTOWER PUMP STATION
3B BIOTOWER NO. 1
3C BIOTOWER NO. 2
3D CAUSTIC SCRUBBERS
3E SOLIDS CONTACTOR – SOLIDS REAERATION BASINS
3F SECONDARY CLARIFIER NO. 1
3G SECONDARY CLARIFIER NO. 2
3H BLOWER BUILDING NO. 2 (SECONDARY)
SOLIDS HANDLING SYSTEM
4A ANAEROBIC DIGESTER NO. 1 – PRIMARY
4B ANAEROBIC DIGESTER NO. 2 – PRIMARY
4C ANAEROBIC DIGESTER NO. 3 – SECONDARY
4D PACKAGED BOILER SYSTEM
4E DIGESTER CONTROL BUILDING
4F DECANT TANKS
4G THERMAL CONDITIONING BUILDING
4H DEWATERING BUILDING
4J INCINERATOR BUILDING
4K SLUDGE BLEND TANK
4L PRIMARY SLUDGE GRAVITY THICKENERS
4M MULTI-STAGE CHEMICAL SYSTEM
4N BIOFILTER SYSTEM
4P DEWATERING BUILDING
4R PRIMARY SCUM WELL
EFFLUENT AND OUTFALL SYSTEM
5A EFFLUENT SCREENS
5B EFFLUENT CHANNELS
SUPPORTING FACILITIES
6A GENERATOR NO. 5 FUEL TANK
6B PARSHALL FLUME BOX
6C BACKWASH WATER WELL
6D CHLORINATION BUILDING
6E MAINTENANCE BUILDING NO. 1
6F CONTROL BUILDING
6G MAINTENANCE BUILDING NO. 2
6H FUEL OIL STORAGE TANK
6J STORAGE
6K EMERGENCY GENERATOR NO. 3 BUILDING
6L LOCKER ROOM BUILDING
6M TRUCK-EQUIPMENT WASH RACK
6N ELECTRICAL UTILITY SERVICE SUBSTATION
6P LIQUIFIED PETROLEUM GAS
PROPOSED FACILITIES
OPTION 3A FACILITIES
7A AERATED GRIT TANKS
7B GRIT BUILDING
7C WET WEATHER STORAGE
7D AERATION TANKS
7E SECONDARY CLARIFIERS
7F PUMP AND BLOWER BUILDING
7G DIGESTERS
7H COGENERATION
7J BLEND TANKS
7K NITRIFICATION/DENITRIFICATION FILTERS
7L DIGESTER CONTROL BUILDING
7M CENTRAL ODOR CONTROL
7N SLUDGE/SEPTAGE/FOG RECEIVING STATION
7P PREAERATION
7R RETURN FLOW PUMP STATION (BY OTHERS)
PLAN
160 0 160 320
SCALE: 1" = 160'
REVISION DATE BRIEF BY APPROVED
DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU
PROJECT:
HONOULIULI WASTEWATER TREATMENT PLANT
ITEM:
FIGURE 4-4
SUB-OPTION 3A
SITE LAYOUT
DESIGNED BY: SS
DRAWN BY: MF/SS
APPROVED:
CHECKED BY:
SECTION HEAD:
BRANCH HEAD:
DATE
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION.
SIGNATURE
60182588
DRAWING 00 C-141
SHEET X OF XX



LEGEND
EXISTING STRUCTURES
PROPOSED STRUCTURES
FUTURE STRUCTURES
EXISTING STRUCTURES TO BE DEMOLISHED
N
EXISTING FACILITIES
PRELIMINARY TREATMENT SYSTEM
1A SEPTAGE RECEIVING STATION
1B ACTIVATED CARBON SCRUBBERS
1C INFLUENT SCREENS
1D INFLUENT PUMP STATION
1E VENTURI METER FLOW MEASUREMENTS
1F AERATED GRIT CHAMBERS (TO BE DEMOLISHED)
1G PREAERATION TANKS (TO BE DEMOLISHED)
1H BLOWER BUILDING NO. 1 (PRIMARY)
PRIMARY TREATMENT SYSTEM
2A PRIMARY CLARIFIER NO. 1
2B PRIMARY CLARIFIER NO. 2
2C PRIMARY CLARIFIER NO. 3
2D PRIMARY CLARIFIER NO. 4
2E CAUSTIC SCRUBBERS
2F PRIMARY SLUDGE PUMP STATION NO. 1
2G PRIMARY SLUDGE PUMP STATION NO. 2
SECONDARY TREATMENT SYSTEM
3A BIOTOWER PUMP STATION
3B BIOTOWER NO. 1
3C BIOTOWER NO. 2
3D CAUSTIC SCRUBBERS
3E SOLIDS CONTACTOR – SOLIDS REAERATION BASINS
3F SECONDARY CLARIFIER NO. 1
3G SECONDARY CLARIFIER NO. 2
3H BLOWER BUILDING NO. 2 (SECONDARY)
SOLIDS HANDLING SYSTEM
4A ANAEROBIC DIGESTER NO. 1 – PRIMARY
4B ANAEROBIC DIGESTER NO. 2 – PRIMARY
4C ANAEROBIC DIGESTER NO. 3 – SECONDARY
4D PACKAGED BOILER SYSTEM
4E DIGESTER CONTROL BUILDING
4F DECANT TANKS
4G THERMAL CONDITIONING BUILDING
4H DEWATERING BUILDING
4J INCINERATOR BUILDING
4K SLUDGE BLEND TANK
4L PRIMARY SLUDGE GRAVITY THICKENERS
4M MULTI-STAGE CHEMICAL SYSTEM
4N BIOFILTER SYSTEM
4P DEWATERING BUILDING
4R PRIMARY SCUM WELL
EFFLUENT AND OUTFALL SYSTEM
5A EFFLUENT SCREENS
5B EFFLUENT CHANNELS
SUPPORTING FACILITIES
6A GENERATOR NO. 5 FUEL TANK
6B PARSHALL FLUME BOX
6C BACKWASH WATER WELL
6D CHLORINATION BUILDING
6E MAINTENANCE BUILDING NO. 1
6F CONTROL BUILDING
6G MAINTENANCE BUILDING NO. 2
6H FUEL OIL STORAGE TANK
6J STORAGE
6K EMERGENCY GENERATOR NO. 3 BUILDING
6L LOCKER ROOM BUILDING
6M TRUCK-EQUIPMENT WASH RACK
6N ELECTRICAL UTILITY SERVICE SUBSTATION
6P LIQUIFIED PETROLEUM GAS
PROPOSED FACILITIES
OPTION 3B FACILITIES
7A AERATED GRIT TANKS
7B GRIT BUILDING
7C WET WEATHER STORAGE
7D AERATION TANKS
7E SECONDARY CLARIFIERS
7F PUMP AND BLOWER BUILDING
7G TRICKLING FILTERS PUMP STATION
7H TRICKLING FILTERS
7J SOLIDS CONTACT BASINS
7K BLOWER BUILDING
7L TRICKLING FILTERS SECONDARY CLARIFIERS
7M DIGESTERS
7N COGENERATION
7P BLEND TANKS
7Q NITRIFICATION/DENITRIFICATION FILTERS
7R DIGESTER CONTROL BUILDING
7S CENTRAL ODOR CONTROL
7T SLUDGE/SEPTAGE/FOG RECEIVING STATION
7U PREAERATION
7V RETURN FLOW PUMP STATION (BY OTHERS)
BOARD OF WATER SUPPLY HONOULIULI WATER RECYCLING FACILITY
CONVENIENCE CENTER
FRANKLIN D. ROOSEVELT AVENUE
GEIGER ROAD
KAPOLEI PARKWAY
RENTON ROAD
RENTON RD
KOAHI ST
MANAKUKE ST
HAAKEI ST
LEIALOALO ST
PAIOHA ST
PUAHIO ST
PAALUA ST
MALIO ST
LUAHINE PL
ELEMAKULE ST
PHILLIPINE SEA
DITCH
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E 11,500
E 12,000
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E 13,500
PLAN
160 0 160 320
SCALE: 1" = 160'
REVISION DATE BRIEF BY APPROVED
DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU
PROJECT: HONOULIULI WASTEWATER TREATMENT PLANT
FIGURE 4-5
ITEM: SUB-OPTION 3B
SITE LAYOUT
DESIGNED BY: SS
DRAWN BY: MF/SS
APPROVED:
CHECKED BY:
SECTION HEAD:
BRANCH HEAD:
DATE
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION.
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DRAWINGOO C-163
SHEET X OF XX

4.3 Cost Estimate Comparison

The preliminary capital costs for each option are presented in Table 4-5.

Table 4-5. Comparison of WWTP Options

Parameter	Sub-option 1A	Sub-option 1B	Option 2	Sub-option 3A	Sub-option 3B
O&M Cost ($/yr)	$21.3M	$20.6M	$19.8M	$20.4M	$21.0M
Capital Cost	$563M	$546M	$454M	$505M	$568M
LIFE-CYCLE COST ($/YR)	**$37,800,000**	**$36,300,000**	**$32,900,000**	**$34,800,000**	**$37,400,000**

Note: Lifecycle cost includes the sum of the NPV of capital cost, and NPV of O&M cost minus the NPV of residual value in 2012 dollars for the planning period spanning 2012-2050
Source: *TM 12.C Secondary Treatment Process Evaluation and Selection*, AECOM 2012

4.4 Recommended Alternative

Phased implementation of Option 2 is recommended for the upgrade of the Honouliuli WWTP to full secondary treatment. Option 2 is the lowest capital and O&M cost option, additionally it would:

- Use the existing TF/SC process to the end of its useful life, maximizing the reuse of current assets
- Produce a higher quality secondary effluent than is currently produced at the WWTP with associated benefits for effluent reuse.
- Reduce future land use requirements with the smallest footprint of evaluated options
- Achieve ease of operation: only one process (at build out) and no need for separate nitrification and denitrification processes
- Require smallest dedicated wet weather storage basin volume (due to availability of redundant aeration tank volume for peak wet weather flow storage)

This option was further developed in *TM 12.O Conceptual Design Report and Preliminary Drawing Set* (AECOM, November 2014). Once the secondary treatment option was selected, the location of the treatment facilities and site layout components were refined.

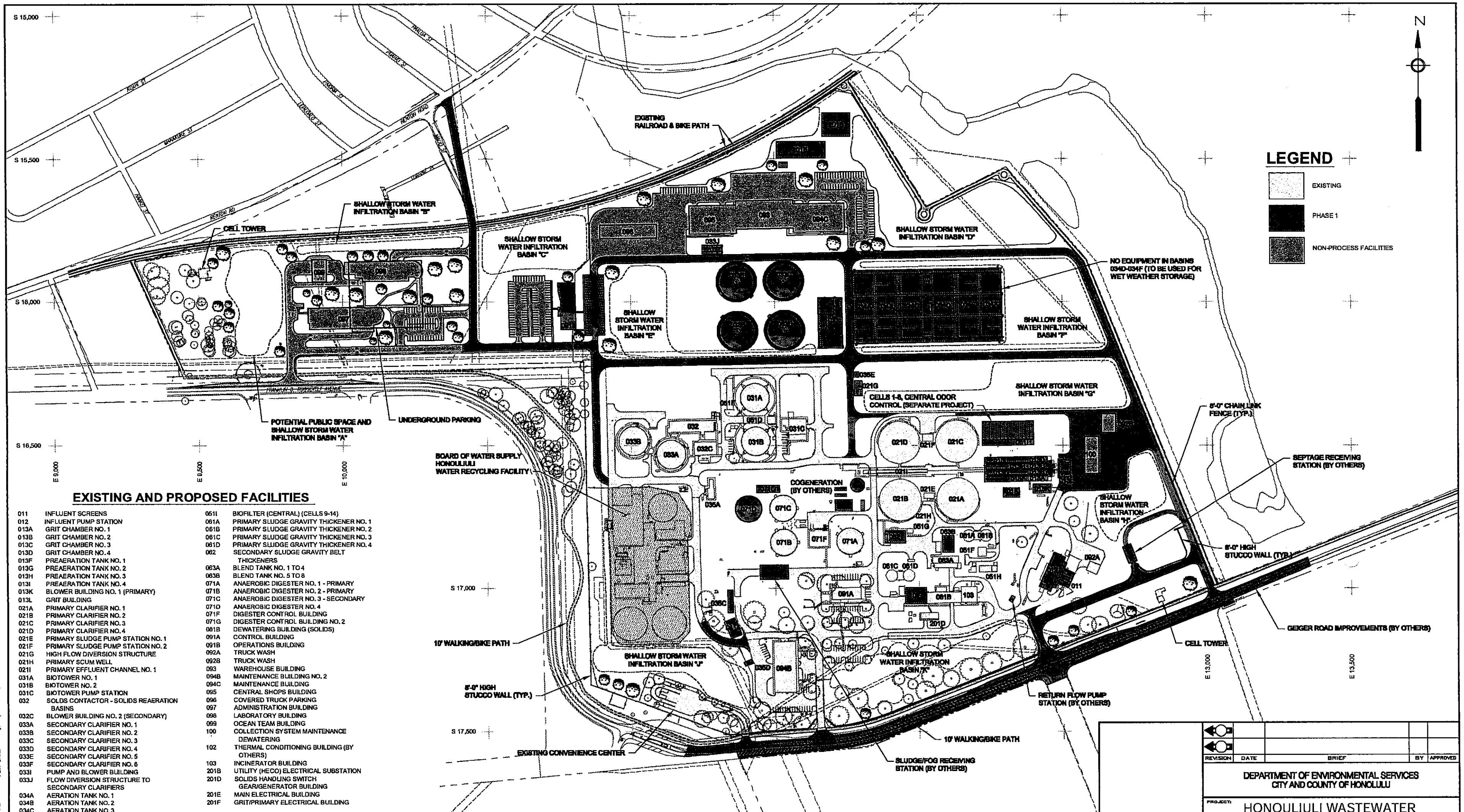
4.5 Recommended Site Layout

Potential facilities, including process related facilities for the Honouliuli WWTP (operations building, maintenance, warehouse, truck parking, collection system maintenance (CSM) dewatering, septage receiving station, and sludge receiving station) and non-process related facilities (administration building, laboratory building, ocean team boathouse, and central shops) have been proposed to be located at the Honouliuli WWTP site to accommodate the proposed secondary treatment upgrades and maximize use of available developable land. A summary of the anticipated staffing, building footprint, and parking needs for each proposed facility is provided in Table 4-6.

Multiple site layout concept alternatives were developed to conceptualize the potential for land use at the Honouliuli WWTP site for the ultimate build-out in Year 2050. Figure 4-6 presents the recommended general site layout for Option 2. There is the potential for a perimeter walking/biking path around the entire site, as shown on Figure 4-6, that would provide the public with a source of recreational activity. The path would be located outside the fenced areas. A separate entrance and parking area would be provided for users of the walking/biking path.

The total estimated construction cost, inclusive of the costs of upgrading the Honouliuli WWTP and the costs of constructing facilities at the Honouliuli WWTP required to relocate non-process related functions to the plant, is

$760 million. It is understood that some of these functional needs may be met at alternative off site locations in lieu of the Honouliuli WWTP site. In addition, several buildings may be restored or demolished; sites of demolished buildings would be made available for future operational needs. It is anticipated that further changes to the site layout, support structures, and buildings will occur as part of later detailed design efforts. However, for the purposes of evaluating potential environmental and social impacts of total site development, the site layout represents the location of all potential support facilities at the Honouliuli WWTP site.



EXISTING AND PROPOSED FACILITIES

011	INFLUENT SCREENS
012	INFLUENT PUMP STATION
013A	GRIT CHAMBER NO. 1
013B	GRIT CHAMBER NO. 2
013C	GRIT CHAMBER NO. 3
013D	GRIT CHAMBER NO. 4
013F	PREAERATION TANK NO. 1
013G	PREAERATION TANK NO. 2
013H	PREAERATION TANK NO. 3
013I	PREAERATION TANK NO. 4
013K	BLOWER BUILDING NO. 1 (PRIMARY)
013L	GRIT BUILDING
021A	PRIMARY CLARIFIER NO. 1
021B	PRIMARY CLARIFIER NO. 2
021C	PRIMARY CLARIFIER NO. 3
021D	PRIMARY CLARIFIER NO. 4
021E	PRIMARY SLUDGE PUMP STATION NO. 1
021F	PRIMARY SLUDGE PUMP STATION NO. 2
021G	HIGH FLOW DIVERSION STRUCTURE
021H	PRIMARY SCUM WELL
021I	PRIMARY EFFLUENT CHANNEL NO. 1
031A	BIOTOWER NO. 1
031B	BIOTOWER NO. 2
031C	BIOTOWER PUMP STATION
032	SOLDS CONTACTOR - SOLIDS REAERATION BASINS
032C	BLOWER BUILDING NO. 2 (SECONDARY)
033A	SECONDARY CLARIFIER NO. 1
033B	SECONDARY CLARIFIER NO. 2
033C	SECONDARY CLARIFIER NO. 3
033D	SECONDARY CLARIFIER NO. 4
033E	SECONDARY CLARIFIER NO. 5
033F	SECONDARY CLARIFIER NO. 6
033I	PUMP AND BLOWER BUILDING
033J	FLOW DIVERSION STRUCTURE TO SECONDARY CLARIFIERS
034A	AERATION TANK NO. 1
034B	AERATION TANK NO. 2
034C	AERATION TANK NO. 3
034D	AERATION TANK NO. 4
034E	AERATION TANK NO. 5
034F	AERATION TANK NO. 6
035	EFFLUENT SCREENS
035A	PARSHALL FLUME BOX
035C	SECONDARY EFFLUENT METERING
035D	FINAL EFFLUENT CHANNEL
035E	PRIMARY EFFLUENT METERING
051D	CAUSTIC SCRUBBERS (SECONDARY)
051E	GRANULAR ACTIVATED CARBON ADSORBERS (SECONDARY)
051F	BIOFILTER SYSTEM (PRIMARY SLUDGE)
051G	GRANULAR ACTIVATED CARBON ADSORBERS (SECONDARY SLUDGE)
051H	MULTI-STAGE CHEMICAL SYSTEM (SOLIDS DEWATERING)
051I	BIOFILTER (CENTRAL) (CELLS 9-14)
061A	PRIMARY SLUDGE GRAVITY THICKENER NO. 1
061B	PRIMARY SLUDGE GRAVITY THICKENER NO. 2
061C	PRIMARY SLUDGE GRAVITY THICKENER NO. 3
061D	PRIMARY SLUDGE GRAVITY THICKENER NO. 4
062	SECONDARY SLUDGE GRAVITY BELT THICKENERS
063A	BLEND TANK NO. 1 TO 4
063B	BLEND TANK NO. 5 TO 8
071A	ANAEROBIC DIGESTER NO. 1 - PRIMARY
071B	ANAEROBIC DIGESTER NO. 2 - PRIMARY
071C	ANAEROBIC DIGESTER NO. 3 - SECONDARY
071D	ANAEROBIC DIGESTER NO. 4
071F	DIGESTER CONTROL BUILDING
071G	DIGESTER CONTROL BUILDING NO. 2
081B	DEWATERING BUILDING (SOLIDS)
091A	CONTROL BUILDING
091B	OPERATIONS BUILDING
092A	TRUCK WASH
092B	TRUCK WASH
093	WAREHOUSE BUILDING
094B	MAINTENANCE BUILDING NO. 2
094C	MAINTENANCE BUILDING
095	CENTRAL SHOPS BUILDING
096	COVERED TRUCK PARKING
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100	COLLECTION SYSTEM MAINTENANCE DEWATERING
102	THERMAL CONDITIONING BUILDING (BY OTHERS)
103	INCINERATOR BUILDING
201B	UTILITY (HECO) ELECTRICAL SUBSTATION
201D	SOLIDS HANDLING SWITCH GEAR/GENERATOR BUILDING
201E	MAIN ELECTRICAL BUILDING
201F	GRIT/PRIMARY ELECTRICAL BUILDING

REVISION	DATE	BRIEF	BY	APPROVED

DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU

PROJECT: HONOULIULI WASTEWATER TREATMENT PLANT

SITE LAYOUT PHASE 1 PLAN

DESIGNED BY: T. HAMIC
DRAWN BY: M. FRANK
APPROVED:
CHECKED BY: ----
SECTION HEAD
BRANCH HEAD

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

SIGNATURE

EXPIRATION DATE OF THE LICENSE

JOB NO. W#-##

DRAWING 000 G-019 SHEET 19 OF 166

PATH/FILENAME: \\USHNL1FP003\DATA\PROJECTS\USIO\WASTEWATER\60182588-HONOULIULI FAC PLAN\400 TECH INFO\434 TASK 12\434.15 TASK 12.0 CONCEPTUAL DESIGN\DRAWINGS\CAD FILES\60228084-HONOULIULI WWTP\SHEETS\G\000 G-019A - NONPROCESS.DWG
LAST UPDATE: Tuesday, September 30, 2014 3:36:46 PM PLOT DATE: Tuesday, September 30, 2014 4:19:59 PM

Table 4-6. Functional Areas, Estimated Staffing, and Estimated Footprint

Functional Area	Existing/Proposed Facility	Estimated Staffing/Need	Estimated Footprint (Sq. Ft.)	Estimated Additional Parking Stalls [1]
Administration [2] (CSM, DDC, ENV, Refuse, and WTD)	Proposed	200 additional people	45,000 (100 ft × 450 ft)	240
BWS-HWRF [3]	Existing/Potential Expansion	1 RO storage tank	1-5 acres	Located within BWS site
Central Shops [2]	Proposed	125% of existing	23,000 (132 ft × 175 ft)	28
Convenience Center [2]	Existing	Same as existing	40,000 (100 ft × 400 ft)	Located within Convenience Center site
CSM Sewer Cleaning Debris [3]	Proposed	Same as existing	5,000 (50 ft × 100 ft)	2
DFM Storm Drain Debris [3]	Proposed	Same as existing	5,000 (50 ft × 100 ft)	30
Laboratory (Central) [2]	Proposed	42 additional people	Combined with Ocean Team	55
Maintenance [3]	Proposed	28 additional people [1]	45,000 (150 ft × 300 ft)	60
Multi-Purpose Rooms [2]	Within proposed Operations Bldg.	50 additional people	3,000 (40 ft × 75 ft)	Included with Admin Parking
Ocean Team [2]	Proposed	11 additional people	28,500 (100 ft × 285 ft)	10
Operations [3]	Proposed	31 additional people [1]	Within treatment processes	44
SCADA/Instrumentation (Central) [3]	Within proposed Admin Bldg.	8 additional people	2,250 (45 ft × 50 ft)	19
Secondary Treatment [3]	Proposed	Full secondary treatment	20 acres	None
Septage/FOG Receiving Station [3]	Existing	Same as existing	1,200 (20 ft × 60 ft)	None
Warehouse/Storage [3]	Proposed	200% of existing	25,600 (160 ft ×160 ft)	22
Solar Farm [2]	Proposed	10% of existing yearly kWh average (6,328,800 kWh)	1.6 acres (100 ft × 500 ft and 100 ft × 200 ft)	None
Truck Wash [3]	Proposed	Truck washing station to accommodate 2-3 trucks	4,000 (40 ft × 100 ft)	None
Estimated Total	—	370 additional staff	—	270 additional parking stalls

Legend: Admin = Administration; Bldg. = Building; DDC = Department of Design and Construction; DFM = Department of Facility Maintenance; FOG = fats, oils, and greases; kWh = kilowatt hour; WTD = Wastewater Treatment and Disposal.
[1] The parking indicated is for additional parking areas. With limited exception, existing parking throughout the site will not be replaced or removed.
[2] Non-process facility
[3] Process facility

4.5.1 Demolition of Existing Facilities

Areas, structures, and buildings identified for abandonment and demolition include:

- Chlorination Building
- Maintenance Building No. 1
- Control Building
- Effluent Channels, Screens and Structure

- Septage Receiving Station

The TF/SC secondary treatment system is anticipated to be demolished at the end of useful life prior to 2035, unless the facilities can be reused with upgrades and rehabilitation. If the land this system occupies becomes available, it could be considered for such uses as HWRF expansion, sludge handling, tertiary treatment, or support facilities. The timing of these future needs may be a factor in determining the end of life for the TF/SC treatment works. Any additional expansion would be subject to additional environmental review.

The Thermal Conditioning, Dewatering, and Incineration Buildings may be demolished to facilitate a larger sludge processing operation dependent on the outcome of the *Island-wide Sludge Management Plan*. However, if dewatering only is required in the future it is anticipated that at a minimum the Dewatering Building would remain with some interior modification.

The Aerated Grit Chamber and Preaeration Tanks structure will either be demolished or rehabilitated with modification. The determination of retaining the preaeration process and associated structure will be made following startup of the future treatment works.

4.5.2 Treatment Works

A pump and blower building is proposed within the proposed secondary treatment works. Placement of the grit removal system would depend on location of major access roads. It would be preferred to keep the grit removal system adjacent to the IPS for purposes of hydraulics and piping efficiencies. If the Geiger Road Sludge and Septage Receiving Entrance is converted into the new Main Entrance with access through the existing treatment works area, this would result in a separation of the IPS and grit removal system to opposite sides of the new drive.

4.5.3 Support Facilities

Leeward Maintenance, Central Shops, and the Warehouse would be located in one new contiguous structure north of the new secondary treatment works. The arrangement of the structure places the Leeward Maintenance and Central Shops areas such that they are connected with respective access on opposite sides of the building. This arrangement would facilitate the integration, separation, or reconfiguration of these respective functions to meet future needs. The warehouse would be situated in such a manner as to function independently while having ability to easily interface with Leeward Maintenance and Central Shops through interconnection within the same overall building structure. Due to the shipping and receiving functions of the warehouse, access would be provided from both sides of the facility.

4.5.4 Co-Located Facilities

Administration and Laboratory Buildings would be located on the northwest portion of the site in two separate buildings. These buildings would face each other across a courtyard area and would be arranged in an east to west manner to limit sun exposure on exterior walls and to face Roosevelt Avenue, which would be the primary entrance point. Reception, SCADA, and multifunction meeting/training areas would be located in the Administrative building. In addition to the outside parking shown, parking would be provided under the Administration and Laboratory Buildings.

The Ocean Team would be located in a new building adjacent to the laboratory, which would facilitate sample delivery and coordination purposes. The building and surrounding parking area would be provided with a separate fenced enclosure and security.

A new Operations Building would be provided west of the new secondary treatment works and the Leeward Maintenance, Central Shops, and Warehouse. This building location would facilitate operation of the new treatment works and administrative interactions with the Administration, Laboratory, and Leeward Maintenance, Central Shops, and Warehouse. However, this location would be on the far side of the site from the IPS, headworks, and main entrance points on Geiger Road.

The HWRF expansion area would be located directly north of its current location. Initially, the area north of the existing TF/SC treatment works would be available, with additional area becoming available at the end of the TF/SC useful life (between 2030 and 2035). Timing of land availability and space requirements would need to be coordinated to determine if this phasing would be suitable to meet HWRF needs.

The new Truck Washes and CSM Sewer Debris Drying Area would be located east and outside of the treatment works area. This area would need to be accessed using the same entrance as the Leeward Maintenance, Central Shops, and Warehouse.

4.5.5 Access Points and Vehicle Management

The Operations, Leeward Maintenance, Central Shops, and Warehouse functions could all access the site through what is currently the Geiger Road sludge and septage receiving entrance. This entrance would be expanded and improved to provide a four-way intersection with the "Ewa by Gentry" property across Geiger Road. It is anticipated that, at a minimum, Geiger Road would need to be provided with turn lanes, as well as acceleration and deceleration lanes, into and out of the property to accommodate large trucks (as discussed in Section 5.10 Traffic). The intent would be to route large truck traffic and shift worker vehicles around the perimeter of the site and not through the treatment works area.

The Leeward Maintenance, Central Shops, Warehouse, Truck Wash, CSM Sewer Debris Drying, and Refuse Convenience Center functions could also access the site through what is currently the Geiger Road additional property entrance. This entrance would be expanded and improved to provide turn lanes, as well as acceleration and deceleration lanes, into and out of the property to accommodate large trucks. Although this entrance would not be across Geiger Road from the "Ewa by Gentry" property in a way that would facilitate a four-way intersection, it would provide access to the maintenance, warehouse, and CSM activities without having to traverse through the treatment works area.

HWRF, Central Hauled Waste Receiving, Sludge and Fats, Oils, and Greases Receiving Station, and the Future Central Sludge Handling facilities could all access the site through the existing Geiger Road main entrance. With the understanding that these functions all operate independent of each other, with separate operating times and security requirements, the current single point of entry gate may need to be modified to provide separate gated entrances to each function. Other configurations may include modification of the treatment works fence to exclude these areas, with each of these areas having respectively fenced and secured areas.

The Administration, Ocean Team, and Laboratory Buildings could be accessed from Roosevelt Avenue through a new entrance. This entrance would also be the main receiving entrance for visitors to the treatment, operations, maintenance, or warehouse facilities. The Ocean Team would require daily access for boats and trailers. It is anticipated that Roosevelt Avenue would need to be provided with turn lanes, as well as acceleration and deceleration lanes into and out of the property, to accommodate the first shift (8am to 5pm) nature of the large number of office type workers.

Malio Street would be improved and the entrance to the property extended from the north to the south to the point of intersection with the gravity sewers, which run the length of the property from west to east. This could provide access to the Administration Building, Ocean Team Building, Laboratory Building, Operations Building, Leeward Maintenance, Central Shops, and Warehouse. This entrance would also provide access to Kapolei Parkway via Renton Road. Highway access via Kapolei Parkway may be more desirable for some activities, which may dictate future use and need for this entrance. It is anticipated that Malio Street and Renton Road, up to the Kapolei Highway intersection, would need to be improved to accommodate truck traffic to and from the site.

A new plant access road would be developed along the easement of the gravity sewers, which run the length of the property from west to east providing a "T" intersection with the Malio Street extension (Figure 4-6). This road would connect the Administration, Ocean Team, and Laboratory Building area to the treatment works, Operations Building, Leeward Maintenance, Central Shops, and Warehouse. Security at this access point could be monitored and controlled at the Operations Building. The development of multiple access points and interconnecting internal roads is important for providing alternative entrances in times of emergencies.

4.6 Project Funding

Funding for the project would be through the Sewer Revenue Bonds issued by the CCH; additionally CCH has an option to apply for a low interest loan from the state revolving fund (SRF) loan for some or all of the funds needed. This will be determined as the project is developed.

4.7 Project Phasing and Schedule

The FACD states that "CCH shall Complete Construction of facilities necessary to comply with secondary treatment standards of the [Clean Water] Act, as defined by 40 CFR Part 133, for wastewater discharges from the Honouliuli WWTP by the compliance milestone of June 1, 2024, and shall meet the following interim compliance milestones:

- By January 1, 2017, CCH shall execute a design contract and issue a notice to proceed with the design of all secondary treatment process facilities needed to comply with secondary treatment standards for wastewater discharges from the Honouliuli WWTP.
- By January 1, 2019, CCH shall execute a construction contract (or contracts) and issue a notice (or notices) to proceed with construction of all secondary treatment process facilities necessary to comply with secondary treatment standards for wastewater discharges from the Honouliuli WWTP.

The implementation of full secondary treatment as proposed in the PER is a two-phase build out (of Option 2) to eventually provide full secondary treatment using an AS process. Initially, the existing TF/SC process, with a capacity of 13 mgd or more depending on the interim process utilized and the number of new facilities constructed, would remain in service following appropriate rehabilitation to allow it to continue operation through to the end of its useful life (+/-2035). An AS process would be constructed to provide supplemental secondary treatment, with the intent to provide full AS treatment at the end of the TF/SC useful life. The TF/SC would treat a constant flow of 13 mgd and the AS process would be sized to handle peak flows, including wet weather flows. The proposed components for both of the phases for build-out of secondary treatment could be as follows:

- Phase 1 (completed 2023) – upgrade the secondary treatment design average capacity to 40 mgd and design peak capacity to 114 mgd.
  - Preliminary and primary treatment including four new influent mechanically cleaned screens, one new emergency bypass channel, six new influent pumps, and rehabilitation and modification of the existing grit removal system.
  - Existing TF/SC process (two TFs, four SC basins, and two secondary clarifiers) continue to remain in service.
  - Secondary treatment including six new AS aeration basins with anoxic selectors (three with aeration and mixing equipment and three without) and four new secondary clarifiers.
  - Wet weather storage provided by the three aeration basins without equipment installed.
  - Sludge processing to meet increase in sludge production due to additional flow and full secondary treatment.
  - Ancillary facilities consisting of a Pump and Blower Building to house aeration blowers, Return Active Sludge (RAS) pumps, waste activated sludge (WAS) pumps, and controls, and Main Electrical Building for electrical supply and backup power equipment.
- Phase 2 (completed 2035) – increase the design average capacity to 45 mgd and the design peak capacity to 126 mgd.
  - Existing TF/SC process (two TFs, four SC basins and two secondary clarifiers) decommissioned or re-purposed.
  - Secondary treatment modifications, including installing aeration and mixing equipment in three unfinished AS basins (previously used for offline wet weather storage), and two new secondary clarifiers (total of six).
  - Wet weather storage provided by wet weather storage basins.

- Sludge processing to meet increase in sludge production due to additional flow.
- Additional aeration blowers, RAS pumps, WAS pumps, and controls in the Pump and Blower Building and electrical supply and backup power equipment in the Main Electrical Building.

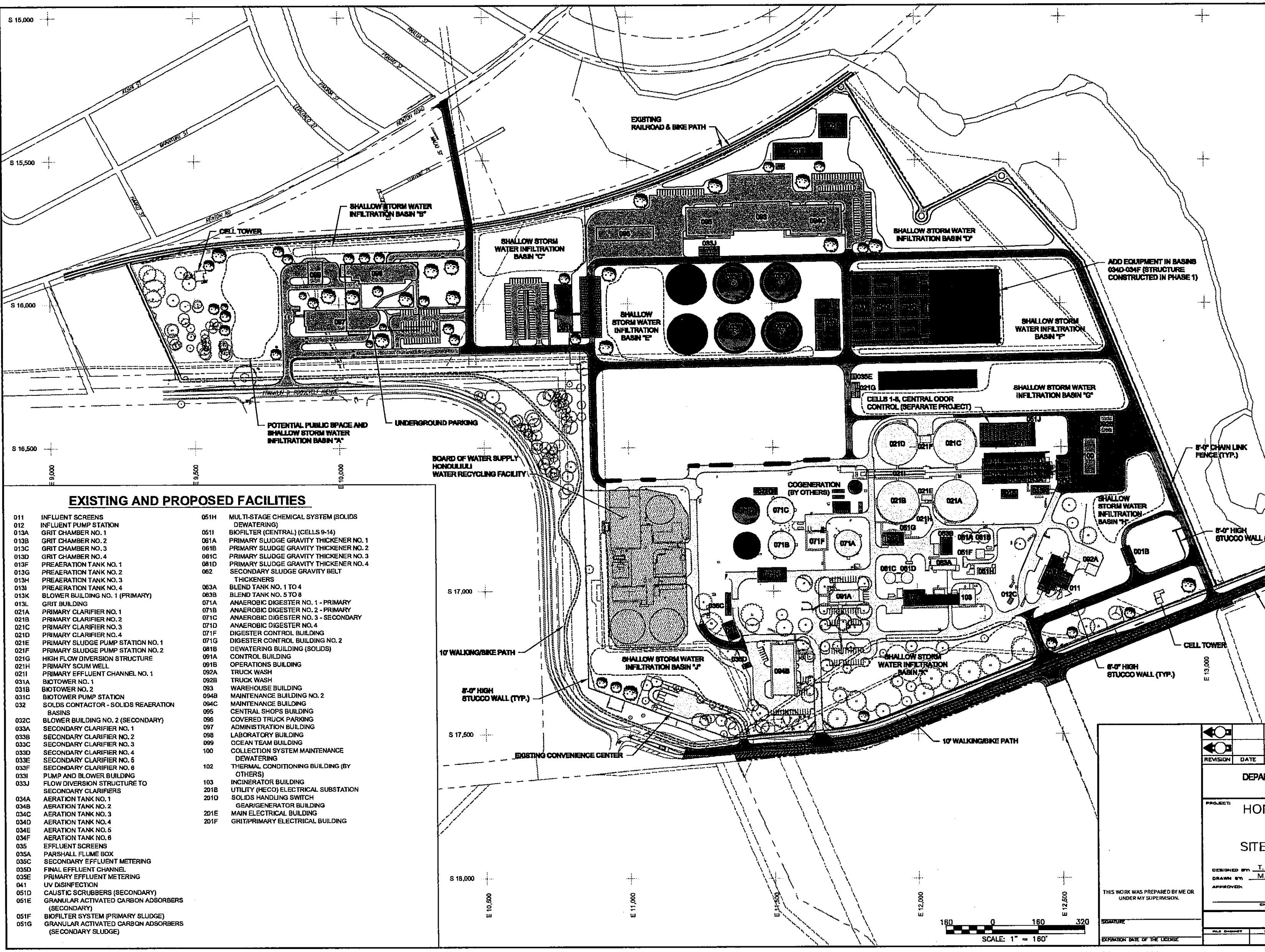
– Phase 3 (any work beyond 2050) – increase the design average capacity beyond 45 mgd and the design peak capacity beyond 126 mgd. Needs will be reassessed prior to Phase 3.

- Expansion of the odor control system may be required to address the odor control needs of the additional proposed facilities.

Figure 4-6, Figure 4-7, and Figure 4-8 present the recommended concept layouts for Phase 1, Phase 2, and Phase 3, respectively. These layouts are intended to provide implementation flexibility and dedicated function areas with independent access and operation. These recommendations may or may not be carried into detailed design and implementation.

In the interim, upgrades and maintenance would continue as issues arise.

Figure 4-9 shows the recommended timeline for the proposed Honouliuli WWTP upgrades. This FEIS only addresses Phase 1 and Phase 2, as Phase 3 concerns needs beyond the current planning period to 2050. Therefore, Phase 3 is not shown on this figure. Note that the planning/design portion of Phase 1 has begun, as described in this FEIS. Other potential phasing strategies may be applied as the design progresses.



LEGEND

N

- EXISTING
- PHASE 1
- NON-PROCESS FACILITIES
- PHASE 2

THE MINIMUM REQUIRED INFILTRATION AREA IS APPROXIMATELY 8.0 ACRES

INFILTRATION BASIN	AREA (ACRES)
A	1.29
B	0.41
C	1.27
D	3.78
E	1.50
F	2.56
G	2.41
H	0.26
J	1.50
K	3.64

TOTAL INFILTRATION AREA = 18.62 ACRES

THE PROJECT MEETS MINIMUM INFILTRATION AREA REQUIREMENTS

DESIGN CONSIDERATIONS:

1. THE SHALLOW STORM WATER INFILTRATION BASINS ARE SHOWN BEYOND WHAT IS REQUIRED. DURING DESIGN, THE FINAL LOCATIONS AND SIZES OF THESE BASINS WILL BE EVALUATED.
2. THE SHALLOW STORM WATER INFILTRATION BASINS MAY SERVE A DUAL PURPOSE AND ARE POTENTIAL LOCATIONS FOR PHOTOVOLTAICS, (SEE SHEET 000 E-003).

