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

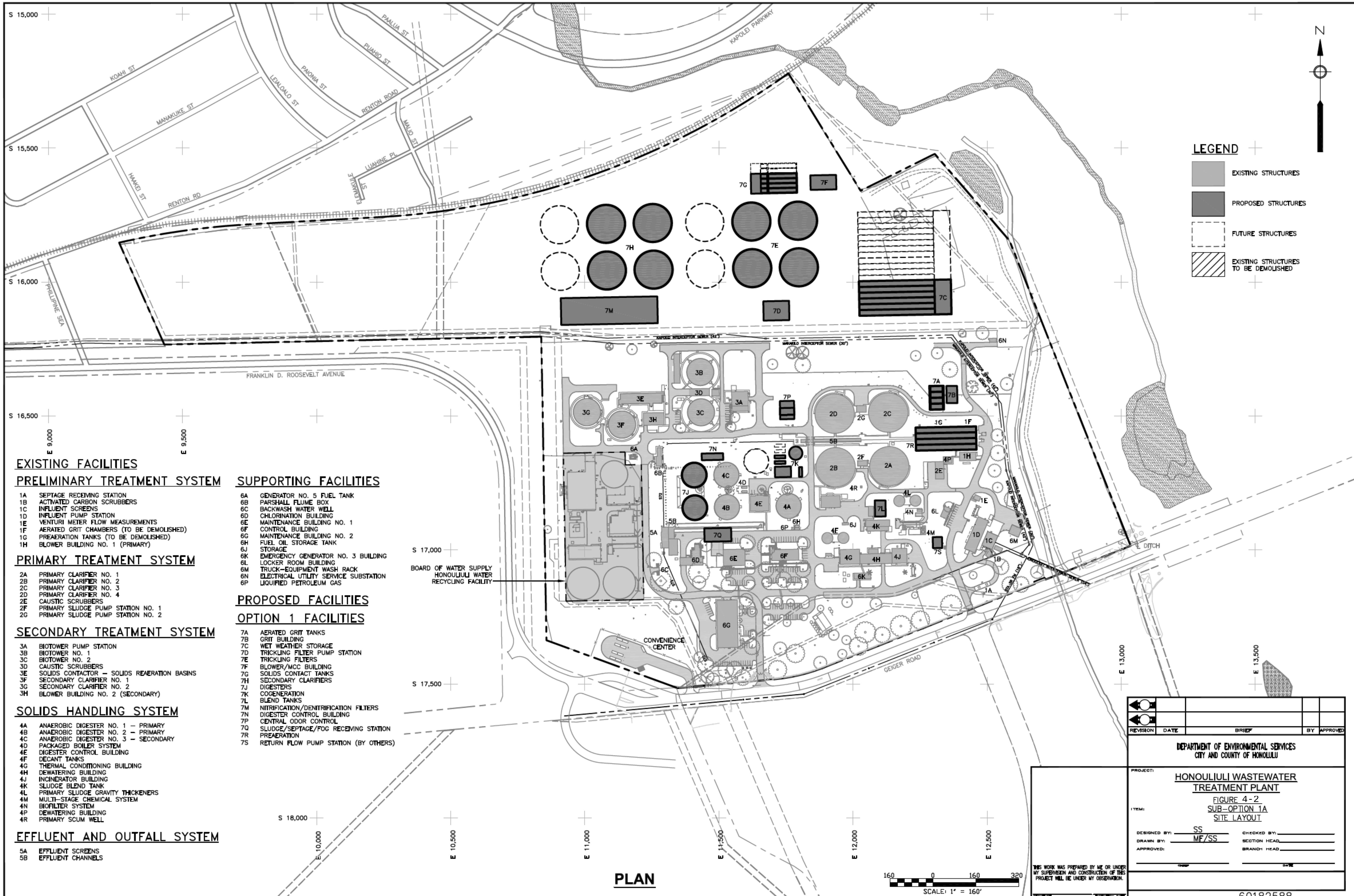
Option 3 would maintain the existing 13 mgd TF/SC process in operation and add additional TF/SC and/or AS capacity. There are two sub-options for Option 3:

- 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.



