DEPARTMENT OF DESIGN AND CONSTRUCTION

CITY AND COUNTY OF HONOLULU

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GEORGE TAMASHIRO, P.E.
ASSISTANT DIRECTOR

WW.P 02-455

December 6, 2002

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
235 South Beretania Street
State Office Tower, Suite 702
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

Subject: **Final Environmental Assessment and Finding of No Significant Impact (FONSI) La'ie Wastewater Collection System Expansion, Phase II**

The City and County of Honolulu, and Hawaii Reserves Incorporated (HRI) propose to upgrade the existing sewer collection system servicing La'ie. Proposed improvements include installation of new collector mains, laterals, and individual grinder pumps at an estimated 724 private residences in La'ie. These improvements are being developed jointly between the City and County of Honolulu and HRI under a cooperative agreement signed December 29, 2000.

The City and County of Honolulu, Department of Design and Construction, has reviewed the comments received during the Draft Environmental Assessment 30-day public comment period, which began August 22, 2000. This agency has determined that this project will not have significant environmental effects and hereby issues a FONSI. Please publish this notice in the December 23, 2002 OEQC Environmental Notice.

We have enclosed a completed OEQC Environmental Notice Publication Form and four copies of the final EA. Please contact Mr. Kyle Yukumoto or Mr. Jim Niermann of R.M. Towill Corporation, agent to the applicant, at 842-1133 if you have any questions.

Very truly yours,

RAE M. LOUI, P.E.
Director

Enclosures

118

2002-12-23-OA-FEA-

FINAL ENVIRONMENTAL ASSESSMENT
Prepared in Accordance with Requirements of Chapter 343, Hawaii Revised Statutes

LA'IE WASTEWATER COLLECTION SYSTEM EXPANSION, PHASE II

La'ie, Oahu, Hawaii

DECEMBER 2002

Prepared For:

Department of Design and Construction
Wastewater Division
City and County of Honolulu

and

Hawaii Reserves Incorporated
55-510 Kamehameha Highway
La'ie, Hawaii 96762-1193

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(RMTC Ref: 1-18401-2W)

DEPARTMENT OF DESIGN AND CONSTRUCTION

CITY AND COUNTY OF HONOLULU

FINAL

ENVIRONMENTAL ASSESSMENT

FOR

LA'IE WASTEWATER COLLECTION SYSTEM EXPANSION, PHASE II

AT
LA'IE, OAHU, HAWAII

December 2002

PROPOSING AGENCY: Department of Design and Construction
Wastewater Division
City and County of Honolulu

and

Hawaii Reserves Incorporated
55-510 Kamehameha Highway
Laie, Hawaii 96762-1193

PREPARED BY: R. M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

THIS ENVIRONMENTAL DOCUMENT IS SUBMITTED PURSUANT TO CHAPTER 343, HRS.

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PROJECT SUMMARY

Project	La'ie Wastewater Collection System Expansion, Phase II
Proposing Agency	City and County of Honolulu Department of Design & Construction Wastewater Design & Engineering Division and Hawaii Reserves Incorporated 55-510 Kamehameha Highway La'ie, Hawaii 96762-1193
Accepting Authority:	City and County of Honolulu Department of Design & Construction Wastewater Design & Engineering Division
TMK:	Zone 5 Section 5, See Appendix A for Plats and Parcels
Location:	La'ie, Koolau Loa District, Island of Oahu, Hawaii
EA Preparer	R. M. Towill Corporation 420 Waiakamilo Road, Suite 411 Honolulu, Hawaii 96817 Phone: (808) 842-1133
Existing Land Uses:	Various, including: Residential, Commercial, Agricultural, and Preservation.
Zoning:	Preservation (P-2) Agricultural (AG-1 Restricted, AG-2 General) Residential (R-5, R-7.5)
Proposed Action:	Replacement of existing cesspools, septic systems, and wastewater collection system with individual grinder pumps at residential properties and low-pressure collector mains to collect and convey sewage to the existing pump station and reclamation facility.
County Permits	Plan Approval, Building and Construction Permits
State Permits	NPDES Form C for Storm Water Related to Construction Activity NPDES Form F for Hydrotesting Waters NPDES Form G for Construction Dewatering

SECTION 1
Introduction

1.1 PROPOSED ACTION

The City and County of Honolulu and Hawaii Reserves Incorporated (HRI) intend to develop the La'ie Wastewater Collection System under a cooperative agreement signed December 29, 2000. HRI is the owner of the existing wastewater collection system.

Under the agreement, HRI and the City, subject to the City Council's approval, plan to jointly fund the replacement and expansion of the Collection System in two phases so that the La'ie Water Reclamation Facility (LWRF) will treat all wastewater from the La'ie Community. Additionally, HRI intends to convey and transfer the LWRF, and the Facility Site to the City, and the City intends to own and operate the Collection System, the LWRF and the Facility Site, so as to service the La'ie Community.

The proposed expansion will include nearly all existing developed areas of La'ie, and where necessary and appropriate, modifications to existing non-compliant systems. The expansion involves two phases. Phase I, which is currently under development, includes a new pump station (La'ie Wastewater Pump Station), force main, and new connection points on Naniloa Loop for the existing gravity collection system. In compliance with Title 11, Chapter 200, Hawaii Administrative Rules (HAR), and Chapter 343, Hawaii Revised Statutes (HRS), an environmental assessment was prepared and a finding of no significant impact (FONSI) was published for Phase I improvements.

Phase II improvements involve expansion of the collection system to the remaining developed areas of La'ie that are not currently connected to the LWRF. Planned improvements include installation of individual grinder pumps on residential properties and low pressure collector mains to collect and convey sewage to the pump station and reclamation facility. Six hundred eighty-three individual parcels are involved in the proposed improvements. A list of TMK numbers for parcels being connected to the sewer system is included in **Appendix A, La'ie Sewer System TMK List**.

This Environmental Assessment (EA) is prepared for Phase II improvements. Because public funds will be used, the proposed project is subject to the preparation of environmental documentation per requirements of Title 11, Chapter 200, HAR, and Chapter 343, HRS. This EA assesses the impacts anticipated from proposed Phase II improvements, and proposes mitigation measures to reduce or eliminate adverse effects to the natural, social, and built environments.

1.2 BACKGROUND

The town of La'ie is located on the northeast coast of the island of Oahu, approximately 40 miles from downtown Honolulu. The existing collection system encompasses the Brigham Young University Hawaii (BYU-H) campus, the Latter-day Saints (LDS) Temple, the Polynesian Cultural Center (PCC), Temple View Apartments (TVA) and Faculty Housing, and approximately 25% of the

residential area or about 175 homes. A map of La'ie town, its wastewater facilities and existing wastewater collection system are shown in **Figure 1.2-1**.

In addition to the Phase I improvements currently in development, the existing wastewater collection system consists of the following:

- Two lift stations serving La'ie Town (PCC and TVA)
- One pump station (Moana) and gravity collection lines serving the BYU-H campus
- Existing residential collection lines

The existing collection system was installed in increments between 1958 and 1974. The stages and their scope are as follows:

1 - (1958) - Sewered the middle part of the residential area, and a portion of BYU-H. Installation of the Moana Street pump station.
2 - (1960) - Sewered the upper area of BYU-H dormitories.
3 - (1961) - L.D.S. Temple and additional residential lots were sewered. Installation of the TVA pump station.
4 - (1962) - Sewered additional residential lots and part of the PCC.
5 - (1970's) - Sewered the TVA and Faculty Housing.
6 - (1974) - Sewered the remaining portions of the PCC. Installation of the PCC pump station.

Collection systems developed under Stages 2, 5, and 6 (mostly private property) will not be modified by this project.

The collected wastewater is treated at the La'ie Water Reclamation Facility (LWRF). This facility was expanded in 1997 to accommodate a design average flow of 900,000 gallons per day. Current flows from the existing collection system are approximately 300,000 to 350,000 gallons per day. The facility is designed to treat wastewater to "R-1" levels. R-1 water, which is the highest level of treatment for reclaimed water, is oxidized, filtered, and disinfected at the facility, and used for irrigation at various locations in the La'ie area. Reclaimed water use in Hawaii is regulated by the State Department of Health (DOH).

Since the LWRF expansion was completed in 1997 there have been no spill or overflow incidents at the facility. The LWRF continues to function effectively. The existing lift stations have not experienced any operational problems, however there have been spills along various points of the existing collection system due to pipe failures, and, after thirty years of service, the gravity and force mains have required replacement. The Phase I improvements, currently under construction, will upgrade the existing collection system with a new gravity collector main, pump station and force main.

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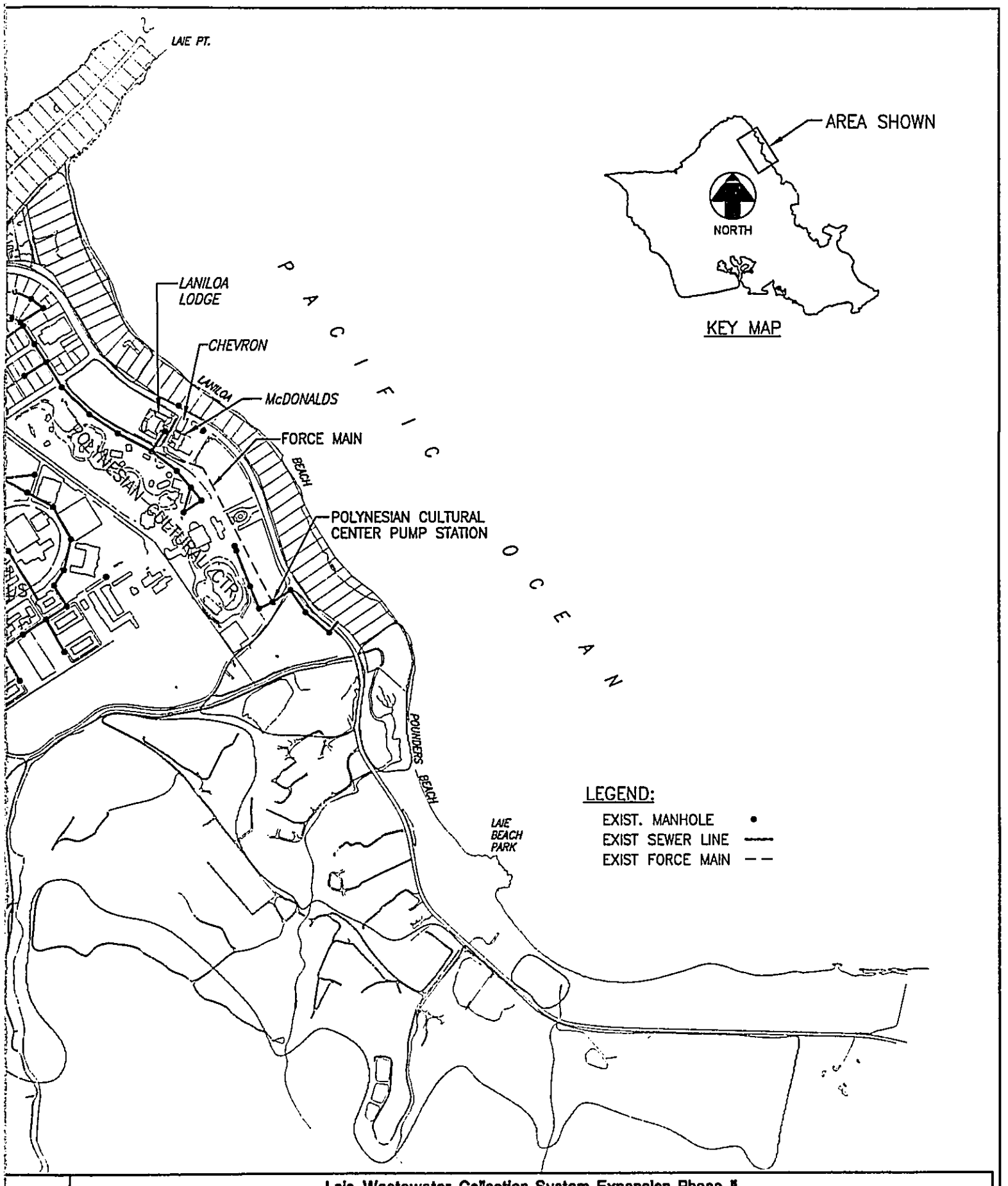

Laie Wastewater Collection System Expansion Phase II

Existing Laie Wastewater System

Figure 1.2-1

SECTION 2
Description of Project

2.1 PROJECT PURPOSE AND NEED

For nearly 30 years, residential areas of Laie have relied on individual cesspools and septic tank systems for wastewater disposal. Only about 175 of the 720 homes in the Laie area are currently sewered. The vast majority of the remainder utilize deteriorating cesspools and septic systems that are performing poorly. Expansion of the existing sewer collection system to include these homes will provide a significant environmental improvement.

Proposed improvements under Phase II of the expansion will replace over 500 cesspool and septic systems with a modern sewer collection and reclamation system. Phase II improvements include planned low pressure sewer mains, laterals, and individual grinder pumps. Phase II improvements are planned for new La'ie, Old La'ie, residential areas along the coast and Kamehameha Highway, and, as funds allow, on La'ie Point. The new low pressure systems will greatly improve system reliability and will eliminate the potentials for leaks or spills from aging sewer lines and cesspools. Instead of raw sewage being released into the ground, sewage and wastewater will be collected and treated to high enough quality for reuse in irrigation. **Figure 2.1-1** depicts the Phase II project area.

Phase II improvements are being developed to prevent raw sewage from unsewered homes from being discharged into the ground and affecting the groundwater table. Upgrading the existing sewer collection system and extending the system throughout the community will allow for wastewater to be collected and treated to a fairly high level (R-1) of treatment. R-1 water will be reused for irrigation and to provide the Laie community with another water resource.

The La'ie Sewer Project is master planned to meet existing wastewater service needs and to eliminate aging and leaking cesspools from service. The upgraded sewer collection system is designed to increase capacity above existing levels in order to accommodate the possibility of future development in La'ie, as planned in the *Ko'olauloa Sustainable Communities Plan* (KSCP).