EXISTING AND PROPOSED FACILITIES

011	INFLUENT SCREENS
012	INFLUENT PUMP STATION
013A	GRIT CHAMBER NO. 1
013B	GRIT CHAMBER NO. 2
013C	GRIT CHAMBER NO. 3
013D	GRIT CHAMBER NO. 4
013F	PREAERATION TANK NO. 1
013G	PREAERATION TANK NO. 2
013H	PREAERATION TANK NO. 3
013I	PREAERATION TANK NO. 4
013K	BLOWER BUILDING NO. 1 (PRIMARY)
013L	GRIT BUILDING
021A	PRIMARY CLARIFIER NO. 1
021B	PRIMARY CLARIFIER NO. 2
021C	PRIMARY CLARIFIER NO. 3
021D	PRIMARY CLARIFIER NO. 4
021E	PRIMARY SLUDGE PUMP STATION NO. 1
021F	PRIMARY SLUDGE PUMP STATION NO. 2
021G	HIGH FLOW DIVERSION STRUCTURE
021H	PRIMARY SCUM WELL
021I	PRIMARY EFFLUENT CHANNEL NO. 1
031A	BIOTOWER NO. 1
031B	BIOTOWER NO. 2
031C	BIOTOWER PUMP STATION
032	SOLIDS CONTACTOR - SOLIDS REAERATION BASINS
032C	BLOWER BUILDING NO. 2 (SECONDARY)
033A	SECONDARY CLARIFIER NO. 1
033B	SECONDARY CLARIFIER NO. 2
033C	SECONDARY CLARIFIER NO. 3
033D	SECONDARY CLARIFIER NO. 4
033E	SECONDARY CLARIFIER NO. 5
033F	SECONDARY CLARIFIER NO. 6
033I	PUMP AND BLOWER BUILDING
033J	FLOW DIVERSION STRUCTURE TO SECONDARY CLARIFIERS
034A	AERATION TANK NO. 1
034B	AERATION TANK NO. 2
034C	AERATION TANK NO. 3
034D	AERATION TANK NO. 4
034E	AERATION TANK NO. 5
034F	AERATION TANK NO. 6
035	EFFLUENT SCREENS
035A	PARSHALL FLUME BOX
035C	SECONDARY EFFLUENT METERING
035D	FINAL EFFLUENT CHANNEL
035E	PRIMARY EFFLUENT METERING
041	UV DISINFECTION
051D	CAUSTIC SCRUBBERS (SECONDARY)
051E	GRANULAR ACTIVATED CARBON ADSORBERS (SECONDARY)
051F	BIOFILTER SYSTEM (PRIMARY SLUDGE)
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REVISION	DATE	BRIEF	BY	APPROVED

DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU

PROJECT: HONOULIULI WASTEWATER TREATMENT PLANT

SITE LAYOUT PHASE 2 PLAN

DESIGNED BY: T. HAMIC
DRAWN BY: M. FRANK
APPROVED:
CHECKED BY:
SECTION HEAD:
BRANCH HEAD:
CHIEF
DATE

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

SIGNATURE

EXPIRATION DATE OF THE LICENSE

JOB NO. W#-##

SCALE: 1" = 160'
160 0 160 320

DRAWING 000 G-022 SHEET 20 OF 166

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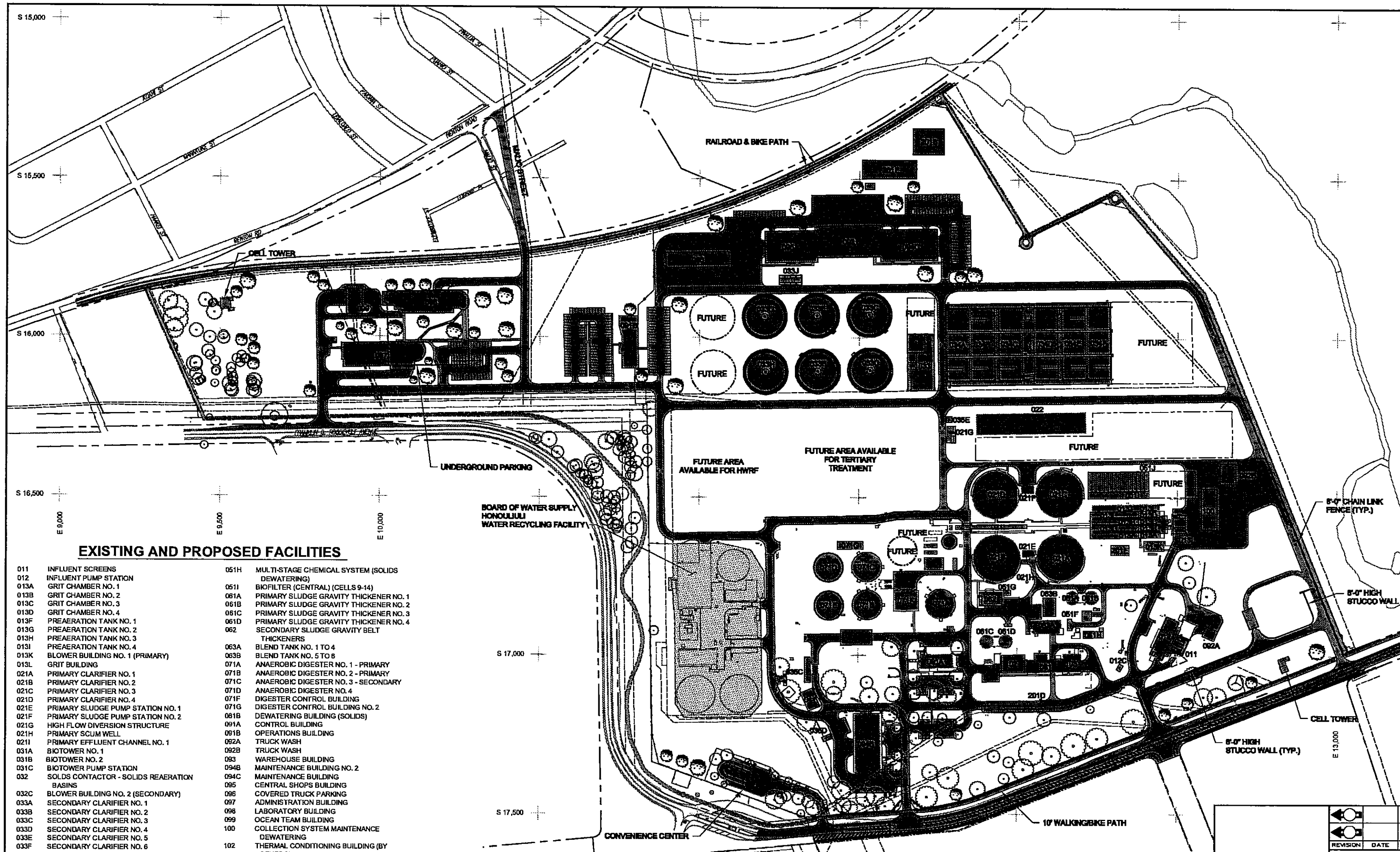

LEGEND

EXISTING

FUTURE

THE MINIMUM REQUIRED INFILTRATION AREA IS APPROXIMATELY 8.0 ACRES

INFILTRATION BASIN	AREA (ACRES)
A	1.29
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033E	SECONDARY CLARIFIER NO. 5
033F	SECONDARY CLARIFIER NO. 6
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034F	AERATION TANK NO. 6
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035A	PARSHALL FLUME BOX
035C	SECONDARY EFFLUENT METERING
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160 0 160 320
SCALE: 1" = 160'

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

SIGNATURE

EXPIRATION DATE OF THE LICENSE

REVISION	DATE	BRIEF	BY	APPROVED

DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU

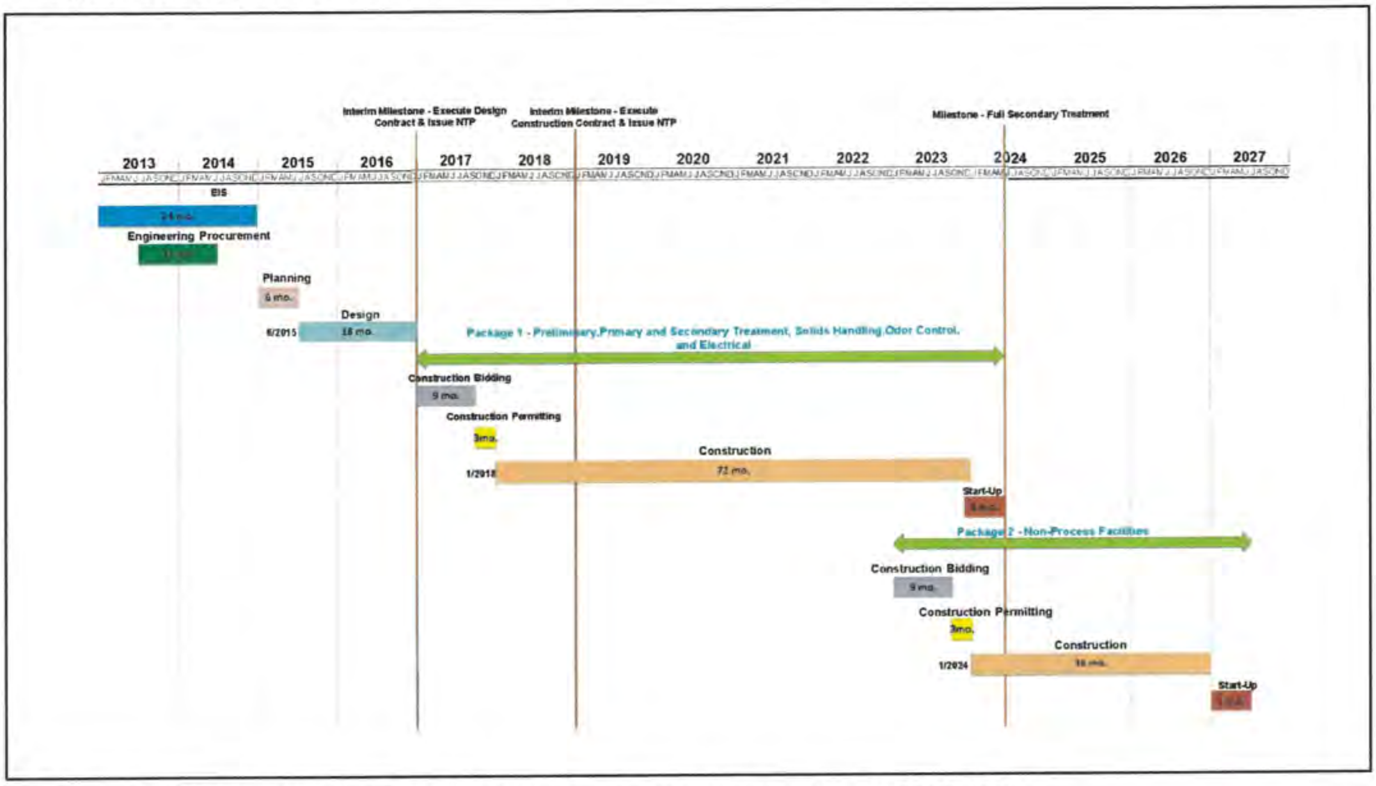
PROJECT: HONOULIULI WASTEWATER TREATMENT PLANT SITE LAYOUT PLAN BEYOND 2050

DESIGNED BY: ----
DRAWN BY: ----
APPROVED:
CHECKED BY: ----
SECTION HEAD
BRANCH HEAD
CHIEF
DATE

JOB NO. W#-##

DRAWING 000 G-023 SHEET 21 OF 166

Figure 4-9. Recommended Timeline



Reference: Honouliuli/Waipahu/Pearl City Wastewater Facilities Plan Final PER (AECOM, 2016)

5 EXISTING ENVIRONMENT, IMPACTS AND MITIGATION MEASURES

This section discusses preliminary findings and information on the existing environment, potential impacts and mitigation measures for the proposed project. The existing environmental conditions in the project area are presented where data is available; however, where sufficient detail to characterize the area is not available, general information and characteristics on the larger sewer basin or the island are provided. Geographic information system (GIS) information used in this document is from the following sources: 1) HoLIS provided by the CCH DPP, 2) Hawaii State GIS Program provided by the DBEDT, and 3) data from the United States Census Bureau (USCB) and the Oahu Metropolitan Planning Organization (OMPO) (incorporated into GIS for socioeconomic analysis). The study area (the geographic area that would be most affected by the proposed expansion and upgrading of the Honouliuli WWTP and relocating of non-process related functions and facilities from the Sand Island WWTP and other locations to the Honouliuli WWTP) for each environmental parameter is typically within the immediate vicinity of the Honouliuli WWTP unless otherwise discussed (i.e., socioeconomics). A future baseline or future without the project was considered for some technical analyses (i.e., traffic, air, and noise), when applicable.

Whenever practicable, potential impacts are divided into Construction Impacts and Operational Impacts. Construction Impacts are, in general, short term impacts due to construction activities. Operational Impacts are, in general, long term impacts from normal operation of the facilities. Mitigation measures that would reduce the impact of construction or operation of the alternatives on the natural environment are presented. No off site work is proposed as part of the proposed project; therefore, the potential direct impacts associated with the project reflect proposed activities solely within the Honouliuli WWTP site.

This project would be designed to the extent possible to: 1) avoid, 2) minimize and 3) mitigate impacts of the proposed project on existing resources in the project area.

5.1 Climate

5.1.1 Existing Setting

The climate in Hawaii is considered subtropical with annual temperatures in the project area ranging from 60°F to 85°F and mean monthly temperatures ranging from 73°F in January and February to 81°F in August. The mean annual rainfall in the project area ranges from 50 to 76 cm (20 to 30 inches). The project area is located within the leeward physiographic zone of Oahu; therefore, the area experiences relatively low rainfall. The islands are exposed to trade and Kona winds. Trade winds are from the northeast and prevail approximately 70 percent of the time. Kona winds are from the south. Average wind in the area ranges from 15 to 25 mph with gusts over 35 mph.

5.1.2 Impacts and Mitigation Measures

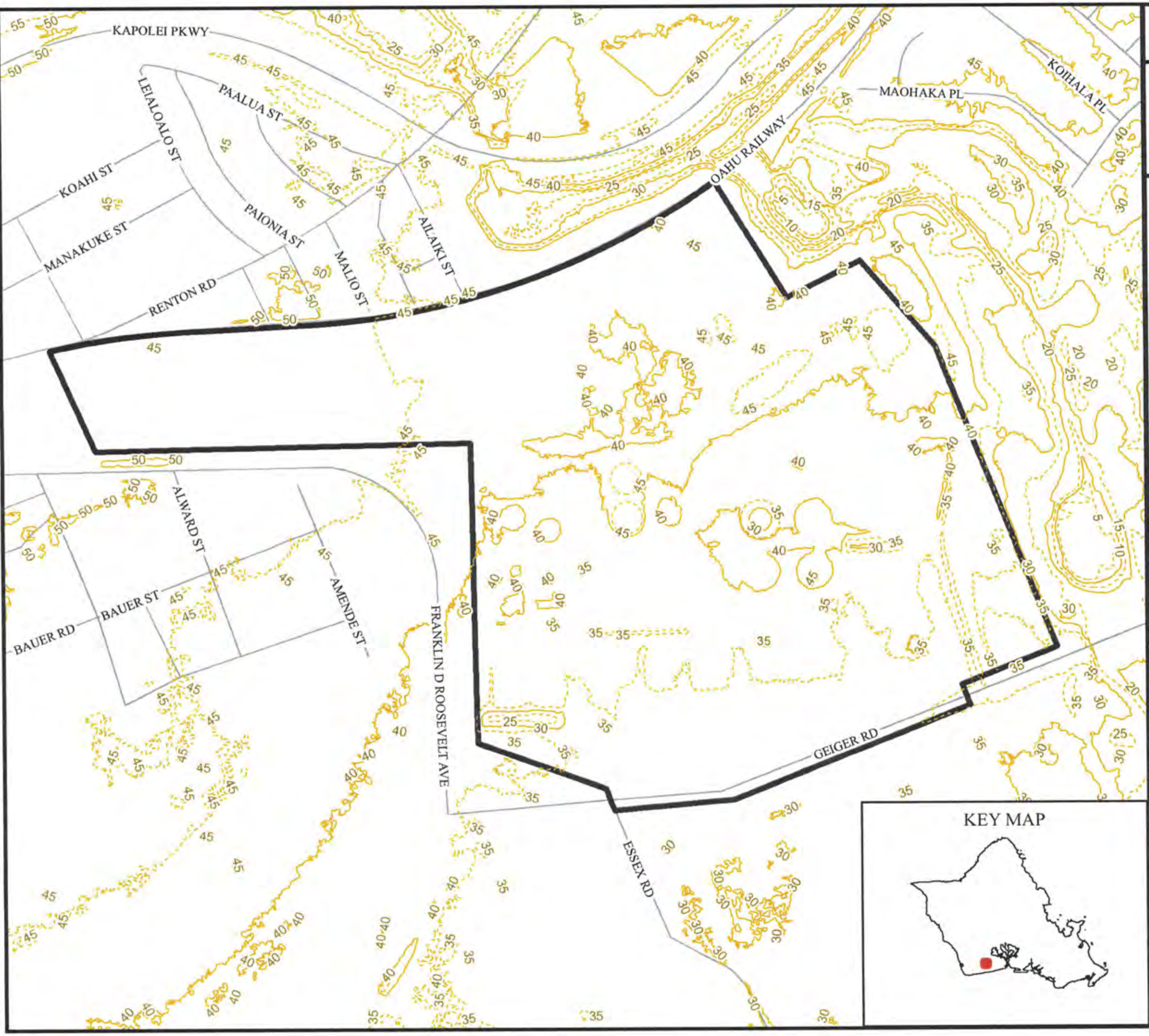
No significant impacts on climate in the project area are anticipated as a result of construction or operation regardless of the alternative selected. Parameters such as temperature, wind, or rainfall levels are not anticipated to be affected. Therefore, no mitigation measures are proposed.

5.2 Physiography

5.2.1 Geology and Topography

5.2.1.1 Existing Setting

The eastern portion of the island of Oahu, where the WWTP site is located, was created by the (inactive) Waianae volcano. The WWTP is located within the coastal plain area called the Ewa Plains, south of the Schofield plateau. Topography within the Ewa plains in the vicinity of the WWTP is gently sloping and relatively flat. Elevation at the WWTP property ranges from 25 ft mean sea level (MSL) in the southern portion of the site to 45 ft MSL in the northern portion of the site (Figure 5-1).



City and County of Honolulu

HONOULIULI/ WAIPAHU/ PEARL CITY WASTEWATER FACILITIES PLAN

Legend

- Honouliuli WWTP
- Elevation Contours
  - 10-ft contours
  - 5-ft contours
- Street

0 500
Feet
1 inch = 500 feet

FIGURE 5-1

TOPOGRAPHY

December 2014

AECOM

1001 BISHOP ST, STE 1600
HONOLULU, HAWAII 96813

G:\Projects\MUNI\60220849HON\Maps\EI\Figure_5-1 Topography.mxd

5.2.1.2 Construction Impacts and Mitigation Measures

Regardless of the alternative selected, construction of the project is not anticipated to impact the geology of the project area. The WWTP site, in which the proposed upgrades and secondary treatment improvement alternatives and the potential siting of new facilities would be located (as well as proposed roadway improvements and construction of new WWTP site entrances), is highly developable (relatively flat to moderately sloping) land, so relatively minimal alterations to the topography of the site would be required. Excavation and trenching may be necessary for construction of facilities and installation of utilities.

5.2.1.3 Operational Impacts and Mitigation Measures

It is anticipated that the normal operation of the proposed facilities would not affect the topography or geology of the project site. Excavation and trenching may be necessary for emergency work on the proposed facilities.

5.2.2 Soils

5.2.2.1 Existing Setting

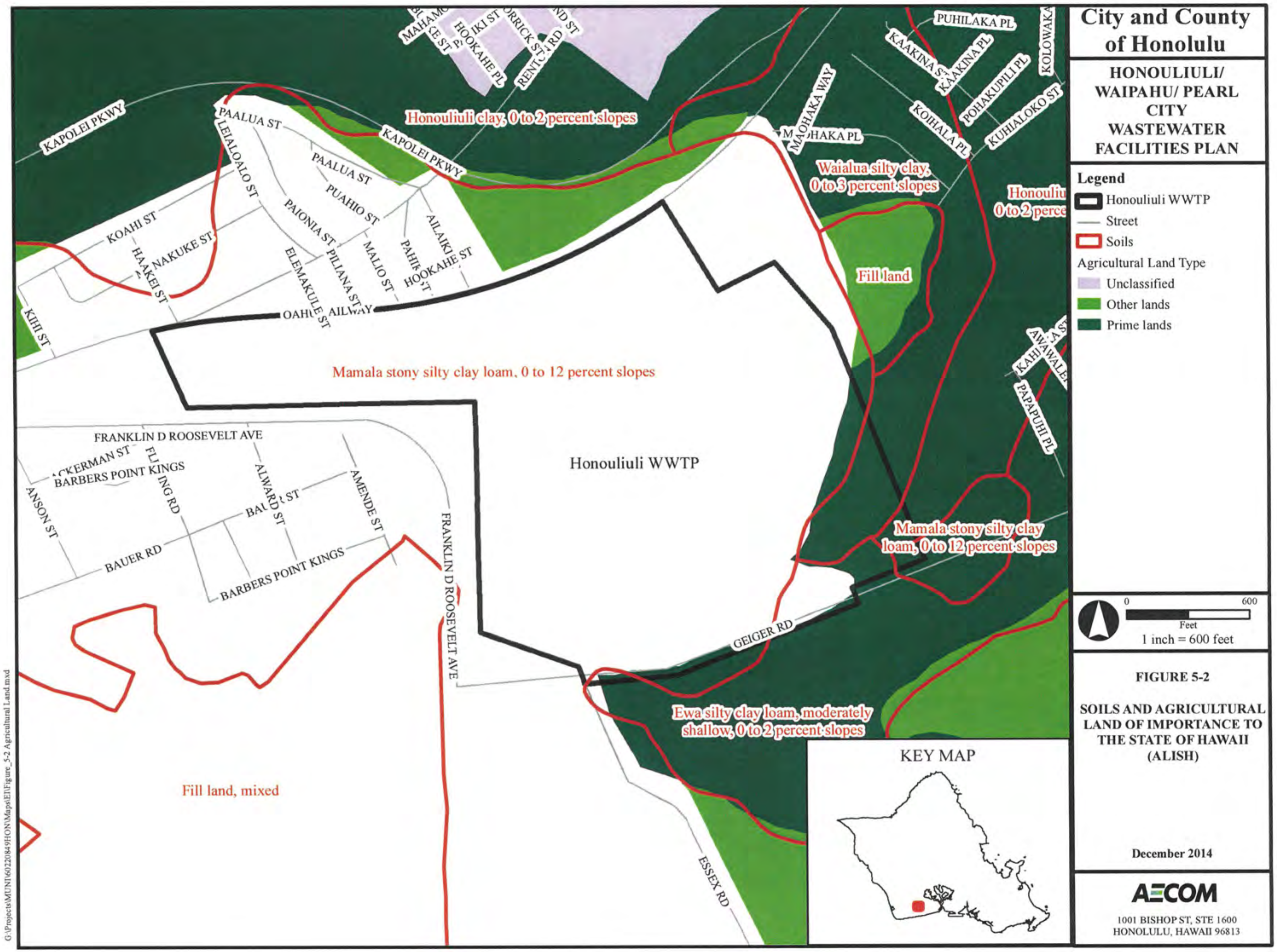
Three soil suitability studies have been prepared for lands in Hawaii. The principal focus of these studies is to describe the physical attributes and relative productivity of different land types for agricultural production within the State of Hawaii. The three studies are the U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (formerly U.S. Soil Conservation Service) Soil Survey, the University of Hawaii Land Study Bureau Detailed Land Classification, and the State of Hawaii Department of Agriculture's Agricultural Lands of Importance to the State of Hawaii (ALISH).

According to the USDA Soil Conservation Service (SCS) Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii (USDA SCS 1972), there are seven soil associations on Oahu, one of which is located at the WWTP site. The soil association in the project area is Lualualei-Fill land-Ewa association defined as: deep, nearly level to moderately sloping, well-drained soils that have a fine textured or moderately fine textured subsoil or underlying material and areas of fill land located on coastal plains.

Soils on the site are classified primarily as Mamala stony silty clay loam, 0 to 12% slopes; with a small portion of Ewa silty clay loam, moderately shallow, 0 to 2% slopes; and Waialua silty clay on 0 to 3% slopes in the southeastern corner of the Honouliuli WWTP property (Figure 5-2).

Other soil information was gathered from the Hawaii Statewide GIS Program website including information on erosion potential of the land, agricultural productivity and ALISH. The erosion potential of the land in the project area is considered potentially highly erodible.

Agricultural productivity within the limits of the WWTP site is considered unclassified, with the exception of an area of prime agricultural land in the southeastern corner of the site, as shown on Figure 5-2. Prime agricultural land/prime farmland is defined by the USDA Natural Resource Conservation Service (NRCS) as land best suited for the production of food, feed, forage and fiber crops. Although the area has historically been utilized for agricultural purposes, the WWTP site has since been developed and urbanized; therefore, it would be considered unsuitable for crop production, either because the land value of the property is too high for unsubsidized agricultural use or because crop production would be incompatible with surrounding land uses. There are no regulations specific to this designation; however, federally assisted/managed/funded projects may be subject to the Farmland Protection Policy Act (FPPA) (USDA NRCS 1981). According to Part 523, Subpart B, 523.10B(ii) of the FPPA Manual, lands identified as "urbanized area" (UA) on USCB maps are not subject to provisions of the FPPA (USDA NRCS 2013). The Honouliuli WWTP is located within an area designated as UA as shown on the 2010 Census – Urbanized Area Reference Map for Urban Honolulu (USCB 2012); therefore, it is not anticipated that the project would be subject to the FPPA.


City and County of Honolulu
HONOULIULI/ WAIPAHU/ PEARL CITY WASTEWATER FACILITIES PLAN
Legend
Honouliuli WWTP
Street
Soils
Agricultural Land Type
Unclassified
Other lands
Prime lands
0
600
Feet
1 inch = 600 feet
FIGURE 5-2
SOILS AND AGRICULTURAL LAND OF IMPORTANCE TO THE STATE OF HAWAII (ALISH)
December 2014
AECOM
1001 BISHOP ST, STE 1600
HONOLULU, HAWAII 96813
KEY MAP
Honouliuli clay, 0 to 2 percent slopes
Waialua silty clay, 0 to 3 percent slopes
Fill land
Mamala stony silty clay loam, 0 to 12 percent slopes
Honouliuli WWTP
Mamala stony silty clay loam, 0 to 12 percent slopes
Ewa silty clay loam, moderately shallow, 0 to 2 percent slopes
Fill land, mixed
KAPOLEI PKWY
PAALUA ST
LEIALOALO ST
PAIONIA ST
PUAHIO ST
PILIANA ST
MALIO ST
ELEMAKULE ST
AILAIKI ST
HOOKAHE ST
KOAHI ST
HAAKEI ST
KIHI ST
FRANKLIN D ROOSEVELT AVE
BARBERS POINT KINGS
ANSON ST
ALWARD ST
AMENDE ST
BAUER RD
GEIGER RD
ESSEX RD
MAOHAKA WAY
KOIHALA PL
POHAKUPILI PL
KUHIALOKO ST
PUHILAKA PL
KAAKINA PL
PAPAPUHI PL
HOOKAHE PL
G:\Projects\MUNI\60220849HON\Maps\EI\Figure_5-2 Agricultural Land.mxd

5.2.2.2 Construction Impacts and Mitigation Measures

For all alternatives considered, construction activities would result in impacts to the soils in the project area, including soil loss. Excavation of approximately 673,250 cubic yards is likely to be necessary for the construction of new structures within the WWTP site; not including the potential for construction of an underground parking garage (the option to build underground parking is currently conceptual). Roadway improvements and construction of new entrances may also impact local soils. Section 5.13.3.2 provides more detail on the excavation quantities. The majority of the soil would be reused on site.

In addition, regardless of the alternative selected, localized contamination of soils could result from construction activities, as there is the potential for accidental release of construction equipment fluids (e.g., oil and grease) or damage to existing utility lines.

Mitigation measures would be implemented during construction activities to minimize the potential for impacts. Since construction of the project would require grading of 7,500 square feet or more of land, a drainage and erosion control plan would be prepared by an engineer and submitted for approval by the CCH Department of Planning and Permitting, in accordance with the CCH Permits, Bonds and Inspection for Grading, Soil Erosion and Sediment Control Regulations (14 Regulations of Honolulu 14.2(c)). Construction methods to preserve the integrity of existing facilities would be implemented and construction equipment would be maintained in good working condition to reduce the potential for accidental spills. In addition, although construction activities would involve grading and excavation, mitigation measures such as erosion and sedimentation controls (i.e., silt fence, filter bags) would be implemented to reduce impacts to the natural environment. Soil which is not immediately used for backfilling would be stockpiled and covered or otherwise protected (e.g., surrounded by silt fence) to prevent erosion or sedimentation. In addition, temporary seeding and mulching may be used to minimize soil erosion and provide soil stabilization on slopes.

For more details on construction impacts and mitigation refer to Section 5.13.3.2. – *Solid Waste Disposal, Construction Impacts and Mitigation Measures.*

5.2.2.3 Operational Impacts and Mitigation Measures

The primary objective of all the alternatives is to upgrade and improve the existing WWTP; thereby, providing capacity for future flows and secondary treatment. However, even with an improved system, there is the potential for wastewater spills to occur which would result in contamination of the soils. Soils stability inspections near the proposed facilities would need to be conducted periodically to make sure there are no issues with the foundation of the facilities.

The larger stormwater BMP system, including stormwater detention/infiltration basins at several locations within the project area and vegetated drainage swales, would enhance drainage and erosion control during operation. With the implementation of the BMP system, this project is not anticipated to result in operational impacts to soils.

5.3 Hydrology

5.3.1 Groundwater

5.3.1.1 Existing Setting

The Honouliuli WWTP site is located within the Waipahu-Waiawa system within the Pearl Harbor State of Hawaii Department of Land and Natural Resources (DLNR) aquifer sector. The sustainable yield for the Waipahu-Waiawa system is approximately 16 MGD, and it is the primary source of drinking water for the study area. The closest well to the WWTP site is approximately 3.1 miles to the north. The WWTP site is also located within the Southern Oahu Basal Aquifer, which is designated as a Sole Source Aquifer by the EPA. EPA review is required for federally funded projects within a Sole Source Aquifer to determine if there is potential for contamination. EPA review is not required for state, local, or privately funded projects (EPA 2014).

Groundwater moves downward until it encounters impermeable geological features and contributes to the freshwater (Ghyben-Herzberg) lens or emerges as springs. In Hawaii, the thickness of the lens generally decreases seaward, but it can be "dammed" near the coastline by sediments or limestone caprock. The majority of the water supply on Oahu is from the freshwater within these aquifer systems. There are no public groundwater wells within a one-mile radius of the WWTP site (SWCA 2015).

Groundwater recharge is a potentially feasible effluent use in addition to irrigation and industrial use that has been identified for Honouliuli effluent. According to *Water Reuse: Issues, Technologies, and Applications* (Metcalf & Eddy 2007), "groundwater recharge has been used to: (1) reduce, stop, or even reverse declines of groundwater levels; (2) protect underground freshwater in coastal aquifers against saltwater and brackish water intrusion; and (3) store surface water, including flood or other surplus water and reclaimed water, for future reuse." In groundwater recharge, the effluent moves from the surface water to the groundwater via the vadose layer. The soils, sand, and roots in the vadose layer act as a filter before the effluent reaches the groundwater.

5.3.1.2 Construction Impacts and Mitigation Measures

It is anticipated that limits would be applied to the Honouliuli WWTP effluent if the reclaimed water from the HWRF were considered for aquifer recharge, or reuse irrigation per current *Guidelines for the Treatment and Use of Recycled Water* (DOH 2002), hereafter referred to as the *Reuse Guidelines*. The proposed limits are shown in Table 5-1. Discharge locations for groundwater recharge have not been identified yet.

Table 5-1. Irrigation or Groundwater Recharge Criteria

Parameter	Limit
BOD_5, mg/L	30
TSS, mg/L	30
Total Nitrogen, mg/L	10
Total Phosphorus, mg/L	1
Turbidity, NTU	2
Fecal Coliform, per 100 mL	2.2 [(1)]

Legend: mL = milliliter.
Source: DOH 2002
[(1)] For disinfected R-1 Water.

Regardless of the alternative selected, construction activities could potentially impact groundwater if encountered during construction (e.g., potential for accidental release of construction equipment fluids (e.g., oil and grease)). Mitigation measures would be implemented during construction activities to preserve the integrity of existing infrastructure (sewer piping, etc.) and keep construction equipment in good working condition to prevent accidental spills. Also, dewatering may be necessary for construction that occurs below the groundwater table, including construction of a potential underground parking facility. Any construction activity occurring in or near groundwater would be conducted in accordance with applicable regulations. In addition, appropriate BMPs (e.g., silt fences, proper storage and movement of spoil), monitoring of groundwater and careful site preparation would be utilized to minimize adverse impacts.

5.3.1.3 Operational Impacts and Mitigation Measures

The stormwater detention/infiltration basins proposed at several locations within the project area may have an effect on the local groundwater table by raising the local groundwater table near the basins during and for some time after rain events (groundwater mounding). Since these basins would be designed as part of a larger stormwater BMP system including vegetated drainage swales, this system is anticipated to enhance the quality of stormwater recharge to groundwater.

Regardless of the alternative selected, this project is being implemented to reduce the potential of sanitary sewer overflows (SSOs) by increasing capacity of the existing treatment system for current and future needs. The proposed increase in capacity could also enable and/or encourage currently unsewered areas to connect to a centralized system, as was conservatively assumed for flow projections for design purposes. Unsewered areas in the sewer basin are on individual wastewater systems (IWSs). IWSs, if not maintained properly, may contaminate groundwater.

The conversion of existing on-site wastewater treatment population to sewered population may also result in a reduction to local groundwater recharge, as its wastewater no longer would be discharged to the groundwater, but would be conveyed to the WWTP and discharged at the ocean outfall. Depending on the sub-basin area, this could have localized effects on groundwater levels.

As with any wastewater system, there is the potential for leakage and breakage in sewerlines that would result in impacts to groundwater; therefore, mitigation measures for the operational impacts include proper operation and maintenance of the proposed facilities.

5.3.2 Surface Water

A natural resources survey, including a discussion of streams in the vicinity of the proposed project, was conducted by SWCA in November 2014 (SWCA 2015), and is attached as Appendix B and summarized below as it pertains to the project site and immediate vicinity.

5.3.2.1 Existing Setting

A National Wetland Inventory (NWI)-mapped wetland (former drainage ditch) is located in the eastern portion of the property, generally oriented north-south, as shown on Figure 5-3. This wetland is part of the abandoned irrigation system from when the area was used for agricultural purposes and no longer functions as an active irrigation ditch. Some standing water may be observed during rain events; however, surface water does not appear to persist throughout the year.

In addition, the Kaloi Gulch Stream lies to the north of the site and several small ponds associated with Coral Creek Golf Course are located to the east of the project site, as shown on Figure 5-3. Wetlands. Several of these small ponds are connected by small stream segments.

5.3.2.2 Construction Impacts and Mitigation Measures

Erosion and sedimentation measures would be employed where necessary during construction activities; therefore, nearby off site surface waters are not anticipated to be impacted as a result of stormwater during construction activities. Construction activities will also be conducted in compliance with a CWA 402 NPDES Construction Stormwater Permit issued by the Department of Health – Clean Water Branch.

The existing abandoned irrigation ditch described above would be permanently impacted (filled) during site construction. Since this ditch is no longer used for irrigation purposes, no impacts to the ability to irrigate within the vicinity of the proposed project are anticipated. The project team will consult with the Army Corps of Engineers, U.S. Fish and Wildlife, CCH, and other regulatory agencies, as necessary, to determine whether filling the former irrigation ditch is jurisdictional under current regulations. If the ditch is determined to be jurisdictional by one or more agencies, then the project team would work with the appropriate agencies to determine acceptable mitigation options. A Stream Channel Alteration Permit (SCAP) may be required from the DLNR Commission on Water Resource Management for any temporary or permanent activity within the former irrigation ditch, and a wetland survey may be required.

New CCH drainage standards requiring low impact development strategies went into effect in June 2013 (DPP 2012). The design storm runoff from 1 inch of rainfall must be retained on-site to the maximum extent practicable, using Post-Construction Treatment Control BMPs. The design of stormwater retention and quality basins must take into consideration the soil type, proximity to the groundwater table, and stormwater discharge permit limits.

Stormwater management retention/infiltration basins and related facilities are proposed throughout the WWTP site, as shown on Figure 4-6, the Site Layout for Phase 1. The stormwater basins at the Honouliuli WWTP site would be shallow dry basins except during and after storm events, until infiltration and/or evaporation of basin contents is complete. Surface flow conveyance would be used to the greatest extent possible by incorporating vegetative drainage swales to address constructability issues as well as to enhance stormwater quality.

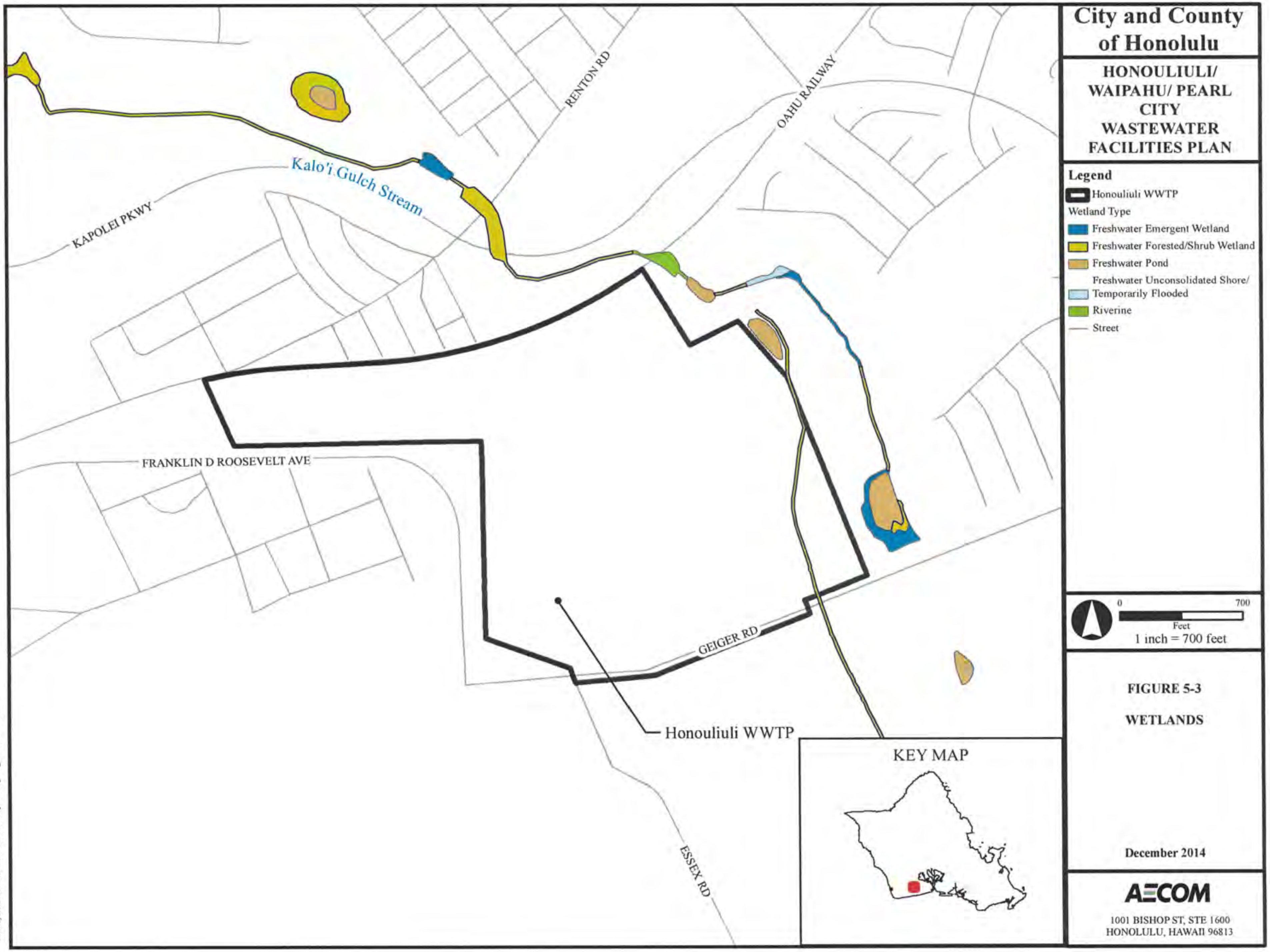


FIGURE 5-3

WETLANDS

Consideration would be given to implementation of various best management practice structures from the new drainage standards that can serve as demonstration-type installations for future developments. In addition, the road frontage area along Geiger Road with large trees and a landscaped area would be used as a vegetative buffer and for stormwater management. This area would provide overland flow of stormwater across a vegetated area that would perform as both a vegetated swale and an infiltration area.

5.3.2.4 Operational Impacts and Mitigation Measures

The project may result in an increase in future effluent discharged to Mamala Bay via the Barbers Point Deep Ocean Outfall. However, with the implementation of BMPs on site, this project is not anticipated to result in operational impacts to nearby surface waters.

5.3.3 Coastal Waters

A natural resources survey was conducted by SWCA in November 2014 (SWCA 2015). It is attached as Appendix B and information relevant to coastal waters is summarized below.

5.3.3.1 Existing Setting

The nearest coastal water to the project site is West Mamala Bay (and Pacific Ocean), located approximately 1.8 miles south of the project site. Pearl Harbor (West Loch) is located approximately 2.2 miles northeast of the project site.

The effluent from the Honouliuli WWTP is discharged to Mamala Bay via the Barbers Point Deep Ocean Outfall. As described in Section 2.3, the 84-inch diameter outfall extends approximately 8,760 ft into the ocean and discharges treated effluent approximately 200 ft below the surface through a 1,750-ft long diffuser pipe. The marine environment in the vicinity of the Barbers Point outfall comprises a barren area of low-relief, calcium carbonate sand bottom, although the outfall pipe and armor rock provide areas of increased habitat complexity (Smith and Dollar 1987). Smith and Dollar (1987) observed very few macro-benthic invertebrates or fish in the outfall environment.

5.3.3.2 Construction Impacts and Mitigation Measures

Since the nearest coastal water is located approximately 1.8 miles from the project site, it is unlikely that construction activities at the Honouliuli WWTP would directly impact coastal waters as a result of stormwater runoff and sedimentation. However, potential impacts would be mitigated by adherence to Federal, State, and City water quality regulations governing grading, excavation, stockpiling, and sedimentation and erosion by stormwater during construction. No construction activities are proposed in the vicinity of the outfall.

5.3.3.3 Operational Impacts and Mitigation Measures

Operation of the proposed project is for purposes of compliance with the consent decree which requires treatment facilities necessary to comply with secondary treatment standards, as discussed further in Section 5.7, Water Quality. In addition, this project would minimize the potential of additional SSOs from the existing conveyance and treatment system. The increase in the capacity would allow the connection of currently unsewered areas on IWSs into the CCH's wastewater system and would be consistent with Primary Urban Center (PUC) and Ewa Development Plans and the Central Oahu Sustainable Communities Plan; therefore reducing the chances of contamination to coastal waters.