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)

REVISION	DATE	BRIEF	BY	APPROVED

DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU

PROJECT: HONOULIULI WASTEWATER TREATMENT PLANT

ITEM: FIGURE 4-2
SUB–OPTION 1A
SITE LAYOUT

DESIGNED BY: SS
DRAWN BY: MF/SS
APPROVED:
CHIEF

CHECKED BY:
SECTION HEAD
BRANCH HEAD
DATE

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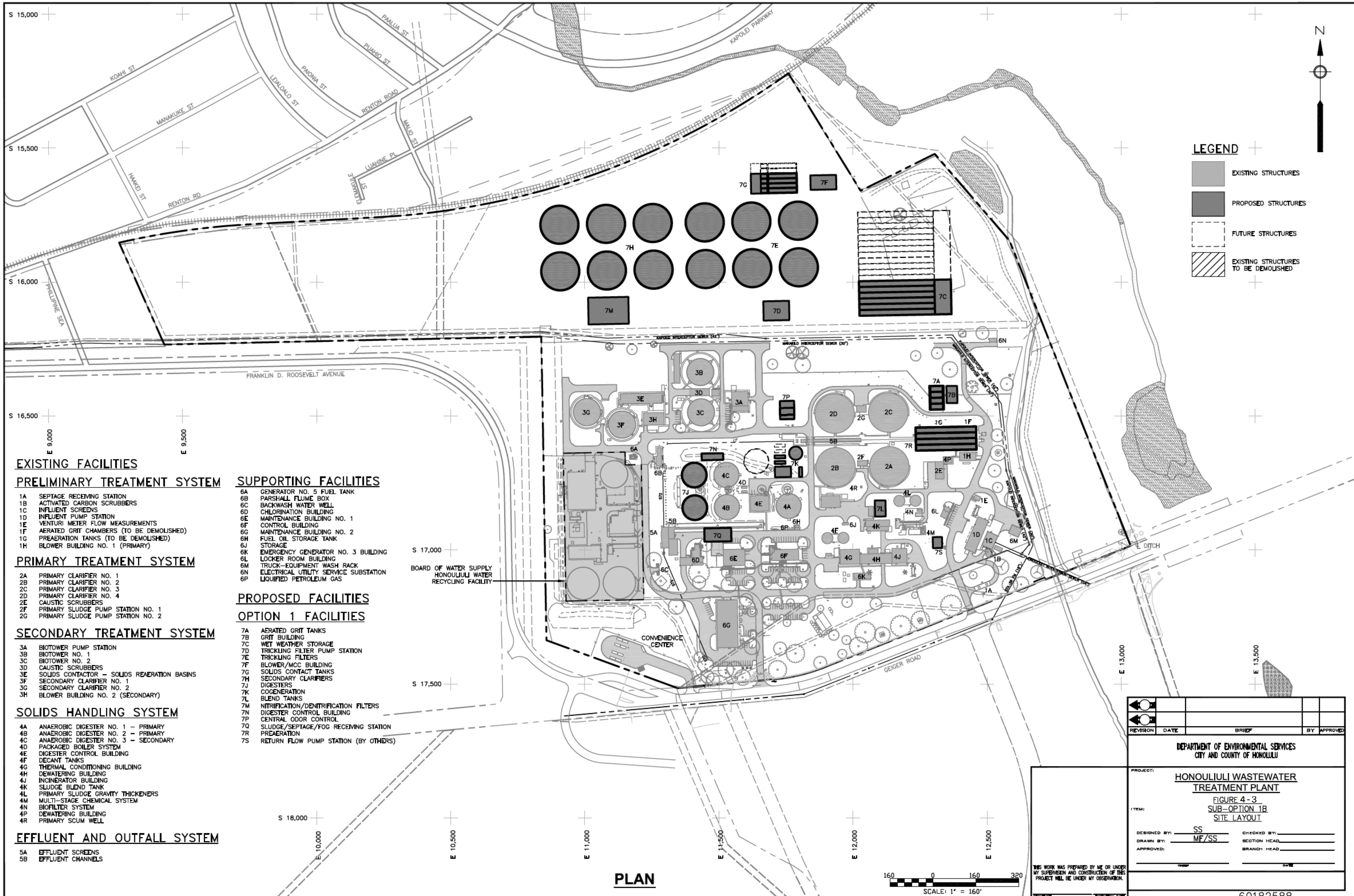

EXISTING FACILITIES

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)