2.2 SERVICE AREA AND DESIGN FLOWS

The La'ie Wastewater Collection System Master Plan envisions expansion of the collection system to include residential areas, commercial areas, institutional areas, and resorts. Each of these areas were grouped into service area categories that are identified in **Table 2.2-1.** Phase I areas, listed in the table, consist of privately owned entities that are serviced by an existing sewage collection system. Phase I improvements are currently being constructed under the terms of a cooperative agreement between the City and HRI (HRI, December 29, 2000). Phase II areas include both sewered and unsewered properties that would be upgraded or serviced by a new sewer system. Wastewater flows from all categories will flow into the new pump station.

TABLE 2.2-1
SERVICE AREA CATEGORIES

Category	Area Description
(Phase I)	These are primarily private entities that will remain private and sewered with upgraded system.
	Residential Areas Temple View Apartments Faculty Townhouses
	Commercial Areas Polynesian Cultural Center
	Institutional BYU-H Campus BYU-H Dormitories
(Phase II)	These are the currently sewered and unsewered areas of La'ie that are to be upgraded or sewered through establishment of a Sewer Improvement District
	Residential Areas Currently Sewered (New La'ie) Old La'ie Mauka of Kamehameha Highway Kamehameha Highway, Kahawainui to La'ie Point La'ie Point Kamehameha Highway, La'ie Point to Wailele
	Commercial Areas La'ie Shopping Center Hawaiian Telephone Co. Chevron Service Station McDonalds
	Institutional Elementary School Temple Church - Makai Temple Church - Mauka LDS Chapel LDS Temple
	Resort Laniloa Lodge

Design flows developed for the new pump station were based on various sources including:

- Laie Water Reclamation Facility Plan, August, 1993
- Water demand data
- City and County of Honolulu wastewater flow generation criteria
- Hawaii Reserves Incorporated information

The proposed grinder pump system has been designed well within the limits of the peak design capacity of the pump station and LWRF. The LWRF is sized for a design average flow of 0.90 million gallons per day (mgd), and peak wet weather flow of 5.58 mgd. Currently, the treatment facility handles a design average flow of approximately 0.30 mgd.

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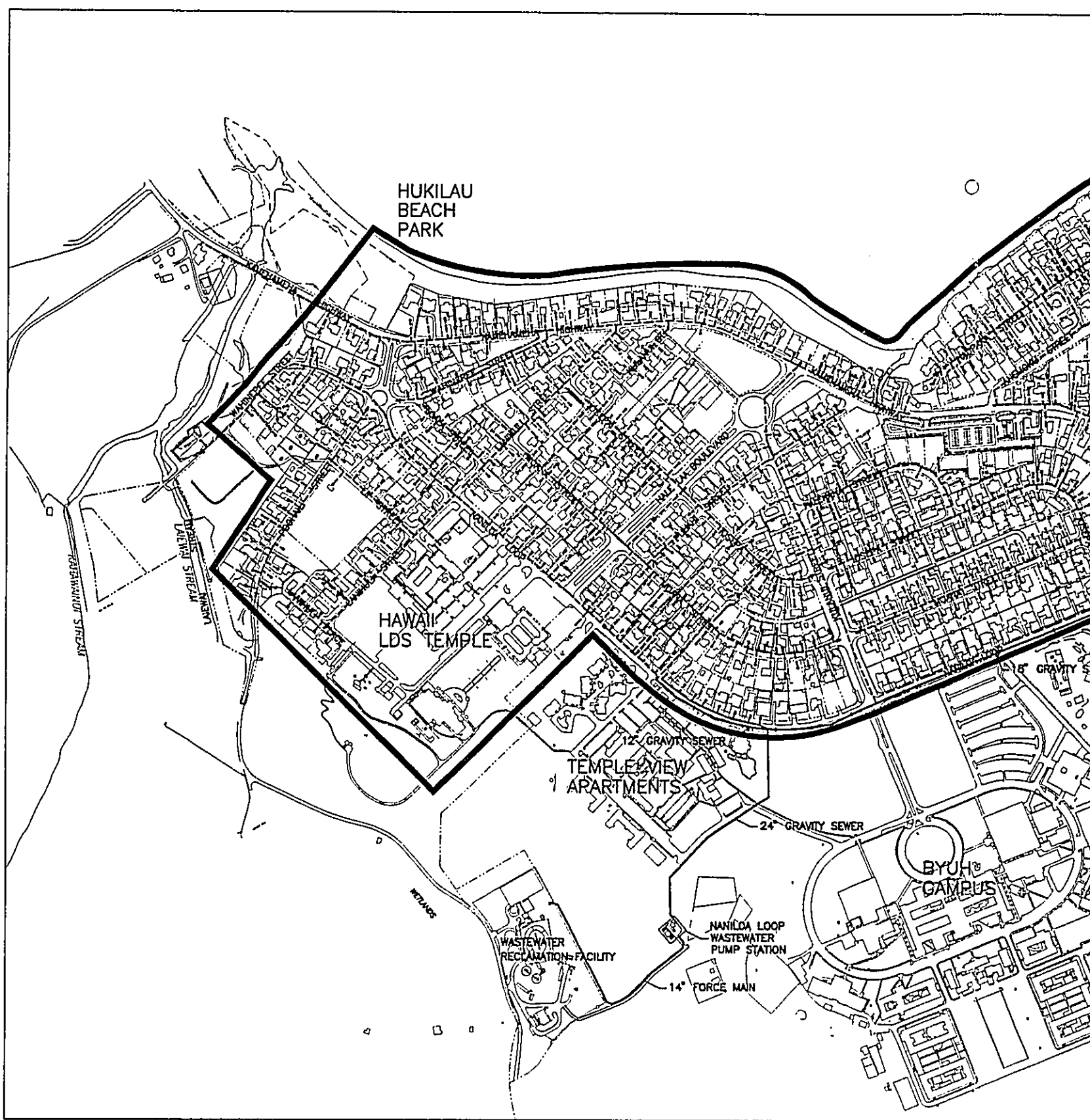

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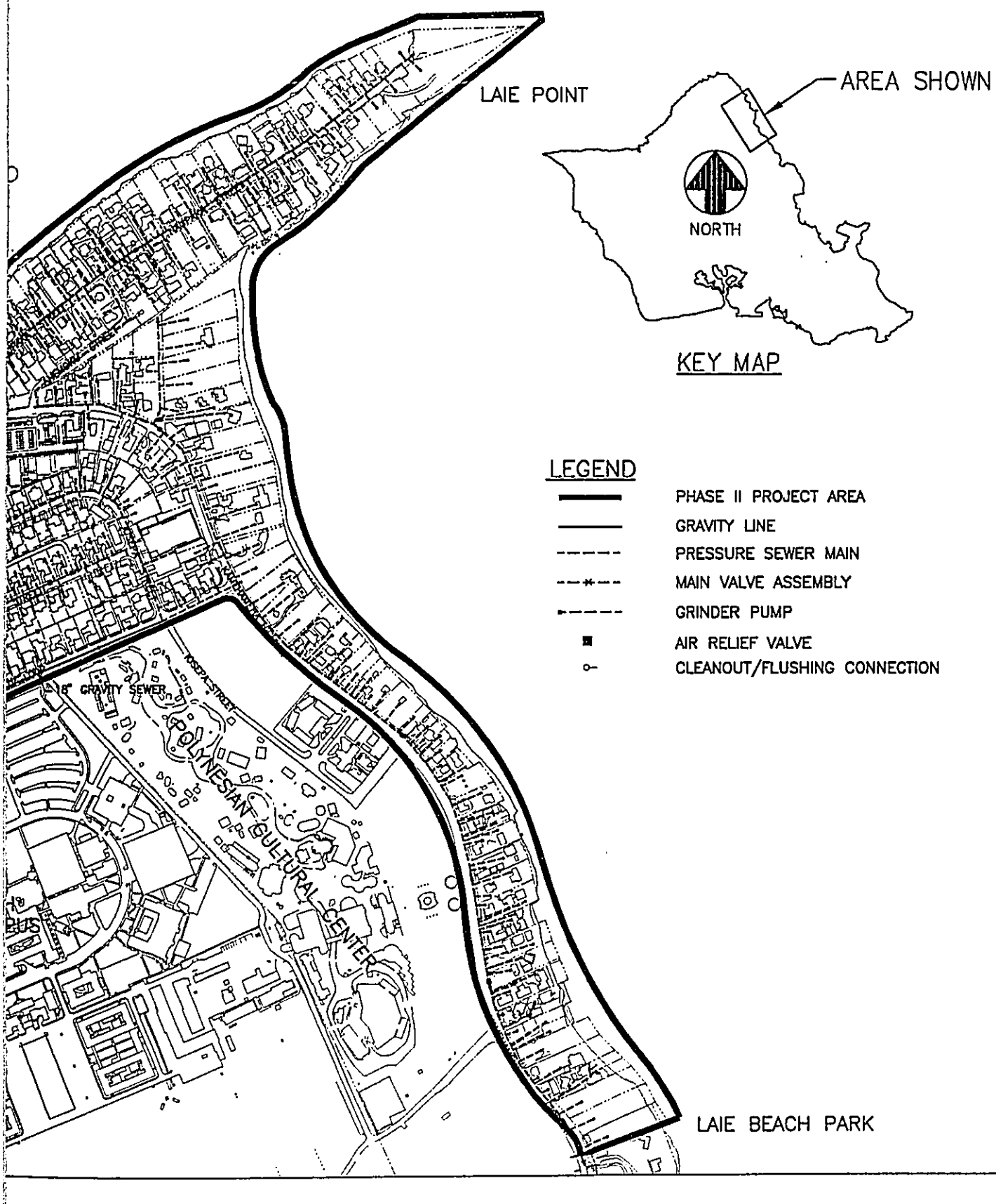

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LAIE WASTEWATER COLLECTION SYSTEM EXPANSION PHASE II

PHASE II PROJECT AREA

Figure 2.1-1

Design flows for the pump station (La'ie WWPS), force main, and grinder system are presented in **Table 2.2-2.**

TABLE 2.2-2
LA'IE WASTEWATER TREATMENT SYSTEM
SUMMARY OF PROJECTED FLOW CAPACITIES

	Flow Rate
LWRF Design Average Flow	0.90 mgd
LWRF Design Peak Wet Weather Flow	5.58 mgd
Pump Station Design Average Flow	0.39 mgd
Pump Station Design Maximum Flow	1.67 mgd
Grinder System Design Average Flow	13,760 gpd
Grinder System, Design Peak Flow	681,000 gpd

Wastewater flows from the new grinder system are not anticipated to exceed the design average of 13,760 gpd. Incremental increases comprising this amount are described in **Table 2.2-3.**

TABLE 2.2-3
INCREMENTAL FLOW INCREASES FROM
NEW GRINDER PUMP SYSTEM

Area	Description	Flow Rate (gpd)
Base Bid	All residential areas mauka of Kamehameha Highway	11,200
Additive #1	Ocean-front residences between Laie Point and Hukilau Beach Park	640
Additive #2	Makai residences situated south of Laie Point between Anemoku Road and Naniloa Loop Road.	320
Additive #3	Ocean-front residences between Naniloa Loop and Laie Beach Park.	960
Additive #4	Residences on Laie Point.	640
	Total Anticipated Flow	**13,760**

2.3 TECHNICAL CONSIDERATIONS

2.3.1 NEW COLLECTION SYSTEM

The new collection system will primarily consist of a network of grinder pump stations that will feed a network of low pressure force mains. The low pressure force mains will then discharge to a gravity system that will feed the new Naniloa Loop Pump Station, currently under construction. The BYUH campus, PCC, and Temple View Apartments, and a few homes fronting Naniloa Loop will be serviced by the gravity system. The remainder of the community will be serviced by the low-pressure system.

The gravity portion of the collection system will consist of the following:

- Lateral connections between homes on Naniloa Loop and the gravity main.
- Polyvinyl chloride (PVC) C900 and C905 pipe will be used for all gravity sewer applications.

The grinder pump portion of the collection system will consist of the following:

- The grinder pump station is a sealed contiguous unit consisting of a submersible grinder pump, level controller and alarm indication, check valve on the discharge line and external control panel. The wet well typically ranges in size from 24 to 39 inches in diameter with a corresponding volume of 75 to 150 gallons.
- When pumping into pressure lines, the head will vary. The unit must be sized to accommodate the maximum pressure anticipated. A grid model to determine the maximum pressures based on the maximum number of pumps likely to be operating at one time is used to size the system.
- Operates off of 120 or 240 volt, 60 hertz, single phase power.
- Each lot will have its own grinder pump station.
- High density polyethylene (HDPE) pipe will be used for all low pressure applications. Installation will involve both open cut and directional drilling methods.
- Flushing connections will be provided at the terminal end of each main, at intersections, and at any sharp changes in direction. Isolation valves will be provided on both sides of the flushing connection.

Figure 2.3-1 depicts the typical grinder pump installation.

2.4 SYSTEM OWNERSHIP, OPERATION, AND MAINTENANCE

The new collection system is being developed by a Consultant, R. M. Towill Corporation, for the City and Hawaii Reserves, Inc. (HRI). A Grant of Easement is being prepared as part of a "Cooperative Agreement to Jointly Construct a Collection System and Transfer the Laie Water Reclamation Facility", between the Grantor, HRI, as agent for Property Reserves, Inc., collectively called the GRANTOR, and the City and County of Honolulu, herein called the GRANTEE.