There is a potential for indirect impacts due to additional development allowed by sewered areas, including an increase in wastewater flow to the Honouliuli WWTP and effluent discharged to Mamala Bay.

5.4 Natural Hazards

5.4.1 Hurricanes

5.4.1.1 Existing Setting

Tropical storm systems that have sustained winds exceeding 73 miles per hour, form in warm tropical waters near the equator, and strike in the Atlantic and Eastern Pacific Oceans are known as hurricanes. Similar tropical storm systems that strike in the Western Pacific Ocean, Indian Ocean and Southern Pacific Oceans are called typhoons and cyclones, respectively. Due to the geographic location of Hawaii within the Eastern Pacific Ocean, tropical storms that strike Hawaii are referred to as hurricanes. In Hawaii, hurricane season runs from June 1st to November 30th. The last major hurricane (Category 4) was Iniki, which passed over Kauai on September 11, 1992. Although most of the damage was on Kauai, Oahu also experienced some damage from wind and storm surge, which did not impact the Honouliuli WWTP. When a hurricane hits the island, the wastewater management facilities are just as likely to be damaged as any other structure in the area.

5.4.1.2 Impacts and Mitigation Measures

Regardless of the alternative selected, neither construction nor operation related activities are expected to impact hurricanes or the frequency of hurricanes in the project area. However, during construction, there is the potential that a hurricane could occur. A public emergency siren operated by the State of Hawaii Department of Defense (HDoD), which would be used in the event of a hurricane, is located at Ewa Makai Middle School approximately 0.6 miles southeast of the site. This alarm may not be audible at the WWTP site, as these sirens are typically audible within 0.5 miles. However, information would also be available via television, internet, and radio.

In the event that a hurricane is predicted, construction equipment would be secured and all applicable Federal, State, and CCH requirements would be implemented to reduce potential damage. Emergency procedures outlined in the Honouliuli WWTP Health and Safety Plan would be followed. If evacuation is required, the nearest Public Emergency/ Hurricane Evacuation Shelter is located at Ewa Elementary (see Figure 5-13), approximately 0.7 miles north of the WWTP site. The closest open shelter can also be found by texting "shelter 96706", which is the zip code of the Honouliuli WWTP, to "43362" (4FEMA) (FEMA 2014).

As a long-term measure, the wastewater management facilities would be designed and constructed to meet all applicable International Building Code (IBC) and Federal, State, and CCH requirements to help protect against potential structural impacts resulting from a hurricane or accommodate future meteorological events related to climate change. Back-up power supply would be available at the facilities to help prevent SSOs during emergencies and power outages.

5.4.2 Tsunamis

5.4.2.1 Existing Setting

Tsunamis are a series of waves that are created by sea floor movements caused by earthquakes, landslides, or volcanic eruptions. The Hawaiian Islands are always at risk for tsunamis, as the islands are susceptible to tsunamis generated from earthquake and volcanic activity from the area bordering the Pacific Ocean (also known as the "Rim of Fire"). The last major tsunami was the 1960 Hilo tsunami. Although this particular tsunami did not affect Oahu, tsunamis can be a hazard on Oahu.

The CCH Department of Emergency Management (DEM) completed revised Oahu tsunami evacuation zone maps in 2010. According to the tsunami evacuation zone maps, the WWTP site is not located within a tsunami evacuation zone. The Honouliuli WWTP is located approximately 1.5 miles north of the shoreline (areas within 1 mile of the coastline are at greater risk, according to the Federal Emergency Management Agency [FEMA]).

5.4.2.2 Impacts and Mitigation Measures

Regardless of the alternative selected, neither construction nor operation related activities are expected to impact tsunamis or the frequency of tsunamis in the project area.

As mentioned in Section 5.4.1, Hurricanes, the HDoD public emergency siren located at Ewa Makai Middle School would be used in the event of a tsunami. As previously mentioned, this alarm may not be audible at the WWTP site. Information would also be available via television, internet, and radio.

In the event that a tsunami alert is given, construction equipment would be secured and all applicable Federal, State, and CCH requirements would be implemented to reduce potential damage. Emergency procedures outlined in the Honouliuli WWTP Health and Safety Plan should be followed. FEMA recommends moving to higher ground, at least two miles from the coastline (FEMA 2014). If evacuation is required, the closest Public Emergency/ Hurricane Evacuation Shelter located greater than 2 miles from the shoreline is located at Ewa Elementary (see Figure 5-13), approximately 0.7 miles north of the WWTP site. The closest open shelter can also be found by texting "shelter 96706" to "43362" (4FEMA) (FEMA 2014).

As a long-term measure, the wastewater management facilities would be designed and constructed to meet all applicable IBC and Federal, State, and CCH requirements to help protect against potential structural impacts resulting from a tsunami. Back-up power supply would be available at the facilities to help prevent SSOs during emergencies and power outages.

5.4.3 Earthquakes

5.4.3.1 Existing Setting

Oahu does not have any active volcanoes; therefore, the island is not subject to significant earthquakes from volcanic activity. However, earthquakes are not uncommon in Hawaii. Most earthquakes in the Hawaiian Islands are caused by volcanic activity on the island of Hawaii, the Big Island. Earthquakes that reach Oahu are generally not strong and cause little or no damage. One of the larger and more recent earthquakes occurred offshore of Puakō, Hawaii. The earthquake measured 6.7 on the Richter scale and caused minor damages on the island of Oahu. When an earthquake hits the island, the wastewater management facilities are just as likely to be damaged as any other structure in the area.

The IBC classifies likelihood of seismic activity into zones ranging from 0 to 4. Seismic Zone 0 represents no chance of severe ground shaking and Seismic Zone 4 represents a 10% chance of severe shaking in a 50-year interval. The IBC classifies Oahu as Seismic Zone 2A.

5.4.3.2 Impacts and Mitigation Measures

Regardless of the alternative selected, neither construction nor operation related activities are expected to impact earthquakes or the frequency of earthquakes in the project area. However, there is the potential for an earthquake to occur during construction or operation. Therefore, all applicable Federal, State, and CCH requirements would be implemented to minimize impacts that may result during the construction of the proposed project. In addition, as a long-term measure, the proposed wastewater management facilities would be designed and constructed to meet Seismic Zone 2A requirements and all applicable IBC and Federal, State, and CCH requirements. Back-up power supply would be available at the facilities to help prevent SSOs during emergencies and power outages.

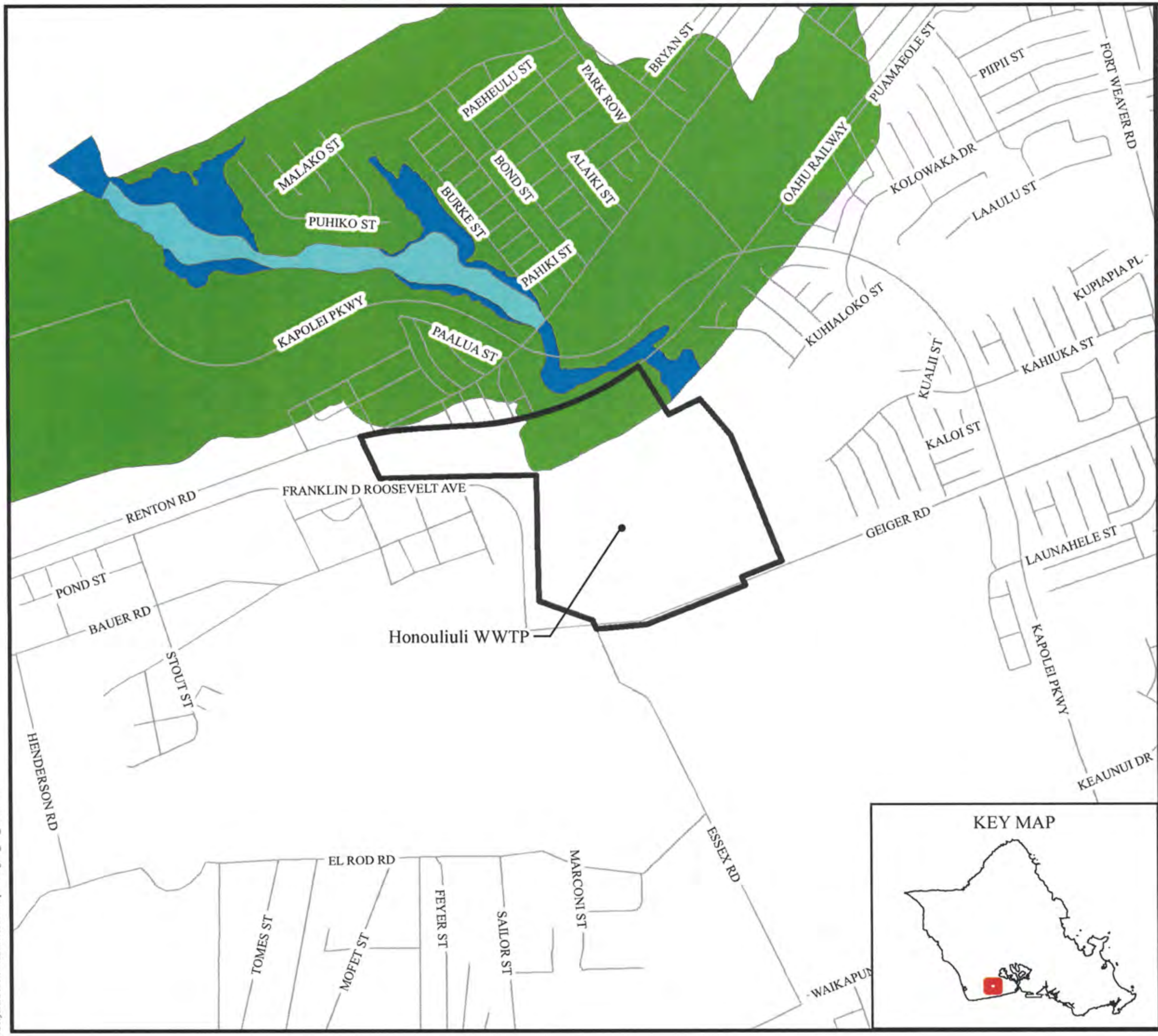
5.4.4 Flood Hazard

5.4.4.1 Existing Setting

The Honouliuli WWTP is located to the north of the southwestern coastline on the island of Oahu. The CCH DPP has digitized FEMA's flood insurance rate maps from 2006 to 2007 into a GIS flood zone layer. According to the digitized flood zone layer, the WWTP is not located within a flood prone area (Figure 5-4).

5.4.4.2 Construction Impacts and Mitigation Measures

The existing Honouliuli WWTP is not located within a flood zone; therefore, regardless of the alternative implemented, no flood hazard impacts are anticipated.



City and County of Honolulu

HONOULIULI/ WAIPAHU/ PEARL CITY WASTEWATER FACILITIES PLAN

Legend

- Honouliuli WWTP
- Street

Flood Zones

- AE = 100 Year Flood, Base Flood Elevation Determined
- AEF = 100 Year Flood, Flood Way Area With AE
- X = Beyond 500 Year Flood Plain

0 1,200
Feet
1 inch = 1,200 feet

FIGURE 5-4

PROJECT AREA FIRM

December 2014

AECOM

1001 BISHOP ST, STE 1600
HONOLULU, HAWAII 96813

G:\Projects\MUNI\60220849HON\Maps\EI\Figure_5-4_FIRM.mxd

5.4.4.3 Operational Impacts and Mitigation Measures

No permanent changes in grade within the flood zone are proposed. Therefore, no operational impacts are anticipated.

5.4.5 Climate Change

5.4.5.1 Existing Setting

Planning for climate change is challenging as there are several changing and unknown factors. The risks of climate change include changes in rainfall intensity, sea level rise, groundwater levels, and impacts from storm hazards. The United States Army Corp of Engineers (USACE) has developed tools and references for guidance. One such tool, available on the USACE Climate Change website, is the USACE sea level rise calculator – which may be used to provide sea level predictions. In addition to the USACE tools and reference, there are also ongoing efforts at the State and CCH to evaluate changes that need to be made to current rules, regulations, and practice standards, with the ultimate goal of establishing a standard that can be implemented State wide. It is anticipated that as additional data is collected over the next 10 to 20 years, trends and future projections are refined, and new standards and codes are developed, the planning for the next phase at the WWTP site will be adjusted accordingly for the site buildout by 2050. The projected trends in meteorological events currently show a range of projections, but a convergence of the projections is expected as more data is obtained and the models are refined.

Regarding the sea level rise issue, the Honouliuli WWTP site varies from 25 to 40 feet above sea level, and is well above the projected sea level change for Honolulu which ranges from a low of 0.3 ft. to a high of 1.5 ft. through the year 2050, as calculated utilizing the Army Corps of Engineers' Sea-Level Rise Calculator. Resiliency in withstanding flood events will be appropriately addressed during the design phase in accordance with the standards that are in affect. New flood standards that will be developed in the future to address climate changes will affect the planning and design of future improvement projects for the site buildout by 2050.

5.4.5.2 Operational Impacts and Mitigation Measures

At grade improvements constructed under the proposed project varies from 25 to 40 feet above MSL. Since the potential rise through 2050 ranges from 0.3 to 1.5 feet, the near term impacts to the WWTP will be minimal. State and City policies and regulations on sea level rise mitigation are still in the process of development. As these issues become clearer, the planning for additional long-range improvements at the Honouliuli WWTP will need to appropriately address these issues in the future. Changes in sea levels are anticipated to occur gradually and over many years, which should provide CCH sufficient time to plan and implement the necessary measures.

It is likely that over time, the existing ocean outfall will experience reduced flow capacity due to the effects of sea level rise. Addressing all the impacts of sea level rise on this outfall system will likely be done in future planning efforts.

CCH recognizes the threat of climate change and the importance of planning for its effects. Full support and cooperation will be provided towards the ongoing efforts to establish State-wide policies and regulations. The Department of Environmental Services intends to work with other State and County agencies in the future as the guidance and policies to address climate change are further developed.

5.5 Natural Environment

A natural resources survey was conducted by SWCA on November 16, 2014 (SWCA 2015). The survey included the area within the fence line of the original WWTP site as well as the area to the immediate north, northwest and east of the bounds of the existing Honouliuli WWTP (hereafter referred to as the expansion property). The *Biological Resource Assessment* summarizing the results of this survey is attached as Appendix B and is summarized below (SWCA 2015).

5.5.1 Flora

5.5.1.1 Existing Setting

In general, the vegetation observed within the surveyed area is typical of the vegetation typically found within disturbed urban areas. Within the fenceline of the original WWTP site, the areas around the treatment works are generally paved or covered with gravel to facilitate maintenance. Areas typically not requiring access for treatment works are manicured grass. Several large well-established cultivated trees are located sporadically throughout the property and along Geiger Road to the south of the site. The majority of vegetation on the expansion property is grass, brush, and small trees, as further described below. Open areas with extensive patches of bare ground, gravel, and asphalt exist within this area; the expansion area has been disturbed by past and current land uses (SWCA 2015).

During the natural resources survey, a total of 79 plant taxa were observed within the survey area, including four species native to the Hawaiian Islands: ʻaʻaliʻi (*Dodonaea viscosa*), hinahina (*Vitex rotundifolia*), ma ʻo hau hele (*Hibiscus brackenridgei*), and ʻuhaloa (*Waltheria indica*), which are all common throughout the Hawaiian Islands. Of the four indigenous plant species, only one, the ma ʻo hau hele (the Hawaiian state flower), is a Federally-listed species. However, this species was observed within a garden adjacent to a facility building; therefore, it is likely cultivated and not naturally occurring. No other State- or Federally-listed threatened, endangered, or candidate plant species were observed in this area during the survey. Although the Honouliuli WWTP is located within the historical range of the endangered koʻoloaʻula (*Abutilon menziesii*), the species was not observed during the natural resources survey and is not known to have recently been documented in the project area. According to the Threatened and Endangered Plants layer from the Hawaii Statewide GIS Program, there are no known threatened or endangered plants in the project area.

The vegetation in expansion property portion of the survey area is primarily characterized as a highly disturbed kiawe (*Prosopis pallida*) forest that covers approximately 47.8 acres with sparse Guinea grass (*Urochloa maxima*) cover in the understory due to the presence of leaf litter, dry conditions, and grazing (Figure 5-5). Metal scraps, debris, and graveled and asphalt areas were observed within portions of the surveyed area. The kiawe trees range from 4.5–8 meters (15–26 ft) tall and comprise approximately 70% of the tree cover throughout the survey area. Large koa haole (*Leucaena leucocephala*) and Manila tamarind (*Pithecellobium dulce*) trees sparsely scattered throughout the kiawe forest comprise most of the remaining tree cover. Two herbaceous species, lion's ear (*Leonotis nepetifolia*) and golden crown-beard (*Verbesina encelioides*), are widely distributed throughout the understory. Other non-native herbaceous and shrub species scattered sparsely throughout the area or in isolated patches include khaki weed (*Alternanthera pungens*), spiny amaranth (*Amaranthus spinosus*), wild bean (*Macroptilium lathyroides*), hairy abutilon (*Abutilon grandifolium*), bracted fanpetals (*Sida ciliaris*), and Cuban jute (*Sida rhombifolia*). The non-native, parasitic western field dodder (*Cuscuta campestris*) was also found within larger trees during the survey.

Figure 5-5. Kiawe Forest within the Expansion Property with Sparse Guinea Grass Cover in the Understory (SWCA 2015).

5.5.1.2 Construction Impacts and Mitigation Measures

The total anticipated area of grading, grubbing, and clearing for construction activities is approximately 75 acres. Regardless of the alternative implemented, it would be necessary to clear vegetation for the construction of new facilities within the expansion property. Tree clearing for improvements within the existing WWTP site would not be required. Given that the area has been highly altered by human activity and generally lacks environmentally sensitive naturally occurring species, the proposed work is not expected to result in any significant adverse impact on the flora within the WWTP site. Native Hawaiian plants are recommended for landscaping within the project area, including species such as: ko'oloa'ula, kou (*Cordia subcordata*), 'ilie'e (*Plumbago zeylanica*), and 'a'ali'i.

5.5.1.3 Operational Impacts and Mitigation Measures

Although construction of new structures would result in permanent impacts to the plants present at the WWTP site, the proposed facilities would be located within previously disturbed areas. Areas with new facilities would be landscaped after construction; native plant species are recommended for landscaping whenever possible. Therefore, no significant operational impacts to flora in the area are anticipated, regardless of the alternative implemented.

5.5.2 Fauna

5.5.2.1 Existing Setting

The fauna within the surveyed vicinity of the WWTP site is dominated by non-native birds and mammals. Nine introduced and one indigenous bird species were recorded during the natural resources survey in the surveyed vicinity of the WWTP site. The common myna (*Acridotheres tristis*) was the most frequently observed, as well as the zebra dove (*Geopelia striata*) and spotted dove (*Streptopelia chinensis*). All of these species are common to the main Hawaiian Islands, particularly in urban or disturbed areas (HAS 2005; as referenced in SWCA 2015).

Only one native species, the migratory Pacific golden plover (*Pluvialis fulva*), was observed in this area. This species is abundant throughout Hawaii.

The WWTP site is located directly adjacent to the Coral Creek Golf Course, which contains water features that are attractive to waterbirds. As a result, it is possible that endangered Hawaiian stilts (*Himantopus knudseni*) could be present in close proximity to the proposed project area. Hawaiian stilts, as well as Hawaiian coots (*Fulica alai*), are highly mobile and may occupy newly, sometimes unintentionally, created habitat for foraging and even nesting such as areas that hold standing water after heavy rainfall. There are currently no nesting water birds within the proposed project area.

Four migratory bird species protected under the amended Migratory Bird Treaty Act (MBTA) of 1918 were observed during the survey, including the cattle egret (*Bubulcus ibis*), Hawaiian duck–mallard hybrids, Pacific golden plover, and house finch (*Haemorhous mexicanus*).

Other fauna observed during the survey included mammals: feral cats (*Felis catus*) and small Asian mongooses (*Herpestes javanicus*); and invertebrates: the globe skimmer (*Pantala flavescens*) and two butterflies, including the Gulf fritillary (*Agraulis vanillae*) and the western pygmy blue butterfly (*Brephidium exilis*). The globe skimmer is native to Hawaii. No reptiles or amphibians were observed during the survey.

No State- or Federally-listed threatened, endangered, or candidate bird, mammal, or insect species were observed during the survey of the Honouliuli WWTP site. The endangered pueo (*Asio flammeus sandwichensis*) was not observed during the survey; however, this bird species occurs in habitat found at the WWTP site, including wet and dry forests, grasslands, shrublands, and urban areas. The endangered Hawaiian hoary bat (*Lasiurus cinereus semotus*) is the only native land mammal in Hawaii, and there are no native reptiles or amphibians in Hawaii. Surveys were not conducted for the endangered Hawaiian hoary bat, but this species is not likely to utilize the highly fragmented and urban area in the vicinity of the WWTP site.

No aquatic fauna was observed or is known to occur at the proposed project site. Aquatic fauna that may occur in the vicinity of the Barbers Point ocean outfall in Mamala Bay include large numbers of fish such as bluestripe snapper (*Lutjanus kasmira*), *blotcheye soldierfish* (*Myripristis berndti*), and bigeye scad (*Selar crumenophthalmus*) and mammals including spinner dolphins (*Stenella longirostris*). Federally endangered species that may occur in Mamala Bay in limited numbers include humpback whales (*Megaptera novaeangliae*), Hawaiian monk seals (*Monachus schauinslandi*), and green sea turtles (*Chelonia mydas*). The monk seal is not common in the main Hawaiian Islands. Marine mammals are protected under the Marine Mammal Protection Act.

5.5.2.2 Construction Impacts and Mitigation Measures

Regardless of the alternative selected, the proposed project activities are not expected to impact non-native and native species.

Considering the presence of endangered waterbirds in the vicinity of the WWTP site, endangered/listed species may be attracted to construction sites or facilities if (temporary) habitat is created. Construction activities could create temporary depressions at the work sites that, if they accumulate standing water, might attract waterbirds, particularly the endangered Hawaiian stilt. Should this happen, activities in the area would be disrupted and may be stopped temporarily in compliance with the Endangered Species Act (ESA). Other BMPs, including conducting nest searches during nesting periods (February to August for the Hawaiian stilt) prior to the start of construction may be employed, as recommended in SWCA 2015.

Construction lights are known to blind and disorient migratory birds. Therefore, during construction, mitigation measures including shielding lights and facing the lights downward would be used to minimize impacts to migratory birds. All work would be in accordance with Federal, State and CCH regulatory requirements including, but not limited to the MBTA and the ESA.

Due to the presence of suitable habitat for the endangered pueo in the vicinity of the WWTP, mitigation measures would be implemented to reduce disturbance to the species, including suspending work with heavy machinery or vehicular traffic within 300 feet of any area where indications of nesting are observed until young birds have the opportunity to fledge (SWCA 2015).

Although the potential for encountering Hawaiian hoary bats is small, measures to avoid impacts include: avoiding the use of barbed wire on the top of any fences erected for the proposed project to help prevent entanglement and avoiding trimming trees taller than 15 ft between June 1 and September 15 during the period when juvenile bats may be roosting.

No construction activities are proposed in the vicinity of the outfall; therefore, impacts to marine fauna in the vicinity of the outfall are not anticipated.

5.5.2.3 Operational Impacts and Mitigation Measures

Few long-term impacts to fauna are anticipated from operation and maintenance, regardless of the alternative implemented. Fauna observed within the area would likely find suitable habitat in nearby areas. The operation of an upgraded (secondary treatment) Honouliuli WWTP is expected to improve the quality of the wastewater discharged; thus reducing the chance of altering the marine environment. The upgrade is likely to reduce nutrient and chemical pollution from the wastewater.

5.5.3 Wetlands

5.5.3.1 Existing Setting

The U.S. Army Corps of Engineers, EPA, and DOH define wetlands as areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas.

The Kaloʻi Gulch Stream is located to the north and east of the project site. Manmade ponds located within the golf course to the north and east of the project area are connected to this stream. The USFWS's NWI classifies these ponds as "PUBHx" (Palustrine Unconsolidated Bottom, permanently flooded, and excavated). One manmade pond located within the golf course is located adjacent to the WWTP property. In addition, an abandoned irrigation ditch flows from this pond south through the existing WWTP facility and is classified as "PSS3Ax" (Palustrine Scrub-Shrub, Broad-Leaved Evergreen, temporarily flooded, and excavated wetland). Figure 5-3 illustrates wetlands identified by the U.S. Fish and Wildlife Service's (USFWS) NWI within the vicinity of the project area.

5.5.3.2 Construction Impacts and Mitigation Measures

During design, facilities would be located to: 1) avoid to the maximum extent practicable, 2) minimize and 3) mitigate impacts to the wetland resources in the project area. However, it is anticipated that the former irrigation ditch located on the project site would need to be filled to construct the various site components in that location. The project team will consult with the Army Corps of Engineers, USFWS, CCH, and other regulatory agencies, as necessary, to determine whether filling the abandoned irrigation ditch is jurisdictional under current regulations. If the ditch is determined to be jurisdictional by one or more agencies, then the project team would work with the appropriate agencies to determine acceptable mitigation options. A SCAP may be required from the DLNR Commission on Water Resource Management for any temporary or permanent activity within the former irrigation ditch, and a wetland survey would likely be required. All work would be performed in accordance with Federal, State, and CCH regulatory requirements including, but not limited to the Section 404 of the Clean Water Act, if applicable.

5.5.3.3 Operational Impacts and Mitigation Measures

This project is not anticipated to result in operational impacts to nearby wetlands. Wetlands may be indirectly affected by the lowering of groundwater due to increased water demand from the projected increase in population and potential subsequent reduction of groundwater recharge. However, there is potential that treated effluent would be used for groundwater recharge, thereby minimizing impacts to groundwater. Discharge locations for groundwater recharge have not been identified yet.

5.6 Archaeological and Historical Resources, and Cultural Impact Assessment

As defined in HRS Chapter 6E and Chapter 50.

At the request of AECOM, Cultural Surveys Hawai'i, Inc. (CSH) prepared an archaeological assessment (Yucha et al. 2015) and a Cultural Impact Assessment (Cruz e al. 2011) for the proposed project. The assessments are attached as Appendix C and summarized below. The scope of work for the archaeological and cultural impact assessment comprised:

1. Historical research including study of archival sources, historic maps, Land Commission Awards (land titles), and previous archaeological reports to construct a history of land use and determine if archaeological sites have been recorded on or near the project area.
2. A pedestrian inspection of the southwestern portion of the project area, including the heavily built-out WWTP, to identify any surface archaeological features and to investigate and assess the potential for impact to such sites. This inspection was undertaken to identify sensitive areas that may require further investigation or mitigation before the project proceeds.
3. Consultation with Hawaiian organizations, agencies, community members and cultural practitioners in the vicinity of the Honouliuli WWTP in order to identify individuals with cultural expertise and/or knowledge of the Project area and the vicinity. The organizations consulted included SHPD, the Office of Hawaiian Affairs (OHA), the Oahu Burial Council (OIBC) and community and cultural organizations.
4. Preparation of the assessment report including the results of the historical and cultural research and the fieldwork with an assessment of archaeological potential based on that research, and with recommendations for further archaeological work, if appropriate. Mitigation recommendations, if there are archaeologically sensitive areas that need to be taken into consideration, also would be provided.

5.6.1 Existing Setting

The project area is within an inland, dry coral plain that in pre-Contact times had a thin to absent soil layer. Due to its distance from the coast and Pearl Harbor, and from an adequate source of fresh water, this inland area was little used during the period prior to Western contact. Within or in the vicinity of the project area, there are no Land Commission Awards, indicating that during the division and redistribution of land in 1848 there were no verified claims to lands in the area. Trails passed through the vicinity but are not believed to have passed through the project site. From the late 1800s through the late 1900s, a century of commercial sugar cane cultivation was enabled by the drilling of groundwater wells and the diversion of surface water from distant stream systems, as well as by the hydraulic transport of soils from mountain slopes to the plain. The intensive land disturbance associated with the establishment and operation of the cane plantations probably removed most of any evidence of pre-Contact use that may have existed.

Previous archaeological studies have not reported archaeological resources within or in the vicinity of the project area, and the archaeological sensitivity of the area is generally regarded as low. O'Hare et al. (2011) noted that the project area has been extensively disturbed by prior infrastructure construction and is of relatively low archaeological concern. In another study, O'Hare et al. (2007) focused on the area in the vicinity of the expansion property, along the north and east sides of the Honouliuli WWTP, but identified no historic properties. This study found evidence of extreme ground disturbance and did not find Hawaiian traditional features on the surface. O'Hare et al. (2007) concluded that it is highly unlikely that there are any subsurface Hawaiian features intact. The existing WWTP is not known to have been the subject of previous formal archaeological investigation; however, the property has undergone extensive land disturbance associated with the construction of the infrastructure at the plant. Table 5-2 list recorded historic sites within a 0.5-mile radius of the project area.

Table 5-2. Historic Sites 0.5 Miles of the Project Area

State Inventory of Historic Properties Number	Site Type	Description	Significance
50-80-12-5127	Military	World War II ‘Ewa runway site	Recommended eligible for National Register of Historical Places
50-80-12-9708	Sugar plantation infrastructure	Waialua Agricultural Company Engine No. 6	On National Register of Historic Places
50-80-12-9714	Sugar plantation infrastructure	Oahu Railway and Land Company right of way	On National Register of Historic Places
50-80-12-9761	Sugar plantation infrastructure	Railway rolling stock	On Hawaii Register of Historic Places
50-80-12-9786	Sugar plantation infrastructure	‘Ewa Village Historic District	On National Register of Historic Places

Source: Yucha et al. 2015.

On October 24, 2014, CSH conducted a pedestrian inspection of the southwestern portion of the project area which has been entirely developed with infrastructure related to the Honouliuli WWTP, and a reconnaissance of the remainder of the project area which comprised relatively undeveloped contiguous areas to the north and east of the plant. No historic properties were identified within either the WWTP portion or the undeveloped portion of the project area.

CSH recommends no further cultural resource management work for the proposed project.

5.6.1.1 Construction Impacts and Mitigation Measures

Although shallow subsurface work may be conducted within the project area, the proposed project would not involve construction activities in the vicinity of previously identified historical or archaeological sites listed or eligible for listing on the Hawaii Register of Historic Places or the National Register of Historic Places. In addition, surface conditions observed during field inspections on and in the vicinity of the project area suggest a low probability of encountering archaeological, cultural, or historic resources during construction activities. The project area has a low level of archaeological concern; therefore, construction in this area is not anticipated to adversely impact cultural or archaeological resources. CSH's effect recommendation for the proposed project is “no historic properties affected” (Yucha et al. 2015).

Potential impacts to any archaeological, cultural, or historic resources that may be encountered during construction of the proposed improvements would be mitigated by complying with HRS Chapter 6E, Historic Preservation. The proposed approach is to identify areas of concern and provide data for the determination of appropriate mitigation prior to implementation of specific projects. The DLNR State Historic Preservation Division (SHPD) would be consulted regarding the proper handling of such resources within the project area prior to implementation of the project. Should any significant archaeological, cultural, or historic sites be found during construction activities, all work in the vicinity would cease and the DLNR SHPD would be promptly notified.

5.6.1.2 Operations Impacts and Mitigation Measures

Operation of the wastewater system once the project has been completed is not anticipated to impact archaeological or historic resources.

5.7 Water Quality

5.7.1 Existing Setting

The Honouliuli WWTP discharges via the Barbers Point outfall to Mamala Bay, which is classified in the Hawaii DOH Water Quality Standards (HAR Section [§]11-54-2) as a Class A “dry” (defined as the average fresh water inflow from the land is less than one percent of the embayment volume per day) “open coastal water” (defined as marine waters bounded by the 183 meters or 600 ft depth contour and the shoreline). Permitted effluent discharges in Mamala Bay include point sources such as the Sand Island, Honouliuli, and Fort Kamehameha WWTPs and NPDES permitted industrial and agricultural sources and non-point sources such as stormwater. Long term studies of benthic organisms in the vicinity of the Barbers Point ocean outfall compared to control sites indicate that effects of the existing effluent are negligible (SWCA 2015).

The Honouliuli WWTP is governed by NPDES Permit No. HI0020877 (effective March 30,2014). The 2010 Consent Decree has interim limits until full secondary treatment is completed. Table 5-3 shows the Honouliuli WWTP 2010 Consent Decree effluent limits.

Table 5-3. Honouliuli WWTP Effluent Limits

<table>
<tr><th colspan="5">Discharge Limitations</th><th colspan="2">Monitoring Requirements</th></tr>
<tr><th>Discharge Parameter</th><th>Average Monthly</th><th>Average Weekly</th><th>Maximum Daily</th><th>Units</th><th>Minimum Frequency</th><th>Sample Type</th></tr>
<tr><td>Flow[1]</td><td>report</td><td>report</td><td>report</td><td>mgd</td><td>continuous</td><td>recorder or totalizer</td></tr>
<tr><td rowspan="2">BOD_5 [1]</td><td>53,679</td><td>166
55,424</td><td>report</td><td>mg/L
lbs/day</td><td rowspan="2">daily</td><td rowspan="2">24-hour composite</td></tr>
<tr><td colspan="4">As a monthly average, not less than 30% removal efficiency from influent stream</td></tr>
<tr><td rowspan="2">TSS [1]</td><td>50
16,721</td><td>53
17,580</td><td>report</td><td>mg/L
lbs/day</td><td rowspan="2">daily</td><td rowspan="2">24-hour composite</td></tr>
<tr><td colspan="4">As a monthly average, not less than 60% removal efficiency from influent stream</td></tr>
<tr><td>pH [2]</td><td colspan="4">Not less than 6.0 standard units nor greater than 9.0 standard units</td><td>five times/week</td><td>grab</td></tr>
</table>

Legend: — = not applicable; lbs/day = pounds per day.
Source: 2010 Consent Decree (Civil No. 94-00765 DAE-KSC); 2014 Reissued NPDES Permit No. HI0020877
Notes:
(1) 2010 Consent Decree interim limits.
(2) The terms and conditions of the reissued NPDES Permit HI0020877 remain in full force for parameters other than flow, BOD_5, and TSS.

The 2012 and 2013 effluent data (Table 5-4) provided by CCH indicates that the Honouliuli WWTP consistently complies with the 2010 Consent Decree interim limits. However, additional treatment will be necessary to meet the treatment limits that would be associated with future full secondary treatment requirements.

Table 5-4. 2012 and 2013 Honouliuli WWTP Effluent Outfall Discharge Data

Discharge Parameter	Average Monthly [1]	Average Weekly [2]	Daily Average [3]	Maximum Daily	Minimum Daily	Monthly Removal Efficiency [4]
2012						
Flow, mgd	23.0	27.9	20.5	32.1	16.3	—
BOD_5, mg/L	133	143	121	176	79	68.0%
TSS, mg/L	38	42	35	50	22	89.9%
2013						
Flow, mgd	23.6	25.2	21.5	29.5	17.2	—
BOD5, mg/L	122.3	135	116	180	77.5	67.4%
TSS, mg/L	39.3	50	36	68	22	88.7%

Legend: — = not applicable
Source: 2012 CCH Honouliuli WWTP data, as presented in *Technical Memorandum 12.O, Honouliuli WWTP Concept Design Report*
Notes:
(1) Highest of the 12 actual monthly averages.
(2) Highest of the 52 actual weekly averages (Sunday to Saturday).
(3) Average of 365 days.
(4) Lowest of the 12 actual monthly averages.

Upgrades to the Honouliuli WWTP would be designed to comply with the 2010 Consent Decree and would result in the reduction in biological oxygen demand (BOD) and total suspended solids (TSS), as shown in Table 5-5. Although effluent flow to Mamala Bay is anticipated to increase due to the projected population growth within the sewershed, effluent concentrations and overall loads would decrease as a result of the proposed upgrade to secondary treatment.

Table 5-5. Reduction in BOD and TSS anticipated from proposed upgrades to the Honouliuli WWTP

Parameter	Existing	Proposed	% Change
Flow (average daily) (gpd) [1]	25,800,000	45,000,000	57.3
Flow (liters/day)[1]	97,660,000	170,343,540	57.3
BOD (mg/L)	120	15	-87.5
BOD (mg/day)	12,083,035,104	2,555,153,100	-78.9
BOD (lb/day)	26,639	5,633	-78.9
TSS (mg/L)	36	15	-58.3
TSS (mg/day)	3,624,910,531	2,555,153,100	-29.5
TSS (lb/day)	7,992	5,633	-29.5

Note: (1) Based on 2012effluent data presented in *TM 12.O, Honouliuli WWTP Concept Design Report*

As previously mentioned in Section 5.3.2 Surface Water and Section 5.5.3 Wetlands, a mapped wetland (former drainage ditch) is located in the eastern portion of the WWTP site; however, this wetland no longer functions as an active irrigation ditch.

<u>Since it is the State's position that all projects must reduce, reuse, and recycle to protect, restore, and sustain water quality and beneficial uses of State waters, project planning should:</u>

- Treat storm water as a resource to be protected by integrating it into project planning and permitting.
- Include statements regarding the implementation of methods to conserve natural resources.
- Consider storm water BMP approaches.

- Consider the use of green building practices, such as pervious pavement and landscaping with native vegetation.
- Identify opportunities for retrofitting or bio-engineering existing storm water infrastructure to restore ecological function while maintaining hydraulic capacity.

Further planning and design will be performed to confirm that the project will meet the pertinent Clean Water Branch requirements for Section 401 WQC as well as NPDES requirements during construction. The wastewater plans shall conform to applicable provisions of Hawaii Administrative Rules, Chapter 11-62, 'Wastewater Systems" as amended on March 21, 2016.

5.7.1.1 Construction Impacts and Mitigation Measures

In the short-term, potential construction impacts to the mapped wetland located within the project area would be mitigated by adherence to State and CCH water quality regulations governing grading, excavation, and stockpiling.

The proposed stormwater basins at the Honouliuli WWTP site would be shallow dry basins except during and after storm events, until infiltration and/or evaporation of basin contents is complete. Vegetative drainage swales would be used when feasible to help enhance stormwater quality.

5.7.1.2 Operations Impacts and Mitigation Measures

With the proposed treatment processes, permit compliance will be accomplished in the following ways.

- Influent and effluent flow meters compliant with DOH standard conditions would measure the flow. Influent flow would be measured by a magnetic flow meter downstream of the influent pumps. Effluent flow would be measured by a flow meter in the outfall. The flow meters would be tied into the SCADA system and data logged in the Real Time Historian for use in NPDES reporting.
- There would be composite samplers on the influent and effluent flow streams to collect samples for daily composite reporting requirements. The influent sampler would continue to be located upstream of the influent screens. The effluent sampler would be located downstream of where the brine from the recycled water facility joins with secondary clarifier effluent. Both composite samplers would be flow paced based on the respective (influent or effluent) flow signal.
- Standard sample locations would be provided to plant operations for collection of grab samples.

Overall, the proposed project will provide wastewater treatment facilities necessary to comply with secondary treatment standards and have beneficial long-term water quality impacts on groundwater (due to the potential to replace IWSs, which may contaminate groundwater, with a centralized sewer system) and surface and coastal waters, as it would better manage peak wastewater flows. The proposed alternatives also provide for storage of peak wet-weather inflow and infiltration to prevent or minimize wastewater spills.

5.8 Air Quality

Air quality is defined by ambient air concentrations of specific pollutants of concern with respect to the health and welfare of the general public. Air quality can be affected by air pollutants produced by mobile sources, such as vehicular traffic, non-road equipment used for construction activities, etc.; and by fixed or immobile facilities, referred to as “stationary sources”. Stationary sources can include combustion and industrial stacks and exhaust vents. Potential air quality impacts in the vicinity of the Honouliuli WWTP would occur from both construction and operational activities associated with implementation of the proposed improvements. The analysis of these potential air quality impacts was conducted and is detailed in an air quality analysis technical memorandum prepared by AECOM in November 2014 (AECOM 2014c). It is attached as Appendix D and is summarized below.

5.8.1 Existing Setting

Regional and local climate, together with the amount and type of human activity, generally dictate the air quality of a given location. The climate of the project area is very much affected by its leeward and coastal situation. Winds are predominantly trade winds from the east/northeast, except for occasional periods when Kona storms may generate strong winds from the south or when trade winds are weak and land breeze/sea breeze circulations may develop. Wind speeds typically vary between approximately 5 and 15 miles per hour, providing relatively good ventilation much of the time. Temperatures in leeward areas of Oahu are generally very moderate, with average daily temperatures ranging from approximately 70°F to 84°F. The extreme minimum temperature recorded at Honolulu Airport is 54°F, while the extreme maximum temperature is 95°F. This area of Oahu is one of the drier locations in the state, with rainfall often highly variable from one year to the next. Monthly rainfall has been measured to range from as little as a trace to as much as 10 inches. Average annual rainfall is approximately 20 to 30 inches, with summer months typically the driest.

To protect public health and welfare, the EPA, under the requirements of the 1970 Clean Air Act (CAA) as amended in 1977 and 1990, has established National Ambient Air Quality Standards (NAAQS) for six air pollutants known as criteria pollutants (40 CFR 50): carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10} [particulate matter with a diameter ≤ 10 micrometers], and $PM_{2.5}$ [particulate matter with a diameter ≤ 2.5 micrometers]), lead (Pb), and sulfur dioxide (SO_2). Note that O_3 is not emitted directly into the atmosphere; instead it is created by the combination of nitrogen oxides (NO_x) and volatile organic compounds (VOC), which are referred to as O_3 precursors.