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

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APPROVED:
CHECKED BY:
SECTION HEAD
BRANCH HEAD
CHIEF
DATE

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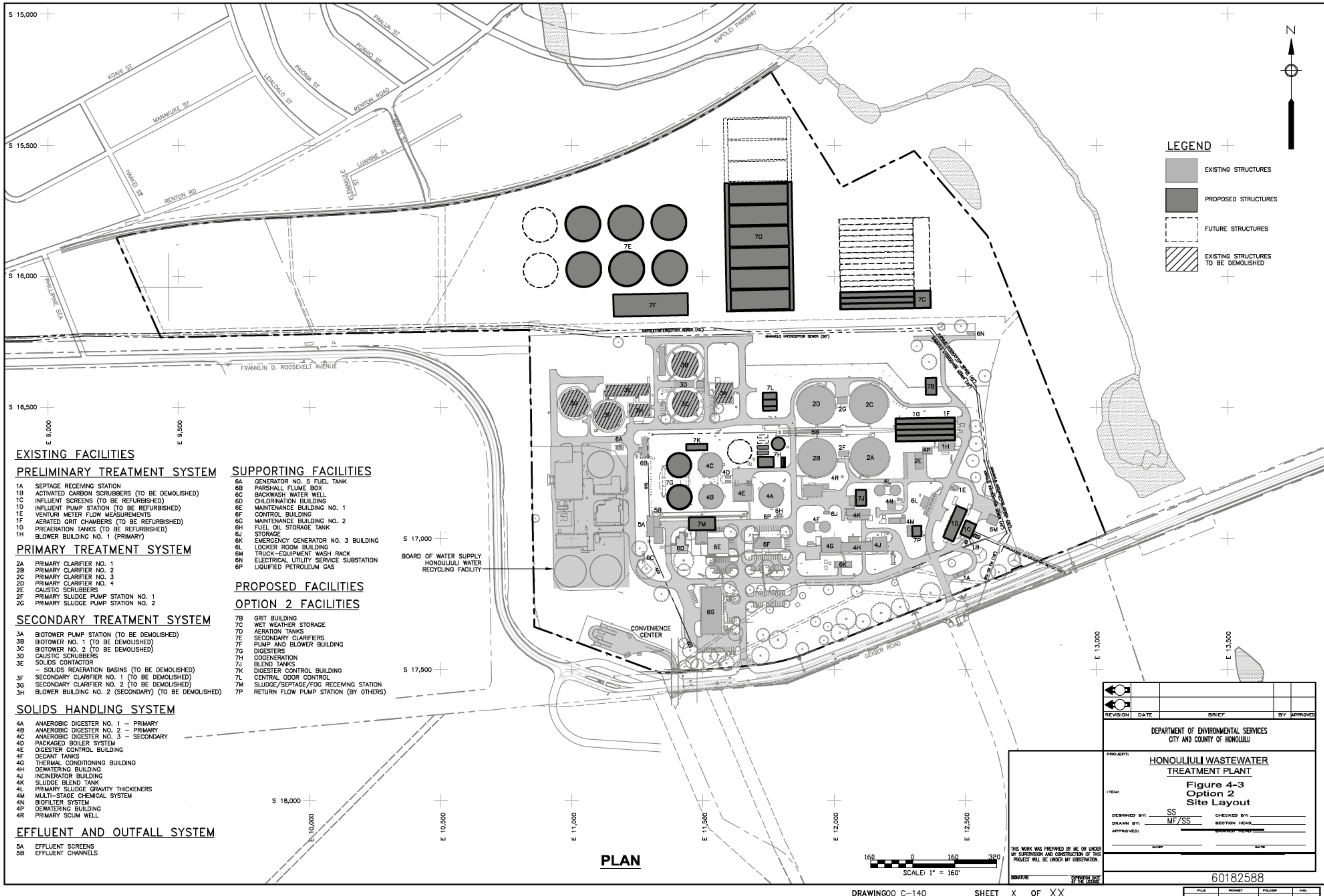
N
LEGEND
EXISTING STRUCTURES
PROPOSED STRUCTURES
FUTURE STRUCTURES
EXISTING STRUCTURES TO BE DEMOLISHED
KOAHI ST
MANAKUKE ST
HAAKEI ST
RENTON RD
LEIALOALO ST
PANONA ST
PAAKUA ST
PUAHIO ST
RENTON ROAD
LUAHINE PL
KAPOLEI PARKWAY
PHILIPPINE SEA
FRANKLIN D. ROOSEVELT AVENUE
GEIGER ROAD
CONVENIENCE CENTER
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 (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)
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
Option 2
Site Layout
DESIGNED BY: SS
DRAWN BY: MF/SS
APPROVED:
CHECKED BY:
SECTION HEAD
CHIEF
DATE
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION.
SIGNATURE
EXPIRATION DATE OF THE LICENSE
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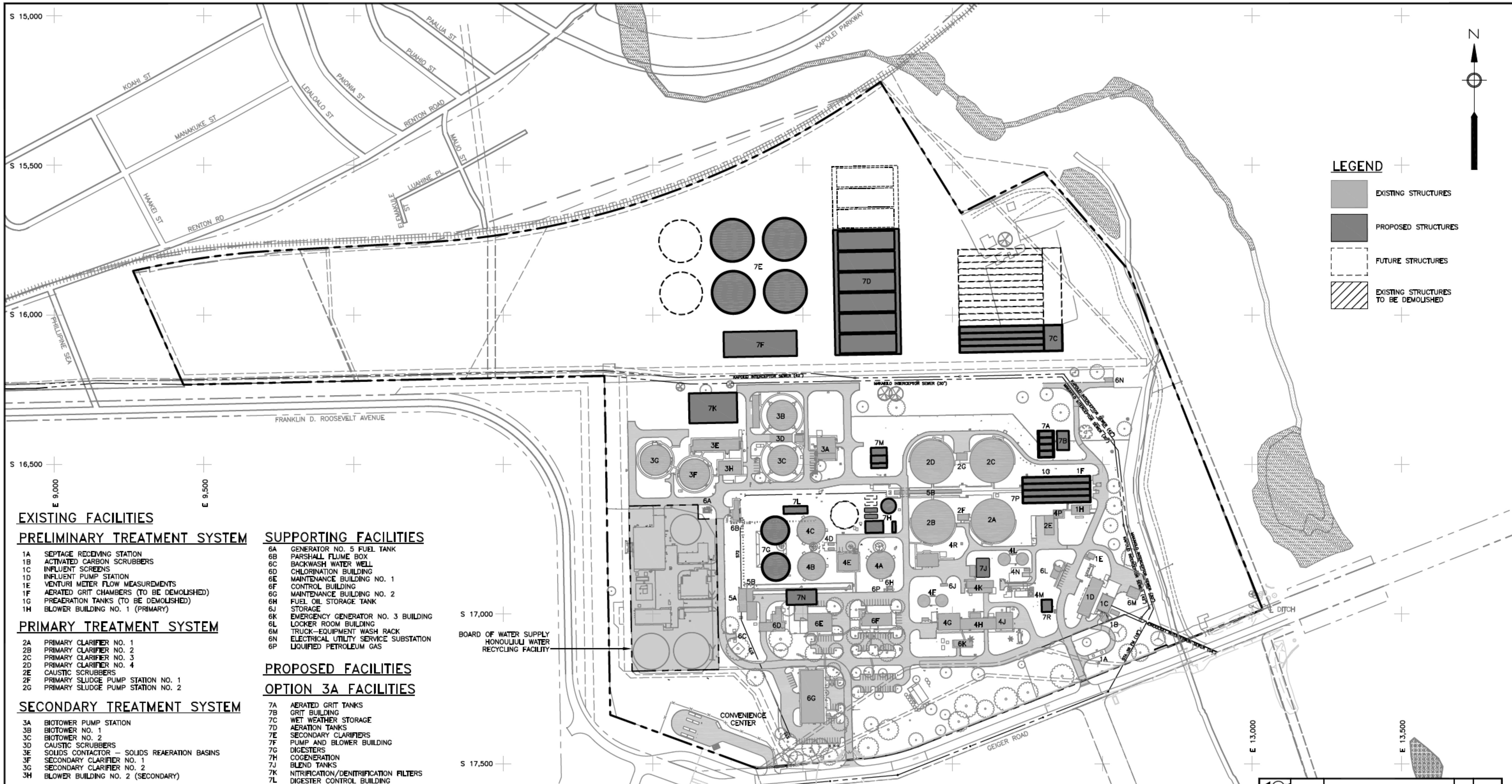