The GRANTOR shall grant and convey unto the GRANTEE its successors and assigns forever, the right of perpetual easement to lay, maintain, operate, repair or remove sewer pipelines, conduits below the surface and the right of entry upon the Grantor's land for the aforesaid

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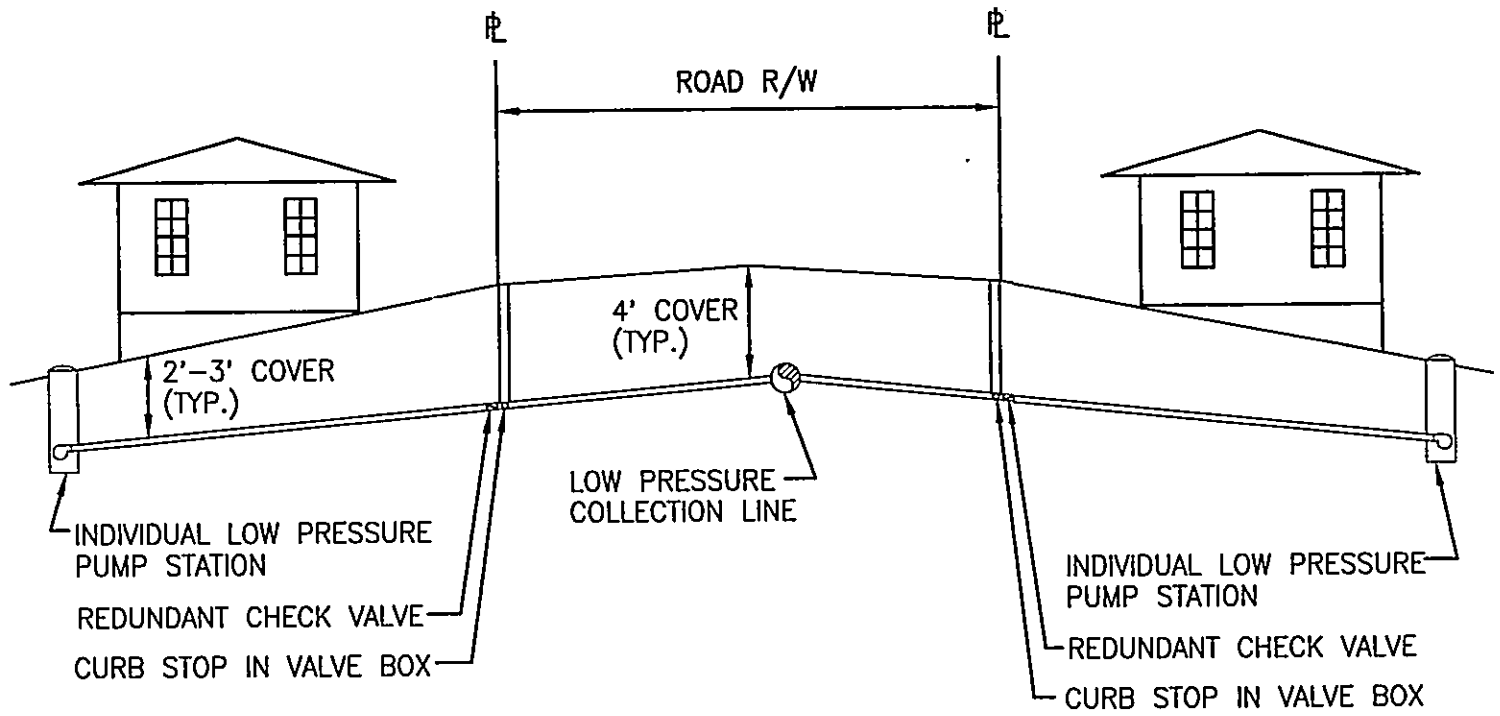
Lale Wastewater Collection System Expansion

Typical Grinder Pump Installation

Figure 2.3-1



purposes, over, across, through and under a portion of that certain property situated at Laie, Koolauloa, Oahu, Hawaii, as indicated under Exhibit A in the Cooperative Agreement. (See Appendix B - Exhibits A and G from the "Cooperative Agreement to Jointly Construct a Collection System and Transfer the Laie Water Reclamation Facility.)

The Project will also directly impact portions of private property throughout the service area (Laie Sewer Improvement District), as indicated under Exhibit G in the Cooperative Agreement. (See Appendix B - Exhibits A and G from the "Cooperative Agreement to Jointly Construct a Collection System and Transfer the Laie Water Reclamation Facility.) Use of private land will be addressed as follows:

The service area consists of several roadways and other attendant properties privately owned by an affiliate of co-sponsor HRI. HRI will either facilitate the dedication without reimbursement or conveyance of easements in consultation with the City for properties necessary for the project.

Grinder pumps and laterals will be placed on property owned by customers of the new system. Participating customers will voluntarily convey a "Right-of-Entry in Gross" agreement as part of the project. Customers not voluntarily conveying a "Right-of-Entry in Gross" shall install, own, operate and maintain the grinder pumps and laterals placed within their property. The balance properties will remain private.

Upon project completion, the complete system, including sewer mains, laterals, grinder pumps and pump control panels, will be owned, operated and maintained by the City under the terms of the cooperative agreement with HRI to include those areas where participating customers have voluntarily conveyed a "Right-of-Entry in Gross" agreement.

2.5 BEST MANAGEMENT PRACTICES (BMPs)

BMPs consisting of guidelines and mitigation measures to prevent construction related runoff, discharge pollution, and other detrimental impacts to waters of the State will be employed during all periods of construction activity. Mitigation measures shall include, but not be limited to the following:

- Clearing and excavation shall be held to a minimum necessary to meet project design and construction plan requirements.
- Construction shall be phased to minimize the exposure time of cleared or excavated areas. Existing ground cover shall not be destroyed, removed or disturbed more than 20 calendar days prior to the start of construction.
- Storm water flowing toward active project areas shall be diverted as much as practicable using appropriate controls, such as berms and silt fences, as determined by the contractor according to site conditions.
- Areas that remain unfinished for more than 30 calendar days shall be hydro-mulched or seeded to provide temporary soil stabilization.
- The project contractor will select locations for stockpiling construction material. As appropriate to the site, a sediment retention berm or silt fence will be installed around the down-slope side of stockpile sites to retain sediment discharge during heavy rainfall.

- Fueling of construction equipment will be performed off-site or within an area designated by the contractor. Any site designated for refueling shall be located away from surface water and constructed to contain spills and seepage and prevent storm water runoff from carrying pollutants into state coastal waters.
- The contractor, based on professional experience and expertise, may modify the proposed BMP mitigation measures as necessary to account for unanticipated or changed site conditions.

2.6 PROJECT SCHEDULE AND COSTS

2.6.1 PROJECT SCHEDULE

The project is expected to proceed in accordance with the following schedule:

Completion of design phase	December 2002
Start of construction	April 2003
Completion of construction	October 2004

2.6.2 ESTIMATED COSTS

Phase II improvements will be funded by both public and private sources. The estimated construction cost for the project is $12.77 million in public funds, and $0.98 million in private funds. Annual operation and maintenance costs are estimated to be $60 thousand dollars.

SECTION 3
Description of Affected Environment

3.1 PHYSICAL ENVIRONMENT

3.1.1 CLIMATE

Climate data presented here is summarized from the Laie WRF Facility Plan.

Laie is located on the windward coast on the northeastern portion of Oahu. Therefore the area has constant exposure to the northeast tradewinds that are the predominant winds to Oahu. Average wind velocity in the area varies from 10 to 15 mph.

Mean temperatures are typical of the island chain. Mean maximum temperatures range from the mid 70's F in winter to the low 80's F in fall and summer. Mean minimum temperatures range from the low 60's in the winter to the low 70's in summer.

Average annual rainfall recorded at BYUH farms Station 903.1 was 54.37 inches (4.5 inches/month) for the period from 1968 to 1991. The dryer months of May through September average 3-4 inches per month. The wetter months of October through April average 4-8 inches per month.

3.1.2 TOPOGRAPHY

The major developed areas of Laie are generally located in low lying areas. Elevations are typically in the 6 ft. to 10 ft. msl range. The land rises sharply as one moves more inland. The Laie WRF is located on a rise at an elevation in the 70 ft.+ msl. The area known as Laie Pt. rises to an elevation in the upper 20's. In general, the bulk of the collection system can be characterized as low lying and flat.

Kamehameha Highway is generally at or above the typical grade on the mauka side of the highway in Laie thereby acting as a barrier to floodwaters.

3.1.3 SOILS AND GEOLOGY

Design level geotechnical explorations were completed in March 1999 and presented in the draft report "Preliminary Geotechnical Engineering Exploration - Expansion of the Laie Treatment Works Sanitary Sewer Collection System" May 1999, Geolabs. The following is a summary of the report:

- Groundwater is generally at elevations in the +2 ft. msl range implying that groundwater is present at elevations from less than 4 ft. to 8 ft. below the ground surface in the project area.
- The soil characteristics in the area can be generally described as being underlain by dense coral sands and gravel extending to a depth of about 40 feet below the existing ground surface.

Soil Types existing in the project site include:

BS Beaches - Beaches occur as sandy, gravelly, or cobbly areas. Beach sands are derived from corals and seashells.

CR Coral Outcrop - Coral outcrops consist of coral or cemented calcareous sand. Coral outcrops are geographically associated with Jaucas sand deposits.

JaC Jaucas Sand, 0 to 15 percent slope - Jaucas sand consists of excessively drained, calcareous soils. In most places the slope does not exceed 7%. Permeability is rapid. Runoff is slow to very slow. The hazard of water erosion is slight, however wind erosion is a severe hazard where vegetation has been removed. Jaucas sand deposits are associated with traditional Hawaiian burial practices and are commonly found to contain archaeological deposits.

Kfb Kaloko Clay, noncalcareous variant - Kaloko soils are poorly drained alluvial soils located on coastal plains. In the noncalcereous variant, permeability is slow, runoff is ponded to very slow, and the erosion hazard is none to slight.

KlA Kawaihapai clay loam, 0 to 2 percent slope - Kawaihapai soils consist of well-drained soils in drainageways and on alluvial fans on the coastal plains. Permeability in this soil type is moderate, runoff is slow, and the erosion hazard is no more than slight.

LaB Lahaina silty clay, 3 to 7 percent slope - Lahaina soils consist of well-drained soils on upland areas. In the project area, they occur only in the vicinity of the Temple. In most cases, the surface layer and part of the subsoil have been removed by erosion. Exposure of soft weathered rock is common. The erosion hazard is moderate to severe.

Ms Mokuleia loam - Mokuleia soils consist of well-drained alluvial soils along the coastal plains. These soils are shallow and nearly level deposits over coral sand. Permeability is moderate in the surface and rapid in the subsoil. Runoff is very slow, and the erosion hazard is no more than slight.

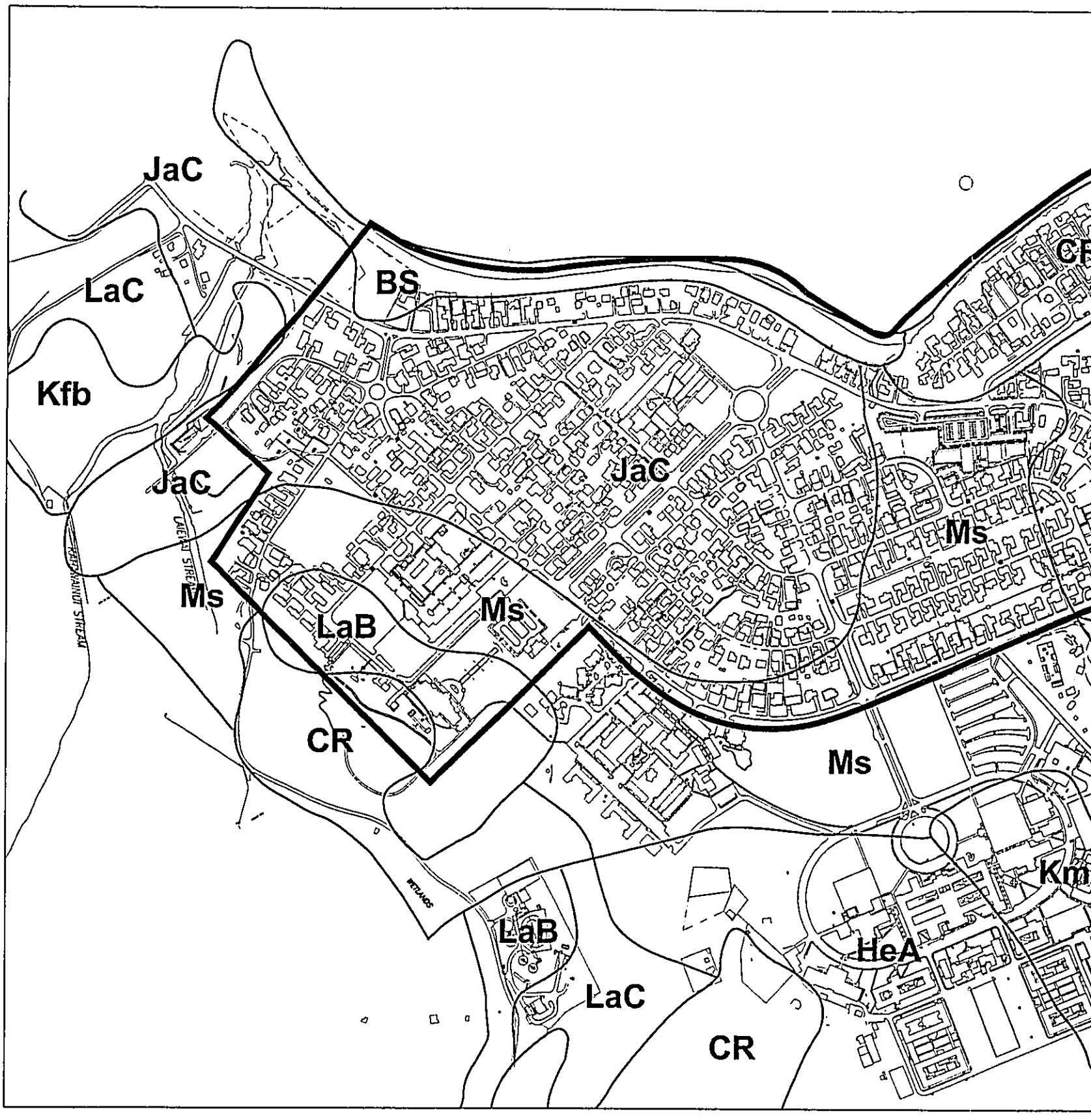
(Source: United States Department of Agriculture, Soil Conservation Service; and the University of Hawaii Agricultural Experiment Station, Honolulu, August 1972.)