The state of Hawaii has essentially adopted the NAAQS, although the Hawaii standards for CO are more stringent than the national standards. In addition to criteria pollutants, Hawaii also has an ambient standard for H_2S.

Existing ambient air quality conditions can be illustrated based on the attainment or nonattainment status of the NAAQS and Hawaii standards. Based on air quality data collected and published by the EPA and DOH, the State of Hawaii complies with all applicable ambient standards, including the NAAQS and State Ambient Air Quality Standards. The air in Hawaii is clean and low in pollutants, and the area where the project is located is designated as attainment for all air quality standards.

In addition to the NAAQS, the CAA also sets permit rules and emission standards for stationary pollution sources of certain sizes. The DOH has adopted the EPA-established stationary source regulations and acts as the administrator to enforce stationary source air pollution control regulations in Hawaii (DOH, Title 11, Chapter 60.1, Air Pollution Control). DOH grants an air permit to applicable facilities for not only federal enforceable major sources but also non-major sources in the state. The Honouliuli WWTP is a minor source for criteria pollutants and is operating under a non-covered source permit (No. 0215-020N) issued by the DOH.

Since H_2S is the primary compound in wastewater collection and treatment systems that causes odor, the DOH-established ambient standard 0.025 parts per million by volume (ppmV) in any 1-hour period at the property line of a facility can be used as a measure of potential odor effects. The Honouliuli WWTP has six separate odor control systems that collect and treat foul air from the WWTP. Odor Control System Permit No. 0215-02-N limits the H_2S concentrations at each individual odor control system outlet. Ongoing monitoring is conducted at 13 fenceline monitoring locations along the original property line and at the outlet stacks of each odor control system in compliance with permit requirements.

Although there are currently no greenhouse gas (GHG) emission limits for CCH WWTPs, in 2007 the Hawaii State Legislature passed Act 234, "Global Warming Solutions Act" which Governor Linda Lingle signed into law. Act 234 required the DBEDT and DOH to update their Inventory of Greenhouse Gas Emissions Estimates for 1990 by December 31, 2008 and to reduce the amount of GHG emissions in Hawaii to levels at or below 1990 levels by 2020. As a result of Act 234, ICF International completed the Hawaii Greenhouse Gas Inventory: 1990 and 2007 in December 2008 for DBEDT.

5.8.1.1 Construction Impacts and Mitigation Measures

Regardless of the alternative selected, short-term impacts to air quality would result from the proposed project either directly or indirectly as a consequence of project construction.

The major potential short-term air quality impact of the project would occur from emission of fugitive dust during construction activities. During construction phases, emissions from engine exhausts would also occur both from on-site construction equipment and from vehicles used by construction workers and from trucks traveling to and from the project construction site.

However, given the phasing of construction activities over several years, hot spot air quality concerns associated with concentrated equipment operations would be limited. Moreover, the construction equipment required for the proposed project is typical of equipment used for routine infrastructure development projects in urban areas. Short-term emissions, including GHG emissions, from the small number of construction equipment would be inconsequential compared to regional emissions or the US inventory for GHG emissions, factoring in the substantially greater number of unrelated on-road vehicles and associated emissions that constitute the majority of baseline mobile emissions in the project area. Therefore, construction equipment impacts are anticipated to be less than significant.

During the worst-case construction year, 2021, it is anticipated that a total of 185 construction workers would arrive at the site during the AM peak hour and 185 construction workers would exit the site during the PM peak hour, in addition to 8 total trips (4 entering and 4 exiting) generated by cement trucks during each of the AM and PM peak hours of traffic. According to the traffic impact analysis described in Section 5.10, the level of service with or without the project at affected intersections would remain at similar levels. Therefore, the air quality impacts from on-road mobile source operations associated with construction activities would be temporary and comparable to the 2021 baseline condition, resulting in no significant impacts.

It is anticipated that a short-term increase in GHG emissions would occur associated with construction activities. However, such an increase would be temporary and would be further evaluated during the final design stage when proposed project component is well defined and emissions can be reasonably forecasted.

Although mitigation measures are not warranted during the construction period, BMPs to control construction emissions would be implemented to minimize visible fugitive dust emissions at the property line. The BMPs would include watering of active work areas, using wind screens, keeping adjacent paved roads clean, and covering open-bodied trucks. Additional measures can also be considered if necessary, such as using newer equipment, reducing truck on-site idling time, and moving construction materials and workers to and from the project sites during off-peak traffic hours.

5.8.1.2 Operational Impacts and Mitigation Measures

After construction activities are completed, the long-term operational air quality impacts with the implementation of the proposed project would include an upgrade to the standby power capacity, possible introduction of a new energy saving combined heat and power (CHP) system, and an increase in mobile source operation due to the plant expansion and an increase in wastewater treatment capacity.

Under future operational conditions, three smaller existing generators would continue to provide emergency power to the current load, and new diesel powered generators would provide standby power to the new loads. Given their emergency usage purposes, potential air quality impacts would be short in duration and would be unlikely to cause significant air quality impacts.

A CHP facility may be incorporated at the Honouliuli WWTP to make beneficial use of digester biogas. If such a facility is incorporated at the Honouliuli WWTP, it would need to be permitted according to State and Federal air regulations. Since this facility would be a new stationary source, the emissions at the Honouliuli WWTP would increase resulting in adverse air quality impacts on the local level. However, because the feasibility of constructing such a facility is still under evaluation and has no design specifics, the potential air emissions from the facility cannot be reasonably estimated. If the CHP facility option is elected in the future, the CHP facility would need to be considered for future air quality permitting in conjunction with the biosolids disposal process during the design stage. During the air permitting process, it is anticipated that a separate air quality impact modeling analysis would be conducted to address potential air quality impacts associated with the CHP facility.

With an anticipated 55 peak hour vehicles entering the project site under the future operational condition, the traffic movements with and without the project at affected intersections in 2030 would remain operating at similar levels of service. Therefore, the air quality impacts from on-road mobile source operations associated with operational activities would be comparable to the 2030 baseline condition, causing less than significant off-site mobile source air quality impacts.

The proposed project recommends replacing the existing Primary Odor Control System with new biological odor control systems. Similarly, odor control would be provided to the new treatment facilities. In addition, grit covers, primary clarifier covers, and primary effluent channel covers are recommended for odor containment. These project activities and upgrades to components are common to each of the secondary treatment options. Therefore, compounded with the improvements to the existing Primary Odor Control System and the proposed secondary treatment alternative, the odor impacts under the proposed plant improvement plan are not anticipated to be significant. The ambient odor monitoring program to be implemented after the completion of the project would demonstrate compliance with the DOH ambient odor standard in terms of H_2S concentration levels.

Similar to the criteria pollutants, it is anticipated that an increase in GHG would occur associated with the project. However, such an increase would be further evaluated during the final design stage when the proposed project component is well defined and emissions can be reasonably forecasted. Given its global effects, such a typical infrastructure development project in an urban area would unlikely cause any meaningful global warming effects.

The potential long-term air quality impacts to the project area are not anticipated to be significant, although there is the potential to increase on-site stationary and mobile source emissions due to an increase in the plant operational capacity. These project-induced emissions are mostly short in duration, with the exception of the operation of a potential CHP facility. Thus, mitigation measures in excess of odor control measures would unlikely be necessary during the operational period. Compliance with all applicable ambient standards, including odor in terms of H_2S concentration levels, would be further demonstrated 1) during the final design stage of the project when the air permit is modified for applicable criteria pollutants and 2) after the completion of construction with an ambient monitoring program for odor.

5.9 Noise

An acoustical study, which included an analysis of noise near the WWTP site, was prepared by Ebisu & Associates in January 2015 (Ebisu & Associates 2015). It is attached as Appendix E and is summarized below.

5.9.1.1 Existing Setting

Daytime and nighttime noise measurements were obtained in October 2014 at or near the boundary lines of the Honouliuli WWTP site to provide a basis for describing the existing background noise levels at noise sensitive receptors in the project environs and to determine if the facility is in compliance with DOH noise limits. The project is located within the AG-1 (Restricted Agriculture) and I-2 (Intensive Industrial) zoning districts, within which the current DOH noise limit is 70 dBA for both daytime and nighttime periods. DOH stipulates that noise levels shall not exceed the maximum permissible sound levels for more than 10% of the time within any 20 minute period, at any time except by permit or variance. Figure 1 of Appendix E identifies the measurement locations, and Table 1 of Appendix E presents the results of the noise measurements. The major noise sources at the existing Honouliuli WWTP are identified on Figure 2 of Appendix E and include: Dewatering Building Centrifuge, Influent Pump Station, Blower Building #1 (Primary), BioTower Pump Station Booster Fan, and Caustic Scrubber Odor Control Blower. These five major noise sources are anticipated to remain at their present general locations through the evaluation period (i.e. through 2030). During the daytime, motor vehicle traffic and aircraft noise become the dominant noise sources along the Honouliuli WWTP property lines, and the noise measurements were influenced by these off-site noise sources more than the WWTP noise sources. Based on the recorded measurements, the Honouliuli WWTP site is in full compliance with the 70 dBA DOH noise limit for both the daytime and nighttime periods.

Also, traffic noise level measurements were performed in the vicinity of the Honouliuli WWTP site in December 2014. Table 3 and Figure 3 of Appendix E present the results and locations, respectively, of these measurements. Table 4 of Appendix E presents the calculated hourly average, or Leq(h), traffic noise levels at 50, 75, and 100 feet setback distances from the roadways' centerlines during the PM peak traffic hour, which reflects the highest hourly volume of traffic on the project area roads. The Hawaii State Department of Transportation considers traffic noise levels less than 66 Leq(h) to be acceptable for noise sensitive land uses. This criterion level was exceeded at 50 feet from the centerlines of Geiger Road and Roosevelt Avenue.

The U.S. Department of Housing and Urban Development (HUD) uses the Day-Night Average Sound Level (or DNL) descriptor in evaluating acceptable noise levels at noise sensitive locations. The DNL descriptor incorporates a 24-hour average of daytime and nighttime noise levels, with the nighttime noise levels increased by 10 decibels (or dB) prior to computing the 24-hour average. A noise level of 65 DNL is considered to be acceptable for noise sensitive uses by HUD. Traffic noise levels in DNL may be estimated by adding 1 unit to the peak hour Leq(h), so a traffic noise level of 66 Leq(h) during the PM peak hour would result in a 67 DNL value, or 2 DNL units above the HUD noise standard.

Table 5 in Appendix E presents the existing setback distances to the 65, 70, and 75 DNL traffic noise contour lines for unobstructed line-of-sight conditions along the roadways in the immediate environs of the WWTP site. As indicated in Table 5, setback distances in the order of 68 to 70 feet from the centerlines of Geiger Road and Roosevelt Avenue are required to not exceed the HUD 65 DNL noise standard.

5.9.1.2 Construction Impacts and Mitigation Measures

The potential construction noise levels associated with the proposed project were evaluated for the potential impacts and relationship to the current Federal Housing Administration (FHA)/HUD noise standard.

Audible construction noise would be unavoidable during the project construction period. The construction work required for the project would be performed in phases and would move from one location to another throughout the construction period; thus, the length of exposure to construction-related noise at any receptor location would be less than the construction period for the entire project. Also, most of the work would be performed during the normally permitted hours of 7:00 am to 6:00 pm on weekdays, and between 9:00 am to 6:00 pm on Saturdays. Figure 5 in Appendix E depicts the range of noise levels of various types of construction equipment that may be used at the project site when measured at 50 feet from the equipment. The decrease in construction equipment noise with increasing distance from the noisier equipment is shown in Figure 6 of Appendix E.

The predicted increases in traffic noise levels attributable to project-related traffic during the peak construction year (2021) were also evaluated, and it was concluded that these increases would not exceed 1 dB along Renton Road between Kapolei Parkway and the proposed WWTP site entrance road, hereafter referred to as "Honouliuli Driveway 5 (DW5)". Along all other roadways in the immediate environs of the WWTP site, increases in traffic noise levels associated with the project construction traffic were expected to be less than 0.5 dB. Therefore, noise impacts associated with construction-related traffic are not expected at noise sensitive receptors within the immediate environs of the WWTP site.

Noise sensitive residences that are predicted to experience the highest noise levels during construction activities are located northwest of the WWTP site along Phillipine Sea and Renton Road. Predicted construction noise levels at these residences during the site preparation phase of the work in northwest portion of the WWTP site range from 62 to 71 dBA (plus or minus 5 dBA). The highest predicted noise levels during construction are expected to occur at the Coral Creek Golf Course during proposed infrastructure improvements along the eastern boundary of the WWTP site. The closest residences located to the east of the WWTP site are beyond the Coral Creek Golf Course and are anticipated to experience construction noise levels of 65 dBA (plus or minus 5 dBA). Impacts associated with construction noise are not expected to be in the "public health and welfare" category due to the temporary nature of the work conducted within normally permitted hours. Instead, these impacts would be limited to the temporary degradation of the quality of the acoustic environment in the immediate vicinity of the WWTP site.

As is typically the situation with construction projects, it would not be practical or feasible to reduce or eliminate all construction noise to inaudible levels because of the relatively long period of actual construction activities and the relatively low levels of background noise in the surrounding areas. However, special construction noise mitigation measures would be implemented during construction activities. These measures would include: sound attenuation treatment of fixed machinery which operate continuously, so as to limit their combined maximum noise levels to 65 dBA at the closest receptors (i.e. the adjacent golf course and nearest residences) during the daytime and to 45 or 50 dBA at the property lines toward the closest residences during the nighttime; and requiring the use of broadband back-up alarms for vehicles which operate on the construction sites in place of the more commonly used high frequency, beeper back-up alarms. The use of properly muffled construction equipment would also be required on the job site.

Construction activities would be carried out in accordance with HRS Chapter 342F, Noise Pollution, Hawaii Administrative Rules (HAR) Title 11, Chapter 46, Community Noise Control and all Federal, State, and CCH laws and regulations. According to HAR Title 11, Chapter 46, construction activity is permitted Monday through Friday from 7:00 am to 6:00 pm and Saturday from 9:00 am to 6:00 pm. Construction activities associated with the proposed project would comply with these time restrictions to the extent practicable. A Community Noise Variance would be required to exceed the maximum permissible sound levels or for work outside of normal hours.

5.9.1.3 Operational Impacts and Mitigation Measures

Estimates of future WWTP noise levels were conducted by modeling the source noise levels of the WWTP equipment and facilities expected to be in operation following completion of the proposed Phase 2 improvements in 2030. Figure 4 in Appendix E depicts the locations of the future noise sources that were included in the noise modeling, and Table 8 in Appendix E presents the estimated noise levels of these sources at a 50-foot distance. Sound attenuation measures such as enclosures, the addition of silencers or mufflers or acoustical louvers, the use of sound absorptive interior finishes, or the use of sound rated doors were not included in the noise modeling assumptions. The proposed emergency generators in the Main Electrical Building (Building #201E) were not included in the noise modeling because of their intermittent operation during testing or emergencies and since they would likely be sound attenuated so as to not exceed the DOH noise limit of 70 dBA at the WWTP site property boundary during their operation.

Table 9 in Appendix E presents the results of the calculations of predicted plant noise levels at the WWTP site's perimeter at locations A through J without sound attenuation treatments applied to the various noise sources. The results in Table 9 were controlled by the dominant noise sources located in Building #0331 (the blower building) and Building #201F (the grit building). The utilization of sound attenuation treatments to all proposed noise sources (with the exception of the emergency generators) would not likely be required to comply with the 70 dBA DOH noise limit along the WWTP site property boundary. However, acoustical treatments of louder noise sources would be incorporated into the project design to reduce their contributions to the total WWTP site noise levels.

Future road traffic noise levels associated with operation of the proposed project in 2030 were also assessed. By 2030, traffic noise level increase attributable to project traffic is expected to be less than 1.0 dB at all roadways in the project environs, except along the section of Renton Road between Kapolei Parkway and the proposed DW5 entrance. The estimated increases in future traffic noise levels along this section of Renton Road are 0.9 dB due to non-project traffic and 2.0 dB due to project traffic. Since existing traffic volumes along this section of roadway are relatively low (approximately 343 vehicles per hour), and since this area is currently undeveloped within 50 feet of the roadway's centerline, these increases in future traffic noise levels are not expected to result in exceedances of traffic noise level criteria along this roadway section.

Along Renton Road west of the proposed DW5 entrance where existing residences are located, future traffic noise level increases associated with the project are not expected to occur. Also, along Roosevelt Avenue in the vicinity of Phillipine Sea, future traffic noise level increases associated with project traffic are anticipated to be less than 0.2 dB by the year 2030. Along Geiger Road and Roosevelt Avenue where existing traffic noise levels exceed the 66 Leq(h) and 65 DNL noise impact thresholds, future increases in traffic noise levels due to project traffic are lower than the increases associated with non-project traffic, and are predicted to be less than 0.8 Leq(h) or DNL. These increases are not considered to be significant.

5.10 Traffic

A traffic impact analysis report (TIAR), which includes an analysis of traffic near the Honouliuli WWTP site, was prepared by Austin Tsutsumi & Associates, Inc. (ATA) in November 2014 (ATA 2014). It is attached as Appendix F and summarized below.

5.10.1 Existing Setting

Primary access to the Honouliuli WWTP is through an entrance on Geiger Road, hereafter referred to as "Honouliuli Driveway 1 (DW1)", west of the Coral Creek Golf Course and south of the Honouliuli WWTP Control Building. The Septage Receiving Station is accessed through a separate entrance from Geiger Road east of the main entrance, hereafter referred to as "Honouliuli Driveway 2 (DW2)". The expansion property can currently be accessed from the north from Malio Street via Renton Road and from Geiger Road east of the Septage Receiving Station entrance. The Ewa Convenience Center is accessed from Geiger Road west of the main WWTP entrance at DW1.

The majority of parking is located near the main entrance from Geiger Road and distributed around the Control Building, Maintenance Building Number (No.) 1, Chlorination Building, and Maintenance Building No. 2. Minor additional parking is located at the Locker Room Building and Biotower Pump Station. Golf carts are parked where convenient around the site. HWRF has parking within its facility.

ATA conducted manual turning movement counts and field observations for critical intersections during the peak hour and at a time when schools were known to be in-session. Existing traffic volumes, lane configuration and movement level of service (LOS) are illustrated in Figure 5-6. Manual turning movement traffic counts and field observations were conducted at the following study intersections in the vicinity of the WWTP site (intersection numbering below corresponds with numbering in Figure 5-6):

1. Kualakai Parkway/Kapolei Parkway – northwest of the Honouliuli WWTP property
2. Renton Road/Kapolei Parkway – immediately north of the Honouliuli WWTP property
3. Renton Road/Phillipine Sea – west of the Honouliuli WWTP property
4. Roosevelt Avenue/Phillipine Sea – southwest of the Honouliuli WWTP property
5. Roosevelt Avenue/Geiger Road/Essex Road – immediately southwest of the Honouliuli WWTP property
6. Geiger Road/Ewa Refuse Convenience Center Driveway (ECRC) – in the southwest corner of the Honouliuli WWTP
7. Geiger Road/DW1 – located at the southern boundary of the Honouliuli WWTP property
8. Geiger Road/DW2 – located in the southeast corner of the Honouliuli WWTP property
9. Geiger Road/Kapolei Parkway – southeast of the Honouliuli WWTP property
10. Fort Weaver Road/Geiger Road/Iroquois Road – east of the Honouliuli WWTP property
11. Renton Road/Fort Weaver Road – northeast of the Honouliuli WWTP property

Analysis for the study intersections was performed by ATA using methodologies prescribed by the Highway Capacity Manual (TRB 2010). The analysis included control delay results, based on intersection lane geometry, signal timing inputs and hourly traffic volume for signalized and unsignalized intersections. Traffic software calculations, as confirmed or refined by field observations, constituted the technical analysis. Using the peak hour manual count volumes, the traffic software was run and a Level of Service (LOS) was assigned to each intersection. LOS is used to analyze roadways and intersections by categorizing traffic flow and assigning qualitative levels of traffic, with values ranging from free-flow conditions at LOS A to congested conditions at LOS F.

The weekday morning (AM) and afternoon (PM) peak hour turning movement data utilized in this report was collected on Wednesday, September 3, 2014. Based on this traffic count data, the weekday AM peak hour of traffic was determined to be from 7:00 AM to 8:00 AM and the PM peak hour of traffic was determined to be from 4:00 PM to 5:00 PM.

At all signalized study intersections, with the exception of Fort Weaver Road intersections, most vehicles typically cleared each intersection within one signal cycle without any heavy queuing or congestion. All study intersections operate at LOS D or better with adequate capacity except for the following intersections (none of which are located immediately adjacent to the Honouliuli WWTP property):

- Renton Road/Kapolei Parkway (intersection #2 on Figure 5-6 located to the north of the Honouliuli WWTP):

  All movements of this intersection currently operate at LOS D or better during the AM and PM peak hours of traffic with the exception of the northbound left-turn movement, which operates at LOS E during the AM peak hour of traffic. Although the northbound left-turn movement operates at LOS E during the AM peak hour of traffic, adequate capacity is provided.

- Geiger Road/Kapolei Parkway (intersection #9 on Figure 5-6 located to the southeast of the Honouliuli WWTP):

  The eastbound left-turn movement operates at LOS E(E) during the AM(PM) peak hours, but is generally low volume movements of only 8(45) vehicles, respectively. All remaining movements of this intersection operate at LOS D or better during the AM and PM peak hour of traffic.

- Fort Weaver Road/Geiger Road/Iroquois Road & Renton Road/ Fort Weaver Road (intersections #10 and #11 on Figure 5-6 located to the east of the Honouliuli WWTP):

  The majority of movements at these intersections currently operate at LOS E/F conditions during the AM and PM peak hours of traffic mainly due to long delays as a result of requisite long cycle lengths (approximately 4 minutes long). These two intersections also provide split-phase signal operation on the side streets and long pedestrian crossing times across Fort Weaver Road, which contribute to the long delays. During the AM peak hour, the northbound traffic is generally heavier, while during the PM peak hour, traffic is heavier in the southbound direction.

5.10.1.1 Base Year 2021

The year 2021 was selected as the base year to reflect the anticipated peak year of construction activity, which was assumed to occur during Phase 1 construction of the Honouliuli WWTP. It is anticipated that by year 2021, traffic will have increased significantly over existing conditions due to the continuing development of the Ewa-Kapolei region. The following intersections are anticipated to operate at LOS E/F in 2021:

- Kualakai Parkway/Kapolei Parkway intersection (intersection #1 on Figure 5-6, located to the northwest of the Honouliuli WWTP):

  Upon build-out of the Ka Makana Alii Shopping Center, one of the proposed accesses to the shopping center is anticipated to be provided as a new south leg extension from the existing Kualakai Parkway/Kapolei Parkway intersection, ultimately providing a 4-legged intersection. With the improvements at the intersection, the low volume northbound left-turn movement is projected to operate at LOS F during the AM peak hour with only 5 vehicles anticipated to make the left-turn onto Kapolei Parkway. During the PM peak hour, all left-turn movements will operate at LOS E conditions.

- Renton Road/Kapolei Parkway (intersection #2 on Figure 5-6):

  This intersection is forecast to operate similar to existing conditions during the AM and PM peak hours of traffic. However, the southbound left-turn movement will worsen to LOS E during the AM peak hour of traffic and the northbound left-turn movement will worsen to LOS E during the PM peak hour of traffic.

- Geiger Road/Kapolei Parkway (intersection #9 on Figure 5-6):

  The intersection is anticipated to operate overall at LOS D during the AM and PM peak hours of traffic. Due to increased traffic, all left-turn movements are anticipated to operate at LOS E during both peak hours, with the low volume eastbound left-turn movement of 10 vehicles, operating at LOS F.

- Fort Weaver Road/Geiger Road/Iroquois Road & Renton Road/Fort Weaver Road (intersections #10 and #11 on Figure 5-6 located to the east of the Honouliuli WWTP):

  Similar to Existing conditions, the intersections along Fort Weaver Road through the Ewa region will continue to experience LOS F at some movements. However, this is generally ascribed to requisite long traffic signal cycle lengths, split phase operation, and generally long crosswalk lengths across Fort Weaver Road.

All unsignalized study intersections will continue operating at LOS D or better during the AM and PM peak hours of traffic. Table 2 (in Appendix F) shows the Existing and Base Year 2021 LOS at the study intersections.

5.10.1.2 Base Year 2030

The year 2030 was selected as the base year to reflect the anticipated build-out of the Honouliuli WWTP. By year 2030, traffic will continue to increase due to the continuing development of the Ewa-Kapolei region. Based on a LOS comparison between Base Year 2021 and Base Year 2030, the majority of individual movements that are projected to operate at LOS E/F for Base Year 2021 conditions will continue operating at similar levels of service for Base Year 2030 conditions during the AM and PM peak hours of traffic except for the following:

- Kualakai Parkway/Kapolei Parkway (intersection #1 on Figure 5-6):

  The low volume northbound left-turn movement will operate at LOS F during the PM peak hour.

- Renton Road/Kapolei Parkway (intersection #2 on Figure 5-6):

  During the AM peak hour, the northbound approach will worsen to LOS E conditions, with the mainline through movement along Kapolei Parkway nearing its capacity. In addition, the westbound and southbound left-turn movements will operate at LOS E during the PM peak hour of traffic. In order to mitigate the deficiencies of the intersection, dual southbound left-turn lanes were recommended to accommodate the relatively high 275(320) southbound left-turn vehicles during the AM(PM) peak hours. With the dual southbound left-turn lanes, all movements at the intersection are forecast to operate similar to Base Year 2021 conditions.

- Roosevelt Avenue/Philippine Sea (intersection #4 on Figure 5-6 located to the southwest of the Honouliuli WWTP):

  The southbound shared left/through/right-turn lane is anticipated to worsen from LOS D to LOS E. With a low 15(20) vehicles making the southbound left-turn movement, the heavier southbound right-turn movement should not be heavily impacted. Based on existing observations, the southbound queues did extend beyond four vehicles, with the majority of queues typically consisting of only one vehicle.

- Geiger Road/Kapolei Parkway (intersection #9 on Figure 5-6):

  During the AM peak hour, the westbound and southbound left-turn movements will worsen to LOS F. In addition, northbound left-turn movement will worsen to LOS F at overcapacity conditions. During the PM peak hour, the westbound left-turn movement will worsen to LOS F, and the southbound through movement along Kapolei Parkway will operate near capacity. In order to mitigate the deficiencies of the intersection, dual northbound left-turn lanes were recommended to accommodate the high 470(215) northbound left-turn vehicles during the AM(PM) peak hours. Also, the eastbound approach along Geiger Road was restriped from one left-turn, one through and one shared through/right to one left-turn, one through and one right-turn. With the dual northbound left-turn lanes and eastbound restriping, all movements are forecast to operate similar to Base Year 2021 conditions.

- Fort Weaver Road/Geiger Road/Iroquois Road & Renton Road/Fort Weaver Road (intersections #10 and #11 on Figure 5-6):

  The intersections along Fort Weaver Road through the Ewa region will experience LOS F and over-capacity conditions at some movements. However, this is generally ascribed to requisite long traffic signal cycle lengths, split phase operation and generally long crosswalk lengths across Fort Weaver Road.

Table 3 in (in Appendix F) shows the Base Year 2021 and Base Year 2030 LOS at the study intersections.

5.10.2 Construction Impacts and Mitigation Measures

Future year 2021 trip generation is the anticipated peak year of construction activity, which was assumed to occur during Phase 1 construction of the Honouliuli WWTP. It was estimated that the project would generate 185 construction workers to/from the site, with the assumption of 1 vehicle trip per construction worker. Therefore, 185 construction workers would arrive to the site during the AM peak hour and 185 construction workers would exit the site during the PM peak hour. This was assumed to be a relatively conservative estimate, since workers may commute outside the studied peak hours of traffic and carpooling would likely occur.

In addition to the 185 construction workers, 8 total trips (4 entering and 4 exiting) were assumed to be generated by cement trucks during each of the AM and PM peak hours of traffic. This was also a conservative estimate, since it is likely that these trucks would probably avoid peak hours of traffic.

Figure 5-7 illustrates the Project Generated Traffic Volumes for Year 2021. Refer to Appendix F for illustrations of the forecast traffic volumes, lane configuration, and LOS for Future Year 2021 conditions. Additionally, Table 5 (in Appendix F) summarizes the delay, volume to capacity (v/c), and LOS at the study intersections for Base Year 2021 and Future Year 2021 conditions.

Based on a LOS comparison between Future Year 2021 and Base Year 2021, the majority of individual movements that are projected to operate at LOS E/F for Base Year 2021 conditions will continue operating at similar levels of service for Future Year 2021 conditions during the AM and PM peak hours of traffic except for the following:

- Fort Weaver Road/Geiger Road/Iroquois Road & Renton Road/Fort Weaver Road (intersections #10 and #11 on Figure 5-7):

  The intersections along Fort Weaver Road through the Ewa region will experience LOS F and over-capacity conditions at some movements. However, this is generally ascribed to requisite long traffic signal cycle lengths, split phase operation and generally long crosswalk lengths across Fort Weaver Road.

- Geiger Road/DW2 (intersection #8 located in the southeast corner of the Honouliuli WWTP property on Figure 5-7):

  The southbound shared left/through/right-turn lane is anticipated to operate at LOS E during the PM peak hour. The southbound left-turn movement currently operates with 20 vehicles and queues were not observed to extend beyond a couple vehicles long. An additional 30 left-turn vehicles generated by construction worker trips should have minimal impacts to the queues along the southbound approach.

Future Year 2021 Project trips were assigned to all existing driveways in addition to three new proposed accesses, as shown on Figure 5-7. Trip distribution is based on existing traffic flow patterns throughout the study area. All movements at the three new project driveway intersections will operate adequately at LOS D or better during the AM and PM peak hours of traffic. The first access is proposed to be located approximately 600 feet east of the existing Geiger Road/DW2 intersection (intersection #8 on Figure 5-6) and will hereafter be referred to as "Honouliuli Driveway 3 (DW3)" (intersection #12 on Figure 5-7). The second access is proposed to be located approximately 600 feet east of the existing Roosevelt Avenue/Phillipine Sea intersection (intersection #4 on Figure 5-6) and will hereafter be referred to as "Honouliuli Driveway 4 (DW4)" (intersection #13 on Figure 5-7). The third access is proposed to be located along Renton Road adjacent to the Malio Street intersection. The new access is proposed near Malio Street. For purposes of this study, this new access along Renton Road will hereafter be referred to as DW5 (intersection #14 on Figure 5-7).

Although entering traffic volumes at the proposed project driveways are anticipated to operate with adequate LOS, eastbound left-turn lanes are recommended along Geiger Road and Roosevelt Avenue at the intersections with Honouliuli Driveways, including DW1, DW2, DW3 and DW4, and a westbound left-turn lane is recommended at the Renton Road/DW5 intersection (intersection #14 on Figure 5-7). In addition, the left-turn lanes entering these driveways should provide for a minimum storage of at least 50 feet, while the Renton Road/DW5 intersection should provide a minimum of at least 125 feet of storage.

Due to increased regional growth along the major thoroughfares and slight increase in exiting proposed project traffic, the Geiger Road/DW2 intersection will operate at LOS E conditions along its southbound approach but should not experience heavy queuing due to its low volume.

In summary, the following roadway improvements are recommended:

<u>Geiger Road at its intersection with Honouliuli Driveways: DW1, DW2 and DW3 (intersections 7, 8, and 12 on Figure 5-7)</u>

1. Eastbound Approach
   a. Widen to provide a left-turn storage lane.
   b. Provide for a minimum storage of at least 50 feet.

Roosevelt Avenue/DW4 Intersection (intersection 13 on Figure 5-7)

1. Eastbound Approach
   a. Widen to provide a left-turn storage lane.
   b. Provide for a minimum storage of at least 50 feet.

Renton Road/DW5 Intersection (intersection 14 on Figure 5-7)

1. Westbound Approach
   a. Widen to provide a left-turn storage lane.
   b. Provide for a minimum storage of at least 125 feet.

Future operational needs at this facility should be addressed in order to mitigate any traffic conflicts at the proposed driveway alignments. The design should ensure that adequate sight distance is provided for all vehicle types at all project driveways. All driveways that are gated for security purposes should have adequate storage for vehicle queuing and a turnaround area. A signal is being provided for the main driveway as part of a neighboring project.

Any damage to the existing roadway and sidewalk area caused by the project should be restored to its original or better condition. Also, the area Neighborhood Board, as well as the area residents, businesses, emergency personnel, Oahu Transit Services, Inc. (TheBus), etc., should continue to be kept apprised of the details of the proposed project and the impacts that the project may have on the adjoining local street area network.

5.10.3 Operational Impacts and Mitigation Measures

The trip generation for the Future Year 2030 scenario was based on the full build-out of the project. The current staffing level at the Honouliuli WWTP is at 39 full time equivalent (FTE) positions, while the build-out of the project will increase the staffing to an estimated 320 FTE positions. This results in an eight-fold increase to the number of employees at the Honouliuli WWTP. In order to determine the growth in traffic generated by this increase to 320 FTE, all existing traffic turning movements were increased linearly by a factor of 8. Trips were also increased to address trips for solids and solids product handling.

Future Year 2030 Project trips were assigned to all existing driveways, in addition to the three proposed new access points. Trip distribution is based on existing traffic flow patterns throughout the study area. Figure 5-8 illustrates the Project Generated Traffic volumes for Year 2030. See Appendix F for illustration of the forecast traffic volumes, lane configuration, and LOS for Future Year 2030 conditions. Table 7 (in Appendix F) summarizes the delay, v/c, and LOS at the study intersections for Base Year 2030 and Future Year 2030 conditions.

Based on a LOS comparison between Future Year 2030 and Base Year 2030/Future Year 2021, the majority of individual movements projected to operate at LOS E/F for Base Year 2030/Future Year 2021 conditions will continue operating at similar levels of service for Future Year 2030 conditions during the AM and PM peak hours of traffic, except for the following:

- Geiger Road/DW1 (intersection #7 on Figure 5-8):

  This intersection is forecast to operate similar to Base Year 2030 conditions with the exception of the southbound shared left/through/right movement which is projected to operate at LOS E during the PM peak hours of traffic. The southbound left-turn movement currently operates with only 10 vehicles and queues were not observed to extend beyond one vehicle long. An additional 35 left-turn vehicles anticipated to be generated by the proposed project should have minimal impacts to the queues along the southbound approach.

- Geiger Road/DW2 (intersection #8 on Figure 5-8):

  The southbound shared left/through/right movement is projected to operate at LOS E(F) during the AM(PM) peak hours of traffic, respectively. The southbound approach will continue to operate at a low 20 vehicle right-turn movement and 70 vehicle left-turn movement during the more critical PM peak hour. With an anticipated average of only 1 southbound left-turn vehicle arriving every minute, the increase in southbound traffic should have minimal impacts on southbound queues.

- Geiger Road/DW3 (intersection #12 on Figure 5-8):

  This new proposed access is forecast to operate at LOS D or better during the AM and PM peak hours of traffic with the exception of the southbound shared left/right-turn movement which is projected to operate at LOS F during the PM peak hour of traffic. The southbound left-turn movement will operate at a low 50 vehicles during the PM peak hour. With an anticipated average of less than 1 southbound left-turn vehicle arriving every minute, the movement should not experience heavy southbound queues.

- Fort Weaver Road/Geiger Road/Iroquois Road & Renton Road/Fort Weaver Road (intersections #10 and #11 on Figure 5-8):

  As previously discussed, intersections along Fort Weaver Road through the Ewa region will continue to experience LOS F and over-capacity conditions at some movements. However, this is generally ascribed to requisite long traffic signal cycle lengths, split phase operation, and generally long crosswalk lengths across Fort Weaver Road.

In conclusion, based on an anticipated increase in regional growth along the major thoroughfares (without the project), slight increase anticipated in entering/exiting project traffic during peak hours as a result of the proposed project, and proposed improvements to accommodate the slight increase, impacts to traffic in the region due to operation of the proposed project are not anticipated.