PLAN

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)

160 0 160 320
SCALE: 1" = 160'

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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:

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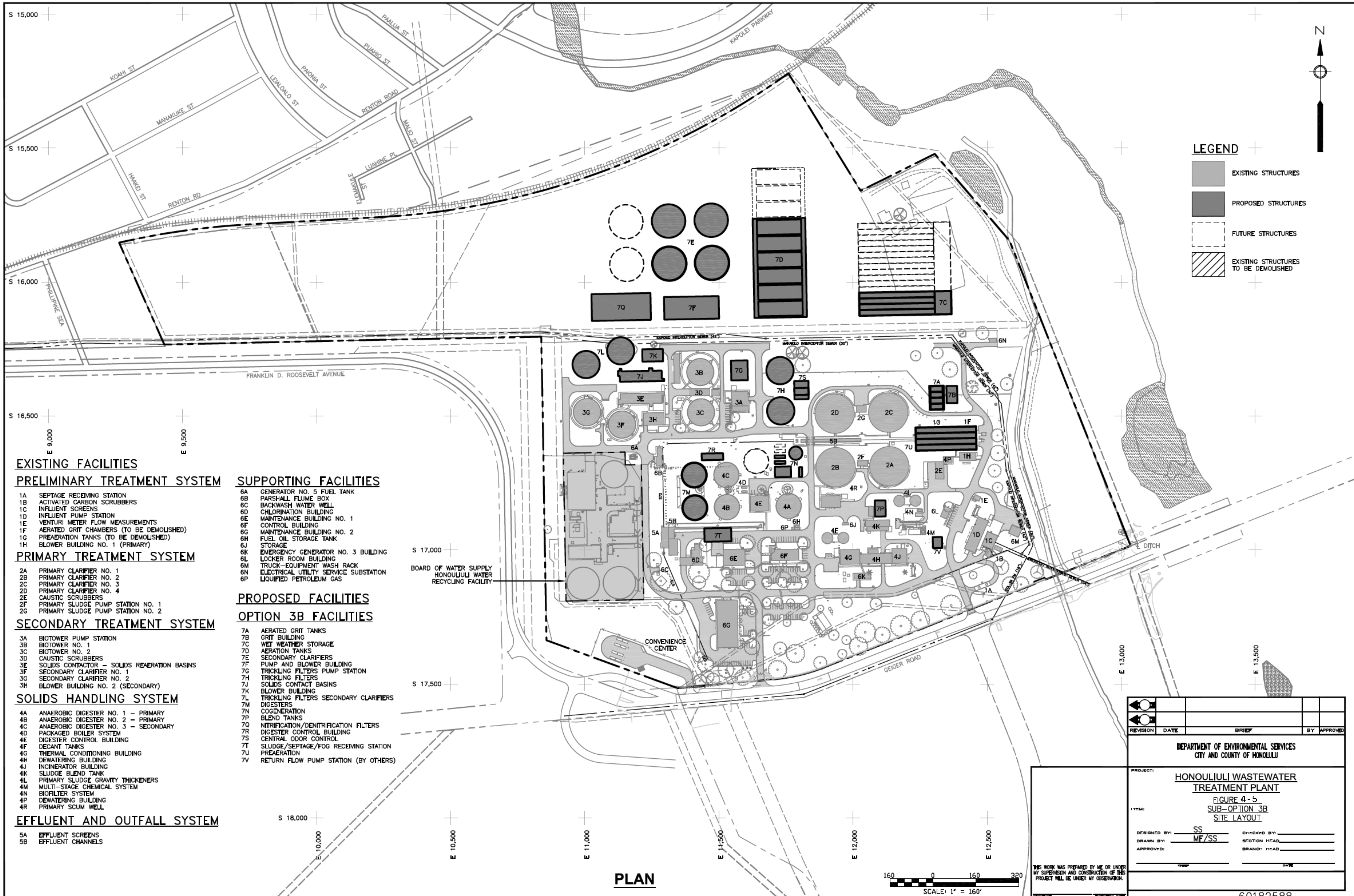