Soil types in the project area are depicted in **Figure 3.1-1, Soils Map.**

Impacts and Mitigative Measures

No significant impacts to soils or geology will result from this project. Excavations required for grinder pump and pipe installation will be backfilled to original grades with native material. Horizontal directional drilling (HDD) may be used for the installation of low-pressure pipes in hard coral formations. Use of HDD technology will reduce impacts to the environment and community by minimizing disturbance to the land and reducing construction time.

- Due to limitations on drilling angles, laterals may require relocation and longer lengths.
- Soils that contain high gravel content (50% or more) and cobble size coral fragments may pose difficulties in drilling and steering the pilot hole as well as maintaining the hole stability.
- Loose sandy soils may result in difficulties in steering during the pilot hole drilling and the potential change in the drill path alignment.



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NORTH

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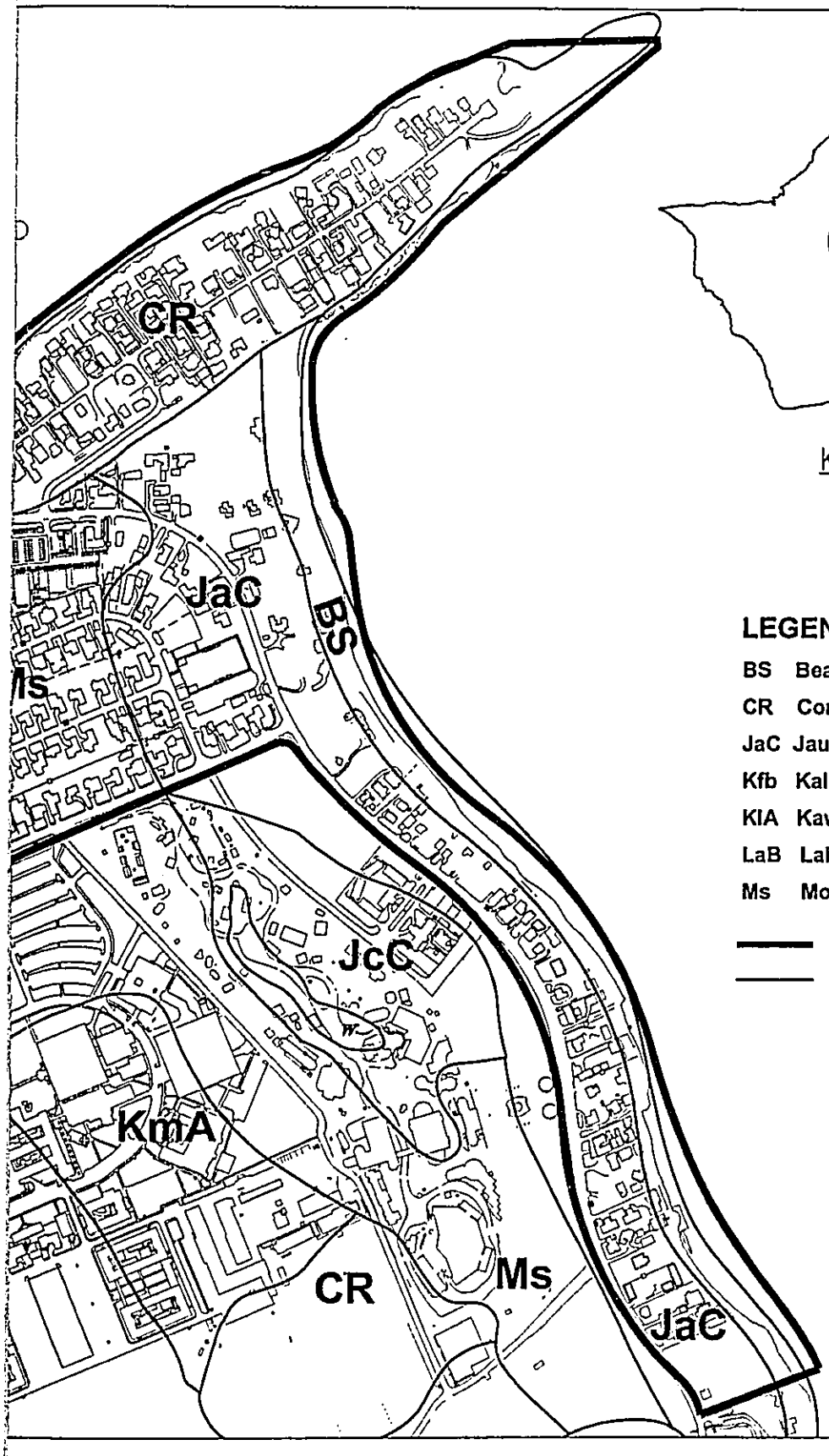
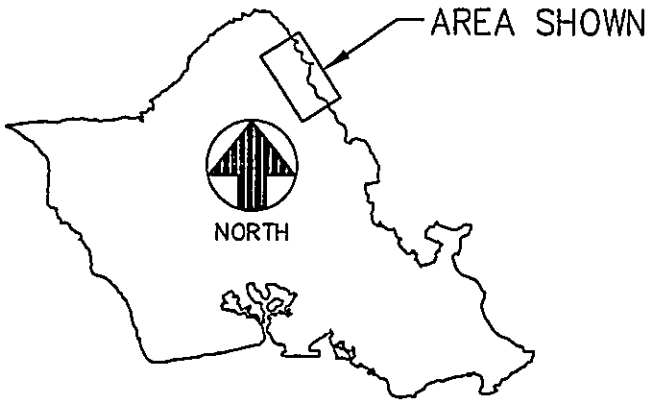
SOILS





KEY MAP

LEGEND

BS Beaches
CR Coral Outcrop
JaC Jaucas Sand, 0 to 15 percent slope
Kfb Kaloko Clay, noncalcareous variant
KlA Kawaihapai clay loam, 0 to 2 percent slope
LaB Lahaina silty clay, 3 to 7 percent slope
Ms Mokuleia loam

PHASE II PROJECT AREA
SOIL BOUNDARIES

2000'

LAIE WASTEWATER COLLECTION SYSTEM EXPANSION PHASE II

SOILS MAP

Figure
3.1-1

3.1.4 HYDROLOGY

Hydrology information presented here is summarized from the La'ie WRF Plan.

The La'ie plain is underlain by two aquifers: a shallow "caprock" aquifer and a deeper basalt aquifer. The caprock aquifer is composed of coral, sand, silt, lithified dunes, and clay. Sedimentary materials such as clay strata and limestone within the caprock retard the movement of groundwater. Groundwater within the cap rock moves toward the ocean, however, local variations may affect the flow direction. This underlying groundwater is not considered a drinking water source. Recharge of the cap rock aquifer is predominantly from infiltration of precipitation, but smaller amounts also enter the aquifer as return flow either from irrigation, seepage from the PCC lagoon, or seepage from the existing leach field.

The deeper basalt aquifer underlies the cap rock aquifer and extends thousands of feet into the subsurface. The basalt aquifer consists of thin bedded lava flows of very high permeability. The upper portion of the basalt aquifer is comprised of weathered volcanics that normally have a lower permeability than the underlying unweathered basalts. The basalt aquifer, like the cap rock aquifer is also recharged predominantly by rainfall, primarily from the mountains mauka of La'ie.

Impacts and Mitigative Measures

The proposed project is not expected to have a significant impact on hydrology. During construction, the Implementation of appropriate Best Management Practices (BMP) by the contractor will minimize the impacts from construction dewatering and the disposal of hydrotesting water, muck and slurry. HDD borings would remain within surface soils and would not penetrate to depths that would impact underlying caprock. Replacement of the existing cesspool system with the new wastewater collection system will improve conditions by eliminating the potential for pollutant seepage from leaking cesspools.

3.1.5 FLOODS AND TSUNAMI

The Flood Insurance Map (**Figure 3.1-2**) shows that the project site is prone to flooding and portions of the coastal area is vulnerable to wave impacts.

The majority of the collection system area is subject to flooding. The few areas served by the new collection system that are not affected by flooding include a large portion of the BYUH campus and the Laie Point area.

Flood elevations in the collection system service area range from +10 to +11 ft. msl with +12 near the coast line.

Impacts and Mitigative Measures

The majority of the low pressure sewer system will be below the water table, and thus generally unaffected by flooding. High-density polyethylene (HDPE) will be used for the pipe material to minimize infiltration and inflow (I/I) and provide maximum pipe thickness and strength against hydraulic forces. The project will comply with rules and regulations of the National Flood Insurance Program and all applicable County Flood Ordinances.

3.1.6 FLORA AND FAUNA

Project activities will occur within existing roadway corridors and on developed parcels where vegetation is entirely introduced. Because these areas have been so greatly disturbed by past human activities, any remnants of vegetation types dominated by native plants no longer exist. Botanical surveys conducted in the La'ie area have identified no endemic species; nor are any "threatened" or "endangered" plant species known from the project area (Char and Associates, April 1991, November 1993). Native plants recorded in the area include rice grass (*paspalum*

scrobiculatum L.), koali (*Ipomoea indica*), kaunaoa-pehu (*cassytha filiformis L.*), hau (*hibiscus tiliaceus L., malvastrum coromandelianum L.*), popolo (*solanum americanum Mill.*), and 'uhaloa (also called hi'aloa, kanakaola) (*waltheria indica*). These plants are indigenous to the Hawaiian islands and known from throughout the Pacific. None are known from the project corridor itself.

The majority of the plants found at the site are common, naturalized species and species commonly used in residential gardening and landscaping. Predominant species include California grass (*Brachiara mutica*), and plants commonly associated with this grass type, such as, honohono (*commelina diffusa*) primrose willow , moonflower (*ipomoea alba*), false daisy (*Eclipta prostrata*), barnyard grass (*Echinochloa crusgalli*), cattail, and water hyacinth (*Eichhornia crassipes*). Other plants found here include iron wood (*Casuarina equisetifolia*) koa haole shrubs (*Leucaena leucocephala*), Java plum (*Syzygium cumini*), Christmas berry (*Schinus terebinthifolius*), Chinese banyan (*Ficus microcarpa*), monkeypod (*Samanea saman*), coconut (*Cocos nucifera*), mango (*Mangifera indica*), avocado (*Persea americana*), banana (*Musa X Paradisiaca*), and numerous weedy species.

Faunal surveys (Bruner, April 1991, November 1993) noted the presence of four endangered and endemic waterfowl in the Poohaili Wetlands, mauka of the existing wastewater treatment facility. They are the Koloa (Hawaiian Duck) (*Anas wyvilliana*), black-necked stilt (*Himantopus mexicanus knudseni*), American coot (*Fulica americana alai*), and common moorhen (*Gallinula chloropus sandvicensis*). Other wildlife known from the area include introduced bird species such as the common mynah, cattle egret, zebra dove, red-crested cardinal, spotted dove and the Japanese white-eye. Mammals in the area include rats and mongooses.

Several surveys of aquatic wildlife in the Kahawainui floodplain and stream have been conducted (AECOS, Inc., May 1991; Environmental Technologies, Inc., February 1992). Aquatic fauna observed during these surveys includes the common guppy, tilapia, Chinese catfish, bull frogs, and freshwater snails. The surface water also harbors an abundance of spiders and insects, particularly earwigs. Additionally, three common species of endemic o'opu (goby) (*Eleotris sandvicensis, Stenogobius genivittatus, Auraous staminueus*), were observed in Kahawainui Stream. None of the aquatic fauna noted are threatened species. (See Appendix C, Biological Studies.)

Impacts and Mitigative Measures

Project activities will take place within existing roadway corridors and developed lands, thus will not have significant adverse impacts to vegetation. No threatened or endangered plant species will be affected by this project.

The project area is dominated with common, introduced plant species not identified with traditional gathering practices. Project activities will not diminish the availability of any plant species as a resource. The project does not occur near the shoreline and does not interfere with access to shoreline resources. The project contractor will use native flora in project landscaping as practicable based on professional experience and site conditions.

The proposed improvements are not located near the Poohaili Wetlands and will not involve the use or destruction of wetland habitat frequented by the birds noted above. The replacement of existing aged cesspools with an improved wastewater collection and treatment system will eliminate a potential source of ground and surface water contamination that could affect wetland habitat and surface water resources. Activities required to construct and operate the new wastewater collection system are not expected to have a significant effect on terrestrial and aquatic wildlife.