Figure 5-6. Existing Lane Configuration, Volume, and LOS

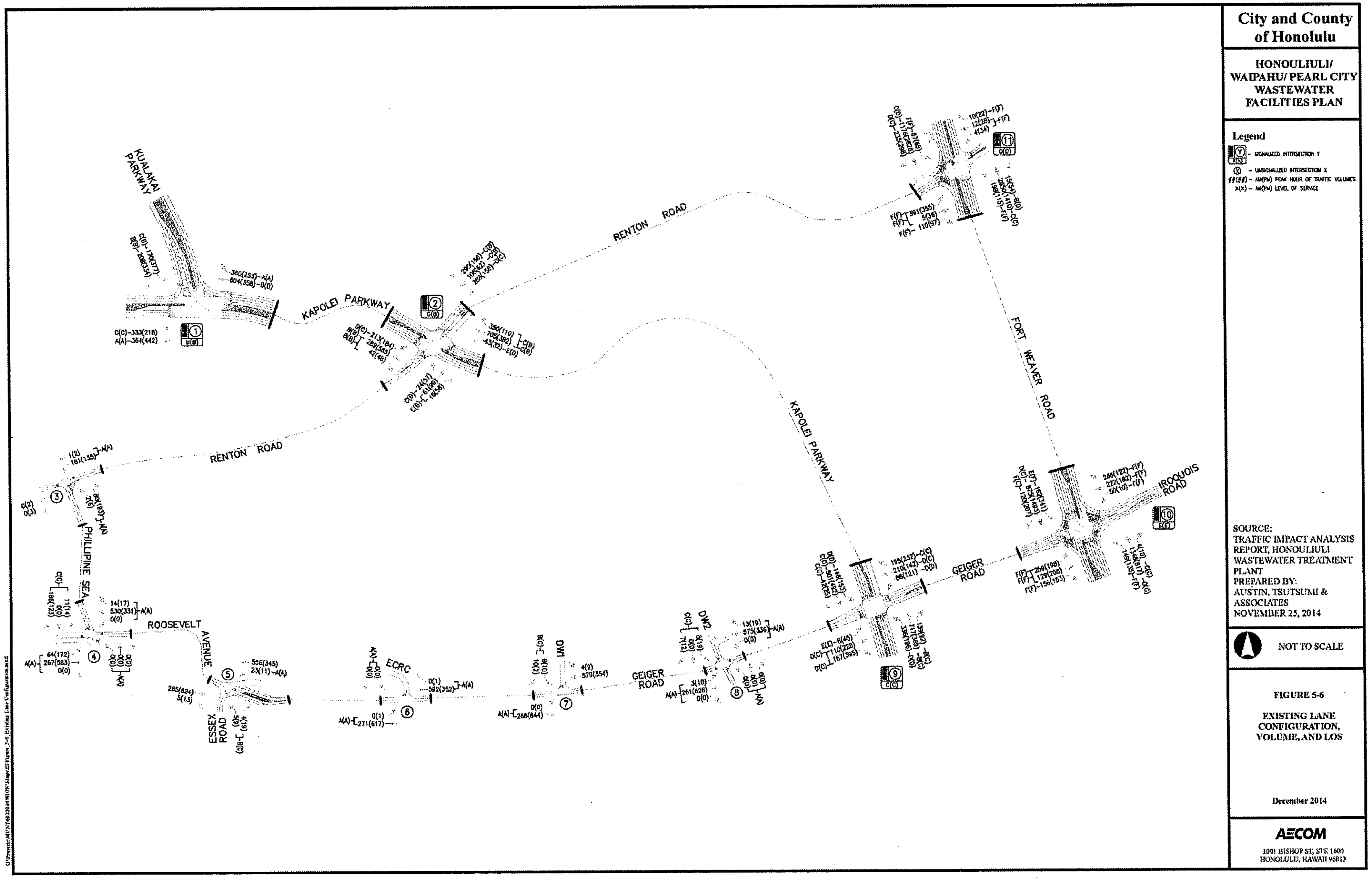


Figure 5-7. Year 2021 Project Only Volumes

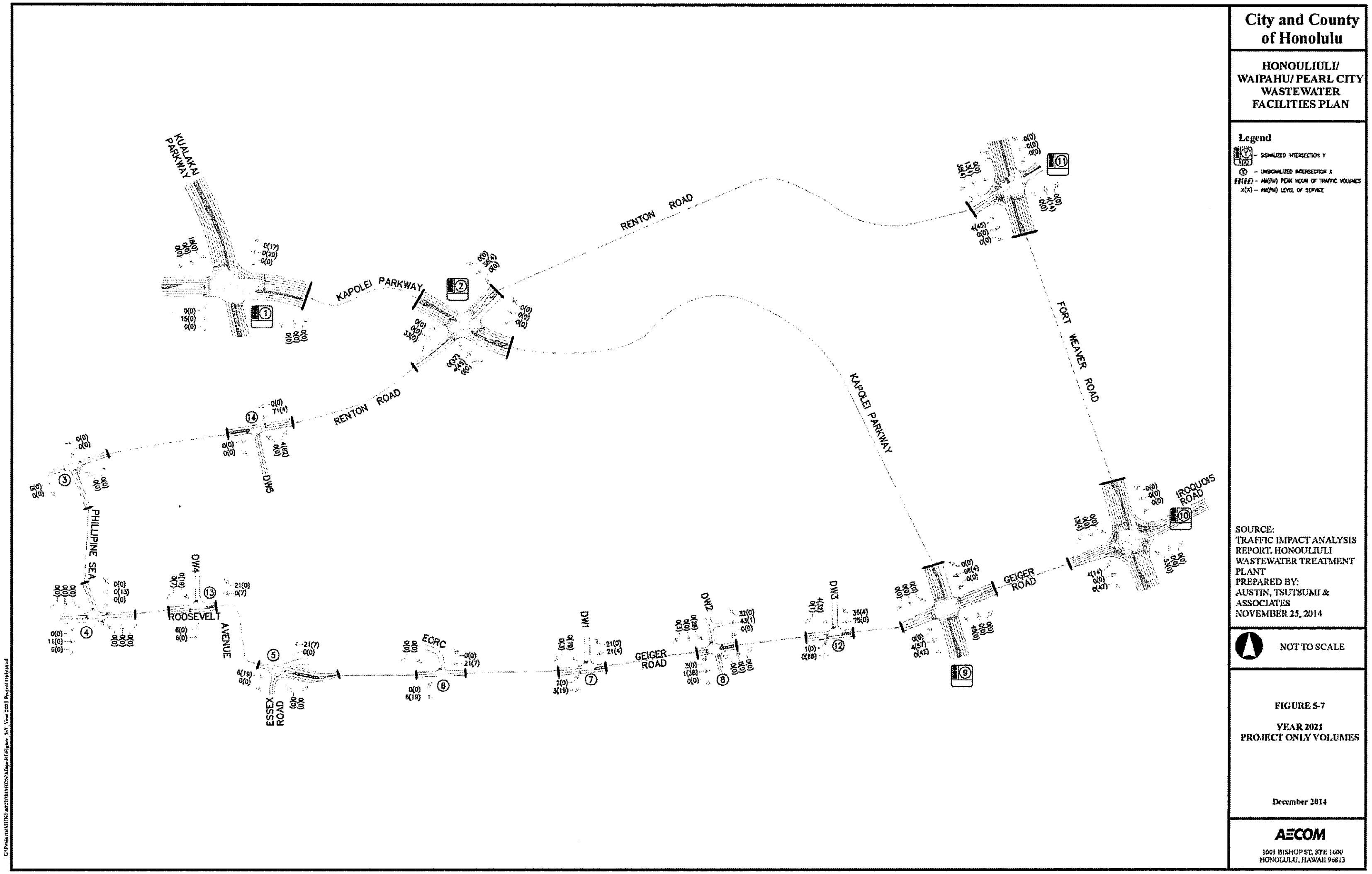
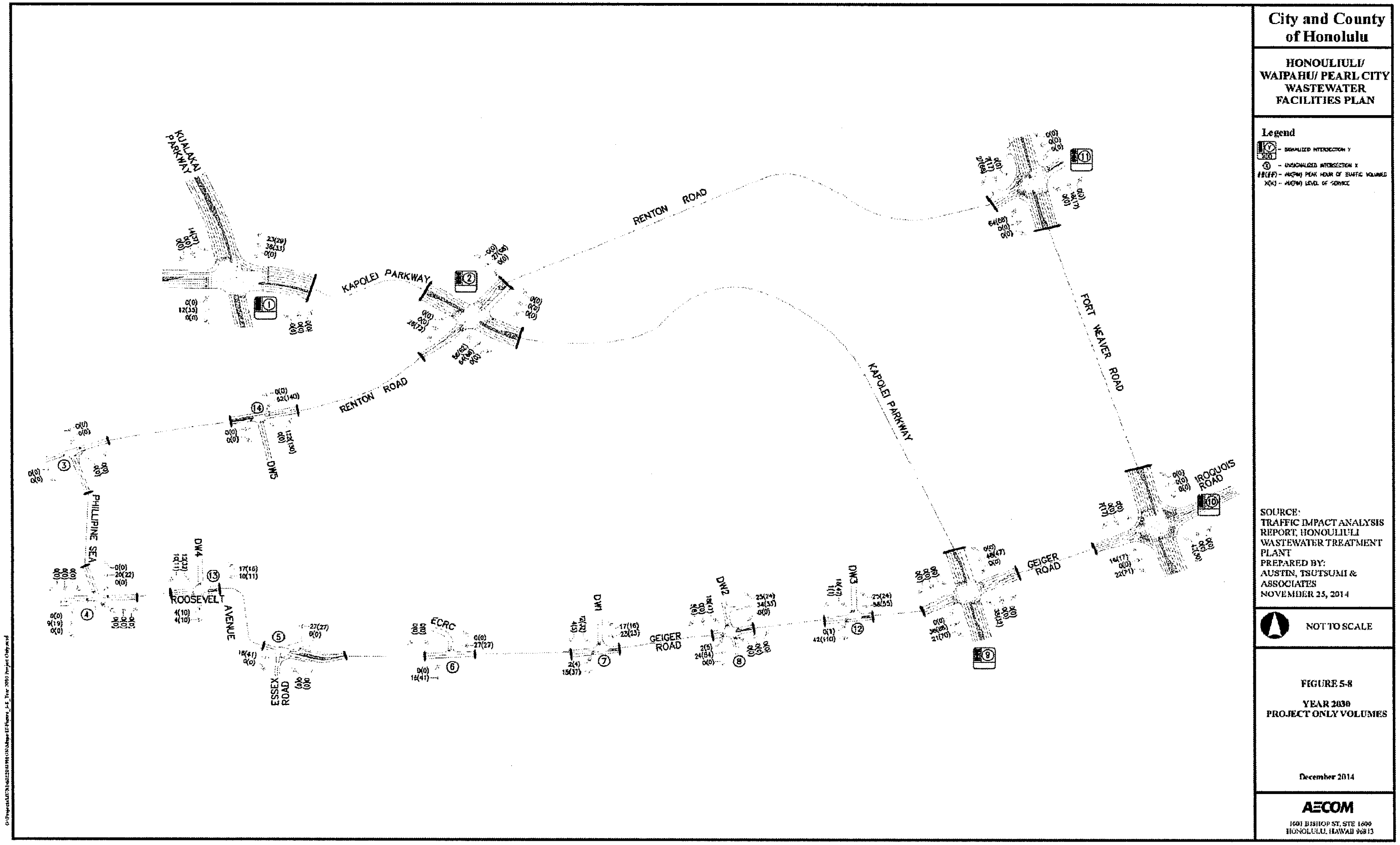


Figure 5-8. Year 2030 Project Only Volumes



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5.11 Visual and Aesthetic Resources

5.11.1 Existing Setting

The visual character of the project site is primarily an industrial setting due to the existing treatment facilities. The WWTP site is visible from nearby golf courses, including Coral Creek Golf Course to the east of the site and Barbers Point Golf Course located to the south of the project site, and residential neighborhoods located along the western and northwestern expansion property boundary. Views of the WWTP from the golf courses are partially screened by the existing tree canopy located between the WWTP site and the golf courses on each golf course property. The WWTP project site is also visible from a rail trail/bike path within the old OR&L railway, located immediately north of the expansion property. Trees within the expansion property currently provide a visual screen between the existing WWTP and the Coral Creek Golf Course, residential areas, and the rail trail. Other nearby properties within viewing distance of the project site includes industrial land uses.

5.11.2 Construction Impacts and Mitigation Measures

Construction of the proposed improvements, regardless of the alternative, would result in temporary impacts to the viewshed from Coral Creek Golf Course, residential areas, and the rail trail/bike path due to the clearing of trees within the expansion property and subsequent construction activities following tree clearing. Visual impacts during construction as viewed from Barbers Point Golf Course are anticipated to be minimal as a result of an existing tree canopy between the site and the golf course.

During construction, fencing surrounding the construction site may be provided as needed to provide a visual screen from construction equipment. Any construction impacts regarding visual aesthetics are expected to be short-term and would cease after construction.

The existing perimeter chain link fence would be removed and replaced with a new combination of walls, ornamental fence, and chain link fence. The selection of fence type would be determined based on location on the property. Fence lines/walls along roadways/property boundaries would be improved to provide an aesthetically pleasing view to replace the industrial look that currently exists, with linear landscape elements along the fences/walls.

5.11.3 Operational Impacts and Mitigation Measures

The proposed project, regardless of the alternative, would include new structures that would be consistent with the industrial character of the existing facility. The facilities would be designed to blend in the new structures with the existing structures and would be designed in accordance with CCH rules and regulations. The viewshed from Coral Creek Golf Course, residential areas, and the rail trail/bike path would be impacted by the change in character from forest to industrial uses. However, as previously noted, the expansion property is an area that has been disturbed by past and current land uses.

The area around the facilities would be fenced and landscaped. The landscaping elements would be irrigated with reclaimed water or drought-tolerant plants, and grasses and native species would be planted whenever feasible. The height and setback of the walls would be considered to minimize impacts to the surrounding neighborhoods. At least 10 ft of clear space would be provided on both sides of fence lines for vehicle access, which would support fence line maintenance. A perimeter walking/biking path around the entire site would provide the public with a source of recreational activity. The path would be located outside the fenced areas. A separate entrance and parking area would be provided for users of the walking/biking path. This path would be designed to include provisions for safe pedestrian, bicycle, and vehicle crossings at all project driveways.

Regardless of the alternative implemented, anticipated indirect impacts to visual aesthetics are associated with upgrades and improvements to the treatment system to allow future developments (residential, commercial and industrial) in the sewer basin to connect to the existing wastewater system, as envisioned in the PUC and Ewa

Development Plans. These future developments are expected to result in a more urbanized look in the sewer basin.

5.12 Socioeconomics

The socioeconomic region of influence (ROI) is the geographic area that would be most affected by the proposed expansion and upgrading of the Honouliuli WWTP, and relocating of non-process related functions and facilities from the Sand Island WWTP and other locations to the Honouliuli WWTP. The ROI is selected as the basis on which social and economic impacts of the proposed project are analyzed, as it encompasses the expected residency distribution of Honouliuli WWTP and Sand Island WWTP employees, their commuting patterns, and the location of businesses providing goods and services to the WWTPs, its personnel, and their families. The ROI for the socioeconomic environment comprises the following census county divisions (CCDs), which are subdivisions of Honolulu County recognized by the USCB:

- Ewa CCD, in which the Honouliuli WWTP is located, as the primary component of the ROI (defined as primary since the project is located in this area)
- Honolulu CCD, in which the Sand Island WWTP is located, as a secondary component of the ROI (defined as secondary as it the actual project site is located outside of this area)

There is a potential for a greater magnitude of socioeconomic effects within the primary component of the ROI, as the project would result in very large construction and operation expenditures at the Honouliuli WWTP, but no or minimal expenditures at the Sand Island WWTP. However, there is greater certainty of socioeconomic effects within the primary component, as the project entails the expansion and upgrading of the Honouliuli WWTP, but addresses the relocation of non-process facilities from the Sand Island WWTP as a potential action.

The ROI, depicted in Figure 5-9, encompasses a land area of approximately 254 square miles (USCB 2014a), representing about 42.3 percent of the county land area (USCB 2014b). Data for Honolulu County are provided as needed in lieu of data available for the CCDs and for context and comparison, and data for the State of Hawaii are provided as relevant for context and general comparison.

5.12.1 Demographics and Economics

Population and Housing

The USCB conducts a census of the United States every 10 years, in years ending in zero, to count the population and housing units for the entire United States. The most recent decennial census was conducted in 2010. Table 5-6 presents population statistics for the ROI. Population data were derived based on the 2000 Census and the 2010 Census.

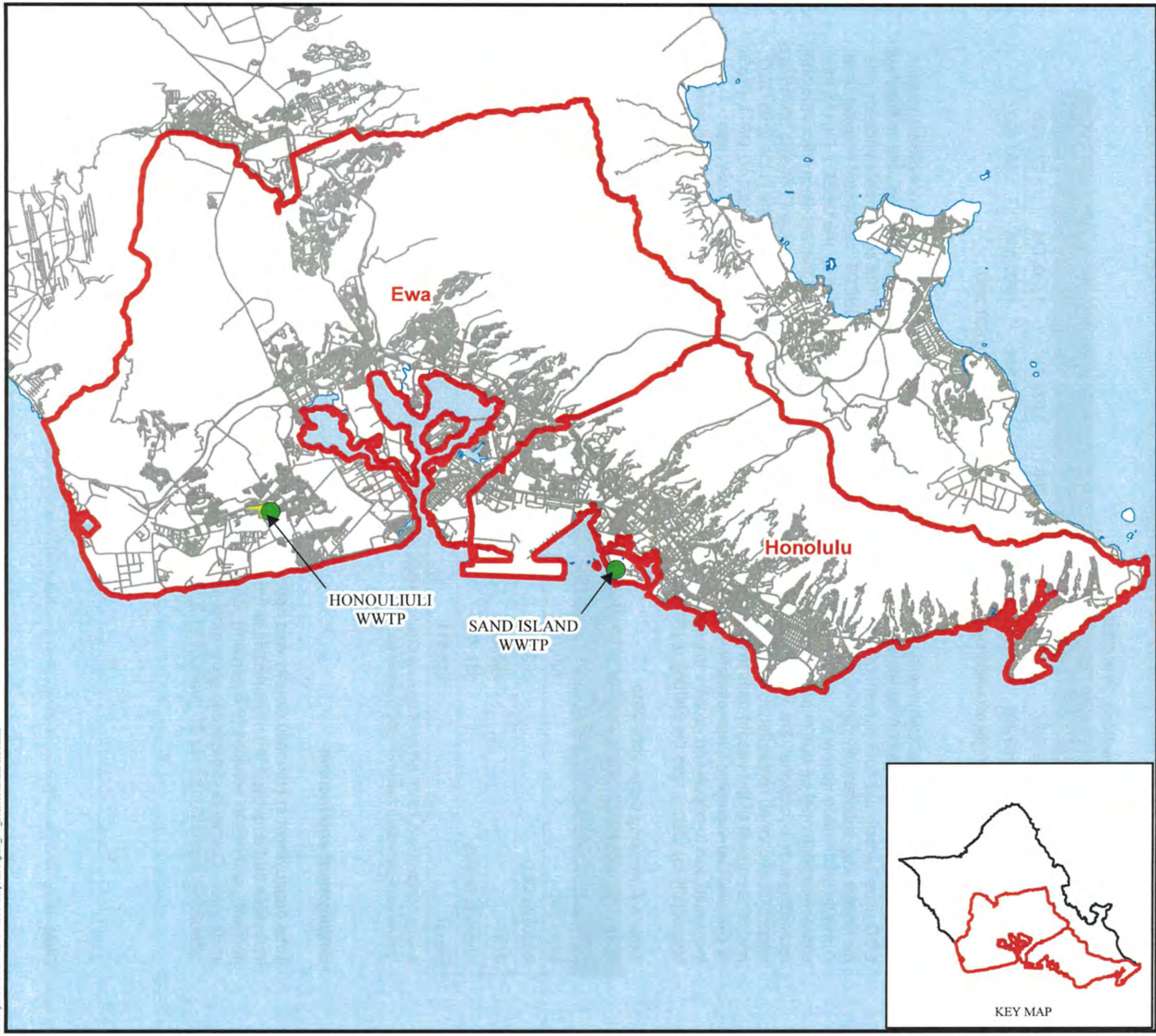
Table 5-6. Population, 2000 and 2010, and Population Density, 2010

Geographic Area	Land area (sq. miles)	Population			2010 Density (persons per square mile)
		2000	2010	Percent Change 2000-2010[1]	
Ewa CCD	165	272,328	323,118	19%	1,958[1]
Honolulu CCD	89	372,279	390,738	5%	4,390[1]
ROI	**254**	**644,607[1]**	**713,856[1]**	**11%**	**2,810[1]**
Honolulu County	601	876,156	953,207	9%	1,586
Hawaii	6,422	1,211,537	1,360,301	12%	212

Sources: USCB 2014b; USCB 2014c, DP-1, Profile of General Demographic Characteristics, 2000 Census and 2010 Census.
[1]Values were calculated based on USCB estimates.

The Honouliuli WWTP and Sand Island WWTP are located in a densely-populated and robust region. ROI population density is about 2,810 persons per square mile; substantially higher than the approximately 1,590 persons per square mile population density of Honolulu County and the 210 persons per square mile density of the State of Hawaii (USCB 2014b). Ewa CCD encompasses a land area of approximately 165 square miles and a water area of about 77 square miles, and Honolulu CCD encompasses a land area of approximately 89 square miles and a water area of about 1,127 square miles (USCB 2014a).

The population within the ROI increased 11 percent from 2000 to 2010; similar to the 12 percent increase in population of the State of Hawaii during that time period. Ewa CCD was the fastest growing area among the geographic areas of comparison, growing approximately 19 percent between 2000 and 2010.



City and County of Honolulu

HONOULIULI/ WAIPAHU/ PEARL CITY WASTEWATER FACILITIES PLAN

Legend
- WWTPs
- Census County Divisions
- Street

0 — 20,000
Feet
1 inch = 20,000 feet

FIGURE 5-9

SOCIOECONOMIC REGION OF INFLUENCE

December 2014

AECOM

1001 BISHOP ST, STE 1600
HONOLULU, HAWAII 96813

G:\Projects\MUNI\60220849HON\Maps\EI\Figure_5-9_Socioeconomic ROI.mxd

Table 5-7 provides population projections for Honolulu County and the State of Hawaii prepared by the DBEDT (DBEDT 2012). Based on DBEDT population projections, the population of Honolulu County will be about 1,003,700 in 2020 and 1,052,100 in 2030, an approximately 5 percent increase per decade. For the State of Hawaii, DBEDT estimates an approximately 8 percent increase between 2010 and 2020, as well as between 2020 and 2030. This rate of increase for the state is higher than the anticipated increase in Honolulu County.

Table 5-7. Population Projections, 2010-2035

Geographic Area	2010	2015	2020	2025	2030	2035
Honolulu County	953,207	976,192	1,003,706	1,029,414	1,052,134	1,071,225
Hawaii	1,360,301	1,418,252	1,481,236	1,543,244	1,602,338	1,657,500

Sources: USCB 2014c, DP-1, Profile of General Demographic Characteristics, 2010 Census; DBEDT 2012.

Based on USCB American Community Survey five-year estimates for 2008-2012, the number of housing units in the ROI totaled about 263,660, as shown in Table 5-8. Approximately 5.7 percent of the housing units in the Ewa CCD were vacant and 10.5 percent of the units in the Honolulu CCD were vacant. The comparable vacancy rate for Hawaii was substantially higher, at 13.9 percent. However, according to the DBEDT, residential housing units currently are in short supply in the state (DBEDT 2014). Although not explicitly stated by the DBEDT (2014), this characterization may be due in part to the large proportion of housing units in Hawaii that are vacant for seasonal, recreational, or occasional use. In 2010, approximately 46.9 percent of the State's total vacant housing units were vacant for seasonal, recreational, or occasional use, and about 16.2 percent of the vacant units in the Ewa CCD and 39.9 percent of the vacant units in the Honolulu CCD were vacant for this reason (USCB 2014c, DP-1, Profile of General Demographic Characteristics, 2010 Census). In recent years, housing demand in Hawaii has increased due to population growth, the conversion of homes to visitor use due a limited supply of hotel rooms (especially on Oahu), and the shifting of military forces to Hawaii (DBEDT 2014).

Table 5-8. Housing Units, 2008-2012

Geographic Area	Total Housing Units	Occupied Housing Units	Vacant Housing Units	Percent Vacant[1]
Ewa CCD	100,797	95,056	5,741	5.7
Honolulu CCD	162,862	145,723	17,139	10.5
ROI	263,659	240,779	22,880	8.7
Honolulu County	337,389	308,490	28,899	8.6
Hawaii	519,811	447,453	72,358	13.9

Source: USCB 2014c, DP04, Selected Housing Characteristics, 2008-2012 American Community Survey.
[1]Values were calculated based on USCB estimates.

Employment and Income

Total employment in Honolulu County was approximately 562,820 jobs in 2010, as shown in Table 5-9. The industries that employed the most people in the county were government (19.7 percent), retail trade (10.0 percent), and health services (9.8 percent). Based on DBEDT projections, between 2010 and 2035, employment in Honolulu County is expected to grow most rapidly in education, health, and business services, with estimated cumulative expansions over 25 years of 41.2, 40.0, and 38.4 percent, respectively.

Table 5-9. Honolulu County Civilian Jobs by Sector, 2010-2035

Geographic Area	2010	2015	2020	2025	2030	2035
Agriculture	3,460	3,450	3,420	3,370	3,310	3,250
Mining and construction	28,160	30,130	31,930	32,720	33,420	34,200
Food processing	4,410	4,470	4,530	4,570	4,610	4,640
Other manufacturing	8,330	8,400	8,440	8,450	8,450	8,430
Transportation	20,200	20,950	21,580	22,060	22,530	22,970
Information	9,380	9,490	9,960	10,320	10,730	11,090
Utilities	2,180	2,260	2,350	2,420	2,490	2,550
Wholesale trade	16,850	17,240	17,600	17,900	18,180	18,420
Retail trade	56,070	57,220	58,200	59,000	59,680	60,200
Finance and insurance	24,960	25,950	26,900	27,750	28,460	29,030
Real estate and rentals	24,330	24,630	24,820	24,910	24,940	24,890
Professional services	34,090	36,510	38,870	41,090	43,210	45,230
Business services	45,440	49,090	52,720	56,240	59,610	62,870
Educational services	15,230	16,530	17,810	19,060	20,300	21,500
Health services	54,990	59,600	64,140	68,570	72,890	76,970
Arts and entertainment	11,940	12,460	12,910	13,290	13,650	13,990
Hotels	15,110	15,450	15,710	15,890	16,080	16,270
Eating and drinking	41,540	43,540	45,330	46,920	48,480	49,990
Other services	35,360	36,800	38,090	39,210	40,210	41,040
Government	110,800	113,570	116,450	119,340	122,220	124,870
Total Civilian Jobs	**562,820**	**587,750**	**611,770**	**633,060**	**653,450**	**672,390**

Sources: DBEDT 2012.

Unemployment rates in Honolulu County decreased at an increasing pace over the last five years, as shown in, Table 5-10, decreasing by more than a quarter from 2009 to 2013. The unemployment rates for the State of Hawaii also decreased over the five-year period, although the rates for the state consistently were higher than the rates for Honolulu County.

Table 5-10. Annual Average Labor Force, 2009-2013

Geographic Area	2009	2010	2011	2012	2013
Honolulu County					
Labor Force	443,556	453,991	458,737	455,937	456,804
Employed	417,987	428,111	433,409	432,869	437,230
Unemployed	25,569	25,880	25,328	23,068	19,574
Unemployment Rate (%)	5.8	5.7	5.5	5.1	4.3
Hawaii					
Unemployment Rate (%)	6.8	6.7	6.5	5.7	4.8

Source: United States Bureau of Labor Statistics, 2014.

Table 5-11 summarizes total personal income data for Honolulu County for the last four years. The United States Bureau of Economic Analysis calculates total personal income as the sum of labor income plus dividends, interest, and rent, plus transfer payments, minus contributions for government insurance, and minus the adjustment for residence. Total personal income in the county increased by approximately 11.8 percent from 2009 to 2012.

Table 5-11. Honolulu County Total Personal Income, 2009-2012

Geographic Area	2009	2010	2011	2012
Total Personal Income ($)	42,363,319	43,243,596	45,662,776	47,382,065
Earnings by Place of Work	30,799,392	31,642,263	33,210,211	34,451,141
Dividends, Interest, and Rent	9,435,291	9,153,105	9,576,812	10,157,594
Transfer Payments	5,600,753	6,115,629	6,375,677	6,402,104
Contributions for Government Insurance	3,456,972	3,648,965	3,475,965	3,605,003
Adjustments for Residence	15,145	18,436	23,959	23,771

Source: United States Bureau of Economic Analysis, 2014.

Construction Impacts and Mitigation Measures

The proposed project would construct (at the Honouliuli WWTP) process facilities and non-process facilities relocated from the Sand Island WWTP, and would cost an estimated $760 million to complete. This total construction cost is inclusive of the costs of upgrading the Honouliuli WWTP and the costs of constructing facilities at the Honouliuli WWTP required to relocate non-process related functions to the plant. As detailed in Appendix G, Economic and Fiscal Impacts, the construction expenditures would result in one-time increases in economic output, employment, and earnings, and one-time increases in fiscal revenues of the state. The economic impacts of project construction would include the impact of expenditures on construction materials, and on earnings of construction workers and professional service providers during the construction period, as well as the impacts of those changes on the overall economy of the CCH.

On a one-time basis, project construction would have an estimated total economic impact of $1.6 billion in output, supporting a total of approximately 13,430 jobs, earnings of $520 million, and fiscal revenues of $70 million (Table 5-12). The estimated construction period is 9 years (AECOM 2014d). Although construction expenditures and therefore the resulting effects actually would vary from year to year, the estimated total economic impact translates to an average annual economic impact of about $180 million, which would support approximately 1,490 jobs, earnings of $60 million, and fiscal revenues of $7.6 million per year. Providing each job or employee represents one household and assuming the current average household size of 2.98 people in Honolulu County

(USCB 2014b), jobs resulting directly or indirectly from project construction would support approximately 4,450 residents on average during project construction.

Table 5-12. One-Time Economic and Fiscal Impacts of Construction

	Output	Earnings	Employment	State Tax
	Million $	Million $	Jobs	Million $
Direct/Indirect Impact	1,126	380	9,462	43
Induced Impact	493	137	3,965	25
Total Impact	1,619	517	13,427	68

The current ROI construction labor force might not be sufficient to fill the jobs, although the construction industry in Hawaii is projected to grow, both on the short term (DBEDT 2014) and on the long term (Table 5-9), with the mining and construction sector expected to expand approximately 13.4 percent between 2010 and 2020 (DBEDT 2012). Employment growth is beneficial to an economy, and expansion of the industry base results in economic benefits on the region. Socioeconomic concerns would materialize if expansion occurs in a short time frame or if other aspects of the economy also undergo a rapid expansion during the same time period. Possible labor shortages could occur, resulting in a rise in labor costs and ultimately a rise in overall construction costs. However, the market would respond to a shortage with new workers entering the construction industry from other industries or new workers coming from outside the region to fill available jobs. If new workers were to enter the region in response to a construction labor shortage, the households that relocate to the ROI would need a supply of housing, to which the local economies likely would respond by increasing the supply.

Operational Impacts and Mitigation Measures

With operation of the proposed project, the number of personnel at the Honouliuli WWTP is projected to increase from the existing 39 employees to a projected ultimate 320 employees. However, in addition to upgrading the Honouliuli WWTP, the project also would entail the relocating of non-process related functions and facilities from the Sand Island WWTP and other locations to the Honouliuli WWTP. Approximately 120 jobs and personnel currently at the Sand Island WWTP would be relocated to the Honouliuli WWTP. Additional jobs and personnel potentially would be relocated to the Honouliuli WWTP from other locations. The likely effect of these jobs would be a shift of expenditures from areas near the Sand Island WWTP and other locations to areas closer to the Honouliuli WWTP, and from the employees' original places of residence to their new places of residence, were some employees to choose to move to be closer to their relocated jobs. Of the projected 320 future employees at Honouliuli, fewer than 161 would be newly employed in new jobs that would result from the project. These new jobs and the operation of new or expanded functions and facilities at the Honouliuli WWTP would be new to the City and County, and would have a continuing economic impact from the WWTP's ongoing operating expenditures.

Annual expenditures from operations of the proposed project would result in ongoing increases in economic output, employment, and earnings, and ongoing increases in fiscal revenues. Projected operations costs were used to estimate economic and fiscal impacts during the operation of the upgraded Honouliuli WWTP, exclusive of the non-process related functions and facilities relocated from the Sand Island WWTP and other locations to the Honouliuli WWTP (Appendix G). Whereas the economic and fiscal impacts of construction evaluated above cover both upgrading the Honouliuli WWTP and constructing non-process related facilities at the plant, the ongoing impacts of operating the non-process related facilities are not evaluated here, as those operating costs are undetermined at the time of writing.

The annual operating expenditures for the proposed project are estimated to be approximately $19.8 million (AECOM 2014e). On an ongoing basis, plant operation related to the upgrading of the Honouliuli WWTP would result in an estimated annual impact of $28.5 million in output, supporting about 90 jobs, earnings of $3.8 million, and fiscal revenues of $990,000 (Table 5-13). Providing each job represents one household and assuming the current average household size of 2.98 people in Honolulu County (USCB 2014b), jobs resulting directly or indirectly from these operations would support approximately 270 residents on average.

Table 5-13. Ongoing Economic and Fiscal Impacts of Operations

	Output	Earnings	Employment	State Tax
	Million $	Million $	Jobs	$
Direct/Indirect Impact	24.9	2.8	59	792,000
Induced Impact	3.6	1.0	30	198,000
Total Annual Impact	28.5	3.8	89	990,000

Both construction and operation effects from the proposed project would be beneficial, providing regional economic benefits from construction spending and labor, as well as long-term positive effects on employment and income in the region. As noted above, approximately 120 jobs and personnel would be relocated from the Sand Island WWTP, likely resulting in a shifting of expenditures to areas closer to the Honouliuli WWTP. Nonetheless, implementation of the project would have overall, beneficial impacts on employment and income.

5.12.2 Environmental Justice and Protection of Children

Environmental Justice

In the United States, environmental justice (EJ) minority populations are comprised of any races that are not white. However, the racial composition of Hawaii is different than that of the United States as a whole, with whites comprising the majority of the population (approximately 74 percent) in the United States, but no group comprising a majority in Hawaii. In Hawaii, the largest racial group is Asian, accounting for approximately 40 percent of the population (Kahihikolo 2008). Because the populations on Hawaii and Oahu are so racially diverse, EJ minority populations in the vicinity of the Honouliuli WWTP were identified using an approach based on the methodology developed by the OMPO (OMPO 2004), as recommended in the *Hawaii Environmental Justice Initiative Report* (Kahihikolo 2008). The objective of the OMPO methodology is to determine where EJ is a concern by taking into account the unique Asian population and the racially diverse areas on Oahu (OMPO 2004).

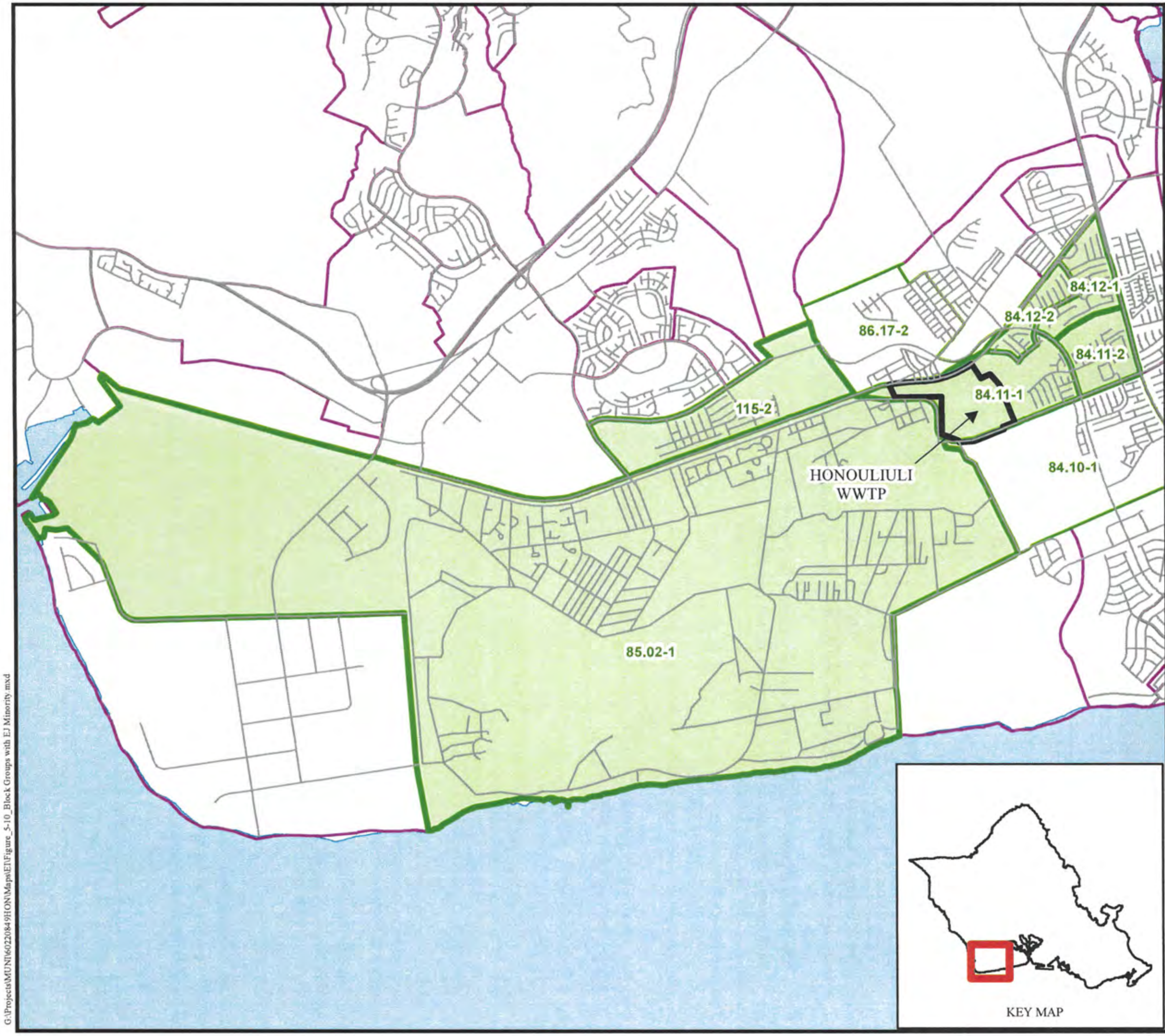
To identify areas where EJ could be a concern in the immediate vicinity of the Honouliuli WWTP — hereafter referred to as the affected area — racial population data for 2010 Census block groups were analyzed. Minority populations in block groups located adjacent to and including the Honouliuli WWTP (located in Block Group 1 of Census Tract 84.11) were compared to minority populations in all block groups throughout Honolulu County. Each minority group was evaluated separately to identify those areas in the county where each minority population is concentrated in a disproportionate way. Consistent with the OMPO methodology, disproportionality was defined as exceeding one standard deviation above the mean relative concentration of a minority group, with the relative concentration for each block group normalized for the areal size of the block group. If this threshold was exceeded for any of the race categories evaluated, an EJ population was determined to be present.

Based on this analysis, six of the eight block groups in the affected area are minority populations (Figure 5-10, Table 5-14). EJ minority populations within the six block groups with minority populations are associated with disproportionately large Hispanic and Latino populations relative to the average for block groups in Honolulu County, which may be attributed to the military-related population in those block groups (OMPO 2004).

Table 5-14. Adjusted Percentage Minority, 2010

Geographic Area	White	Black	American Indian and Alaskan Native	Asian	Native Hawaiian and Other Pacific Islander	Other	Hispanic
Calculated Honolulu County Threshold (percent)	42.7	5.6	1.0	70.7	25.8	1.4	12.2
Block Group 1, Census Tract 84.11	17.4	2.8	0.2	53.0	12.2	0.4	**14.1**
Block Group 1, Census Tract 84.10	19.7	3.4	0.2	57.2	9.6	0.3	9.7
Block Group 2, Census Tract 84.11	19.4	4.0	0.6	50.3	12.1	0.6	**13.2**
Block Group 1, Census Tract 84.12	20.0	4.4	0.9	47.5	14.1	0.5	**12.8**
Block Group 2, Census Tract 84.12	19.2	3.5	0.3	47.1	15.1	0.1	**14.7**
Block Group 1, Census Tract 85.02	35.1	**8.2**	**1.2**	14.2	25.8	0.3	**15.1**
Block Group 2, Census Tract 86.17	8.8	1.4	0.2	61.5	14.9	1.2	11.9
Block Group 2, Census Tract 115	14.0	1.8	0.5	29.6	**39.9**	0.0	**14.1**

Sources: USCB 2014c, QT-P4, Race, Combinations of Two Races, and Not Hispanic or Latino, 2010 Census; OMPO 2004.
Notes:
The Honouliuli WWTP is located in Block Group 1, Census Tract 84.11.
Bold values indicate population percentages of minority populations.



City and County of Honolulu

HONOULIULI/ WAIPAHU/ PEARL CITY WASTEWATER FACILITIES PLAN

Legend

- Honouliuli WWTP
- Minority Block Group
- Other Adjacent Block Group
- Other Block Group
- Street

0 — 4,000
Feet
1 inch = 4,000 feet

FIGURE 5-10

BLOCK GROUPS WITH ENVIRONMENTAL JUSTICE MINORITY POPULATIONS

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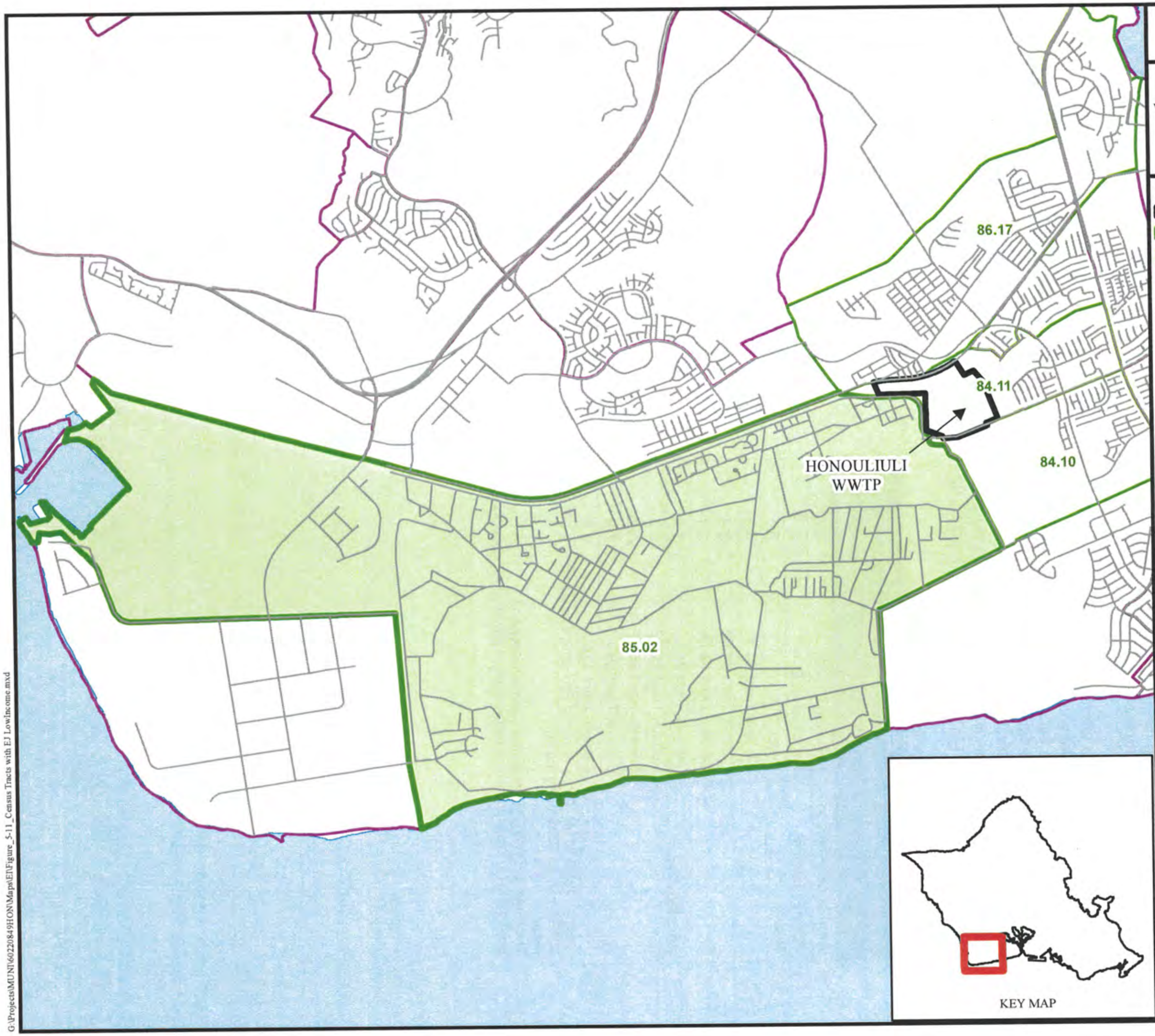
The USCB determines poverty status by using a set of dollar-value thresholds that vary by family size and composition (USCB 2014c, Glossary). If a family's total income is less than the dollar value of the appropriate threshold, then that family and every individual in it are considered to be in poverty. Similarly, if an unrelated individual's total income is less than the appropriate threshold, then that individual is considered to be in poverty. The poverty thresholds do not vary geographically. They are updated annually to allow for changes in the cost of living (inflation factor) using the Consumer Price Index.

As recent, applicable data at the block group level were not available, census tract-level data were used to identify low-income populations. Table 5-15 presents the 2008-2012 American Community Survey five-year estimates for families and individuals in the affected area whose annual income was below the poverty level. The percentage of low-income families in Census Tract 85.02 is by far the highest in the affected area. With the exception of this census tract, the tracts in the affected area have percentages of low-income families lower than in Honolulu County overall, as well as lower than in Honolulu CCD. Therefore, environmental justice will be assessed for low-income populations in Census Tract 85.02 (Figure 5-11).