EXISTING FACILITIES

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)

REVISION | DATE | BRIEF | BY | APPROVED

DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU

PROJECT: HONOULIULI WASTEWATER TREATMENT PLANT

ITEM: FIGURE 4-5
SUB-OPTION 3B
SITE LAYOUT

DESIGNED BY: SS
DRAWN BY: MF/SS
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SECTION HEAD:
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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.

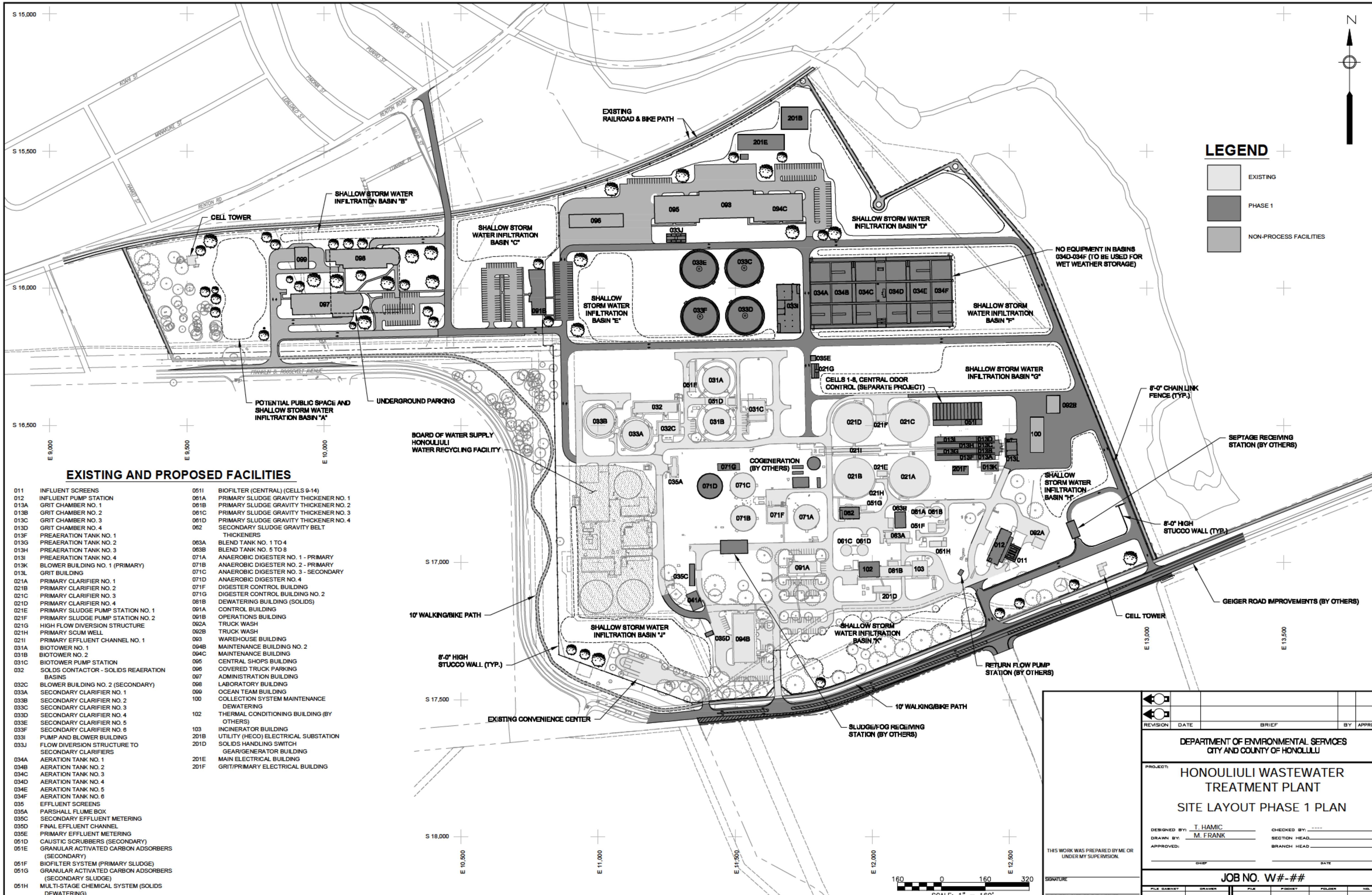
4.5 Recommended Site Layout

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
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093	WAREHOUSE BUILDING
094B	MAINTENANCE BUILDING NO. 2