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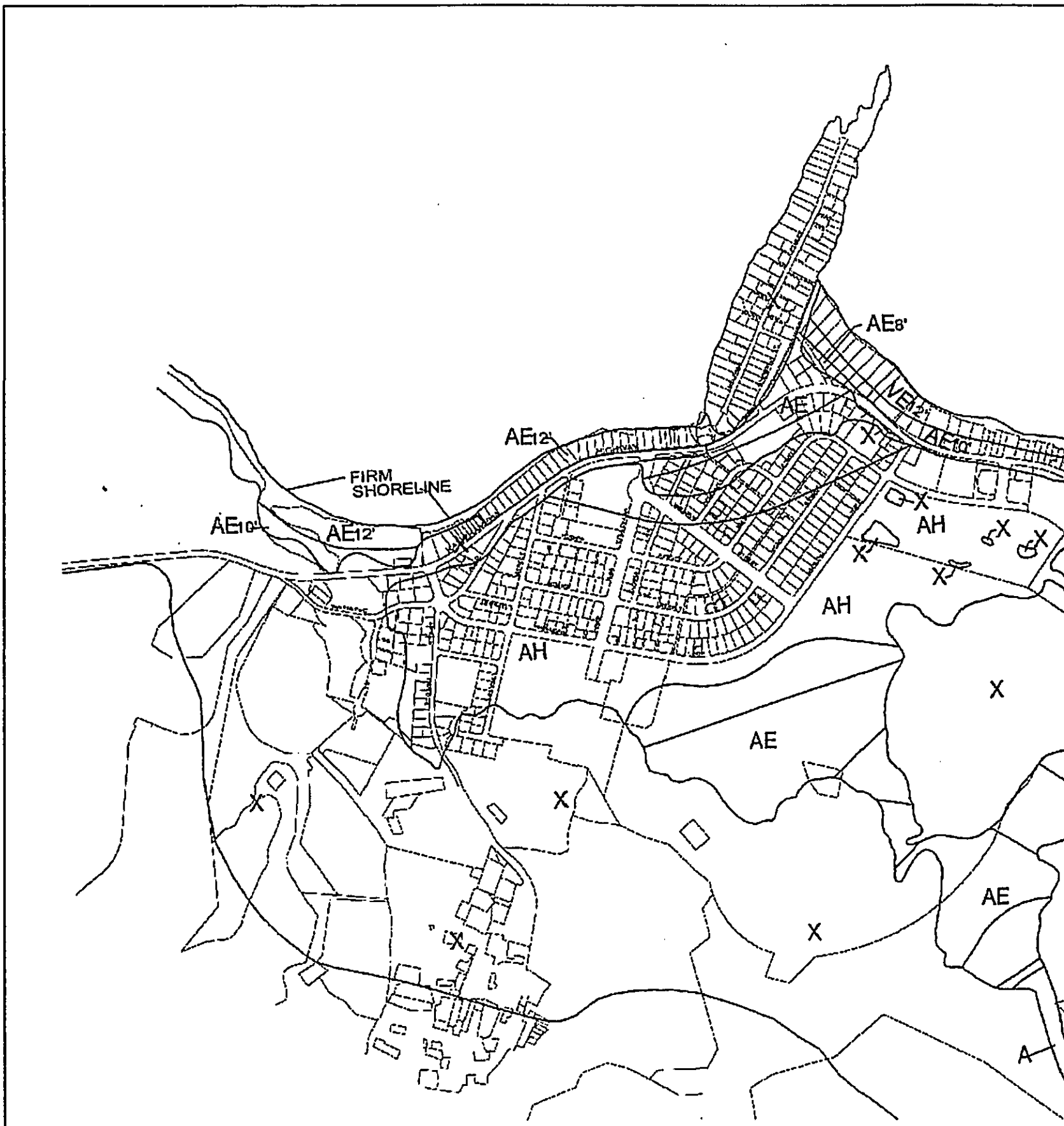

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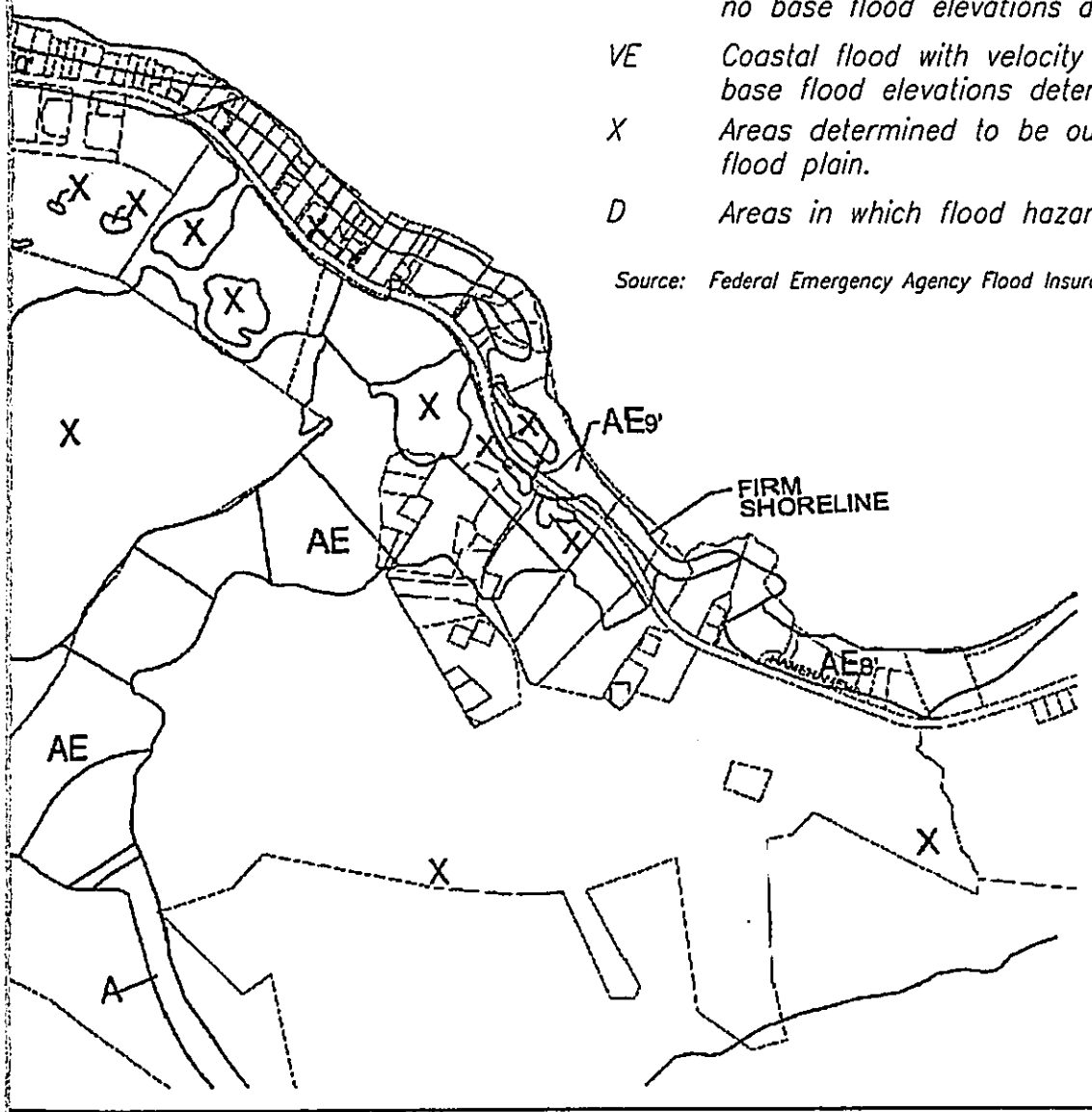
LEGEND

A	No base flood elevations determined
AE	Base flood elevations determined.
AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
A99	To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.
V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.
X	Areas determined to be outside of 500-year flood plain.
D	Areas in which flood hazards are undetermined.

Source: Federal Emergency Agency Flood Insurance Rate Map



Laie Wastewater Collection System Expansion

2000'

Flood Insurance Rate Map for Laie

Figure
3.1-2

3.1.7 WATER QUALITY

The various streams in the La'ie community collect runoff from urban, agricultural, and vacant natural areas. Runoff constituents are carried downstream, and are discharged into the ocean during peak precipitation periods, thereby periodically degrading ocean water quality. Runoff constituents include silt, organic material, debris, trash, terrigenous bacteria, and dissolved runoff constituents.

Coastal waters adjacent to the project site are designated as "Class A" by the Department of Health, State of Hawaii (DOH). Waters designated as "Class A" are to be protected for recreational uses, aesthetic enjoyment, and protection and propagation of marine life.

Impacts and Mitigative Measures

No adverse impacts to water quality are anticipated from construction of this project. The proposed upgrades will benefit environmental conditions by eliminating or substantially reducing the potential for leaks or spills from aging cesspools. The impact of small amounts of suspended sediment entering ocean waters as a result of construction activities is anticipated to be negligible. Runoff from construction areas will be regulated under NPDES permit conditions. Best management practices (BMPs) will be employed to prevent soil loss and sediment discharges from work sites. Project activities and operation of the system following project completion will comply with DOH regulations as set forth in Hawaii Administrative Rules, Title 11 Chapter 54 - Water Quality Standards, and Chapter 55 - Water Pollution Controls. (See Section 2.5, Best Management Practices).

3.1.8 AIR QUALITY

The present ambient air quality in the project area is considered good due to the prevailing northeasterly tradewinds and the absence of "heavy" industries. The air quality is mostly affected by air pollutants from natural and / or vehicular sources. Natural sources include ocean spray, wind-blown dust, or possible distant volcanic emissions from the Island of Hawaii, and vehicular emissions from motorists traveling on Kamehameha Highway, the Quarry Access Road, and local roads. Facilities exposed to wastewater are currently sealed to prevent the escape of odors. Foul air within these spaces is removed and treated before being released to the atmosphere.

Impacts and Mitigative Measures

The proposed project is not expected to have a significant impact on air quality. Construction activities may result in short-term air quality impacts from fugitive dust and equipment emissions. Dust control measures will include, but not be limited to, watering of active work areas, using wind screens, keeping adjacent paved roads clean, and by covering open-bodied trucks. Construction-related exhaust emissions will be mitigated by ensuring that project contractors properly maintain their internal combustion engines and comply with DOH Rules Title 11, Chapter 59 and 60, regarding Air Pollution Control. Construction related impacts to air quality will be temporary and will cease when construction is completed.

Long-term air quality concerns are related to the potential for wastewater-generated odors. Proposed Phase 2 improvements will result in a contained system of wastewater collection and conveyance. The polyvinyl chloride, and high-density polyethylene pipe used in the system are impervious to wastewater odors. The new system will eliminate the potential for odors related to leaks and spills from the existing, aging system of numerous, individual cesspools.

The new collection system will be connected to the waste water pump station being

developed under Phase I. The pump station includes an odor control system. Emission rates from the odor control systems will be below the exempt amounts established in HAR, Chapter 11-60, "Air Pollution Control".

3.1.9 NOISE

Ambient noise conditions in the proposed project area are generally low due to the rural location. The dominant noise is from vehicular traffic along Kamehameha Highway and the local roadways, and from wind. Local residences are generally exposed to sound levels ranging from 70 dB to 60 dB or lower (Day-Night average sound levels). Other normal daytime sources of noise include lawn mowers, barking dogs, and power tools.

Impacts and Mitigative Measures

Short-term noise impacts are related primarily to construction activities. A majority of the noise will be generated during mobilization and operation of heavy construction equipment. Construction equipment noise is expected to be in the range of 55 and 90 dBA in close proximity to the site. To mitigate short-term construction related impacts, the contractor will ensure that project activities are in compliance with the provisions of HAR, Chapter 11-46, "Community Noise Control".

No long-term noise impacts are expected to result from the operation of Phase II improvements. The only potential noise source is from the grinder pumps. The electric pump engines produce very little noise and will be further muffled by their installation underground.

3.2 SOCIO-ECONOMIC ENVIRONMENT

3.2.1 LAND USE

La'ie is situated in a traditionally rural area which is characterized as maintaining a "country" lifestyle. However, the notion of "country" living varies considerably. La'ie's population resides primarily in well-defined neighborhoods, while social and economic activity is largely anchored to the town's business center, the Polynesian Cultural Center and Brigham Young University. The present general mix of land uses in the area consists of: schools, parks, water reservoirs, wastewater facilities, commercial office, retail, and residential and agricultural uses.

Project activities will take place primarily within the State Land Use Urban District, but will cross portions of the State Agricultural Districts as well. The portions of the project located in the Urban District are subject to zoning regulations under the City and County of Honolulu Land Use Ordinances.

Impacts and Mitigative Measures

Construction activities will have short-term impacts on surrounding land uses. To mitigate short-term construction related impacts, the Contractor will be required to follow applicable State and City erosion, dust, and noise control regulations and implement appropriate BMPs.

The proposed project is not expected to have long-term adverse impacts on current or future land uses in the area. Operation of the improved wastewater collection and treatment system is a significant step towards realizing the vision of the La'ie Master Plan. The project is proposed to meet the existing wastewater service needs and to support the withdrawal of aging leaking cesspools from service. The new system will not be an impetus to additional growth or development in La'ie, but is designed to carry

capacity above existing levels in order to accommodate the possibility of future projected needs, as planned in the *Ko'olauloa Sustainable Communities Plan.*

3.2.2 HISTORIC, ARCHAEOLOGICAL, AND CULTURAL RESOURCES

Many observations of the archaeological and historical resources in the La'ie area have been conducted. Observations include reports by Cultural Survey Hawaii (1991), which identified sites that were determined by review of existing archaeological surveys, literature, historic maps, photographs, and Land Court documents. **Figure 3.2-1** Depicts locations of recorded archaeological sites. None of these sites have been included in the National or State Register of Historic Places. Taro terraces, for example, were known to exist, however most were destroyed through sugarcane cultivation and other modern land modifications. An additional historic site, the Nioi Heiau Complex (SIHP No. 50-80-02-281) is located near the new pump station (Phase I improvement), however, according to the State Historic Preservation Division (SHPD), proposed project activities will have "no effect" on the site (see Appendix E, Correspondence, SHPD letter dated August 16, 2000).

Additional studies were conducted to identify areas where cultural resources would be least impacted by construction of the LWRF. In 1992, a walk-through survey by Paul H. Rosendahl was conducted to locate proposed sites for the LWRF. (See Appendix D, Archaeological Studies.) A cluster of features resembling temporary habitation sites were identified on a limestone outcrop. These areas as presented in **Table 3.2-1** are not within the proposed project boundaries.

TABLE 3.2-1
Archaeological Sites

Site No.	Site Feature Types	Significance Assessment / Recommended Treatment
4454	Agricultural Complex (Historic)	Important for information content, no further data collection necessary
4455	Foundation (Historic)	Important for information content, further data collection necessary
4456	Modified Outcrop (Recent)	Important for information content, no further data collection necessary
4457	Irrigation Ditch (Historic)	Important for information content, no further data collection necessary
4458	Agriculture / Habitation (Prehistoric)	Most likely relates to Site 281, Nioi Heiau Complex. Important for information content, no further data collection necessary. Culturally significant, preservation "as is" recommended
4459	Irrigation Ditch (Historic)	Important for information content, no further data collection necessary
4460	Complex, Terraces, and Paved Area / Habitation	Most likely relates to Site 281, Nioi Heiau Complex. Important for research value. Further data gathering and preservation "as is" recommended.
281	Nioi Heiau Complex	Mostly likely corresponds with Sites 4458 and 4460. Important for informational content. Culturally significant. Further data gathering and preservation "as is" recommended.

Source: Paul H. Rosendahl, Ph.D., Inc. (April 1992, September 1995)

As shown the **Figure 3.1-1, Soils Map**, the project site contains Jaucas sand deposits. This soil type is associated with traditional Hawaiian burial practices, and is commonly found to contain subsurface cultural deposits. The SHPD was consulted (personal meeting with Sara Collins and Muffet Jourdane: May 13, 2002) regarding the presence of burial or archaeological sites in the project area. No recorded sites are known within the project corridor, however burials have been found in adjacent sandy areas near Pounders Beach and La'ie Beach Park. The presence of these burials indicates the possibility that others may be found during excavation in areas with similar soil conditions.