Table 5-15. Percentage Low Income, 2008-2012

Geographic Area		Low-Income Population (percent)
Area of Comparison	Honolulu County	9.6
Socioeconomic ROI	Honolulu CCD	10.9
	Ewa CCD	6.5
Affected Area	Census Tract 84.11	4.0
	Census Tract 84.05	2.4
	Census Tract 84.06	3.4
	Census Tract 84.10	1.4
	Census Tract 84.12	3.3
	Census Tract 85.02	**21.3**
	Census Tract 86.17	7.6
	Census Tract 115	3.7

Source: USCB 2014c, DP03, Selected Economic Characteristics, 2008-2012 American Community Survey.
Notes:
The Honouliuli WWTP is located in Census Tract 84.11.
Bold values indicate population percentages of low-income populations.



City and County of Honolulu

HONOULIULI/ WAIPAHU/ PEARL CITY WASTEWATER FACILITIES PLAN

Legend
- Honouliuli WWTP
- Low Income Tract
- Other Adjacent Tract
- Other Tract
- Street

0 4,000
Feet
1 inch = 4,000 feet

FIGURE 5-11

CENSUS TRACTS WITH ENVIRONMENTAL JUSTICE LOW-INCOME POPULATIONS

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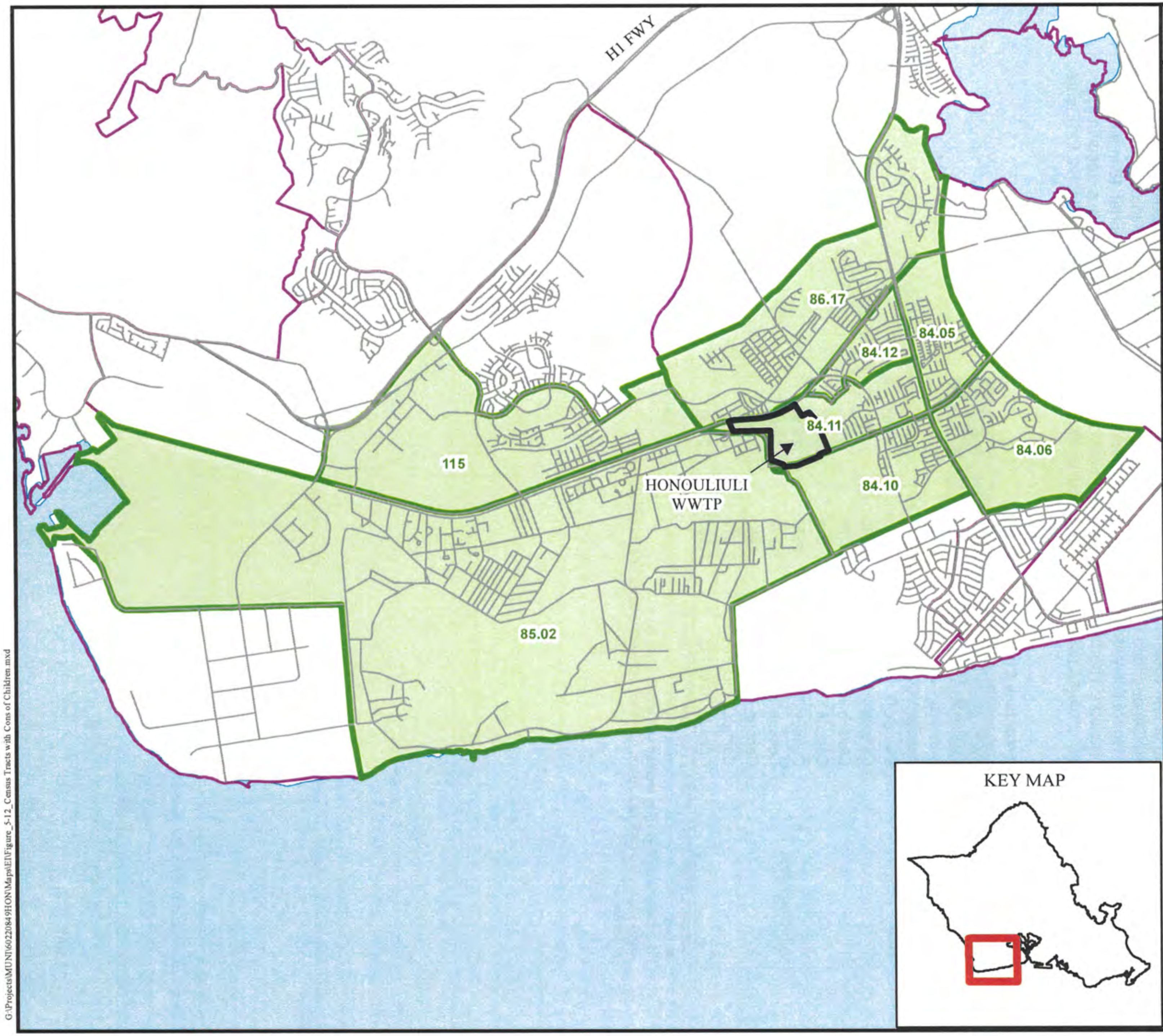
Protection of Children

For the purposes of this analysis, census tracts located adjacent to and including the Honouliuli WWTP were considered the areas potentially most affected by the proposed upgrading of the Honouliuli WWTP. The number and percentage of children under 18 within census tracts, the CCDs within the ROI, and Honolulu County were determined based on 2010 Census data (Table 5-16). The percentage of children under 18 in each of the census tracts in the vicinity of the Honouliuli WWTP was higher than the percentages of children under 18 in all other areas considered for comparison. Therefore, a concentration of children is present in all census tracts in the affected area, including the census tract in which the Honouliuli WWTP is located, Census Tract 84.11 (Figure 5-12).

Table 5-16. Number and Percentage Children, 2010

Geographic Area		Children Under 18	
		Number	Percent
Area of Comparison	Honolulu County	210,500	22.1
Socioeconomic ROI	Honolulu CCD	69,807	17.9
	Ewa CCD	80,225	24.8
Affected Area	Census Tract 84.11	**1,000**	**29**
	Census Tract 84.05	**1,476**	**31.6**
	Census Tract 84.06	**2,078**	**34.7**
	Census Tract 84.10	**668**	**28.5**
	Census Tract 84.12	**1,739**	**26.6**
	Census Tract 85.02	**595**	**27.9**
	Census Tract 86.17	**2,512**	**26.8**
	Census Tract 115	**1,885**	**34.3**

Source: USCB 2014c, P12 Sex by Age, 2010 Census.
Notes:
The Honouliuli WWTP is located in Census Tract 84.11.
Bold values indicate population numbers and percentages of concentrations of children.



City and County of Honolulu

HONOULIULI/ WAIPAHU/ PEARL CITY WASTEWATER FACILITIES PLAN

Legend

- Honouliuli WWTP
- Tract with Concentration of Children
- Other Tract
- Street

0 4,000
Feet
1 inch = 5,000 feet

FIGURE 5-12

CENSUS TRACTS WITH CONCENTRATIONS OF CHILDREN

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Impacts and Mitigation Measures

Although EJ populations and concentrations of children are present in the affected area, based on the analyses presented in this EIS, the proposed project would have less than significant adverse human health or environmental impacts. Negative impacts on the population in the project vicinity are not anticipated, and the project would provide improved wastewater treatment for the surrounding population. The proposed project would allow the wastewater system to safely and efficiently accommodate projected flows up to the year 2035 and provide an adequate wastewater system to support the needs of the population and economy in the service area. With respect specifically to children, as described in Section 5.14.2 Public Schools, the nearest public school to the project site is located approximately 0.6 miles from the Honouliuli WWTP and there are no known childcare facilities within a one-mile radius of the project. <u>However, there are several childcare facilities within a 2 mile radius as well as several DHS registered family care homes within several miles of the treatment plant.</u>

The effects of implementing the project would not be appreciably more severe or greater in magnitude in minority or low-income communities, or in communities with high concentrations of children. Therefore, no disproportionately high and adverse human health or environmental effects on minority populations and low-income populations would occur. Likewise, implementation of the project would not pose disproportionate environmental health or safety risks to children. The proposed project would not negatively impact EJ populations, and would not negatively impact children. There could possibly be direct and indirect benefits to these population groups as a result of additional job opportunities.

5.13 Infrastructure and Utilities

The following section provides a brief overview of the existing water, wastewater, solid waste disposal, electrical, and communications systems, and public services and the direct impacts that the proposed wastewater system improvements would have on each.

Increased capacity in the wastewater treatment system serves the projected increase in development and urban expansion along the Honolulu High-Capacity Transit Corridor Project (HHCTCP) within the sewershed, as planned by the CCH. Information regarding this projected expansion, which may result in increased demands on the CCH's overall public infrastructure services, was addressed in HHCTCP Final Environmental Impact Statement published on June 25, 2010 in the Federal Register.

5.13.1 Water

5.13.1.1 Existing Setting

The emergency fire and potable water supply for the island of Oahu is provided by the CCH BWS, which is a semi-autonomous agency that constructs, operates, and maintains the pumping stations and associated distribution network. The BWS relies solely on groundwater for potable water supply. The Honouliuli WWTP site is located within the Waipahu-Waiawa system, which is the primary source of drinking water for the study area. The closest well to the WWTP site is approximately 3.1 miles to the north. For industrial and irrigation purposes, the BWS utilizes the HWRF, operated by Veolia Water North America and located on the western side of the Honouliuli WWTP, which recycles wastewater for non-potable uses. Access to the HWRF is through the main access gate of the Honouliuli WWTP along Geiger Road. The HWRF provides tertiary treatment to approximately 13 mgd of secondary effluent from the WWTP.

5.13.1.2 Construction Impacts and Mitigation Measures

The BWS has requested consideration of a dedicated entrance and that 3 to 5 acres of land be set aside and reserved for HWRF upgrades, improvements, and/or expansion. The final determination of land area, location, and timing of expansion would need to be defined with BWS during detailed design.

Water system improvements near the Honouliuli WWTP may be required to improve the reliability of the existing potable water system and for the potential expansion of the Honouliuli WWTP. Coordination with the BWS would be necessary during design to avoid or minimize the potential for conflicts regarding the reclamation and reuse of wastewater. Requests for additional potable water or recycled water by consumers must be submitted to BWS for review. Construction drawings would be submitted to BWS review as part of the building permit application process and the estimate of water required during construction and availability of the water would be confirmed during the review and approval of the building permit application.

5.13.1.3 Operational Impacts and Mitigation Measures

The treatment alternatives include the upgrade/construction of wastewater facilities, and may require additional potable and/or emergency water service during operation. BWS recommends the use of drought tolerant/low water use facilities and xeriscaping principles for all landscaping and installation of an efficient irrigation system, such as drip irrigation, incorporating moisture sensors to avoid the operation of the system in the rain and if the ground has adequate moisture. These recommendations would be implemented for the proposed project, regardless of the alternative selected.

5.13.2 Wastewater

5.13.2.1 Existing Setting

The existing wastewater infrastructure in the project area is described in Section 3. Improvement of the existing wastewater treatment system is the focus of the ongoing evaluation and the subject of this FEIS. Wastewater is collected primarily by gravity to 16 pump stations distributed throughout the Honouliuli Sewershed. Wastewater is then pumped through force mains to the interceptor sewers leading to the Honouliuli WWTP, where it is treated and discharged through the Barbers Point Deep Ocean Outfall, located approximately 1.7 miles offshore at a depth of 200 feet.

5.13.2.2 Construction Impacts and Mitigation Measures

Construction is proposed to occur at the existing WWTP site. The plant would continue to operate during construction activities, which are anticipated to continue for several years. Effluent discharged will remain in compliance with the 2010 Consent Decree. It is possible that processes may be temporarily interrupted on occasion to connect new structures and facilities to the existing system, and temporary pumping and piping may be required. Staging areas at the Honouliuli WWTP would be designed to avoid impacting any existing sewer pipes in the vicinity of the project site.

5.13.2.3 Operational Impacts and Mitigation Measures

As mandated by the EPA, the long-term goal of this project is to upgrade the WWTP to secondary treatment. The project may also improve some water quality parameters as it would provide additional treatment capacity to meet future population growth and development and better manage peak wastewater flows, as described in Section 5.7 Water Quality.

5.13.3 Solid Waste Disposal

5.13.3.1 Existing Setting

The Ewa Convenience Center, located at 91-1000 Geiger Road at the southwest corner of the Honouliuli WWTP, accepts residential municipal solid waste only. Multiple roll-off dumpsters are used onsite for the separate collection of different types of materials: combustibles are processed at the Honolulu Program of Waste Energy Recovery (H-POWER), a waste-to-energy facility located at the Campbell Industrial Park in Kapolei; non-combustibles are taken to the Waimanalo Gulch Landfill in Kahe Valley; yard waste is hauled to mulching and composting sites; and large appliances, tires and auto batteries are taken to recycling facilities. There are plans to close the Waimanalo Gulch Landfill and/or limit the amount of solids disposed of. The solids loading to the WWTP comes from the Honouliuli WWTP system in addition to the solids from the Wahiawa and Paalaa Kai WWTPs, which are trucked to the Honouliuli WWTP for further processing and disposal. Construction debris is transported to the PVT Land Company located in Nanakuli by private haulers.

5.13.3.2 Construction Impacts and Mitigation Measures

The construction of the proposed project may have some impact on the solid waste disposal operations within the project area. Approximately 673,250 cubic yards would be excavated for new structures, most of which (approximately 573,000 cubic yards) would be used as backfill onsite. Excess excavated material would be approximately 100,000 cubic yards (equivalent to the estimated volume of the buried foundation of each new structure). If this material could not be kept on site, coordination with local landfills and recycling centers for the disposal of construction debris and/or hazardous materials may be required and the ultimate disposal location will depend on space availability at local landfills. Disposal would be in accordance with appropriate regulations and standards.

5.13.3.3 Operational Impacts and Mitigation Measures

The proposed project is expected to have minimal impact on the solid waste disposal operations within the project area. Solid waste generated at the WWTP would continue to be disposed of in accordance with local requirements.

The upgrade of the existing WWTP to full secondary treatment would increase the solids production. The CCH has evaluated options for biosolids processing and disposal in an effort to reduce solids disposal to the landfill. The CCH ENV developed an *Island-wide Sludge Management Plan (2015)*, which recommended sludge processing technologies for implementation at Honouliuli WWTP. Potential options include building two new conventional mesophilic anaerobic digesters to accommodate the proposed secondary treatment upgrade and population growth, as recommended in TM 11.D.4. The quantity and quality of sludge being processed, and biogas available for beneficial use, will depend to an extent on the outcome of the island-wide sludge planning effort and factors such as on-site processing methods and importation of sludge.

Waste minimization options include composting or further solids handling to reduce the volume of solids such as drying. Drying is the recommended process to provide for sludge reuse by land application as a sludge disposal method. In addition, other solid residuals from the wastewater treatment process, including screenings and grit would be washed and compacted. These measures are consistent with current best practices for handling residuals and are consistent with waste minimization goals.

Another sustainable opportunity is the conversion of solids to energy. There are both off-site and on-site opportunities for the conversion of solids to energy. One off-site alternative is to haul the solids from Honouliuli WWTP to H-POWER. H-POWER is currently accepting sludge and is a viable outlet in the near future. On-site waste-to-energy alternatives include incineration and closed-coupled processes. Section 4.1.5 describes the alternatives considered for the solids handling systems. Further refinement of the processing and disposal options is expected during design.

5.13.4 Electrical and Communication Services

5.13.4.1 Existing Setting

Hawaii Electric Company (HECO) supplies electricity to the majority of Oahu. Two of HECO's major facilities, the Kahe and Waiau Power Plants, are located within approximately 5 miles of the WWTP site. Overall facility electrical demand currently ranges from 1,536 to 1,757 kW (AECOM 2014a). Telephone and internet services within the project area are provided by Hawaiian Telcom and Oceanic Time Warner Cable. Oceanic Time Warner Cable also provides cable services within the project area. These services are transmitted through underground and aerial lines located in the project area. HECO substation upgrades may be required to handle the new secondary power requirements.

There are two cell phone towers located on the WWTP property, one in the southeast corner and the other in the northwest corner.

5.13.4.2 Construction Impacts and Mitigation Measures

Construction of the project would require electricity mostly generated by the burning of fossil fuels and imported fuels for powering equipment and vehicles during construction.

The existing overhead power lines are recommended to be replaced with underground utilities, and the backbone of the electrical distribution would be expanded to areas with new facilities. Regardless of the alternative selected, coordination with HECO, Hawaiian Telcom, and Oceanic Time Warner Cable, would be conducted to minimize and/or avoid potential conflicts with any underground and overhead utility lines in the project area. Proposed improvements, including staging areas, would be designed to avoid impacting any existing electrical and communication lines.

No impacts to the two cell phone towers and their current vehicular access ways are anticipated.

More Information on the electrical component of the proposed secondary treatment upgrade is located in Section *4.1.7*

5.13.4.3 Operational Impacts and Mitigation Measures

An increase in energy consumption would be necessary at the existing Honouliuli WWTP for the proposed project. The increase in energy usage to upgrade the WWTP from primary treatment to secondary treatment and additional solid treatment could be substantial in the WWTP's overall energy consumption. Secondary treatment under aerobic conditions is typically done at the expense of increasing energy consumption while also increasing the solids from microbial synthesis that adds to disposal burden. Electrical demand is anticipated to be 6,943 kW following upgrades to the Honouliuli WWTP, which is higher than the current estimated peak electrical demand (1,757 kW) (AECOM 2014a). Comparing alternatives, it is anticipated that Sub-options 1B and 1A would consume the smallest amount of electricity and Option 2 and Sub-option 3A would consume the most electricity (AECOM 2014e). Energy savings measures may be employed, regardless of the alternative selected, to offset this anticipated increase, such as new light fixtures and skylights, new more efficient blowers and pumps, and new solar panels (AECOM 2014a).

There is a potential for energy recovery from digester gas or by utilizing new emerging technology for gasification of sewage sludge. However, at this time, it is not known if the net energy consumption could be feasibly reduced to favorable levels through the implementation of new technologies that are emerging on the market. CCH is currently evaluating alternatives to use the digester gas for energy recovery.

If a CHP facility is incorporated at the Honouliuli WWTP, it would need to be permitted according to local, State and Federal air regulations, including air permitting in conjunction with the biosolids disposal.

5.13.5 Gas

5.13.5.1 Existing Setting

The Gas Company, LLC maintains underground utility gas mains which serve commercial and residential customers throughout the project area. There are no known major gas lines within the proposed project site.

5.13.5.2 Impacts and Mitigation Measures

Regardless of the alternative selected, coordination with the Gas Company, LLC would be necessary to minimize and/or avoid potential conflicts with the existing gas utilities. Although there are no known major gas lines in the vicinity of proposed construction activities, gas handling systems would be necessary, including piping for the anaerobic digesters. None of the proposed processes are anticipated to require natural gas as a fuel source. The proposed standby generators would use diesel fuel. The thermal dryer would use digester gas as a fuel source. Any leftover digester gas would be:

1. Used to generate electricity (cogeneration)
2. Cleaned and sold as a commercial fuel, or
3. Burned with the existing waste gas flare that is presently used at the site.

Based on the initial coordination, impacts would not be anticipated during construction or operation of the proposed project, regardless of the alternative selected.

5.14 Public Services and Facilities

5.14.1 Police and Fire Protection Services

5.14.1.1 Existing Setting

The Honolulu Police Department (HPD) and Honolulu Fire Department (HFD) provide emergency services to the island of Oahu. The HPD has divided the island into eight patrol districts with five district stations. The Kapolei district station is located within the project area (District 8).

5.14.1.2 Construction Impacts and Mitigation Measures

Coordination with the HPD during construction would be necessary to mitigate traffic congestion and ensure public safety, in those instances when traffic control cannot be provided by the contractor(s) employees alone. When necessary, off-duty police officers would be scheduled and hired.

Coordination with the HFD for the safe design of new or upgraded structures would also be necessary; plans would be submitted to the HFD for review and approval during the design phase. Based on their recommendations and the National Fire Protection Association [NFPA]1; Uniform Fire Code [UFC]™, 2012 Edition, a fire apparatus access road for every facility, building or portion of building within their jurisdiction would be provided when the structure is more than 150 ft from a fire apparatus access road (UFC Section 18.2.3.2.2.~~Section 902.2.1~~). A fire department access road shall extend to within 50 feet (15m) of at least one exterior door that can be opened from the outside and that provides access to the interior of the building. (NFPA 1; UFC™, 2012 Edition, Section 18.2.3.2.1.) In accordance with the NFPA 1; UFC™, 2012 Edition, Section 18.3.1, as amended ,~~UFC Section 903.2~~, on-site fire hydrants and mains capable of supplying the required fire flow would also be provided when any portion of a facility or building is in excess of 150 ft from a water supply. The water supply would also be provided as approved by the county in terms of supplying the required fire flow for fire protection.

5.14.1.3 Operational Impacts and Mitigation Measures

The operation of the proposed wastewater system improvements is expected to have minimal impact on the HPD and HFD. Design drawings should be submitted to HFD for review prior to bid.

5.14.2 Public Schools

5.14.2.1 Existing Setting

There are several public schools located in the vicinity of the project area (within approximately 1 mile [mi.]) including:

- Ewa Makai Middle School (approx. 0.6 mi.)
- Ewa Elementary School (approx. 0.7 mi.)
- Kapolei Middle School (approx. 0.8 mi.)
- Keoneula Elementary School (approx. 1.0 mi.)
- Holomua Elementary School (approx. 1.0 mi.)

There are no childcare facilities within a 1 mi. radius of the project site. The nearest childcare facilities include:

- Seagull schools (two locations, approx. 1.3 mi. and 1.7 mi.)
- Planet Preschool (approx. 1.4 mi.)
- Kama'aina Kids (approx. 1.9 mi.)
- Ewa Plains Enrichment Programs approx. 2 mi.)

Figure 5-13 shows the public schools and childcare facilities in the project area.

City and County of Honolulu

HONOULIULI/ WAIPAHU/ PEARL CITY WASTEWATER FACILITIES PLAN

Legend

- Honouliuli WWTP
- Public School
- Childcare Facility
- Street

0 1,600
Feet
1 inch = 2,400 feet

FIGURE 5-13

PUBLIC SCHOOLS AND CHILDCARE FACILITIES

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G:\Projects\MUNI\60220849HON\Maps\EI\Figure_5-13 Public Schools and Childcare Facilities.mxd

5.14.2.2 Construction Impacts and Mitigation Measures

Public schools and childcare facilities in the vicinity of the project area are not anticipated to be impacted by construction activities (including any increases in noise or traffic) at the Honouliuli WWTP site, due to the distance between the project site and public schools/childcare facilities in the area. The nearest public school to the project site is the Ewa Makai Middle School located approximately 0.6 mi. to the southeast, and there are no childcare facilities within a 1 mi. radius of the project. As previously mentioned, there may be a slight increase in traffic during construction activities at the Fort Weaver Road/Geiger Road/Iroquois Road & Renton Road/Fort Weaver Road intersections (intersections #10 and #11 on Figure 5-7), which are located in the vicinity of Ewa and Holomua Elementary Schools (Figure 5-13).

5.14.2.3 Operational Impacts and Mitigation Measures

Operational effects to schools or childcare facilities are not anticipated as a result of any of the project alternatives, with the exception of the potential for a slight increase in traffic at the Fort Weaver Road/Geiger Road/Iroquois Road & Renton Road/Fort Weaver Road intersections (intersections #10 and #11 on Figure 5-7), located in the vicinity of Ewa and Holomua Elementary Schools.

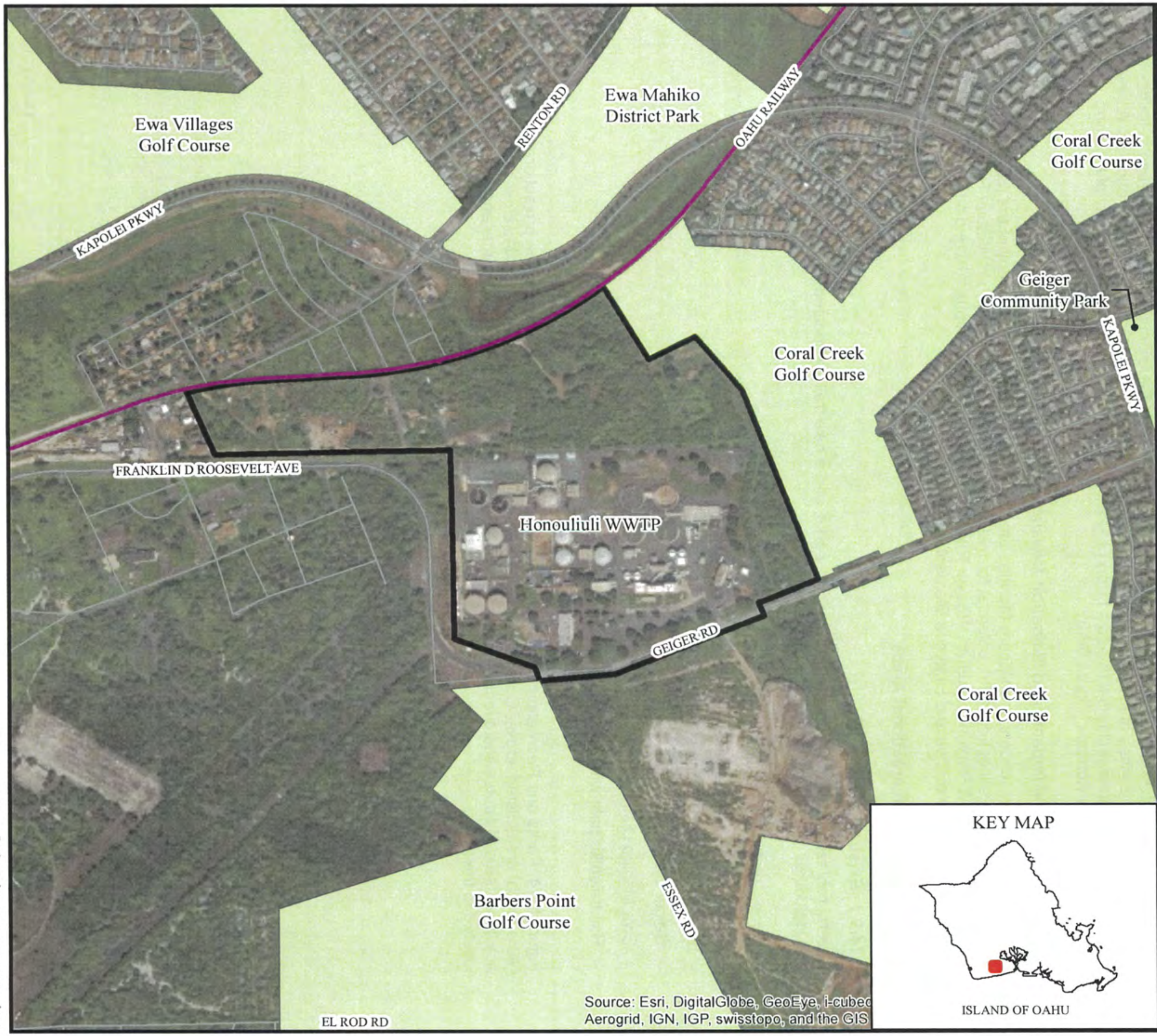
5.14.3 Parks and Recreational Areas

5.14.3.1 Existing Setting

Several recreational areas including golf courses, parks, and a bike trail are located near the project area (within 1 mi.) including:

- Coral Creek Golf Course
- Barbers Point Golf Course
- Ewa Villages Golf Course
- Geiger Community Park
- Ewa Mahiko District Park
- Rail trail/bike path within the old OR&L railway

Figure 5-14. Parks and Recreational Areas shows the parks and recreational areas in the project area. Of the recreational areas listed above, Coral Creek Golf Course and rail trail/bike path are located closest to project activities; the golf course lies directly adjacent to the eastern boundary of the project parcel and the bike path is located to the north.



City and County of Honolulu

HONOULIULI/ WAIPAHU/ PEARL CITY WASTEWATER FACILITIES PLAN

Legend

- Honouliuli WWTP
- Parks and Recreational Areas
- Street
- Rail Trail

0 — 800
Feet
1 inch = 800 feet

FIGURE 5-14

PARKS AND RECREATIONAL AREAS

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5.14.3.2 Construction Impacts and Mitigation Measures

The WWTP alternatives are not anticipated to directly impact park or golf course facilities as a result of construction activities. However, some secondary minor impacts as a result of construction, such as noise, slight increase in traffic, or temporary aesthetic impacts (as discussed in this document) may occur near the closest recreation areas (Coral Creek Golf Course and possibly the bike path). However, these secondary impacts are anticipated to be minor in nature.

In general, if the alternative implemented potentially impacts any park or recreational use, owners of these recreational areas, as well as the CCH Department of Parks and Recreation, would be consulted for acceptability before proceeding further and to coordinate work to avoid any impairment to public use of these facilities.

5.14.3.3 Operational Impacts and Mitigation Measures

Regardless of the alternative implemented, no operational effects to parks and recreational facilities are anticipated, other than periodic inspection and/or maintenance of proposed wastewater management facilities located near park/golf course property. Mitigation measures include the proper design and construction of wastewater facilities.

6 INDIRECT AND CUMULATIVE IMPACTS

6.1 Indirect Impacts

Indirect (also referred to as secondary) effects are effects that are caused by an action but occur later in time or are farther removed in distance, but are still reasonably foreseeable. Such effects may include impacts on environmental resources or public facilities that occur as a result of a project's influence on the pattern of land use or growth rate.

This proposed project focuses on providing hydraulic and treatment upgrades to the Honouliuli WWTP in order to comply with the FACD and to comply with regulatory mandates from the DOH and EPA. Although effluent flow to Mamala Bay is anticipated to increase due to the projected population growth within the sewershed, effluent concentrations and overall loads would decrease as a result of the proposed upgrade to secondary treatment.

The project also provides a basis to meet future wastewater management needs for the projected growth and development in the Honouliuli sewer basin. As noted in Section 3.2, Honouliuli sewer basin population projections were developed for the year 2035 and year 2050 to determine system capacity requirements within the planning period. The projections consider long-term, historic trends for the sewer basin, as well as available data and projections released by CCH and large-scale developments and proposed projects in the area. Previously conducted population and employment projections were also referenced to assist with the effort. The source most relied on was the CCH DPP socioeconomic projections to 2035, which are generally used and accepted for county infrastructure planning efforts (AECOM 2011a).

The results of the population projections indicate overall robust growth within the Honouliuli sewer basin. Most of this growth is projected to occur within the Honouliuli IPS tributary area, where the growing City of Kapolei is located as well as several proposed master planned communities, resorts, and other developments. The population projections methodology and detailed results are provided in Appendix A.

The proposed project is not a population generator in and of itself; rather it is intended to meet the needs of the projected population in the Honouliuli sewer basin. The strong projected growth within the Honouliuli sewer basin is supported by recent growth trends as well as CCH DPP planning documents and growth policies. Additional detail regarding the relationship of State and County land use plans, policies, and controls relating to the proposed project is provided in Section 7.

As stated in Section 5.13.1, construction expenditures associated with the proposed project would result in one-time increases in economic output, employment, and earnings, and one-time increases in fiscal revenues of the state. The economic impacts of project construction would include the impact of expenditures on construction materials, and on earnings of construction workers and professional service providers during the construction period, as well as the impacts of those changes on the overall economy of the CCH. In addition, annual expenditures from operations of the proposed project would result in ongoing increases in economic output, employment, and earnings, and ongoing increases in fiscal revenues.

On a one-time basis, project construction would have an estimated total economic impact of $1.6 billion in output, supporting a total of approximately 13,430 jobs and earnings of $520 million (Section 5.13.1). On an ongoing basis, plant operation related to the upgrading of the Honouliuli WWTP would result in an estimated annual impact of $28.5 million in output, supporting about 90 jobs and earnings of $3.8 million. These economic impacts comprise the volume of economic activity initially produced by constructing and operating the project (direct effects), as well as indirect effects produced by purchases of inputs from local industries and induced effects produced by household spending that results from changes in earnings. Both construction and operation effects from the proposed project would be beneficial, providing regional economic benefits from construction spending and labor, as well as long-term positive effects on employment and income in the region. Implementation of the project would have beneficial impacts on employment and income.

6.2 Cumulative Impacts

Cumulative impacts are typically defined as the impacts on the environment which result from the incremental impact of a project when added to other past, present, and reasonably foreseeable future actions. The potential environmental effect resulting from the incremental impacts of the proposed upgrade to the Honouliuli WWTP, when added to other recent, ongoing, or proposed construction projects occurring at or in the vicinity of the Honouliuli WWTP, is considered in the cumulative effects analysis in this section.

Known major development projects within the general vicinity of the Honouliuli WWTP are listed in Table 6-1. The approximate locations of the developments are identified in Figure 6-1.

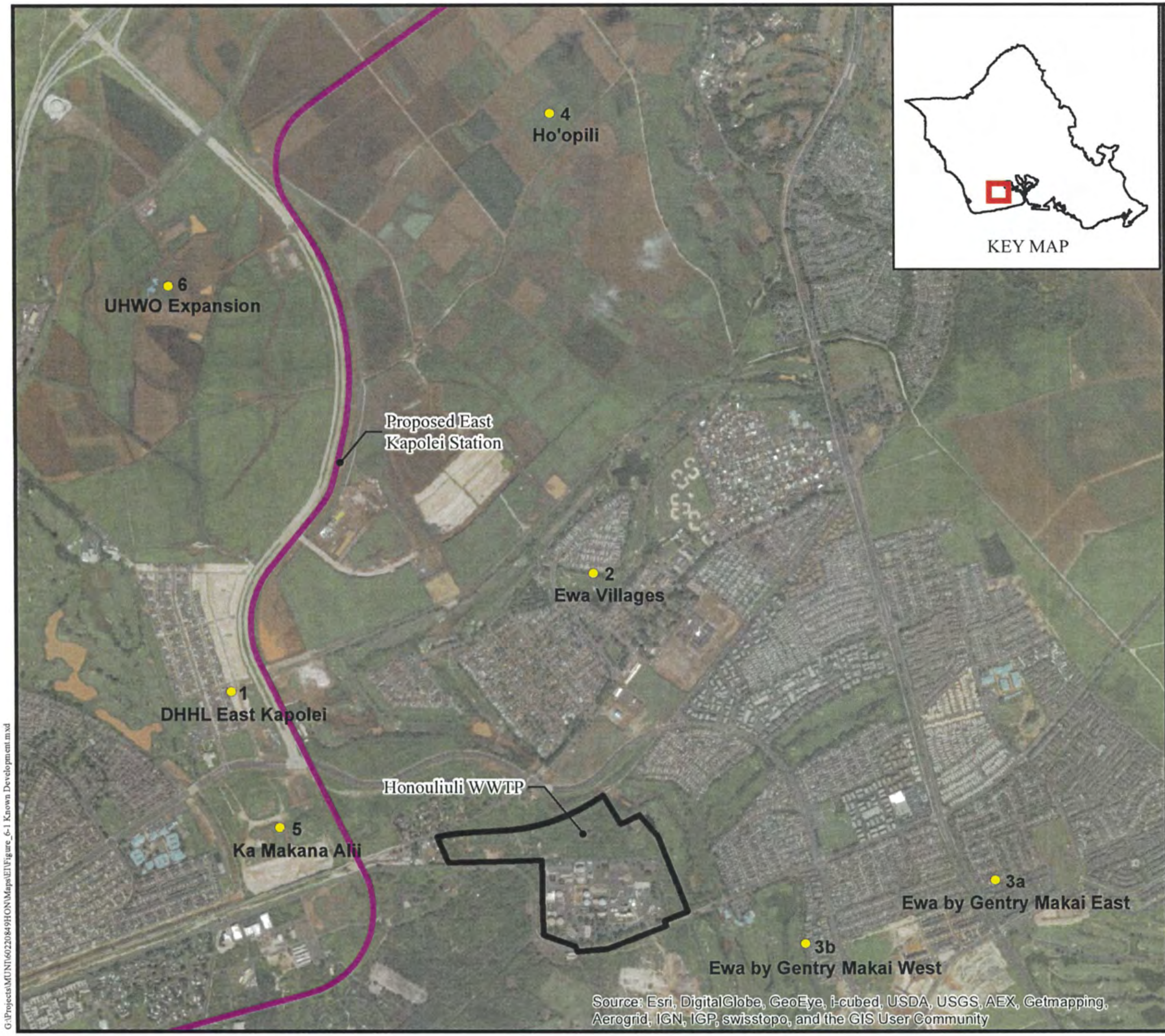
Table 6-1. Status of Known Major Development Projects within the vicinity of the Honouliuli WWTP

Development Name [1]	Original Land Area (Acres) from Development Plans		Status	Remaining Land Area (Acres) to be Developed	
	Res	Non-Res		Res	Non-Res
1. DHHL East Kapolei (also referred to as East Kapolei II)	341	67	Proposed	341	67
2. Ewa Villages	54	—	Proposed	54	-
3a/3b. Ewa by Gentry Makai (East and West)	172	—	Under construction; nearing build-out; approx. 80% complete	34	—
4. Ho'opili	1,600 (Mixed Use)		Proposed	1,600 (Mixed Use)	
5. Ka Makana Alii	—	67	Proposed	—	67
6. UHWO Expansion	—	Approx. 224	Proposed	—	Approx. 224

Legend: DHHL = Department of Hawaiian Home Lands, State of Hawaii; UHWO = University of Hawaii at West Oahu
Sources: Ewa Development Plan, July 2013 (DPP 2013a). Online project status research conducted by AECOM, November and December 2014.
Note: (1) Approximate locations of developments identified on Figure 6-1.

A 20-mile elevated rail line is in the process of construction as part of the Honouliuli Rail Transit Project. A portion of this rail line is located to the north and west of the Honouliuli WWTP (Figure 6-1) and has the potential to encourage higher density, transit oriented development near proposed stations (DPP 2011). The closest proposed station to the project, East Kapolei Station (scheduled to open in 2017), is located more than 1 mi. northwest of the Honouliuli WWTP, as shown on Figure 6-1.

At the Honouliuli WWTP site, there is the potential for a CHP facility to be incorporated on the property. Since this facility would be a new stationary source, the emissions at the Honouliuli WWTP would increase, resulting in adverse air quality impacts on the local level. If the CHP facility option is elected in the future, the CHP facility would need to be considered for future local, State, and Federal air quality permitting in conjunction with the biosolids disposal process during the design stage.



City and County of Honolulu

HONOULIULI/ WAIPAHU/ PEARL CITY WASTEWATER FACILITIES PLAN

Legend
- Honouliuli WWTP
- Proposed Development
- Proposed Mass Transit

0 2,000
Feet
1 inch = 2,000 feet

FIGURE 6-1

KNOWN MAJOR DEVELOPMENT PROJECTS WITHIN THE VICINITY OF THE HONOULIULI WWTP

December 2014

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G:\Projects\MUNI\60220849HON\Maps\EI\Figure_6-1 Known Development.mxd

7 RELATIONSHIP OF ACTION TO STATE AND COUNTY LAND USE POLICIES AND CONTROLS

Development within the State of Hawaii is guided through a combination of land use plans, policies and controls set at the State level and tiered down to the CCH level. This section addresses the various guidance documents, rules and regulations and how the project relates to each relevant State or County plan. The plans were reviewed to assess consistency of the proposed project alternatives with development, plans, zoning, and special management area goals and requirements. The project area includes potential development activity within the Ewa planning area as well as other portions of the Honouliuli sewer basin.

7.1 State of Hawaii

The State of Hawaii maintains a statewide planning system that includes State and County Land Use Plans, Policies and Controls to provide standards and guidelines for development. Updating the West Mamala Bay Facilities Plan and evaluating the need for expansion and upgrade to the Honouliuli WWTP is necessary to address the Consent Decree and to safely accommodate future growth and development. This FEIS references the appropriate Plans, Policies and Controls to assist in evaluating the proposed project.

7.1.1 Hawaii State Plan

The Hawaii State Plan sets forth overall goals, objectives, policies and priorities for the State to guide future long-range development. The purpose of the Hawaii 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.
- 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:

§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 Hawaii'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.

7.1.1.1 Discussion

The proposed project is consistent with the above objectives and policies of HRS, Chapter 226, Hawaii State Planning Act. The project would enable the CCH to maintain basic sanitation standards relating to wastewater collection and treatment in one of Oahu's largest wastewater service areas. The project would result in adequate sewerage facilities to support both current and future economic activities.

7.1.2 State Functional Plans

State Functional Plans are the framework for implementation of the Hawaii State Plan by establishing policies and guidelines for specific activities. State Functional Plans are developed by the agency responsible for the functional area, including agriculture, conservation lands, education, energy, higher education, health, historic preservation, housing, recreation, tourism, and transportation. Table 7-1 shows the various planning objectives and whether the project is consistent, and where the subject is addressed.