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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
CHIEF
DATE

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

SIGNATURE

EXPIRATION DATE OF THE LICENSE

JOB NO. W#-##

FILE CABINET | DRAWER | FILE | POCKET | FOLDER | NO.

DRAWING 000 G-019 SHEET 19 OF 166

PATH/FILENAME: \\USHNL1FP003\DATA\PROJECTS\USIG\WASTEWATER\60182588-HONOULIULI WWTP\SHEETS\G\000 G-019A - NONPROCESS.DWG
LAST UPDATE: Tuesday, September 30, 2014 3:38:49 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.

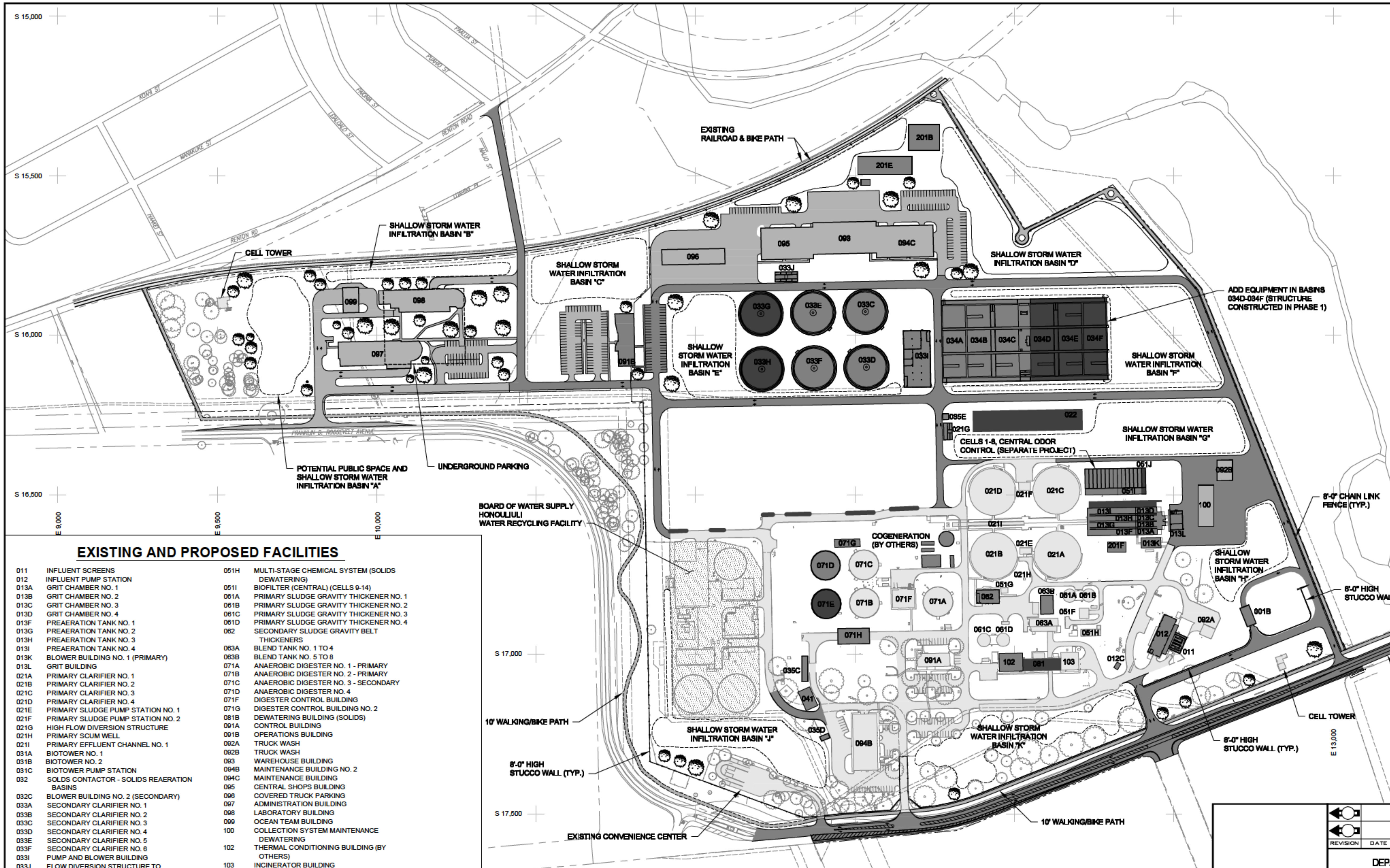
– Phase 3 (any work beyond 2050) – increase the design average capacity beyond 45 mgd and the design peak capacity beyond 126 mgd. Needs will be reassessed prior to Phase 3.