The proposed Phase II wastewater collection system improvements are being constructed on previously developed lands that have undergone intensive modification and disturbance during decades of continuous use. The project site is dominated by common, introduced plant species not identified with traditional gathering practices. No native flora or fauna are known to exist at the project site. Due to the proximity of residential areas and the highway, no hunting is permitted in the project area.

Impacts and Mitigative Measures

All known archaeological sites are located outside the project site. None of the identified archaeological sites will be disturbed by project activities. The limits of the construction area will be clearly identified prior to construction. A five-meter buffer will be maintained around any known archaeological sites during project staging and construction to avoid disturbance from vehicle traffic and heavy equipment use. Further, in accordance with SHPD recommendation, a qualified archaeologist will be employed to monitor excavations in project areas containing Jaucas sand deposits, as depicted in **Figure 3.1-1, Soils**. Prior to beginning work in this area, an archaeological monitoring plan will be prepared by a qualified archaeologist and submitted to SHPD for review and approval. Per consultation with the SHPD, no additional archaeological surveys are required for this project. With the implementation of an acceptable archaeological monitoring plan, the proposed Phase 2 expansion of the La'ie Waste Water Collection System will have "no adverse effect" on significant historic sites. (See Appendix F, letter from SHPD dated September 9, 2002.)

During construction activities, there is a possibility of encountering unknown or unexpected cultural features, deposits, or burials. If this situation occurs, work in the area will be suspended immediately until the monitoring archaeologist evaluates the significance of the findings. The SHPD will immediately be notified to determine the appropriate course of action.

No impacts to cultural practices will result from the proposed wastewater system improvements. Project activities will not diminish the availability of any plant type for use in cultural practices. The proposed project will not interrupt access to coastal areas or to hunting or gathering grounds. Proposed wastewater system improvements will be installed sub-surface within existing developed areas, and thus will not block existing view plains, will not be visible from coastal ocean waters, and will not obstruct any natural features or landmarks.

3.2.3 SCENIC AND VISUAL RESOURCES

The proposed project area is located on low-lying lands adjacent to the coast. The relatively narrow coastal plain backs up against the eastern side of the Koolau Mountain Range creating beautiful views of the mountains and sea. The rural character of La'ie is evident in the landscape of agricultural fields including banana, papaya, coconut, and wetland ponds. This character is reinforced by the green slopes of the Koolau Mountains which serve as

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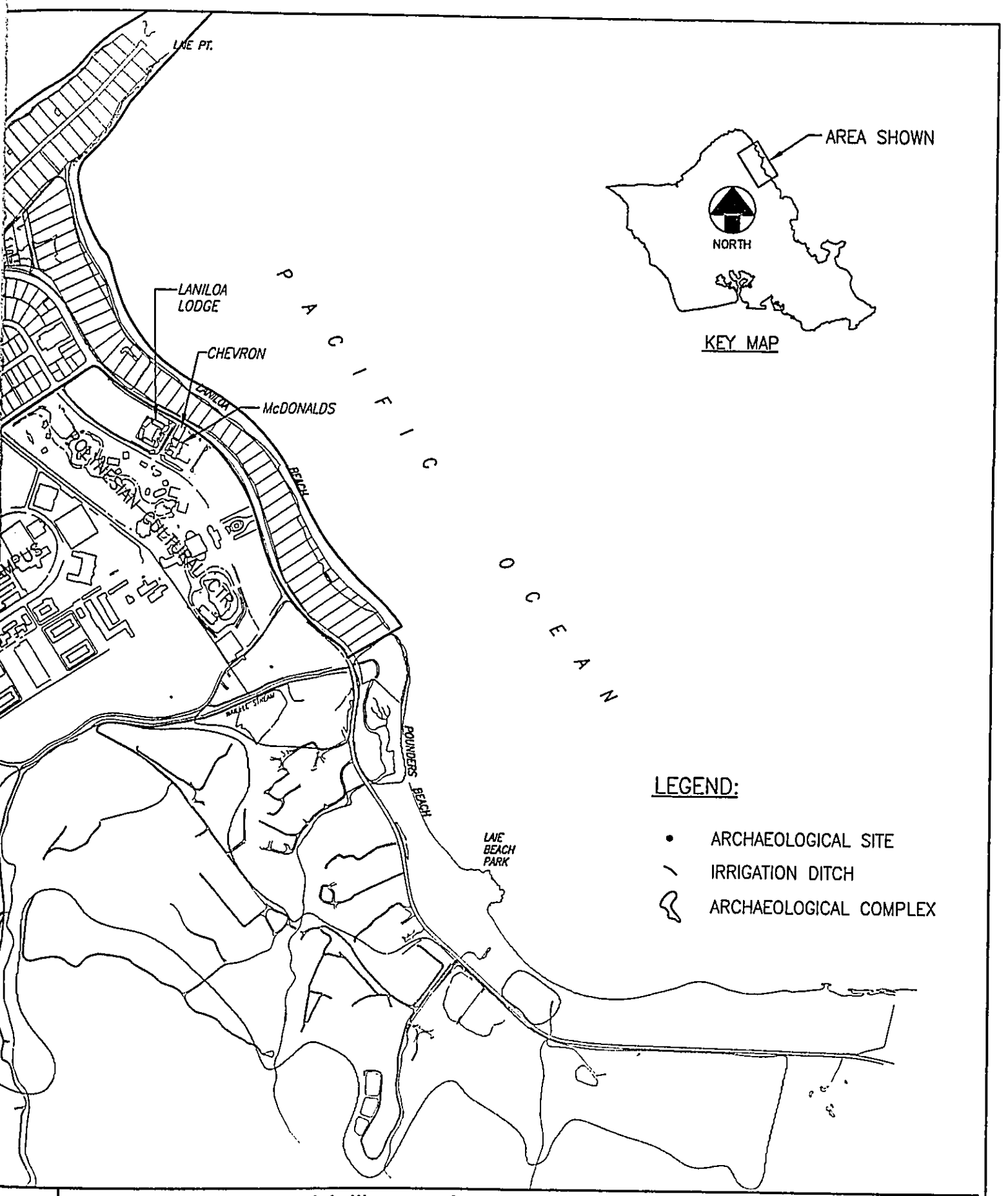


Laie Wastewater Collection System Expansion Phase II

Archaeology Exhibit

Figure
3.2-1

background. The State and County have not identified any view plains or scenic vistas in the project vicinity.

Impacts and Mitigative Measures
There will be no adverse visual impacts associated with the proposed wastewater collection system improvements. All proposed improvements, including collector mains, laterals, and grinder pumps, will be installed underground, thus will not intrude on any view plains. The construction effort will cause temporary visual impacts in the immediate area of work activities. However, these impacts will be temporary, and will cease when the project is complete. No mitigation measures are required or recommended.

3.2.4 RECREATIONAL FACILITIES

There are several City and County parks and a State recreational area within the general area of the proposed project. These recreational areas provide sunbathing, surfing, bodysurfing, fishing, picnicking and volleyball. The Polynesian Cultural Center is a popular commercial recreational attraction while BYU-H provides softball games and tennis.

Impacts and Mitigative Measures
Proposed project activities will not block access or to any of the State or County beach parks or other recreational facilities in the project area. There will be no significant impacts on the use of public recreational facilities.

3.2.5 ACCESS FOR PERSONS WITH DISABILITIES

The Americans with Disabilities Act (ADA) is a wide-ranging civil rights statute that prohibits discrimination against people with disabilities.

Impacts and Mitigative Measures
Proposed improvements consist of installation of underground utilities within existing corridors. None of the improvements will impact access for persons with disabilities to buildings or other facilities. All designs will comply with ADA Accessibility Guidelines.

3.2.6 ECONOMY

Employment opportunities within the La'ie community come from BYU-H, PCC, and other commercial and retail establishments. PCC, a tourist attraction, employs a majority of the area residents while BYU-H also employs a considerable amount of La'ie people. Additional employment is provided by a shopping center, grocery stores, restaurants, and other retail-sales stores. Due to projected population growth increases as anticipated by the City and County's resident and visitor population, the La'ie area will continue to experience an economic surge. Along with new economic opportunities, both resident population and visitor population will continue to grow.

Impacts and Mitigative Measures
The proposed project is not expected to have significant adverse economic impacts. The proposed infrastructure improvements provide one of the basic services needed to support projected development in the area. Economic impacts from the proposed project will result from construction jobs, services, and procurements in the form of construction supplies and equipment. These benefits will be temporary however, and will cease when the project is complete.

3.2.7 POPULATION

La'ie is the largest settlement within the Koolauloa Census Division, comprising an area stretching from Kaaawa to Waimea Bay. The Census Division includes the entire Koolauloa Development Plan Area and a portion of the North Shore Development Plan area. La'ie is a Census Designated Place. Between 1990 and 2000, La'ie's resident population decreased from 5,577 to 4,585, or 17.8 percent. At the same time, the resident population in the Koolauloa Census Division increased 2.5 percent, from 18,443 to 18,899. (State of Hawaii Data Book 2000). Compared to the previous Koolauloa Census Division growth rate of 29.9 percent during the 1980's, the new census numbers indicate a stabilization of the population in the past decade.

Impacts and Mitigative Measures

The proposed Phase II improvements are not expected to have significant adverse impacts on population. The proposed infrastructure improvements provide one of the basic services needed by the existing residents and businesses in the La'ie community.

3.3 INFRASTRUCTURE SYSTEMS AND SERVICES

3.3.1 TRAFFIC AND TRANSPORTATION SYSTEMS

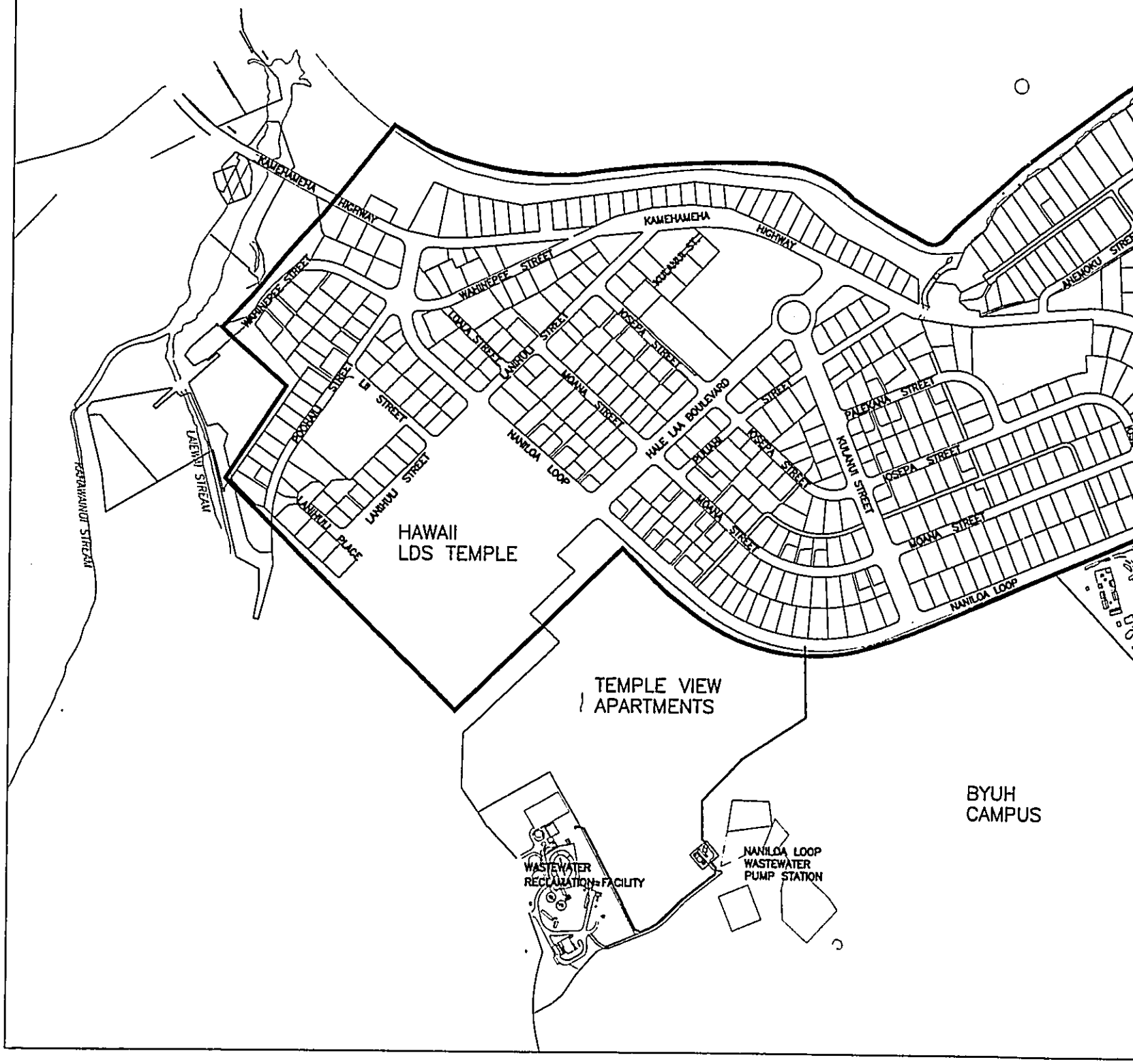
Kamehameha Highway is the main transportation corridor through La'ie, providing one lane of traffic in both directions. Throughout the project area, residential driveways, cul-de-sacs, and collector streets access directly onto Kamehameha Highway. Houses along the shoreline from Pounders Beach north to La'ie Point, and along La'ie Bay have driveways onto the highway. Major residential collector roads that intersect Kamehameha Highway include Naupaka Street, Naniloa Loop, Puuahi Street, Wahinepee Street, Lanihuli Street, and Kulanui Street. In addition, Hale Laa Boulevard provides access to the LDS Temple. See **Figure 3.3-1, Roadways.**

Impacts and Mitigative Measures

Proposed project activities will require extensive work within roadway corridors throughout La'ie. Sewer main installation will occur within roadway shoulders. Construction will not involve excavation within lanes of travel on Kamehameha Highway. However, construction staging and work activities will take place immediately adjacent to Kamehameha Highway and other roadways, and may result in traffic slow downs from temporary detours and the presence of large, slow-moving vehicles and heavy equipment. On residential streets, excavation will occur within the travel lane, thus requiring temporary detours for motor vehicle, bicycle, and pedestrian traffic. Detours can be accommodated within the existing street widths, and will not require re-routing of traffic.