Table 7-1 State Planning Objectives Consistency

Category	HRS 226	Objective	Applicable	Consistent	Section of Report
General	§226 4	State goals	In order to guarantee, for present and future generations, those elements of choice and mobility that insure that individuals and groups may approach their desired levels of self-reliance and self-determination, it shall be the goal of the State to achieve:	Not inconsistent	
	§226- 5	Population	It shall be the objective in planning for the State's population to guide population growth to be consistent with the achievement of physical, economic, and social objectives contained in this chapter.	Not inconsistent	
Objectives and policies for the economy	§226-6	In General	Planning for the State's economy in general shall be directed toward achievement of the following objectives:	Not inconsistent	
	§226-7	Agriculture	Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives:	Not inconsistent	
	§226-8	Visitor industry	Planning for the State's economy with regard to the visitor industry shall be directed towards the achievement of the	Not inconsistent	

			objective of a visitor industry that constitutes a major component of steady growth for Hawaii's economy.		
	§226- 9	Federal Expenditures	Planning for the State's economy with regard to federal expenditures shall be directed towards achievement of the objective of a stable federal investment base as an integral component of Hawaii's economy.	Not inconsistent	
	§226-10	Potential Growth Activities	Planning for the State's economy with regard to potential growth activities shall be directed towards achievement of the objective of development and expansion of potential growth activities that serve to increase and diversify Hawaii's economic base.	Not inconsistent	
	§226-10.5	Information Industry	Planning for the State's economy with regard to the information industry shall be directed toward the achievement of the objective of positioning Hawaii as the leading dealer in information businesses and services in the Pacific Rim.	Not inconsistent	
Objectives and policies for the physical environment	§226-11	Land-based, Shoreline, and Marine Resources	Planning for the State's physical environment with regard to land-based, shoreline, and marine resources shall be directed towards achievement of the following objectives:	Not inconsistent	
	§226-12	Scenic, Natural Beauty, and Historic Resources	Planning for the State's physical environment shall be directed towards achievement of the objective of enhancement of Hawaii's scenic assets, natural beauty, and multi-cultural/historical resources.	Not inconsistent	
	§226-13	Land, Air, and Water Quality	Planning for the State's physical environment with regard to land, air, and water quality shall be directed towards achievement of the following objectives:	Not inconsistent	
Objectives and policies for facility systems	§226-14	For Facility Systems--in general.	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.	Yes	Section 7.1.1
	§226-15	Solid and Liquid Wastes	Planning for the State's facility systems with regard to solid and liquid wastes shall be directed towards the achievement of the following objectives:	Not inconsistent	
	§226-16	Water	Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural,	Not inconsistent	

			commercial, industrial, recreational, and other needs within resource capacities.		
	§226-17	Transportation	Planning for the State's facility systems with regard to transportation shall be directed towards the achievement of the following objectives:	Not inconsistent	
	§226-18	Energy	Planning for the State's facility systems with regard to energy shall be directed toward the achievement of the following objectives, giving due consideration to all:	Yes	Section 4.1.10
	[§226-18.5]	Telecommunications	Planning for the State's telecommunications facility systems shall be directed towards the achievement of dependable, efficient, and economical statewide telecommunications systems capable of supporting the needs of the people.	Not inconsistent	
Objectives and policies for socio-cultural advancement	§226-19	Housing	Planning for the State's socio-cultural advancement with regard to housing shall be directed toward the achievement of the following objectives:	Not inconsistent	
	§226-20	Health	Planning for the State's socio-cultural advancement with regard to health shall be directed towards achievement of the following objectives:	Not inconsistent	
	§226-21	Education	Planning for the State's socio-cultural advancement with regard to education shall be directed towards achievement of the objective of the provision of a variety of educational opportunities to enable individuals to fulfill their needs, responsibilities, and aspirations.	Not inconsistent	
	§226-22	Social Services	Planning for the State's socio-cultural advancement with regard to social services shall be directed towards the achievement of the objective of improved public and private social services and activities that enable individuals, families, and groups to become more self-reliant and confident to improve their well-being.	Not inconsistent	
	§226-23	Leisure	Planning for the State's socio-cultural advancement with regard to leisure shall be directed towards the achievement of the objective of the adequate provision of resources to accommodate diverse cultural, artistic, and recreational needs for present and future generations.	Not inconsistent	
	§226-24	Individual Rights and Personal Well-being	Planning for the State's socio-cultural advancement with regard to individual rights and personal well-being shall be directed towards achievement of the objective of increased opportunities and protection of individual rights to enable	Not inconsistent	

			individuals to fulfill their socio-economic needs and aspirations.		
	§226-25	Culture	Planning for the State's socio-cultural advancement with regard to culture shall be directed toward the achievement of the objective of enhancement of cultural identities, traditions, values, customs, and arts of Hawaii's people.	Not inconsistent	
	§226-26	Public Safety	Planning for the State's socio-cultural advancement with regard to public safety shall be directed towards the achievement of the following objectives:	Not inconsistent	
	§226-27	Government	Planning the State's socio-cultural advancement with regard to government shall be directed towards the achievement of the following objectives:	Not inconsistent	

The proposed alternatives are consistent with the following State Functional Plans:

7.1.2.1 Recreation State Functional Plan

Issue Area IV. Resource Conservation and Management
Objective IV-B: Prevent Degradation of the Marine Environment
Policy IV-B(1): Enhance water quality to provide high-quality ocean recreation opportunities.
Implementing Action IV-B(1)a: Regularly monitor water quality at key ocean recreation sites.

The proposed project would have beneficial water quality impacts on coastal waters in the vicinity of the existing ocean outfall, regardless of the alternative selected, as the quality of effluent would be significantly improved following secondary treatment. As part of NPDES permit requirements for the Honouliuli WWTP, monitoring is regularly conducted at shoreline, nearshore and offshore stations to assess aesthetic conditions for recreational uses and to determine compliance with applicable water quality standards.

7.1.2.2 Historic Preservation State Functional Plan

Issue Area I. Preservation of Historic Sites
Objective B: Protection of Historic Properties
Policy B.2. Establish and make available a variety of mechanisms to better protect historic properties.
Implementing Action B.2.c: Respond to the discovery of prehistoric/historic burials in a timely and sensitive manner, which takes into consideration cultural concerns.

An archaeological literature review and field investigation were conducted for the proposed project. No significant short- or long-term impacts to historic or archaeological resources are anticipated as a result of the construction and operation of the proposed project. Should any significant historic or archaeological resources be found during construction activities, all work would cease within the immediate area and SHPD would be notified immediately.

7.1.3 State Land Use Classification

The Land Use Commission (LUC) administers the state wide zoning law as outlined in Chapter 205 of the HRS and Title 15, Chapter 15 of the HAR. The purpose of the LUC is to designate all lands in the state into one of four land use districts: Urban, Rural, Agricultural, and Conservation to preserve, protect and encourage development and preservation of lands for those uses to which they are best suited in the interest of public health and welfare of the people. A brief description of each land use is provided in the following list:

- Urban District – areas with "city-like" concentrations of people, structures and services and vacant areas for future development. Jurisdiction lies with the respective county through ordinances and rules.

- Rural District – primarily small farms intermixed with low density residential lots of ½ acre or more. Jurisdiction of these areas lies with the LUC and respective counties and permitted uses generally include those relating to agricultural use and low-density residential lots; however, variances may be obtained.
- Agricultural District – includes lands for cultivation of crops, aquaculture, raising livestock, wind energy facility, timber cultivation, agriculture support activities and land with significant potential for agriculture uses. Uses permitted within the district are based on the Land Study Bureau's productivity categories. Lands in the highest productivity categories (A or B) are governed by statute and uses in the lower categories (C, D, E or U) are established by the commission stated in HRS 205-4.5.
- Conservation District – lands comprised of existing forest and water reserve zones and area necessary to protect watersheds and water resources, scenic and historic areas, parks, wilderness, open space, recreational areas, habitats of endemic plants, fish and wildlife, and all submerged lands seaward of the shoreline. These areas are governed by the State DLNR.

7.1.3.1 Discussion

The project area is located within Urban and Agricultural Districts (Figure 7-1). Permissible uses within each district are defined in HAR Title 15, Chapter 15-24. The proposed project activities and uses are permissible within the Urban District but will require a Special Use Permit or Land Use Commission boundary amendment for construction on the land identified as Agriculture.

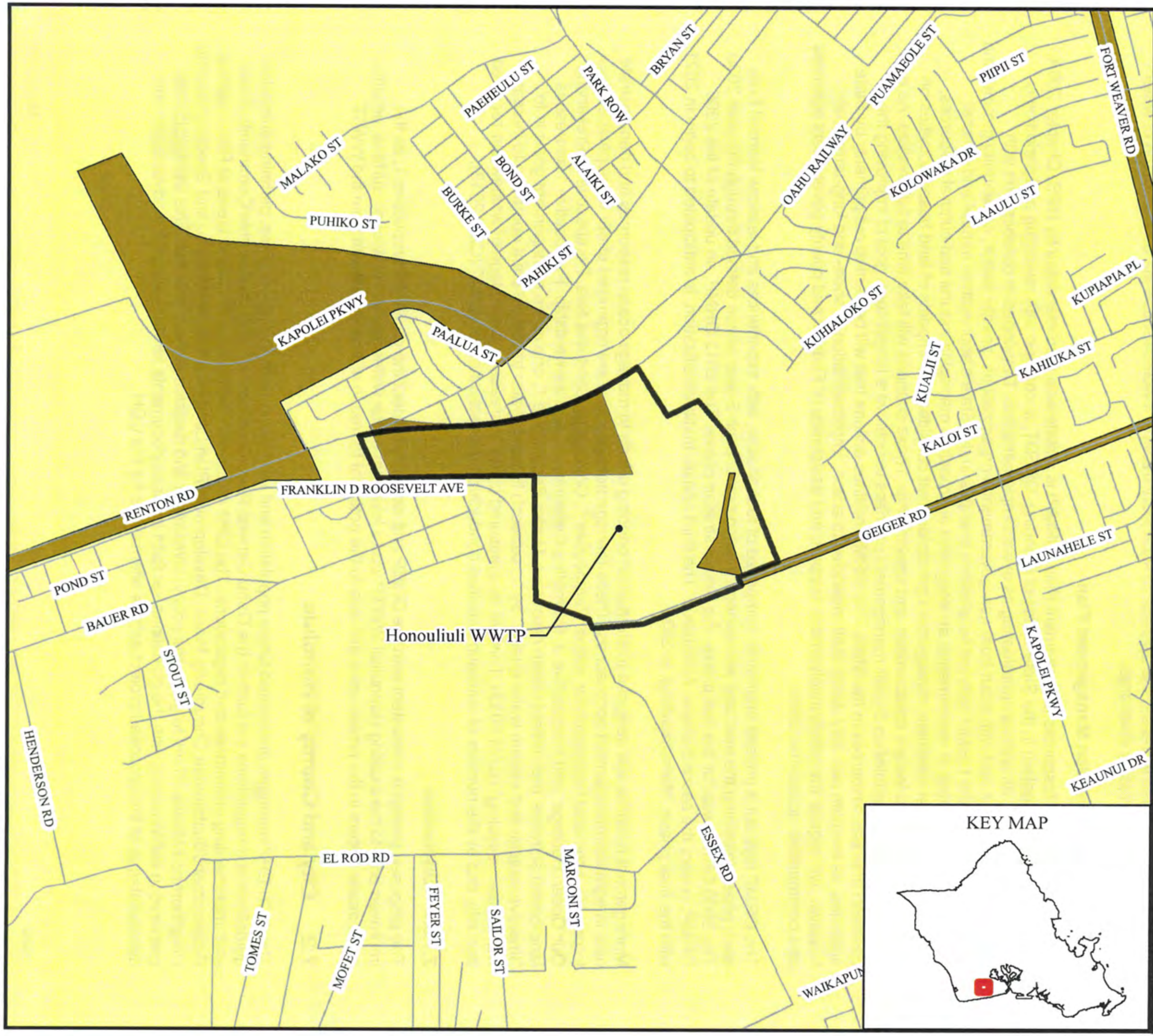
7.1.4 Coastal Zone Management Program

The purpose of the Hawaii Coastal Zone Management (CZM) Program is to "provide for the effective management, beneficial use, protection, and development of the coastal zone". Hawaii's CZM was established through Chapter 205A, HRS, and is administered by the Hawaii Office of Planning. Chapter 205A requires compliance with CZM objectives and policies outlined in Chapter 205A-2(b), The FEIS has examined all of the objectives and policies as listed in HRS § 205A-2 and has not found the project to be inconsistent with the objectives and policies. The following ~~of which~~ are specifically reviewed as applicable to the proposed project.

> *(1) Recreational Resources:*
> *Objective: Provide coastal recreational opportunities accessible to the public.*
> *Policy (B): Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:*
>> *(vi) Adopting water quality standards and regulating point and nonpoint sources of pollution to protect, and where feasible, restore the recreational value of coastal waters.*

The purpose of the proposed project is to improve the quality of effluent discharged to Mamala Bay. Therefore, the proposed project would have beneficial water quality impacts on coastal waters in the project area, including Mamala Bay, which is used for a variety of water recreation activities.

> *(4) Coastal Ecosystems:*
> *Objective: Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.*



City and County of Honolulu

HONOULIULI/ WAIPAHU/ PEARL CITY WASTEWATER FACILITIES PLAN

Legend

- Honouliuli WWTP
- Street

State Landuse District

- Agriculture
- Urban

0 — 1,200
Feet
1 inch = 1,200 feet

FIGURE 7-1

LAND USE DISTRICTS

December 2014

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Policy (E): Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.

The purpose of the proposed project is to improve the quality of effluent discharged to Mamala Bay. Although flows are anticipated to increase, the upgrade to secondary treatment would reduce the concentration of water quality parameters in plant discharge.

7.1.5 Ocean Recreation Management Plan

The Hawai'i Ocean Resources Management Plan (ORMP) is a statewide plan mandated by HRS, Chapter 205A. The Hawai'i CZM Program in the State Office of Planning, DBEDT, is charged with reviewing and periodically updating the ORMP, as well as coordinating its overall implementation. Developed in collaboration with government agencies and with input from non-governmental organizations, private sector, community groups, and other stakeholders, the ORMP calls for substantive changes in the State's approach to natural and cultural resources management. It recommends an integrated approach to managing natural and cultural resources, building on traditional Hawaiian management principles, that considers the impacts of land based activities on ocean resources and fosters collaboration and stewardship. These changes will take time to fully realize. As a result, this ORMP establishes 5-year management priorities to achieve a longer-term goal of improving the condition of ocean resources in the State. The ORMP outlines actions that will be carried out primarily by State agencies, as the plan can only direct State agencies to action. Implementation of short- and long-term goals, however, will require the active involvement, support, and assistance of Federal and county government agencies and communities across the State.

The ORMP lays out a phased approach, comprised of four phases, with experiences and lessons learned from each phase informing the next and with expected outcomes of each 5-year phase defined through the year 2030. The 2006 ORMP was for the first phase, the Demonstration phase. The 2013 ORMP, an update of the 2006 ORMP, covers the second phase, Adaptation. The third phase, Institutionalization, is anticipated to begin in 2021, with the final phase, Mainstreaming, in 2030.

Management priorities are designed to strengthen ongoing efforts to manage ocean resources and demonstrate new integrated management approaches. These management priorities are organized under three perspectives to provide a focused framework for action: Perspective 1, Connecting Land and Sea; Perspective 2, Preserving Our Ocean Heritage; and Perspective 3, Promoting Collaboration and Stewardship. Perspective 1 addresses land-based activities that impact ocean resources. Under Perspective 1, one of the management goals is to "Improve coastal and stream water quality" by "...outreach to wastewater treatment plant operators to increase wastewater recycling" (CZM 2013). This will be measured by an "increase in percentage of wastewater recycled annually and by the number of outreach activities conducted for wastewater recycling" (CZM 2013).

7.1.5.1 Discussion

The proposed project is consistent with the ORMP and would help meet the goals of Perspective 1, as the improvements to the existing Honouliuli WWTP would have beneficial water quality impacts on surface, ground, and coastal waters in the project area and due to the potential for reuse of treated effluent from the WWTP.

7.2 City and County of Honolulu

The CCH DPP manages anticipated future population and land use growth through policies, planning principles, guidelines and regulations set forth in the Oahu General Plan, Development and Sustainable Community Plans, and implementing ordinances and regulations. The DPP maintains and updates the Oahu General Plan, regional Development/Sustainable Community Plans, Development Plan Land Use Annual Reports, and Special Area and Neighborhood Master Plans to guide the policy, investment and decision making process. This ~~DEIS~~FEIS was prepared in conformance with the guidelines set forth in these documents for analysis on the advantages and disadvantages of the proposed project and its alternatives for the CCH.

7.2.1 General Plan

The Oahu General Plan was adopted in 1977 with subsequent amendments leading to the revised 2002 edition (according to the DPP website, as viewed in December 2014, this plan is in the process of being updated). The work associated with the proposed project is consistent with the objectives within the General Plan. These objectives include planning for anticipated future population growth and the increased demands for future sewerage and solid waste disposal services. Policies contained in the General Plan are implemented by the CCH government through ordinances and resolutions as well as rules and regulations. Development Plans for each community provide for the land use and public facilities planning and the sequence in which the development would occur in accordance with the objectives and policies outlined in the General Plan.

The General Plan, a requirement of the CCH Charter, is a written commitment by the CCH to a future for the Island of Oahu. The current plan, approved in 2002, 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 Oahu 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 Oahu.

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.

7.2.1.1 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 wastewater facility improvements would enhance efficiency of the systems and the secondary treatment to provide safe waste collection and disposal.

Objective C is aimed at maintaining a high level of service for all utilities under the jurisdiction of the CCH, including wastewater collection and treatment. Planned improvements would benefit the urban communities within the Honouliuli WWTP service area. 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 districts. The environmental documentation in this FEIS evaluates 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 improve, wastewater facilities that would enable Oahu to continue to be a desirable place to live and visit.

7.2.2 Development Plans/Sustainable Communities Plans

Oahu is divided into eight planning areas that are used by the CCH DPP for long-term planning efforts. Three of these planning areas are located partially or completely within the sewer basin: Ewa, Central Oahu, and PUC (Figure 7-2). Development plans (DPs) required by CCH Charter are prepared to guide population and land use growth over a 20+ year time span for these planning areas. The future growth and plans for the areas of Ewa, Central Oahu, and the PUC are vital elements in determining the potential design for the upgrade of the Honouliuli WWTP. A major revision to these plans was completed in 2004, and the revised plans are reviewed every 5 years to revalidate the overall goals and make appropriate adjustments. The revised Ewa DP was adopted in July 2013, a Public Review Draft Central Oahu Sustainable Communities Plan (SCP) is expected to be circulated to the public for review in 2015, and the review of the PUC DP has been postponed indefinitely.

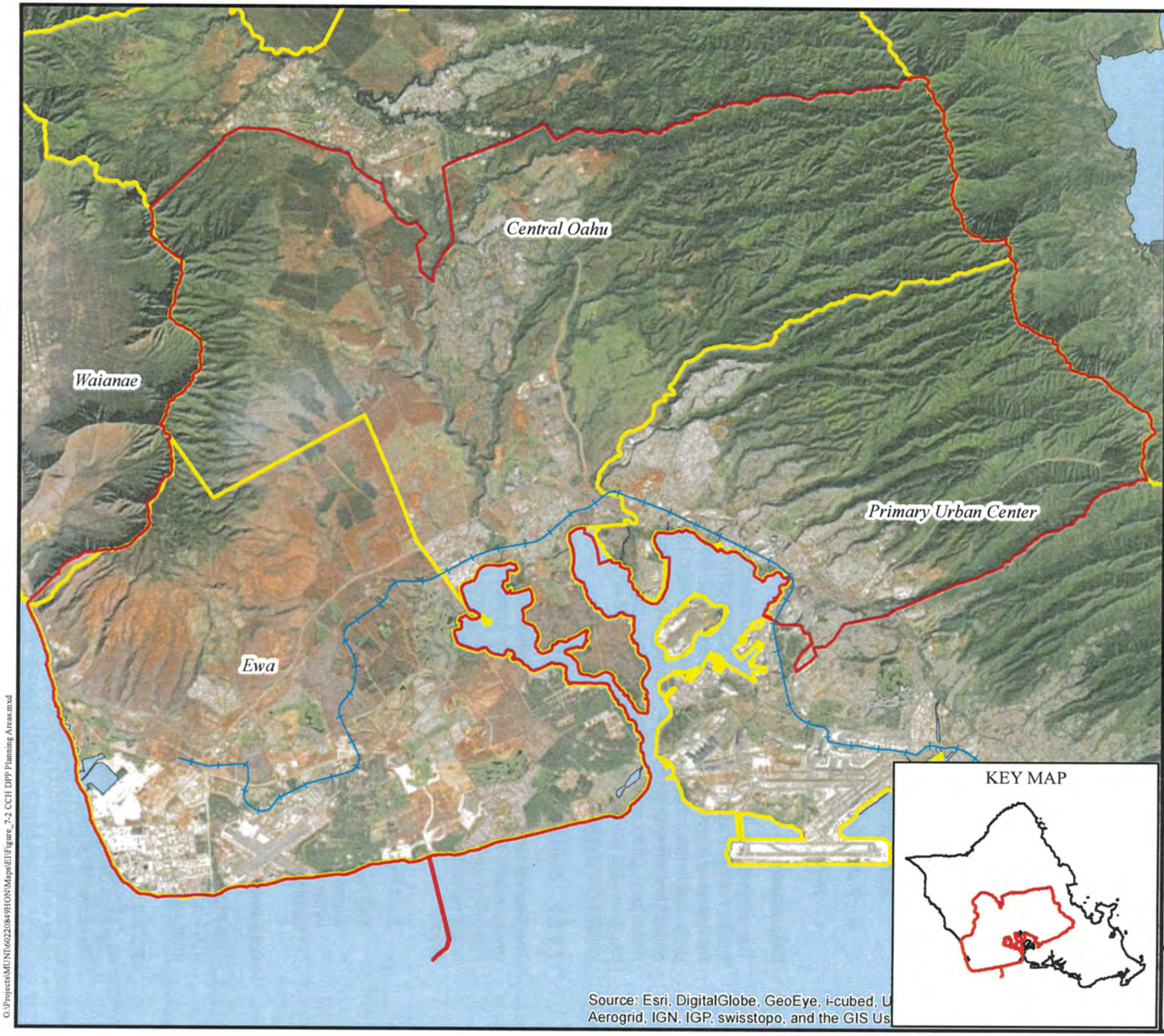
The DPs for Ewa and the PUC are directed toward considerable growth and significant progress to provide a Secondary Urban Center for Oahu, centered in the Kapolei area, and to guide development decisions and actions needed to support the growth. The Central Oahu SCP is a plan with goals directed toward public actions to support the existing population.

Future projects described in these development plans/sustainable communities plans include but are not limited to the Transit Oriented Development Program to expand the transit system in the Aiea-Pearl City, East Kapolei and Waipahu Neighborhoods, pedestrian ways and bike paths, and community centers. The Honouliuli Rail Transit Project will traverse through the Honouliuli sewer basin and possibly encourage higher density, transit oriented development in the vicinity of the proposed stations (a desired effect), as reflected in the transit oriented development plans prepared by DPP for several neighborhoods in the sewer basin (DPP 2013b). The rail project will also help support and connect many of the proposed developments identified in the Ewa DP and Central Oahu Sustainable Communities Plan (DPP 2013a). The proposed alignment for the Honouliuli Rail Transit Project is identified in Figure 7-2.

7.2.2.1 Primary Urban Center DP

The PUC DP, 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 Oahu and the State." The PUC DP is incorporated into Ordinance 04-14 by reference. The proposed project is consistent with the implementation strategies described in the PUC DP, Chapter 5. Particularly pertinent areas are quoted below.

> "5.1 Public Facility Investment Priorities
>
> The vision for the PUC 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 DP vision, policies and guidelines; and



City and County of Honolulu

HONOULIULI/ WAIPAHU/ PEARL CITY WASTEWATER FACILITIES PLAN

Legend

- Proposed Mass Transit
- Sewer Basin
- DPP Planning Area

0 12,000 Feet
1 inch = 12,000 feet

FIGURE 7-2

CCH DPP PLANNING AREAS WITHIN HONOULIULI SEWER BASIN

December 2014

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- Involve applications for zoning and other land use permits that are consistent with the DP 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 DP. 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 would serve to implement the DP 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 priorities and objectives of the PUC DP. With regard to the 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 DP 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.

7.2.2.2 Central Oahu Sustainable Communities Plan

The Central Oahu SCP, approved in 2002 and currently under revision (anticipated to be circulated for public review in 2014 or 2015), implements the objectives and policies of the General Plan for Central Oahu, which is described as "one of Oahu's principal residential development areas." The proposed project is consistent with the implementation strategies described in the Central Oahu SCP, Chapter 5. A particularly pertinent area is quoted below.

5.1.1 Public Facility Investment Priorities

The regional directed growth strategy requires the cooperation of both public and private agencies in planning, financing, and improving infrastructure. The City should take an active role in planning infrastructure and coordinating the expansion of the Honouliuli Wastewater Treatment Plant and reuse of its effluent...

Discussion

This project is consistent with the Central Oahu Sustainable Communities Plan. With regard to the Plan's Section 5.1.1, Public Facility Investment Priorities, this project reflects ENV's active role in planning infrastructure improvements for wastewater systems, particularly the Honouliuli WWTP and the reuse of its treated effluent.

7.2.2.3 Ewa DP

The Ewa DP, most recently updated in 2013, implements the objectives and policies of the General Plan for Ewa. The Ewa DP states:

> In 1977, the Honolulu City Council approved a new General Plan which designated Ewa as the location for a Secondary Urban Center for Oahu to be centered in the Kapolei area. The Secondary Urban Center was to be the focus of major economic activity and housing development, and a center for government services. While the General Plan promotes full development of the Primary Urban Center, it also encourages development of the Secondary Urban Center at Kapolei, and residential development of the urban fringe areas in Ewa and Central Oahu.

The Ewa DP is incorporated into Ordinance 00-16 by reference. The proposed project is consistent with infrastructure and implementation strategies described in the Ewa DP, Chapters 4 and 5. Particularly pertinent areas are quoted below.

> 4.3 WASTEWATER TREATMENT
>
> ...(it is estimated that) the Honouliuli Wastewater Treatment Plant will need to be increased from existing capacity for primary treatment of 38 million gallons per day (mgd) to almost 51 mgd by 2020 to meet projected population and economic growth in Ewa and Central Oahu resulting from implementation of the Development Plans.
>
> 4.3.1 GENERAL POLICIES
>
> Where feasible, use recycled water recovered from wastewater effluent for irrigation and other uses below the Underground Injection Control line of the State Department of Health and the "No-Pass" Line of the Board of Water Supply.
>
> 5.1.2 Public Facility Investment Priorities
>
> The regional directed growth strategy requires the cooperation of both public and private agencies in planning, financing, and constructing infrastructure. The City must take an active role in planning infrastructure and coordinating construction of needed infrastructure, such as expansion of the Honouliuli Wastewater Treatment Plant and recovery of nonpotable water from its effluent...
>
> Significant Capital Improvement Projects of the highest priority for the Ewa Development Plan are: Expanded wastewater treatment plant capacity, and recycling of non-potable water reclaimed from wastewater effluent at the Honouliuli Wastewater Treatment Plant.

Discussion

This project is consistent with the Ewa DP. With regard to the Plan's Sections 4.3 "Wastewater Treatment", 4.3.1 "General Policies," and 5.1.2 "Public Facility Investment Priorities," this project reflects ENV's active role in planning infrastructure improvements for wastewater systems, particularly the Honouliuli WWTP, and for the reuse of its treated effluent (approximately 13 mgd (approximately 50 percent [%] of the ADF) receives secondary treatment for water reuse at the HWRF). The rated design capacity of the existing Honouliuli WWTP is 38 mgd with one unit on standby and 51 mgd with all units in service. In 2013, the ADF was approximately 26.1 mgd. The proposed secondary treatment upgrades are sized for a projected 2050 design ADF of 45 mgd.

7.3 Zoning

The Land Use Ordinance (LUO), Chapter 21, also referred to as the Zoning Ordinance, regulates land to encourage orderly development in accordance with policies including the Oahu General Plan and development plans. According to the LUO, the proposed improvements "fall" into the land use category of "Utility Installations, Type A".

> "Utility Installations, Type A," means uses or structures, including all facilities, devices, equipment or transmission lines...
>
> Type A utility installations are those with minor impact on adjacent land uses and typically include...sewage pump stations....

Discussion

The project is located within the AG-1 (Restricted Agriculture) and I-2 (Intensive Industrial) zoning districts, as shown in Figure 7-3. According the LUO Master Use Table (Table 21-3), "Utility Installations, Type A" are permitted in both zoning districts, subject to standards in Article 5 of the LUO. A Conditional Use Permit (Minor) is not anticipated to be required, as no potential major impacts are anticipated as a result of the proposed project (this type of permit is typically required for "Utility Installations, Type B" projects where major impacts are anticipated).

7.3.1 Special Management Area

Regulations and procedures within the Special Management Areas pursuant to HRS Chapter 205A are further defined in Chapter 25 of the Revised Ordinances of Honolulu to preserve and protect the natural resources of the coastal zone of Hawaii. No "development" shall be allowed in any county within a special management area without obtaining a permit in accordance with HRS 205A-28.

7.3.1.1 Discussion

None of the proposed alternatives are anticipated to occur within any area designated as a Special Management Area.

7.3.2 Shoreline Setback

Regulations and procedures within the shoreline setback pursuant to HRS Chapter 205A are further defined in Chapter 23 of the Revised Ordinances of Honolulu to protect and preserve the natural shoreline and to reduce hazards to property from coastal floods.

7.3.2.1 Discussion

No development shall be allowed in any county within the shoreline setback without obtaining a shoreline setback variance; however, none of the proposed work is anticipated to occur within the shoreline setback area.

7.4 List of Necessary Approvals

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

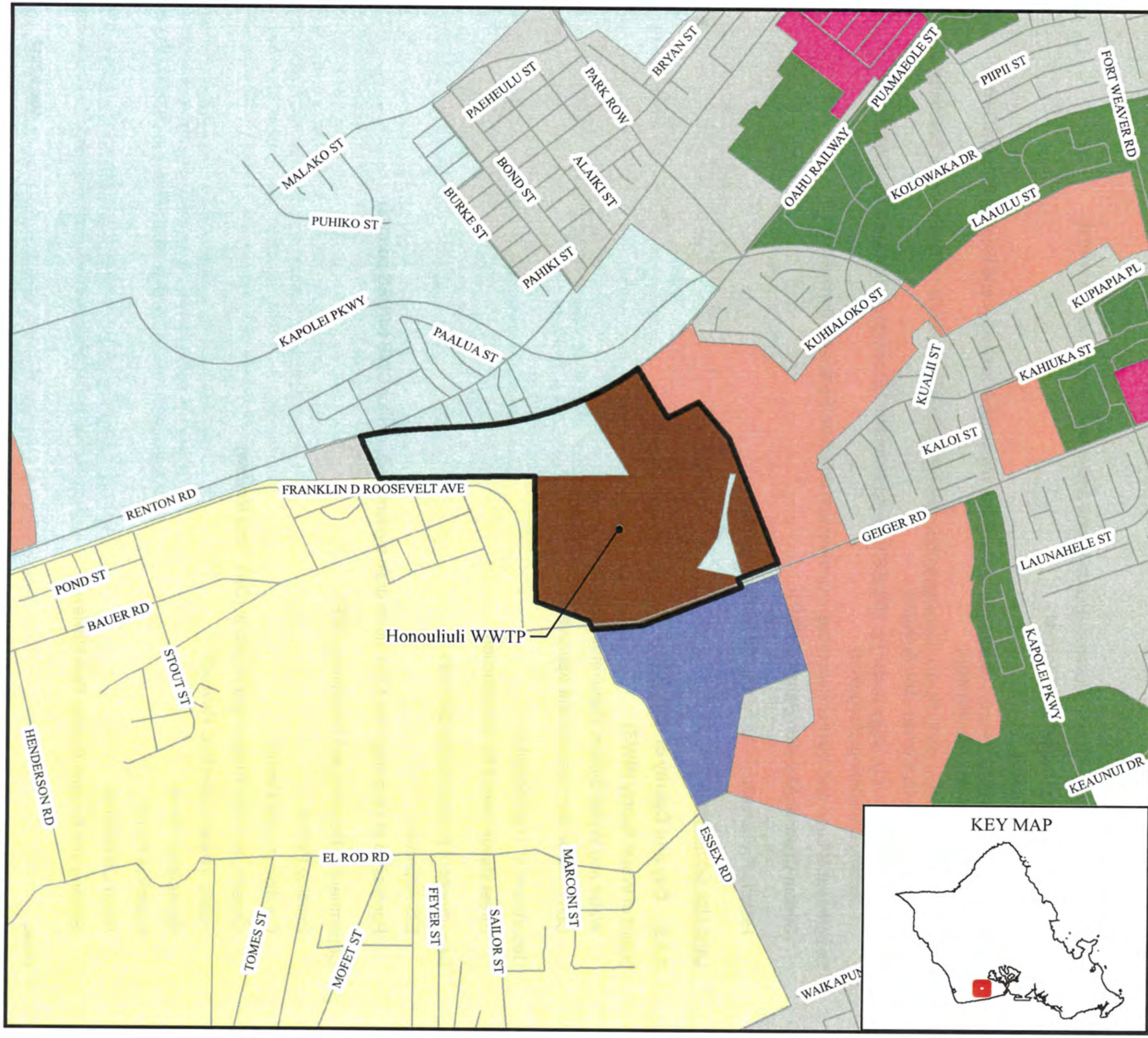
7.4.1 Federal

U.S. Army Corps of Engineers

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

U.S. Environmental Protection Agency

CWA Section 301(h) Review



City and County of Honolulu

HONOULIULI/ WAIPAHU/ PEARL CITY WASTEWATER FACILITIES PLAN

Legend
- Honouliuli WWTP
- Street

Oahu Zones
- A-1 Low-density Apartment District
- AG-1 Restricted Agriculture District
- B-1 Neighborhood Business District
- F-1 Federal and Military Preservation District
- I-2 Intensive Industrial District
- IMX-1 Industrial Mixed Use District
- P-2 General Preservation District
- R-5 Residential District

0 1,200
Feet
1 inch = 1,200 feet

FIGURE 7-3

CITY AND COUNTY OF HONOLULU ZONING

December 2014

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7.4.2 State of Hawaii

Department of Business, Economic Development and Tourism, Office of Planning

Coastal Zone Management Consistency Determination

Department of Health (DOH)

Air Pollution Control Permits (Covered Source Permit and/or Noncovered Source Permit)

Construction Plan Review and Approval

Noise Variance Permit

CWB Individual NPDES Form – Discharge of Municipal Wastewater from New and Existing Publicly Owned Treatment Works (Modification)

CWB Notice of Intent (NOI) Form – Coverage under the NPDES General Permit for Storm Water Discharges Associated with Construction Activities

CWB NOI Form – Coverage under the NPDES General Permit for Discharges Associated with Construction Activity Dewatering (if required)

Department of Land and Natural Resources – Commission on Water Resource Management

Stream Channel Alteration Permit (SCAP)

Historic Preservation – Archeological Monitoring Plan

<u>Land Use Commission</u>

7.4.3 City and County of Honolulu

Board of Water Supply (BWS)

Water and Water System Requirements

Construction Plan Review and Approval

Department of Transportation

Street Usage Permit for Construction

Department of Environmental Services

EIS Approval

Permission to Discharge into CCH storm drain system (required for CWB NPDES permits)

Department of Planning and Permitting (DPP)

Building Permit

Conditional Use Permit

Construction Plan Review and Approval (One Time Review)

Public Infrastructure Map Revision

Dewatering Permit

Electrical Permit

Flood Certification

Grading and Erosion Control Plan Review

Grading, Grubbing, and Stockpiling Permit

Plumbing Permit

Sidewalk/Driveway Work Permit

Special Use Permit

Trenching Permit

7.4.4 Others

Utility Companies

Utility Service Requirements

Permit Regarding Work on Utility Lines

Traffic Control Plans

OR&P Plan Review

8 RELATIONSHIP BETWEEN LOCAL AND SHORT-TERM USES OF HUMANITY'S ENVIRONMENT AND THE MAINTENANCE OF LONG-TERM PRODUCTIVITY

8.1 Short-Term Uses

The proposed project alternatives would involve short-term uses of the environment during the construction phase. These uses would have both positive and negative impacts. Construction activities associated with the proposed project alternatives would temporarily require use of resources, including water, energy, fuel, etc.; however, impacts from the increased use of these resources are anticipated to be minimal.

In the short-term, the proposed project alternatives would also result in positive benefits to economic uses in the local area. The economic impacts of project construction would include the impact of expenditures on construction materials, and on earnings of construction workers and professional service providers during construction.

8.2 Long-Term Productivity

In the long-term, the proposed project alternatives and associated improvements would have beneficial impacts on long-term productivity of the Honouliuli wastewater system due to the WWTP expansion for handling flows from future population growth and development.

A substantial amount of financial resources would be required to construct, operate, and maintain the proposed project. The funds would be drawn from a generally limited pool of assessment and operating fees. Therefore, the capital improvement and annual operating costs associated with the proposed facility improvements would result in an increase in sewer rates for the wastewater system customers on Oahu. However, as stated in Section 5.13.1, annual expenditures from operations of the proposed project would result in ongoing increases in economic output, employment, and earnings, and ongoing increases in fiscal revenues. The operation effects from the proposed project would be beneficial, providing regional economic benefits including long-term positive effects on employment, productivity and income in the region.

If the proposed upgrades were not implemented, the result would be failure to comply with the Consent Decree requirement and comply with permit effluent limitations. In addition, wastewater reuse will provide beneficial reduction of the consumptive use of other water resources. Therefore, long-term productivity would be increased by implementation of the proposed project.

9 IRRETRIEVABLE AND IRREVERSIBLE COMMITMENTS OF RESOURCES

Irreversible and irretrievable resource commitments are related to the use of non-renewable resources and the effects that the use of those resources have on future generations. Irretrievable resource commitments involve the loss in value of an affected resource (e.g., extinction of a threatened or endangered species or the disturbance of a cultural site). The proposed project would constitute an irreversible or irretrievable commitment of non-renewable or depletable resources, for the materials, time, money, and energy expended during activities implementing the project.

In the short term, construction activities would require the consumption of fossil fuel and energy, as construction requires equipment that would use fuel, either gasoline or diesel, to operate. Irreversible and irretrievable commitments to resources would be unavoidable (i.e., resulting emissions would contribute to overall air quality of the region) but would be minor and temporary.

The proposed clearing of trees and vegetation in the expansion area of the Honouliuli WWTP property would constitute an irreversible and irretrievable loss of natural resources; however, proposed landscaping plans are recommended to include native vegetation plantings throughout the project area to minimize this loss. As noted previously, although this area is currently vegetated, it is a disturbed site.

Construction activities would require the manufacturing and use of materials. Following construction, unused materials would be reused or recycled whenever possible. Materials that cannot be recycled at the end of the project lifetime would become an irreversible and irretrievable commitment of resources. However, no supplies are considered scarce and thus would not limit other unrelated construction activities in the region. The packaging of construction materials that cannot be reused or recycled, as well as other waste generated during construction activities, would result in an irreversible and irretrievable allocation of landfill or other solid waste disposal capacity.

It is anticipated that the project would have both beneficial and adverse effects on non-residential development and employment in the area. The proposed project would create demand for construction materials and services, and hence direct and indirect (mostly construction- and industrial-related) employment in the project area; however, the use of the additional acreage to provide for additional facilities within the expansion area north of the existing Honouliuli WWTP site may result in loss of long-term development opportunity for other industrial growth. Footprints within the expansion area would be minimized to the extent possible.

In the long term, the upgraded facility would require fossil fuels to generate the energy for heating, cooling and ventilation. However, upgrades would be constructed with modern equipment that incorporates greater efficiencies than those achieved at the existing facilities. Therefore, although irreversible and irretrievable commitments of resources are unavoidable (i.e., using oil for energy production), these impacts are anticipated to be minimal. In addition, there is a potential for energy recovery from digester gas or by utilizing new emerging technology for gasification of sewage sludge. However, at this time, it is not known if the net energy consumption could be feasibly reduced to favorable levels through the implementation of new technologies that are emerging on the market.

Failure to implement the proposed secondary treatment upgrade would result in a failure to comply with the consent decree.

10 PROBABLE ADVERSE ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

Adverse impacts can be defined as short- and long-term effects relative to the construction and implementation of a specific use. Short-term impacts are usually construction-related impacts that would occur during the course of construction and cease upon completion of the project. Long-term impacts generally result from the implementation of the proposed project.

10.1 Short-term Effects

The proposed project would result in some unavoidable short-term impacts, as described below. These potential impacts are generally minor and would be further minimized through the implementation of BMPs.

10.1.1 Soils

Construction activities would result in unavoidable impacts to soils in the project area due to grading and excavation activities and due to the potential for localized contamination of soils from construction activities (i.e., accidental release of construction equipment fluids). Construction methods to preserve the integrity of existing facilities would be implemented and construction equipment would be maintained in good working condition to reduce the potential for accidental spills. In addition, erosion and sedimentation controls would be implemented to reduce impacts to the natural environment. Soil which is not immediately used for backfilling would be stockpiled and covered or otherwise protected to prevent erosion or sedimentation. In addition, temporary seeding and mulching may be used to minimize soil erosion and provide soil stabilization on slopes.