- 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

- 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	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
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THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

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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:
CHIEF

CHECKED BY: ----
SECTION HEAD
BRANCH HEAD
DATE

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FILE CABINET	DRAWER	FILE	POCKET	FOLDER	NO.

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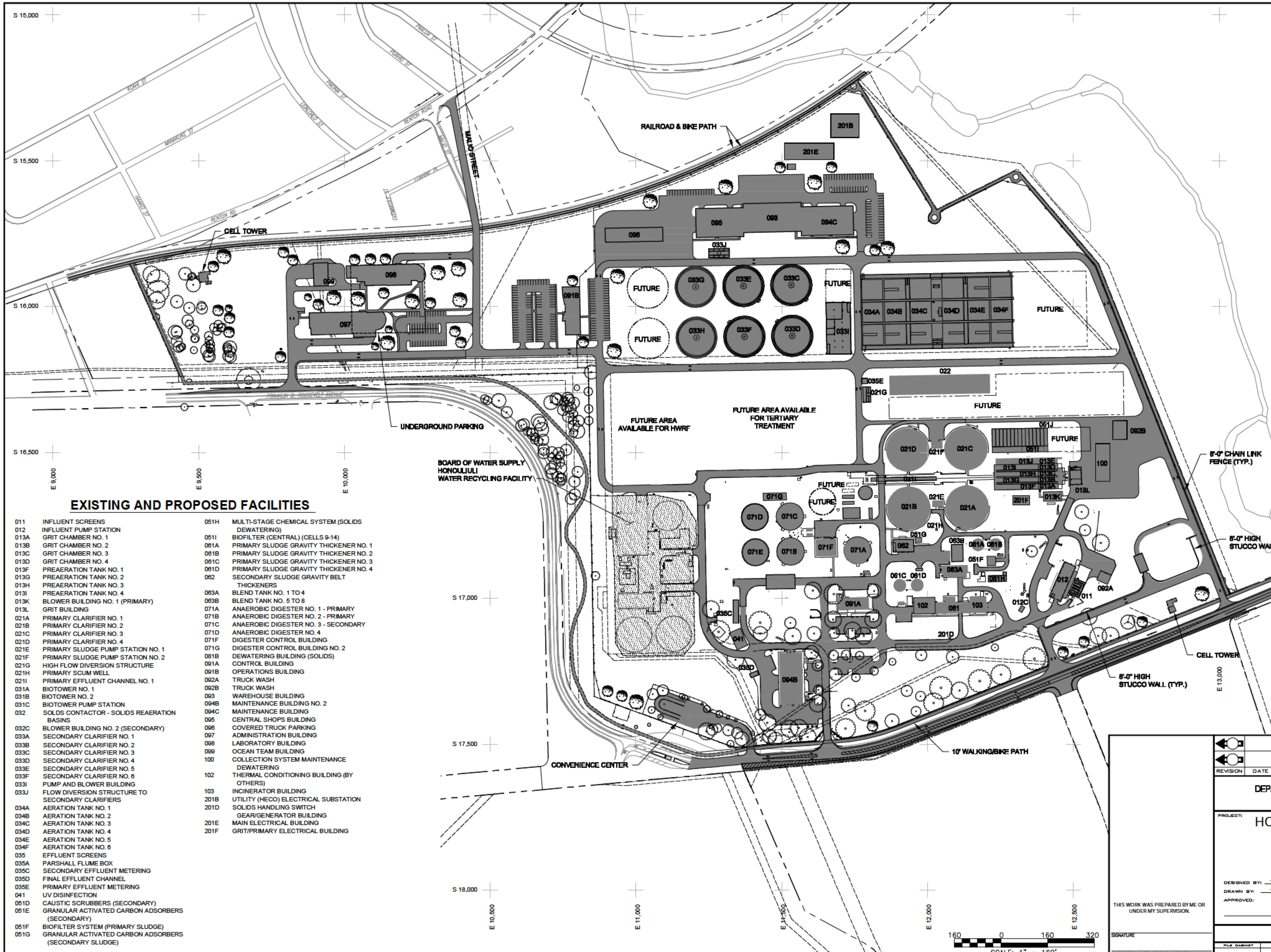