Traffic control barricades, cones, signage, and lighting will be used as necessary to alert drivers and delineate construction boundaries. Approach signs and a flag person will be positioned to direct traffic through temporary traffic control zones as necessary. Officers from HPD will be employed to direct traffic at intersections. To minimize traffic impacts to the nearby residents, the contractor will schedule heavy truck activity as much as possible between the hours of 9:00 a.m. and 3:00 p.m. on weekdays. Heavy truck activity in the vicinity of La'ie Elementary School will be scheduled so as not to interfere with after-school traffic. The HPD will be notified prior to periods of heavy truck activity or during transport and operation of heavy equipment.

The proposed project is expected to have short-term impacts in the form of traffic slow-downs as previously described. The project will also result in a temporary increase in vehicle trips attributable to workers traveling to and from the work site, and the use of



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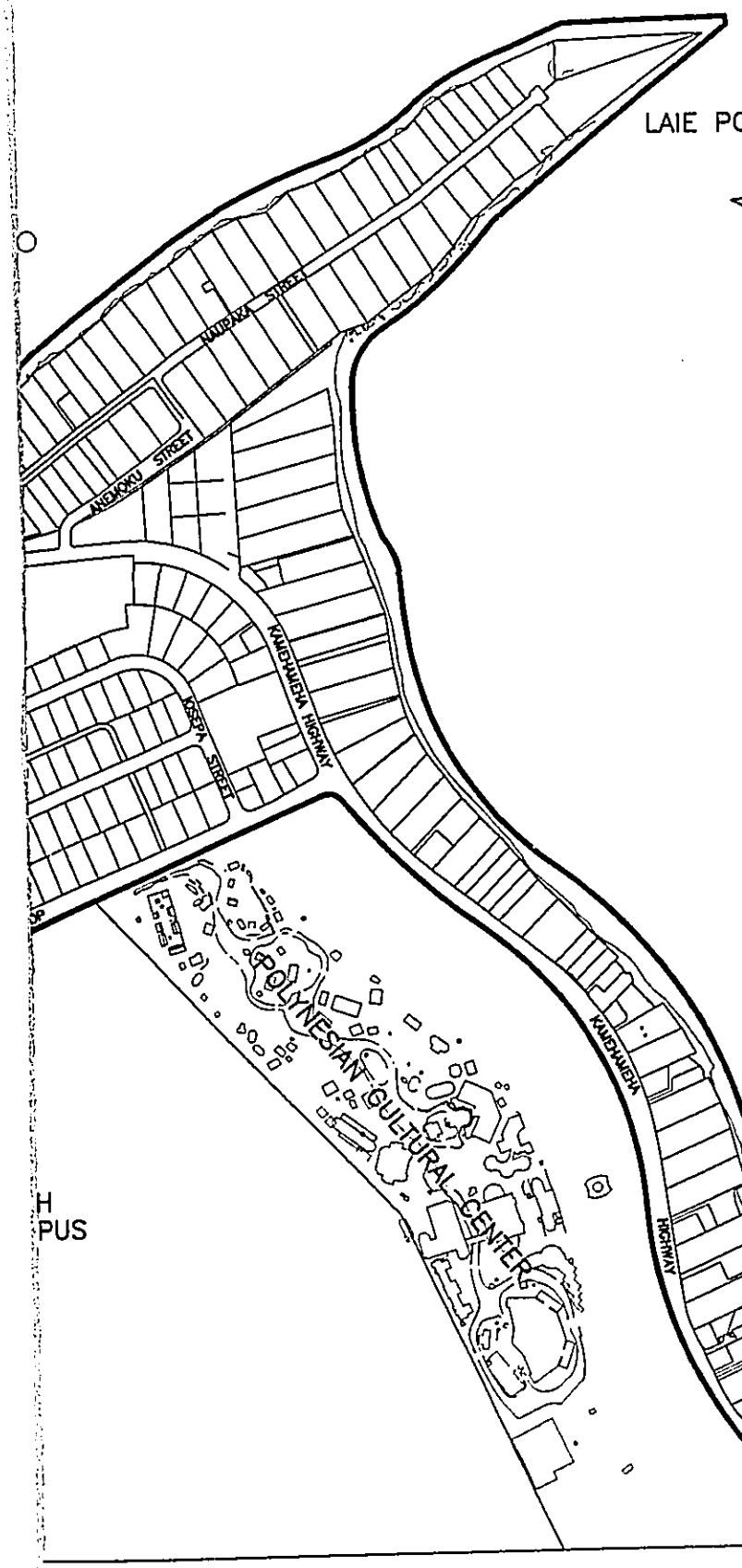
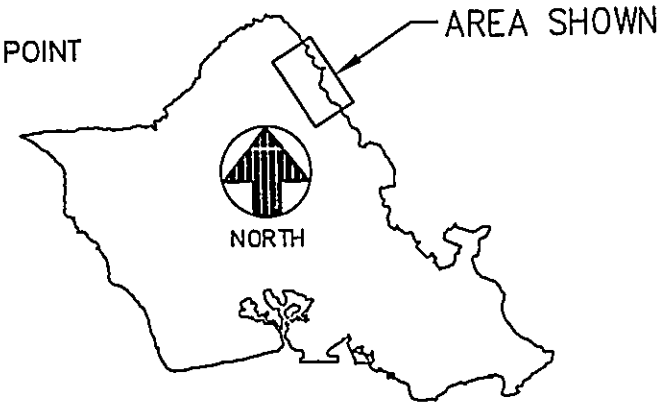




KEY MAP

LEGEND

PROJECT BOUNDARY

PROPERTY LINES

WORK ACTIVITIES ARE PLANNED ON ALL STREETS WITHIN THE PROJECT BOUNDARY

1000'

LAIE WASTEWATER COLLECTION SYSTEM EXPANSION PHASE II

ROADWAY MAP

Figure 3.3-1

construction vehicles during the course of work. All construction-related traffic impacts are temporary, however, and will cease upon project completion.

Short-term construction-related impacts will be mitigated by restricting the hours of construction vehicle activity to non-peak traffic periods, and by the use of traffic control measures as previously described. All traffic control measures will be designed to minimize impacts on continued traffic flow. With the proposed mitigation measures in place, significant short-term adverse impacts to traffic are not anticipated.

Long-term impacts to traffic may result from the need to conduct future repairs or replacement of the waste water collection system mains within existing roadway corridors. Future maintenance activities would create impacts similar to those anticipated from the proposed project and would be mitigated by employing traffic control measures, scheduling construction activities, and otherwise ensuring that the contractor follows Sate and City traffic control regulations.

Based on these findings, no significant adverse impacts are expected to result from this project.

3.3.2 POTABLE WATER SYSTEM

The La'ie community's primary drinking water supply comes from two wells, identified in **Figure 3.3-2** as "Quarry Wells" No. 3856-04 and -06 (Well No. 3856-05 is no longer used). Three additional wells, identified as the "BYU Wells" No. 3855-06, -07, and -08, provide back-up supply. The "Temple Well" No. 3956-03, is no longer used as a potable source. Potable water is currently used for residential, institutional, and commercial services. The system is not connected to the Board of Water Supply (BWS) however, the system has been evaluated by BWS for possible operation in the future.

The potable water is pumped from a contained artesian aquifer and stored in a 2.0 million gallon reservoir, located mauka of the BYU-H campus. The reservoir is a welded steel tank that was reconstructed in 1987. The reservoir provides water through a single system that serves the La'ie community.

Impacts and Mitigative Measures

The proposed Phase II improvements do not require a potable water supply and will not impact the potable water system. Daily water demands will not be affected by this project. Continued availability of potable water is anticipated.

3.3.3 DRAINAGE SYSTEM

Drainage in the Laie area has been a significant concern due to the low elevations, high groundwater table, and the higher elevation of Kamehameha Highway which acts like a dam. Laie is bordered by two streams, Kahawainui to the north and Wailele to the South. Wailele has been a source of flooding. The existing drainage system is illustrated in **Figure 3.3-3.**

Impacts and Mitigative Measures

The proposed project will have proper drainage controls to accommodate additional runoff. Control of the runoff will be through storm drainage facilities, swales, detention basins, and pits as needed. No adverse impacts to the existing drainage systems are anticipated.

3.3.4 WASTEWATER SYSTEM

Wastewater from the service area will be conveyed to the pump station and pumped through a force main to the Laie Wastewater Reclamation Facility (LWRF) for treatment and disposal. Should incoming wastewater flows exceed the pumping capacity of the WWPS, the excess flow would be diverted to an existing drainage ditch, then to an existing 48" drain, and to an existing 12'x4.5' box culvert, and finally discharged into the ocean. Any unintentional or intentional discharge of wastewater from the wastewater system at any point other than the predetermined discharge point is considered a wastewater spill. Depending on quantity and location, a wastewater spill may have to be reported to the Department of Health, Clean Water Branch.

Ownership and operation of the wastewater system, including the LWRF, will be transferred from Hawaii Reserves, Inc. (HRI), to the City and County of Honolulu as part of the *Cooperative Agreement to Jointly Construct a Collection System and Transfer the Laie Wastewater Reclamation Facility.* HRI and the City will continue to comply with the requirements of the *Environmental Water Quality Monitoring (EWQM) Plan for the La'ie Water Reclamation Facility*, dated August 2002. Prior to the transfer of LWRF ownership, an additional agreement will be established between HRI and the City to assign specific responsibilities for EWQM plan requirements as required by the State Department of Health.

Impacts and Mitigative Measures

The proposed system will convey wastewater to the new BYU-H pump station. Proposed upgrades to the sewer system will reduce the risk of leaks or spills from aging sewer lines and failing cesspools.

3.3.5 ELECTRICAL AND COMMUNICATIONS SYSTEMS

The electrical power and communications utilities which serve La'ie are privately owned by Hawaiian Electric Company and Hawaiian Telephone Company. Existing overhead transmission lines deliver 46 kV power to the Hauula and Kahuku substations, which then steps power down to 11.5 kV for overhead distribution in La'ie.

Impacts and Mitigative Measures

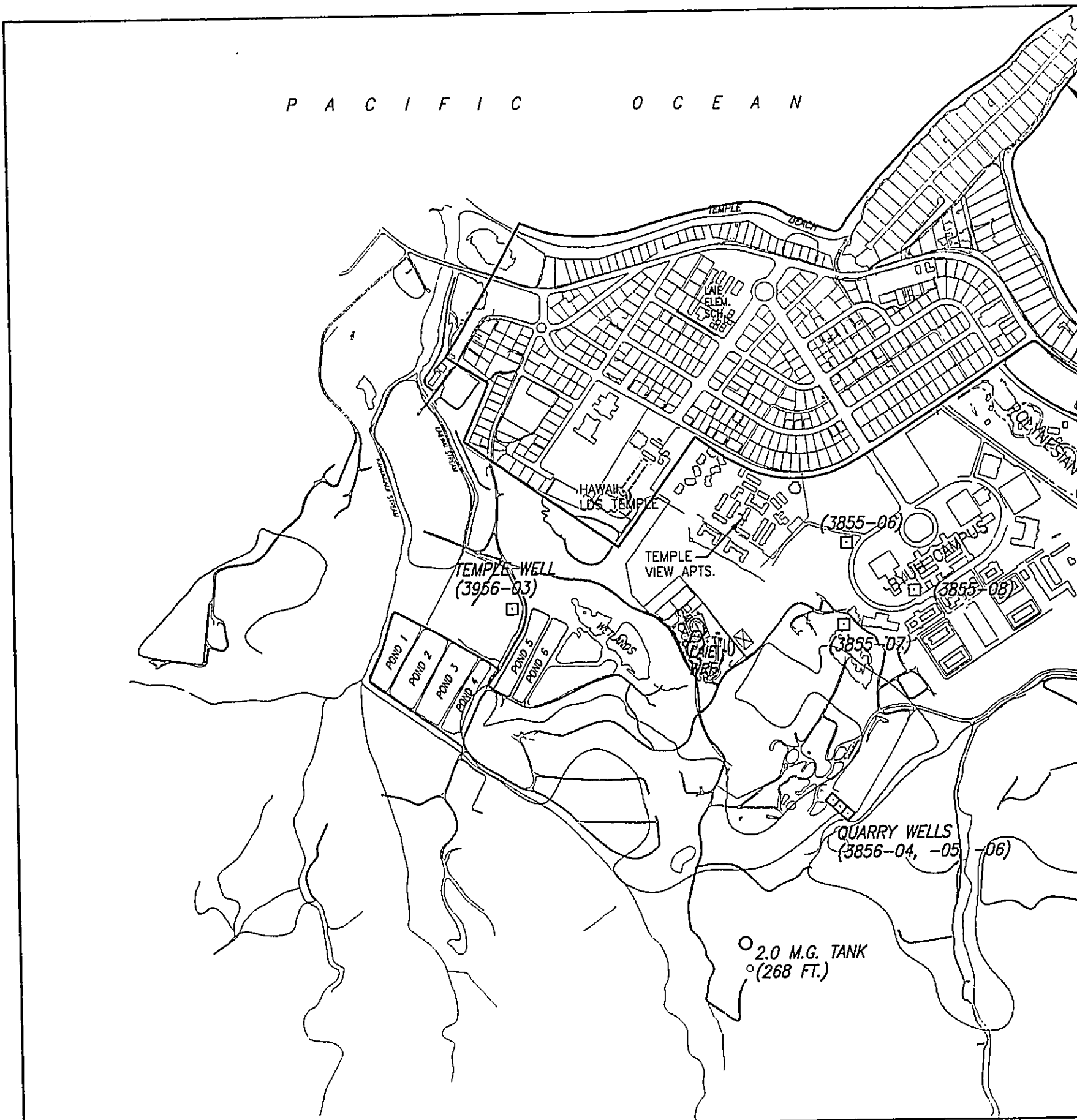
The grinder pumps are expected to generate an electrical load requirement of approximately 200 kilowatt-hour (kwh) per pump per year. With an estimated 724 pumps in operation, annual electrical load requirements for the entire grinder pump system will be 144,800 kwh per year. The HECO system has adequate service capacity to meet the projected power requirements of the proposed project. The use of electrical power for the grinder pump system will provide a significant benefit to the community by improving the reliability of the wastewater system and reducing the risk of wastewater spills. The proposed improvements will not adversely effect the provision of electrical power in the community.