10.1.2 Groundwater

Construction activities could potentially impact groundwater if encountered during construction. Mitigation measures would be implemented during construction activities to preserve the integrity of existing infrastructure and keep construction equipment in good working condition to prevent accidental spills. Also, dewatering may be necessary for construction below the groundwater table, if necessary, and the construction contractor would be required to include provisions for dewatering. Appropriate BMPs, monitoring of groundwater and careful site preparation would be utilized to minimize adverse impacts. In addition, construction activities would result in the disturbance of more than one acre; therefore, a NPDES General Permit for Stormwater Discharges from Construction Activities would be required from the DOH Clean Water Branch (CWB). Proposed designs would comply with stormwater runoff requirements, pursuant to the Clean Water Act.

10.1.3 Wetlands

It is anticipated that the abandoned irrigation ditch located on the project site would need to be filled to construct the various site components in that location. All work would be performed in accordance with Federal, State, and CCH regulatory requirements including, but not limited to the Section 404 of the Clean Water Act and/or section 10 of the Rivers and Harbors Act, if applicable. The project team would consult with the Army Corps of Engineers, U.S. Fish and Wildlife, DLNR Commission on Water Resource Management, CCH, and other regulatory agencies, as necessary, to determine whether filling the former irrigation ditch is jurisdictional under current regulations. If the ditch is determined to be jurisdictional by one or more agencies, then the project team would work with the appropriate agencies to determine acceptable mitigation options.

If the US ACE requires a CWA Section 404, or a RHA Section 10 permit, the project may also need to be evaluated against Federal Consistency requirements. The Office of Planning will be the lead State agency to conduct this evaluation.

10.1.4 Flora

Vegetation would need to be removed within the expansion property area for construction activities. Native Hawaiian plants are recommended for landscaping within the project area, including species such as: ko'oloa'ula, kou, 'ilie'e, and 'a'ali'i to minimize unavoidable impacts to vegetation and trees.

10.1.5 Air Quality

Construction-related air quality impacts would result from site preparation and earth moving activities, the movement of construction vehicles on unpaved areas of the site, emissions from construction equipment, and construction of structures. The construction contractor is responsible for complying with DOH regulations which prohibit visible dust emissions at property boundaries. Although short-term air quality impacts are anticipated to be less than significant, the presence of nearby residences and buildings near most of the affected project sites suggest that open-air areas and naturally ventilated structures could be impacted by dust in spite of compliance with these regulations. BMPs to control dust emissions would be implemented to minimize visible fugitive dust emissions at the property line. The BMPs would include watering of active work areas, using wind screens, keeping adjacent paved roads clean, and covering open-bodied trucks. Measures to control construction emissions from equipment and vehicles can also be considered if necessary, such as using newer equipment and reducing on-site truck idling time. In addition, increased vehicular emissions due to disruption of traffic by construction equipment and/or commuting construction personnel can be alleviated by moving construction materials and workers to the site during off-peak traffic hours.

10.1.6 Noise

Construction noise would be unavoidable during the duration of the respective project construction periods. Short-term increases in noise levels would result from construction activities, vehicles and equipment. The use of muffled equipment, noise barriers, and restrictions on construction hours, as well as adherence to DOH regulations on noise mitigation, would minimize construction and traffic-related noise. For construction work to be performed at night or on weekends and holidays, a Community Noise Variance permit from the DOH would be required if it exceeds regulatory noise levels.

10.1.7 Traffic

An unavoidable slight increase in entering and exiting proposed project traffic is anticipated in some areas during construction activities. Therefore, roadway improvements, including road widening, are recommended at the following five intersections, including intersections 7, 8, 12, 13, and 14 (as shown on Figure 5-7).

- Geiger Road at its intersection with Honouliuli Driveways 1, 2 and 3 (intersections 7, 8, and 12)
- Roosevelt Avenue/Honouliuli Driveway 4 Intersection (intersection 13)
- Renton Road/Honouliuli Driveway 5 Intersection (intersection 14)

10.1.8 Visual and Aesthetic Resources

During construction activities, the presence of cranes and other heavy construction equipment would alter a portion of the viewshed from nearby buildings within the WWTP site. In addition, the proposed improvements would alter the viewshed of the surrounding area by adding new three-dimensional, man-made features. During construction, fencing surrounding the construction site may be provided as needed to provide a visual screen. Any construction impacts regarding visual aesthetics are expected to be short-term and would cease after construction.

10.2 Long-Term Effects

The following unavoidable long-term impacts may result from development of the proposed wastewater facility improvements.

10.2.1 Soils

Following upgrades to the existing WWTP, the potential would still remain for wastewater spills to occur which could result in soil contamination. Soils stability inspections in the vicinity of the foundations of proposed facilities would need to be conducted periodically.

10.2.2 Groundwater

The stormwater detention/infiltration basins proposed at several locations within the project area may have an effect on the local groundwater table. However, these basins would be designed as part of a larger stormwater BMP system and are therefore anticipated to enhance the quality of stormwater recharge to groundwater. In addition, localized effects on groundwater levels may occur due to the potential reduction to local groundwater recharge.

10.2.3 Sludge

There will be an increase in the amount of sludge that is produced, handled, and disposed of due to the upgrade to secondary treatment.

10.2.4 Surface and Coastal Waters

There is a potential for future indirect impacts due to additional development allowed by sewered areas, including an increase in wastewater flow to the Honouliuli WWTP and effluent discharged to Mamala Bay. However, operation of the proposed project is expected to provide for compliance with the consent decree. In addition, this project would minimize the potential of additional SSOs from the existing conveyance and treatment system.

10.2.5 Air Quality

The primary air quality concern associated with the proposed project could be potential odor nuisances. The proposed alternatives include odor control for some of the existing facilities and all new facilities. Compliance with all applicable ambient standards, including odor in terms of H_2S concentration levels, would be demonstrated 1) during the final design stage of the project when the air permit is modified for applicable criteria pollutants and 2) after the completion of construction with an ambient monitoring program for odor. There is potential to increase on-site stationary and mobile source emissions due to an increase in the plant operational capacity. However, the possibility of nuisance odor from the Honouliuli WWTP would likely be reduced by the upgrade to the odor control system, which would help minimize nuisance odor downwind of the Honouliuli WWTP. Operation of the plant under future proposed conditions would involve installation of new standby generators to provide expanded emergency power supply, which may cause potential short-term increase in combustion source emissions. However, given their emergency usage purposes, potential air quality impacts would be short in duration and would be unlikely to cause significant air quality impacts. Thus, mitigation measures in excess of odor control measures would unlikely be necessary during the operational period. If a CHP facility is incorporated at the Honouliuli WWTP, it would need to be permitted according to State and Federal air regulations, as operation of the facility has the potential to produce additional emissions over the long term. The potential air emissions from the facility cannot be defined at this time, since the design is currently conceptual, but would be specified in air quality permit applications.

10.2.6 Traffic

An unavoidable slight increase in entering/exiting project traffic is anticipated during peak hours as a result of the proposed project. Road improvements discussed in Section 10.1.7 are proposed to minimize long term local impacts to traffic.

10.2.7 Noise

The adverse noise impacts resulting from the proposed activity may include increased vehicular noise due to additional vehicles traveling to and from the facilities, and increased stationary noise resulting from new equipment at the facilities. During the operation of the project, compliance with the DOH property line noise limits for fixed machinery would also be required, and it is expected that the long-term noise impacts associated with the proposed improvements would be minimized by the adherence to the DOH rules regarding noise limits for fixed machinery. Mitigation measures include soundproofing or muffling equipment noise such that noise levels remain below the maximum allowable levels. All CCH wastewater facilities must comply with the noise requirements of the DOH, pursuant to Chapter 46, Title 11, Community Noise Control, HAR.

10.2.8 Energy Consumption

Implementation of the proposed improvements would increase demand in energy consumption as all alternatives involve operation of new pumps, blowers, and other equipment required to convey and treat wastewater, which would require use of fuel and electricity. There is a potential for energy recovery from digester gas or by utilizing new emerging technology for gasification of sewage sludge. CCH is currently evaluating alternatives to use the digester gas for energy recovery.

11 SUMMARY OF UNRESOLVED ISSUES

Unresolved issues are invariably associated with projects in the planning and conceptual design stages, as is the case for this proposed project. Consequently, the various planning processes being pursued by the CCH, including the preparation of this FEIS, the Preliminary Engineering Report, and community outreach efforts, are based on the best available information and expertise of those knowledgeable in the design and construction of the proposed types of facilities. The unresolved issues for the proposed project at the time of this FEIS submittal are summarized below along with a discussion of how the issues will be resolved prior to commencement of the project construction and / or operation.

11.1 Design of Secondary Treatment Alternatives and Common Components

The various alternatives and project descriptions presented in this FEIS reflect conceptual designs based on available information. It is likely that adjustments would need to be made as the detailed design of the selected alternative proceeds. As such, the conceptual designs should be regarded as estimates and approximations.

11.2 Site Layout

The site layout presented in this FEIS is intended to conceptualize the potential for land use at the Honouliuli WWTP site for the ultimate build-out in Year 2050. It is understood that some of these functional needs may be met at alternative off site locations in lieu of the Honouliuli WWTP site, in which case additional review would be conducted, if necessary, to analyze associated potential environmental impacts. In addition, several buildings may be restored or demolished; sites of demolished buildings would be made available for future operational needs. It is anticipated that further changes to the site layout, support structures, and buildings will occur as part of later detailed design efforts and results of additional environmental review would be included in future documentation.

11.3 Odor Control

The Honouliuli Wastewater Basin Odor Control Project is ongoing. The project scope addresses odor and corrosion concerns in both the WWTP and tributary collection system. Planning was completed in October 2015. Areas of concern and potential alternatives have been identified in the Preliminary Engineering Report (AECOM 2014b). Pilot testing for collection system and WWTP controls was completed in 2014 and design of improvements <u>for the Headworks Odor Control System</u> is anticipated to be completed by October 2016. <u>Improvements within the WWTP have been discussed in this document</u>.

11.4 System-Wide Improvements to the Honouliuli Wastewater System

The current focus of the Honouliuli Fac Plan is the improvements to the Honouliuli WWTP that are needed to comply with the FACD, which requires that the Honouliuli WWTP be upgraded to a secondary treatment facility by 2024. Meanwhile, the timeline for planning and engineering efforts for other FACD requirements, including improvements to the Honouliuli conveyance system, is independent of the 2024 upgrade deadline, and the recommendations for the conveyance system are still under consideration. Therefore, as previously discussed, the project assessed in this FEIS only concerns the upgrade and expansion of the Honouliuli WWTP to provide secondary treatment and accommodate projected wastewater flows, as well as addresses the potential relocation of non-process facilities (including Administrative support, Central SCADA operations, Laboratory, Ocean Team, Central Shops and the Central Warehouse) that support island-wide wastewater system functions that are currently located at Sand Island WWTP to the Honouliuli WWTP site. The required environmental review associated with the Honouliuli WWTP upgrades, including estimating the flows that will be conveyed to the WWTP, is included in this FEIS. The improvements to the conveyance system will be the subject of separate environmental review documents to be prepared and submitted when the system improvements are better defined.

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13 PREPARERS OF THE FEIS

Proposing Agency

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Y. Ebisu & Associates
Yoichi Ebisu, P.E. Noise and Vibration Analysis

14 CONSULTATION

The pre-assessment consultation process included efforts to inform the community and solicit input in scoping the Final EIS well beyond the requirements of HRS, Chapter 343. This process included formal written consultation pursuant to HRS, Chapter 343 and Title 11, Chapter 200, HAR; meetings with elected officials, agencies, and stakeholders; public informational/scoping meetings; and a core working group process. These outreach efforts are documented below.

14.1 Environmental Impact Statement Preparation Notice Consultation

The following agencies, organizations, and individuals were consulted during the EISPN process. Consultation was conducted to solicit comments from the public regarding their concerns and agency requirements. Notice of availability of the EISPN was published in the July 23, 2010 issue of The Environmental Notice. Copies of all written responses received along with a response to comments matrix (for comment letters warranting a formal response) are reproduced and included in Appendix H. Those who formally replied are highlighted below and responses to comment letters that were included in the response to comments matrix are denoted with a "*" below.

Federal agencies:

- U.S. Congress
  - Daniel Akaka (Ltr and Mtg with his representative)
  - Daniel Inouye (Ltr and Mtg with his representative)
  - Mazie Hirono (Ltr and Mtg with her representative)
  - Charles Djou (Ltr and Mtg with his representative)
- NAVFAC Hawaii (2 Ltrs and Mtg)
- U.S. Army Corp of Engineers (Ltr)
- U.S. Coast Guard, 14th C.G. District (Ltr)
- U.S. Congress
- U.S. Environmental Protection Agency (Ltr)
- U.S. Fish and Wildlife Service, Pacific Division (Ltr and Mtg))
- U.S. National Marine Fisheries Service (Ltr)
- U.S. Natural Resources Conservation Services (Ltr) *
- U.S. Naval Station, Pearl Harbor (Ltr)

State agencies:

- Department of Agriculture (Ltr)
- Department of Accounting and General Services (Ltr and Mtg) *
- Department of Accounting and General Services – Stadium Authority (Ltr and Mtg)
- Department of Business, Economic Development and Tourism (Ltr)
- Department of Business, Economic Development and Tourism – Energy Division (Ltr)
- Department of Business, Economic Development and Tourism – Hawaii Housing Finance and Development Corporation (Ltr)
- Department of Business, Economic Development and Tourism – Office of Planning (Ltr)
- Department of Defense (Ltr) *
- Department of Education (Ltr) *
- Department of Hawaiian Home Lands (Ltr)
- Department of Health (Ltr)
- Department of Health – Clean Water Branch (Ltr and Mtg)
- Department of Health – Environmental Management Div (Ltr)
- Department of Health – OEQC (Ltr)
- Department of Health – Wastewater Branch (Ltr and Mtg)
- Department of Human Services (Ltr)
- Department of Labor and Industrial Relations (Ltr)

- Department of Land and Natural Resources (Ltr and Mtg)
- Department of Land and Natural Resources – Division of Aquatic Resources (Ltr) *
- Department of Land and Natural Resources – Division of Forestry and Wildlife (Ltr)
- Department of Land and Natural Resources – Division of Historic Preservation (Ltr and Mtg)
- Department of Land and Natural Resources – Division of Land Management (Ltr)
- Department of Land and Natural Resources – Land Division (Mtg)
- Department of Land and Natural Resources – Office of Conservation and Coastal Lands (Mtg)
- Department of Land and Natural Resources – Parks Division (Ltr)
- Department of Transportation (Ltr and Mtg)
- Department of Transportation – Highways Division (Ltr) *
- Department of Land and Natural Resources - Commission on Water Resource Management (Ltr)

- House of Representatives
  - District 31 – Linda Ichiyama
  - District 32 – Aaron Johanson
  - District 33 – Blake Oshiro
  - District 34 – Mark Takai
  - District 35 – Henry Aquino
  - District 36 – Roy Takumi
  - District 37 – Ryan Yamane
  - District 38 – Marilyn Lee
  - District 39 – Marcus Oshiro
  - District 40 – Sharon Har
  - District 40 – Ty Cullen
  - District 42 – Rida Cabanilla
  - District 43 – Kymberly Pine
  - District 44 – Karen Awana
  - District 48 – Jon Karamatsu)

- Office of Hawaiian Affairs (Ltr)

- Senate
  - District 14 – Donna Mercado Kim
  - District 15 – Glenn Wakai
  - District 16 – David Ige
  - District 17 – Michelle Kidani
  - District 18 – Clarence Nishihara
  - District 19 – Mike Gabbard
  - District 20 – Will Espero
  - District 21 – Maile Shimabukuro
  - District 22 – Donovan Dela Cruz

City and County of Honolulu agencies:

- Board of Water Supply (Ltr and Mtg) *
- Council Members
  - City Council, District 1 – Tom Berg
  - City Council, District 2 – Ernie Martin
  - City Council, District 5 – Ann Kobayashi
  - City Council, District 7 – Romy Cachola
  - City Council, District 8 – Breene Harimoto
  - City Council, District 9 – Nestor Garcia
- Department of Design and Construction (Ltr and Mtg)
- Department of Facility Maintenance (Ltr and Mtg)
- Department of Parks and Recreation (Ltr) *

- Department of Planning and Permitting (Ltr) *
- Department of Transportation Services (Ltr and Mtg)
- Honolulu Fire Department (Ltr) *
- Police Department (Ltr)
- Emergency Services Department (Ltr)
- Office of Mayor Mufi Hannemann (Ltr)
- Mayor's Office (Ltr)

Other Organizations:
- Ahahui Siwila Hawaii O Kapolei Hawaiian Civic Club (Ltr)
- Coral Creek Golf Course (Mtg)
- Ewa Beach Boys & Girls Club (Ltr)
- Ewa Beach Community Association (Ltr)
- Ewa by Gentry Community Association (Ltr)
- Ewa Task Force (Ltr)
- Hawaii Audubon Society (Ltr)
- Hawaii Farm Bureau Federation (Ltr and Mtg)
- Hawaii Natural Heritage Program (Ltr)
- Hawaii Railway Society (Ltr and Mtg)
- Hawaiian Telecom Company (Ltr)
- Hawaii's Thousand Friends (Ltr)
- Honokai Hale/Nanakai Gardens Community Assn (Ltr)
- Ewa Beach Lions Club (Ltr)
- Kapolei Rotary Club (Ltr)
- Kapolei Chamber of Commerce (Ltr)
- Makakilo Community Association (Ltr)
- Neighborhood Commission Office (Ltr and Mtg)
- Oceanic Cable (Ltr)
- Outdoor Circle (Ltr)
- Palelehua Community Association (Ltr)
- Rotary Club of Kapolei (Ltr)
- UH Environmental Center (Ltr)
- Villages of Kapolei Association (Ltr)
- Waipahu Community Association (Ltr)
- West Loch Estates Homeowner Association (Ltr)
- West Oahu Economic Development Association (Ltr)
- Neighborhood Board
- Aiea Neighborhood Board #20 (Ltr)
- Aliamanu/Salt Lake/Foster Village Neighborhood Board #18 (Ltr)
- Ewa Neighborhood Board #23 (Ltr)
- Makakilo/Kapolei/Honokai Hale Neighborhood Board #34 (Ltr)
- Mililani Mauka/Launani Valley Neighborhood Board #35 (Ltr)
- Mililani/Waipio/Melemanu Neighborhood Board #25 (Ltr)
- Pearl City Neighborhood Board #21 (Ltr)
- Waipahu Neighborhood Board #22 (Ltr)
- Utilities
- Hawaii Electric Company (3 Ltrs and Mtg)
- The GAS Company (Ltr)

14.2 Meetings with Elected Officials, Agencies and Stakeholders

Meetings were held with the following government officials, agencies, and organizations during the EISPN process.

Federal agencies:

- U.S. Congress
  - Daniel Akaka
  - Daniel Inouye
  - Mazie Hirono
  - Charles Djou
- NAVFAC Hawaii
- U.S. Fish and Wildlife Service, Pacific Division

State agencies:

- Department of Accounting and General Services (meeting held on September 29, 2010)
- Department of Accounting and General Services – Stadium Authority
- Department of Health – Clean Water Branch
- Department of Health – Wastewater Branch
- Department of Land and Natural Resources
- Department of Land and Natural Resources – Division of Historic Preservation
- Department of Land and Natural Resources – Land Division
- Department of Land and Natural Resources – Office of Conservation and Coastal Lands
- Department of Transportation

City and County of Honolulu agencies:

- Board of Water Supply
- Department of Design and Construction
- Department of Facility Maintenance
- Department of Transportation Services

Other Organizations:

- Coral Creek Golf Course
- Hawaii Farm Bureau Federation
- Hawaii Railway Society (meeting held on September 1, 2010)
- Neighborhood Commission Office
- HECO

14.3 EIS Consultation

Pursuant to HRS, Chapter 343, and Title 11, Chapter 200, HAR consultation was conducted during the DEIS comment period to solicit comments from public agencies, elected officials, and community organizations regarding their concerns and agency requirements. Due to the change in project scope to only include the upgrade and expansion of the Honouliuli WWTP and to address the potential relocation of non-process facilities to the Honouliuli WWTP site, the list of agencies, organizations, and individuals consulted during the EISPN process included above has been reduced, as follows. Copies of all written comments received along with their respective responses will be reproduced and included in Appendix H.

Federal agencies:

- U.S. Congress
  - Brian Schatz
  - Mazie Hirono
- U.S. Army Corp of Engineers
- U.S. Congress
- U.S. Environmental Protection Agency
- U.S. Fish and Wildlife Service, Pacific Division
- U.S. Natural Resources Conservation Services

State agencies:

- Department of Agriculture
- Department of Accounting and General Services
- Department of Accounting and General Services – Stadium Authority
- Department of Business, Economic Development and Tourism
- Department of Business, Economic Development and Tourism – Energy Division
- Department of Business, Economic Development and Tourism – Hawaii Housing Finance and Development Corporation
- Department of Business, Economic Development and Tourism – Office of Planning
- Department of Defense
- Department of Education
- Department of Hawaiian Home Lands
- Department of Health
- Department of Health – Clean Water Branch
- Department of Health – Environmental Management Div
- Department of Health – OEQC
- Department of Health – Wastewater Branch
- Department of Human Services
- Department of Labor and Industrial Relations
- Department of Land and Natural Resources
- Department of Land and Natural Resources – Division of Aquatic Resources
- Department of Land and Natural Resources – Division of Forestry and Wildlife
- Department of Land and Natural Resources – Division of Historic Preservation
- Department of Land and Natural Resources – Division of Land Management
- Department of Land and Natural Resources – Land Division
- Department of Land and Natural Resources – Office of Conservation and Coastal Lands
- Department of Land and Natural Resources – Parks Division
- Department of Transportation
- Department of Transportation – Highways Division
- Department of Land and Natural Resources - Commission on Water Resource Management
- House of Representatives
    - District 40 – Bob McDermott
    - District 41 – Matthew LoPresti
    - District 43 – Andria Tupola
- Office of Hawaiian Affairs
- Senate
    - District 19 – Will Espero
    - District 20 – Mike Gabbard

City and County of Honolulu agencies:

- Board of Water Supply
- Council Members
    - City Council, District 1 – Kymberly Marcos Pine
    - City Council, District 9 – Ron Menor
- Department of Design and Construction
- Department of Facility Maintenance
- Department of Parks and Recreation
- Department of Planning and Permitting

- Department of Transportation Services
- Honolulu Fire Department
- Police Department
- Emergency Services Department
- Office of Mayor Kirk Caldwell
- Mayor's Office

Other Organizations:
- Ahahui Siwila Hawaii O Kapolei Hawaiian Civic Club
- Barbers Point Golf Course
- Coral Creek Golf Course
- Ewa Beach Boys & Girls Club
- Ewa Beach Community Association
- Ewa by Gentry Community Association
- Ewa Task Force
- Hawaii Audubon Society
- Hawaii Farm Bureau Federation
- Hawaii Natural Heritage Program
- Hawaii Railway Society
- Hawaiian Telecom Company
- Hawaii's Thousand Friends
- Honokai Hale/Nanakai Gardens Community Assn
- Ewa Beach Lions Club
- Kapolei Chamber of Commerce
- CCH Neighborhood Commission Office
- Outdoor Circle
- Rotary Club of Kapolei
- UH Environmental Center
- Villages of Kapolei Association
- West Oahu Economic Development Association
- Ewa Neighborhood Board #23
- Makakilo/Kapolei/Honokai Hale Neighborhood Board #34
- Utilities
- Hawaii Electric Company (HECO)
- The GAS Company

Appendices

Appendix A
Honouliuli Fac Plan Work Task 4.F.1 – Updated Basis of Design: Population, Flows, and Loads, Technical Memorandum, June 2012

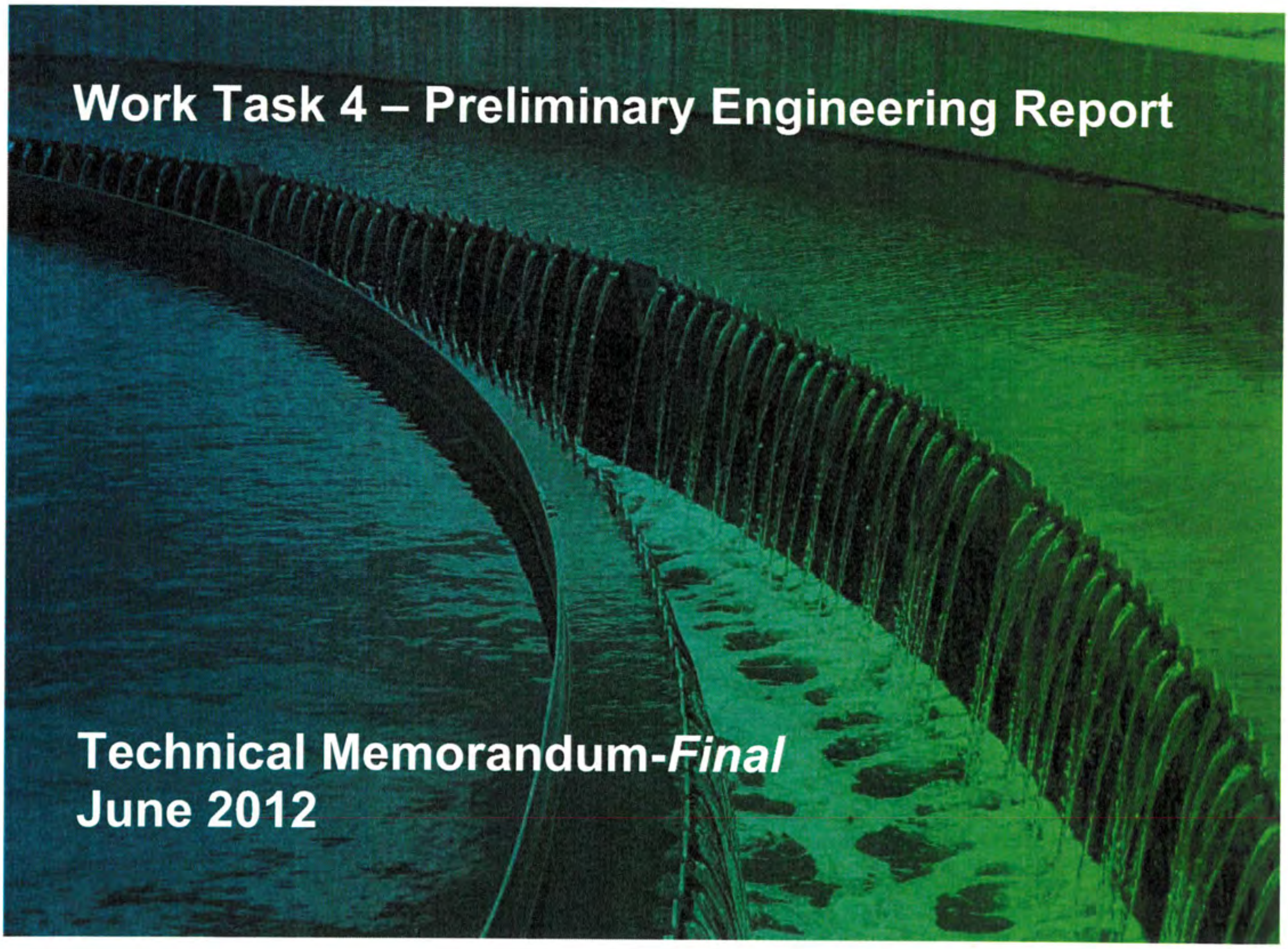
AECOM Water

Submitted to:
City and County of Honolulu
Department of Environmental Services
1001 Uluohia Street Suite 308
Kapolei, Hawaii 96707

Submitted by:
AECOM
1001 Bishop Street, Suite 1600
Honolulu, Hawaii 96813

Honouliuli/Waipahu/Pearl City Wastewater Facilities Plan

Updated Basis of Design Population, Flows, and Loads Item 4.F.1



Work Task 4 – Preliminary Engineering Report

Technical Memorandum-*Final*
June 2012

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List of Acronyms

BOD	Biochemical Oxygen Demand
capita	Population
CCH	The City and County of Honolulu
CIP	Capital Improvement Plan
DBET	Department of Business, Economic Development, and Tourism
DPP	Department of Planning and Permitting
ENV	Department of Environmental Services
EPA	United States Environmental Protection Agency
GIS	Geographic Information System
gpcd	Gallons per Capita Day
GST	Gravity Sewer Tunnel
Hawaii	State of Hawaii
Honouliuli Fac Plan	Honouliuli/Waipahu/Pearl City Wastewater Facilities Plan
I/I	Infiltration and Inflow
IPS	Influent Pump Station
lb	Pound
mgd	Million Gallons per Day
NOAA	National Oceanic and Atmospheric Administration
NH_3-N	Ammonia Nitrogen
Oahu	Honolulu County
PER	Preliminary Engineering Report
Res	Resident
Sewer I/I Plan	Final Sewer Infiltration and Inflow Plan
SSO	Sanitary Sewer Overflows
TAZ	Transportation Analysis Zones
TKN	Total Kjehldahl Nitrogen
TM	Technical Memorandum
TP	Total Phosphorous
TSS	Total Suspended Solids
VU	Visitor Accommodation Units
WWPS	Wastewater Pump Station
WWTP	Wastewater Treatment Plant

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Executive Summary

The City and County of Honolulu (CCH) Department of Environmental Services (ENV) is in the process of developing the Honouliuli/Waipahu/Pearl City Wastewater Facilities Plan (Honouliuli Fac Plan), which covers the Honouliuli sewer basin. The study area for the Honouliuli Fac Plan consists of the Honouliuli Wastewater Treatment Plant (WWTP) and its wastewater service area, including the Ewa and Central Oahu area from Ko Olina to Halawa with the focus on the main conveyance system flowing east to west, from Halawa to Waimalu to Pearl City to Waipahu and to the WWTP. **Figure ES 1** shows the CCH operated WWPSs, Honouliuli WWTP, and the main conveyance system (East Interceptor).

The Honouliuli sewer basin serves a current population of over 300,000 and includes 17 CCH operated wastewater pump stations (WWPSs) and the Honouliuli influent pump station (IPS). The Honouliuli WWTP provides primary treatment to all flow and secondary treatment to approximately half of the total flow received. In 2010, the Honouliuli WWTP treated an average of 25.39 million gallons per day (mgd) of wastewater from the sewer basin.

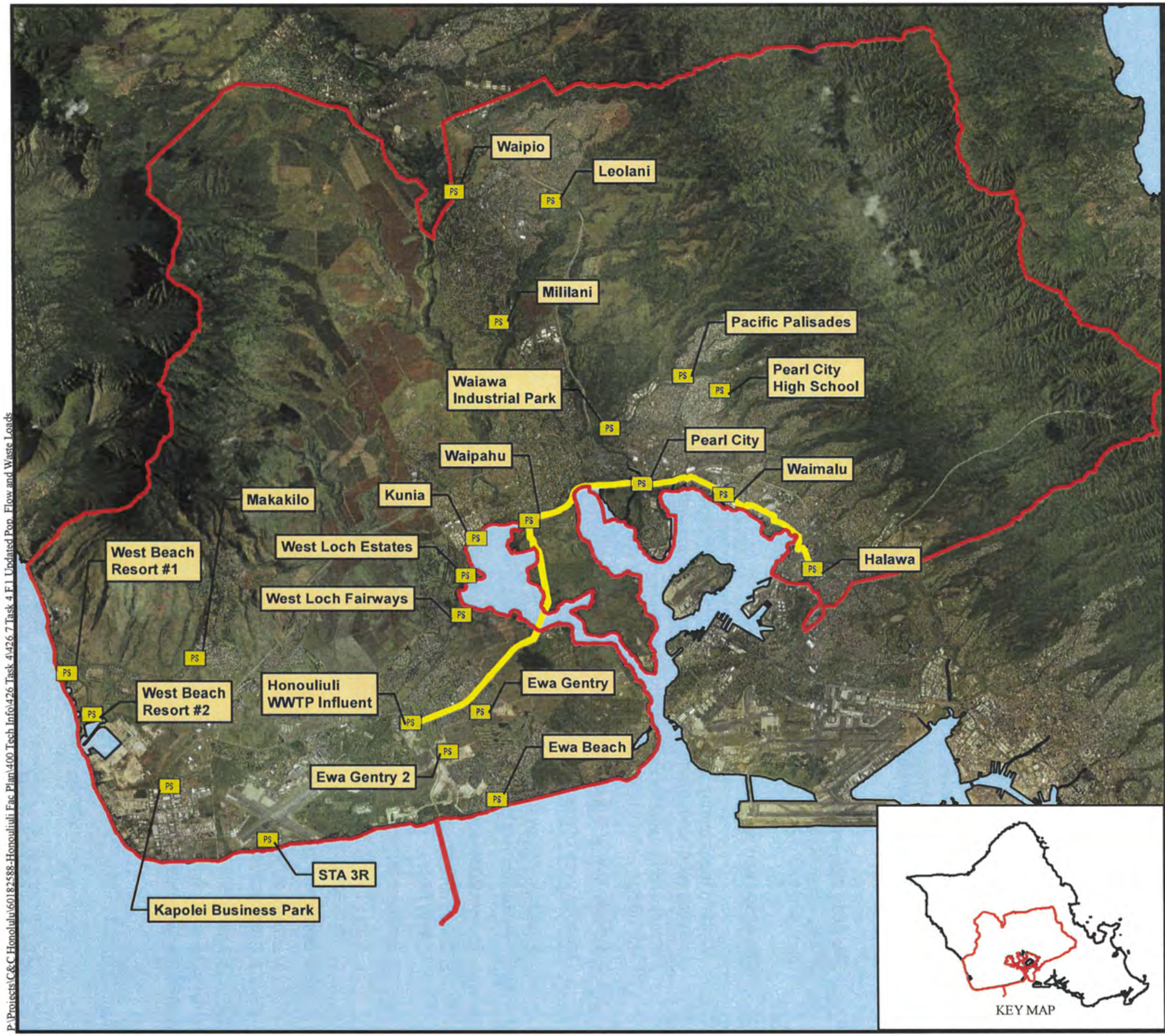
The 2010 Consent Decree requires the upgrade of the existing Honouliuli WWTP to full secondary treatment by 2024. The population, flow, and load projections conducted under this work task and summarized in this technical memorandum will be used as basis of design criteria for the upgrade of the WWTP.

The scope and purpose of this task is to:

- Update the previous population projections from Task 4.A using 2010 Census data and other population and development data made available since the previous projection effort conducted in 2008;
- Provide population projections through the year 2050, with projections for an intermediate design year of 2035 for design of facilities that could be constructed in phases; and
- Update flow and load projections using the population projections.

The objectives of this task were defined and executed in the following order:

a. Determine 2010 population in each tributary area (Halawa, Waimalu, Pearl City, and Waipahu WWPSs and Honouliuli IPS).
b. Project 2035 and 2050 population in each tributary area.
c. Determine 2010 wastewater flows at Halawa, Waimalu, Pearl City, and Waipahu WWPSs and Honouliuli WWTP.
d. Estimate 2010 per capita flow in each tributary area based on 2010 wastewater flows and population.
e. Project 2035 and 2050 wastewater flow in each area using 2010 per capita flow and 2035 and 2050 population, respectively.
f. Determine 2010 loads at Honouliuli WWTP.
g. Project 2035 and 2050 loads at the WWTP using 2010 waste load coefficients and 2035 and 2050 population, respectively.



City and County of Honolulu

HONOULIULI/ WAIPAHU/ PEARL CITY WASTEWATER FACILITIES PLAN

Legend

- PS Pump Station
- Honouliuli Boundary
- East Interceptor

0 — 12,000 Feet

1 inch = 12,000 feet

Task 4.F.1 Update Basis of Design Population, Flows, and Loads

FIGURE ES-1

HONOULIULI FOCUS AREA

June 2012

AECOM

1001 BISHOP ST, STE 1600
HONOLULU, HAWAII 96813

P:\Projects\C&C Honolulu\60182588-Honouliuli Fac Plan\400 Tech Info\426 Task 4\426.7 Task 4.F.1 Updated Pop. Flow and Waste Loads

UPDATED POPULATION PROJECTIONS

Conducting the population projections entailed a substantial data collection effort. Key agencies contacted include the Hawaii Department of Business, Economic Development, and Tourism (DBEDT) and CCH Department of Planning and Permitting (DPP), which are responsible for conducting socioeconomic projections for Hawaii and the island of Oahu, respectively. Also, numerous planning reports and data were reviewed. The projections consider long-term, historic trends for the sewer basin, as well as available data and projections released by CCH and large-scale developments and proposed projects in the area. Previous population and employment projections conducted by AECOM and others were also referenced to assist with the effort. **Table ES 1** shows the results of the updated population projections. Population is projected to decrease slightly in the more mature areas of the sewer basin (such as the Halawa and Waimalu tributary areas), while the majority of growth is projected to occur within the Honouliuli IPS tributary area, where the growing City of Kapolei is located as well as several proposed large-scale developments. Populations in the areas of Pearl City and Waipahu are also projected to increase, due to a number of proposed developments.

Table ES 1. Updated Population Projections Results

Pump Station Tributary Area(1)	Projection Update								
	2010(2)			2035			2050		
	Res	Non-Res	Visitor	Res	Non-Res	Visitor	Res	Non-Res	Visitor
Halawa	15,787	14,193	0	15,562	15,060	0	15,395	15,168	0
Waimalu	32,791	13,213	97	31,695	14,811	92	30,987	15,176	92
Pearl City	39,079	14,503	0	59,956	22,385	0	67,633	26,598	0
Waipahu	128,546	31,492	0	133,979	48,212	0	134,327	50,403	0
Honouliuli Influent	90,214	29,456	1,805	167,042	100,834	11,267	201,082	134,375	14,897
Total	306,417	102,857	1,902	408,234	201,302	11,359	449,424	241,720	14,989
Population Equivalent	325,976(3)			452,938(3)			504,239(3)		

(1) Populations presented are for the areas shown in **Figure 3-2**

(2) Results do not include the following estimated population not served by sewer (based on comparison of aerial photographs and limits of existing collection system): 9,177 Residential; 17,095 Non-Residential.

(3) The following equation was used to arrive at a population value to facilitate computation of per capita sanitary flows/loadings: Population Equivalent = Res Pop. + (11/63) × Non-Res Pop. + (53/63) × Visitor Pop. (63, 11, and 53 are gallons per capita per day wastewater generation values for residential, non-residential, and visitor, respectively, as presented in **Section 3.2.3**).

FLOW PROJECTIONS

Wastewater flows to the Honouliuli WWTP are composed of three components: sanitary flow, dry weather infiltration, and wet weather infiltration/inflow. Development of flow projections for the intermediate design year of 2035 and design year of 2050 involved development of projections for each of the three components of the flow. Flow projections were based initially on measurements of actual flows from flow metering conducted in the 2009-2011 time period as part of the Sewer I/I Assessment and Rehabilitation Program Update project. Projections of future flows were then based on projections of population increase and anticipated areas of new development. A calibrated InfoWorks model was used to route flows through the collection and transport system to generate projected flows at the Honouliuli WWTP. **Table ES 2** shows the typical year flow projections and **Table ES 3** shows the storm flow projections for years 2010, 2035, and 2050.

Table ES 2. Flow Projections from the Honouliuli System Model

Location	Typical Year								
	Peak 1 Hour			Maximum 24 Hour			Annual Average		
	2010	2035	2050	2010	2035	2050	2010	2035	2050
Halawa	3.8	4.9	5.1	2.9	2.9	2.9	1.8	1.9	1.9
Waimalu	10.2	10.3	10.2	7.6	7.6	7.5	5.3	5.3	5.3
Pearl City	16.9	20.0	21.1	12.2	14.7	15.5	8.8	10.8	11.5
Waipahu	20.4	23.0	24.3	13.7	16.1	17.3	11.6	13.2	14.1
WWTP	49.5	69.7	79.5	33.8	50.3	57.0	27.5	39.6	44.4

*All flow values are shown in million gallons per day (mgd)

**This table shows total flow (i.e. sanitary flow, dry weather infiltration, and wet-weather infiltration/inflow)

Table ES 3. Storm Flow Projections from the Honouliuli System Model

Location	2 Year, 6 Hour Storm					
	Peak 1 Hour			Maximum 24 Hour		
	2010	2035	2050	2010	2035	2050
Halawa	5.4	5.5	5.5	3.3	3.4	3.4
Waimalu	18.1	18.1	18.0	10.2	10.2	10.1
Pearl City	30.7	37.7	40.1	16.2	20.4	21.8
Waipahu	24.3	29.7	32.2	15.0	18.3	19.9
WWTP	82.2	114.2	126.4	45.0	65.4	73.5

*All flow values are shown in million gallons per day (mgd)

**This table shows total flow (i.e. sanitary flow, dry weather infiltration, and wet-weather infiltration/inflow)

LOAD PROJECTIONS

The method used to project influent waste loading at Honouliuli WWTP for this TM is the waste load coefficient method. The concentration method was not used because water conservation and water use habits may reduce per capita flow over time, resulting in changing pollutant concentrations. The amount of increase in pollutant concentration is difficult to determine. The per capita waste load coefficient is based on year 2010 data (waste load [lbs/day] and population [capita]). These values are used to estimate waste load coefficients (lbs/capita/day). Industry data shows that waste load coefficients remain relatively constant and are not affected by fluctuations in water usage. The waste load coefficients, along with the 2035 and 2050 population projections are then used to determine mass loadings independent of concentration and flow. **Table ES 4** shows projected influent waste loadings for years 2010, 2035, and 2050.