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103	INCINERATOR BUILDING
201B	UTILITY (HECO) ELECTRICAL SUBSTATION
201D	SOLIDS HANDLING SWITCH GEAR/GENERATOR BUILDING
201E	MAIN ELECTRICAL BUILDING
201F	GRIT/PRIMARY ELECTRICAL BUILDING

REVISION	DATE	BRIEF	BY	APPROVED

DEPARTMENT OF ENVIRONMENTAL SERVICES
CITY AND COUNTY OF HONOLULU

PROJECT:

HONOULIULI WASTEWATER TREATMENT PLANT SITE LAYOUT PLAN BEYOND 2050

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

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION.

SIGNATURE

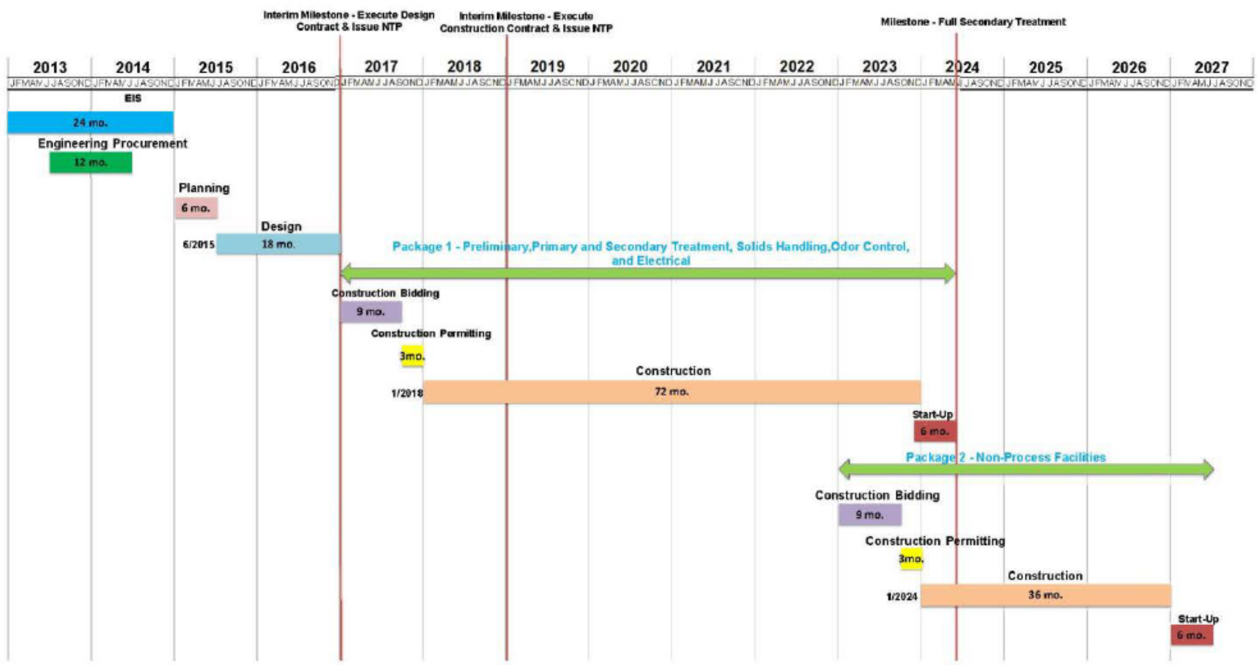
EXPIRATION DATE OF THE LICENSE

JOB NO. W#-##

FILE CABINET	DRAWER	FILE	POCKET	FOLDER	NO.

PATH/FILENAME: \\USHNL1FP003\DATA\PROJECTS\USIG\WASTEWATER\60182588-HONOULIULI FAC PLAN\400 TECH INFO\434 TASK 12\434.15 TASK 12.0 CONCEPTUAL DESIGN\DRAWINGS\CAD FILES\60220849-HONOULIULI WWTP\SHEETS\000 G-023.DWG
LAST UPDATE: Wednesday, October 01, 2014 2:44:35 PM PLOT DATE: Wednesday, October 01, 2014 2:56:19 PM

Figure 4-9. Recommended Timeline



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