3.3.6 SOLID WASTE DISPOSAL SYSTEM

Presently the solid waste generated by La'ie residents is collected by both private vendors and from the City and County of Honolulu and disposed of at the Waimanalo Gulch landfill near Ewa or the H-Power facility in Campbell Industrial Park. At the northern end of La'ie adjacent to the City and County's Corporation Yard there is a City-operated "convenience center" where residents can drop off their waste. Depending on the type, waste from the convenience center is recycled, combusted, or disposed of in a landfill.

Impacts and Mitigative Measures

The proposed project is not expected to have a significant impact on the solid waste disposal system or significantly effect the amount of solid waste generated at the facility.



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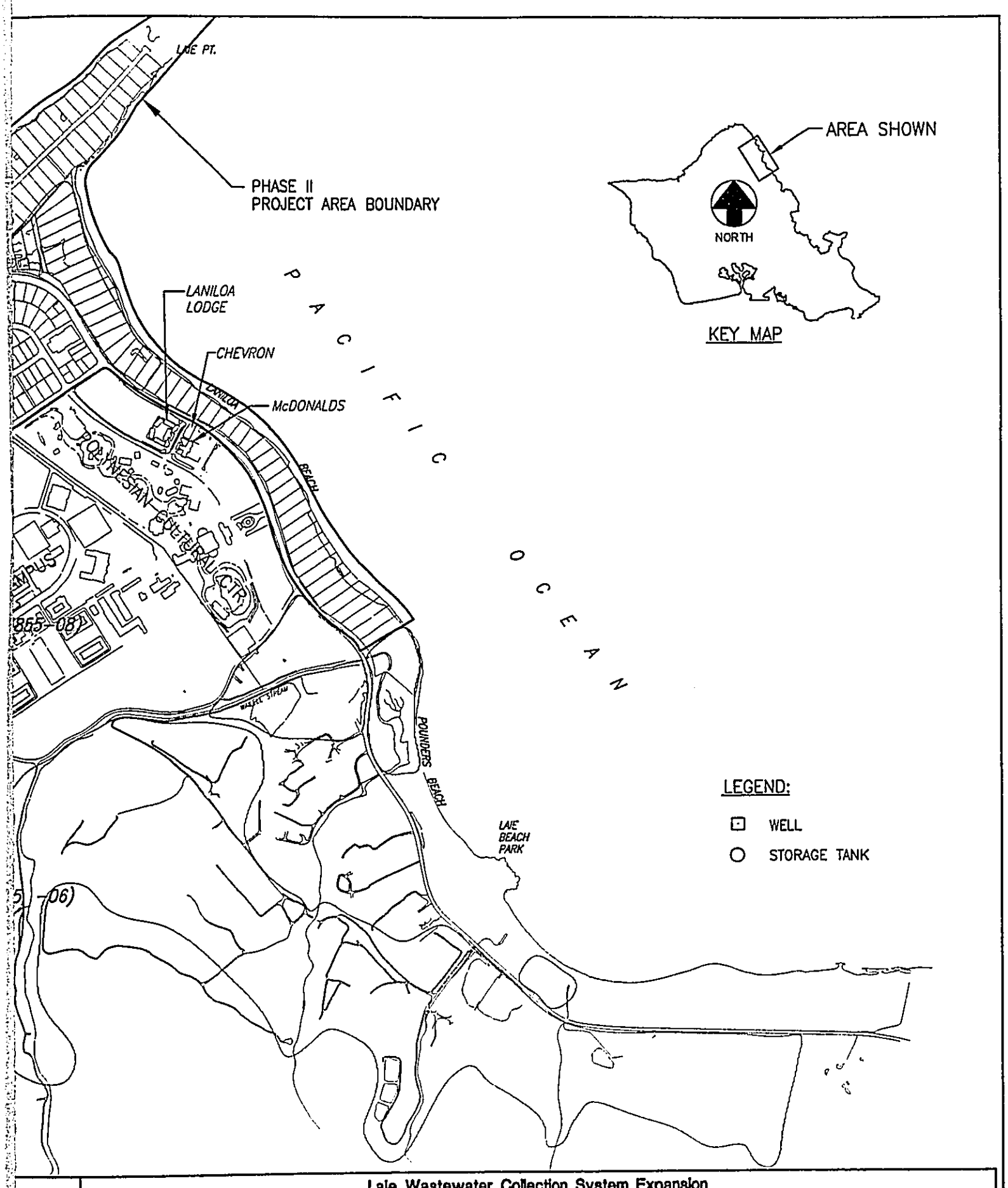
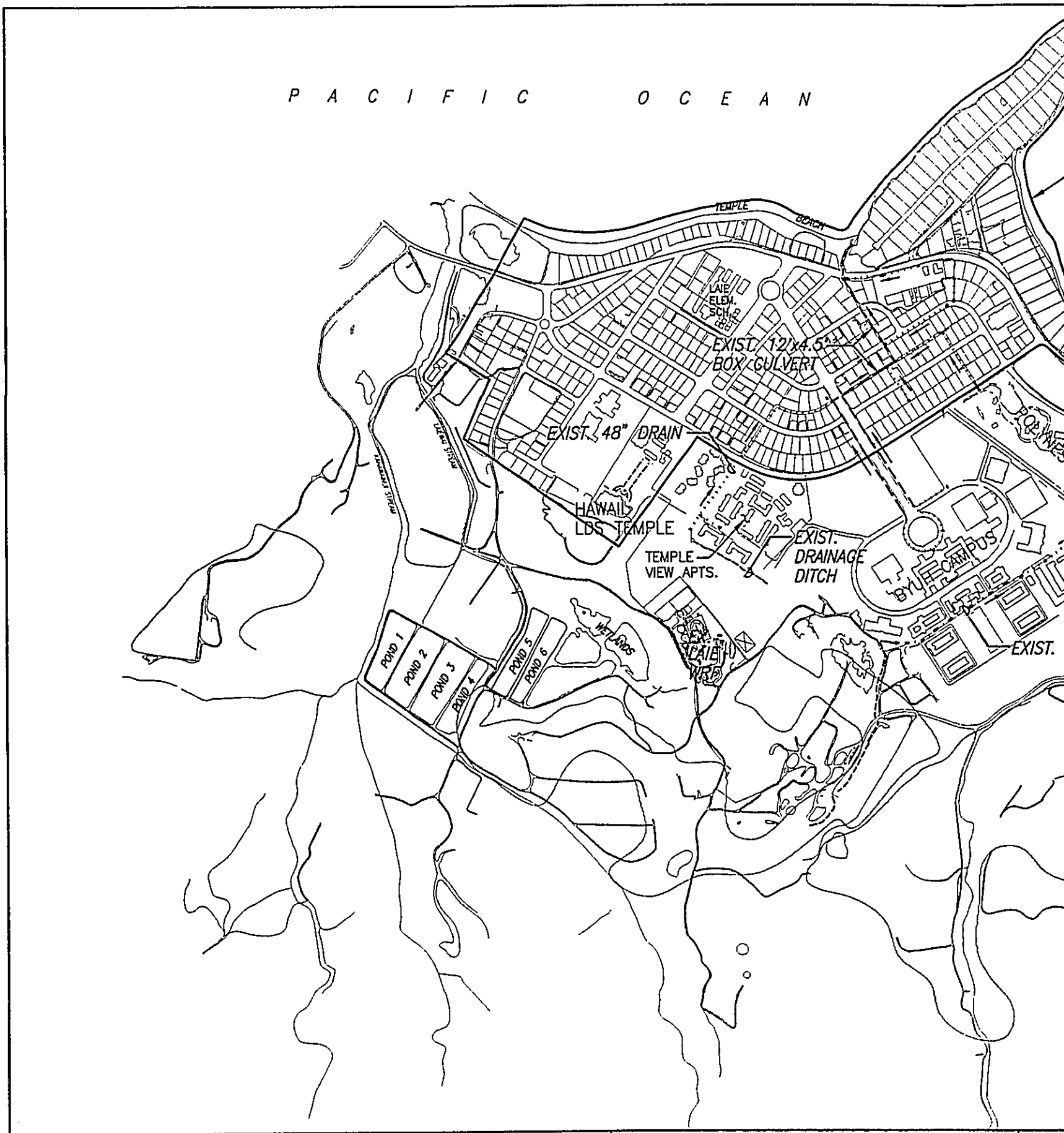


Laie Wastewater Collection System Expansion

Existing Potable Water System

Figure
3.3-2



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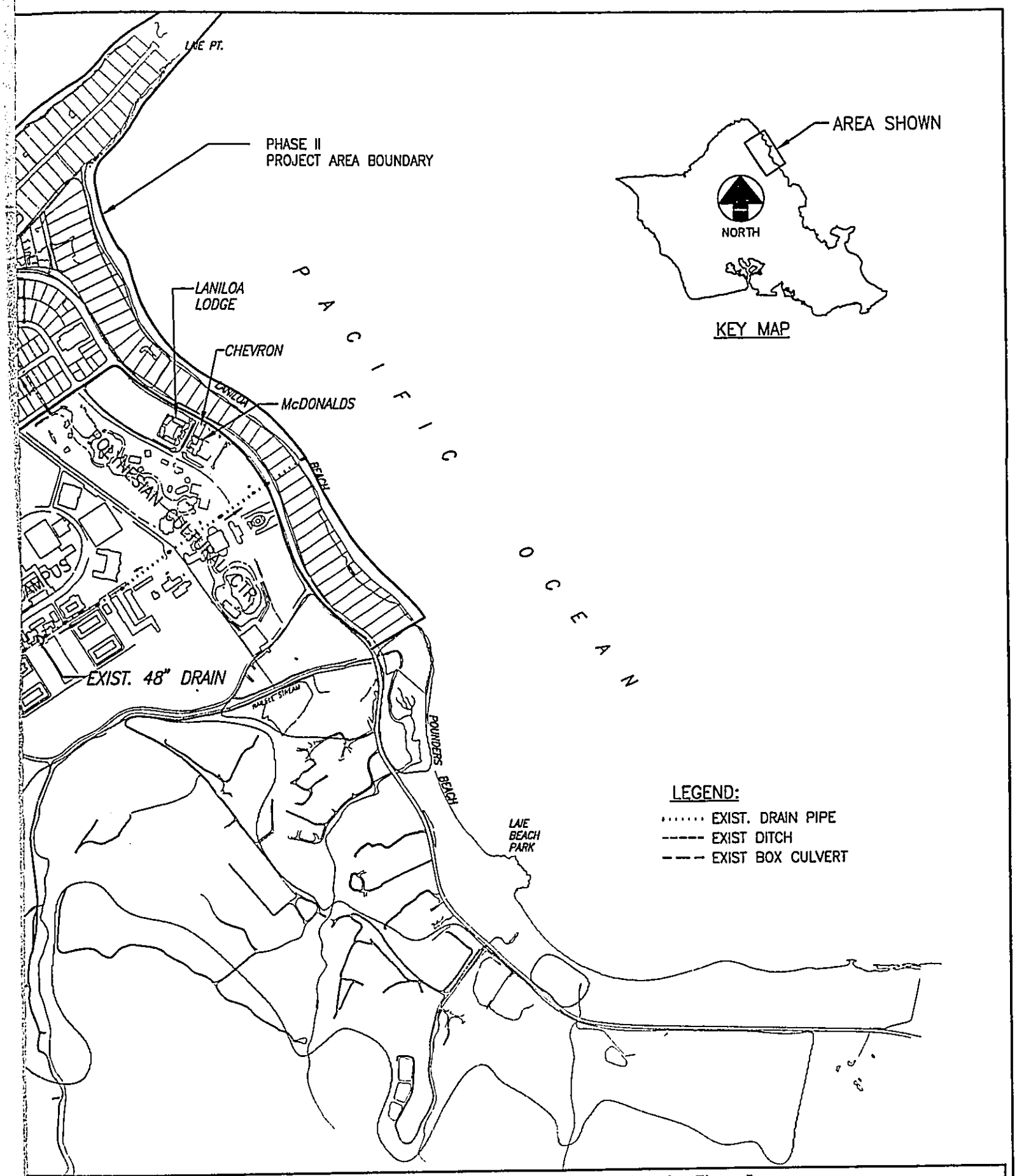

Laie Wastewater Collection System Expansion Phase II

Existing Drainage System

Figure
3.3-3

SECTION 4
Relationship to State and County Land Use Plans and Policies

4.1 THE HAWAII STATE PLAN

The Hawaii State Plan, Chapter 226, Hawaii Revised Statutes, serves as a written guide for the future long range development of the State. The Plan identifies statewide goals, objectives, policies, and priorities.

The proposed project would be in conformance with the State Plan, Section 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.*

The La'ie wastewater collection system will provide sewerage to homes and businesses in the La'ie community that currently rely on aging cesspools for wastewater disposal. The proposed collection system will provide a significant environmental and public health benefit by minimizing the likelihood of ground and surface water contamination from malfunctioning cesspools.

4.2 STATE LAND USE LAW

The La'ie area includes lands which are designated by the State of Hawaii in three categories, including Urban, Agricultural, and Conservation as presented in **Figure 4.2-1.** Proposed Phase II improvements fall within the State Land Use Urban and Agricultural Districts. Those portions of the project located in the State Urban District are subject to zoning regulations under the City and County of Honolulu Land Use Ordinances.

4.3 CITY AND COUNTY GENERAL PLAN

The City and County of Honolulu General Plan serves as a written guide for the future long-range development and welfare of Oahu. The Plan identifies island-wide goals, objectives, policies, and priorities for achieving the aspirations of Oahu's residents.

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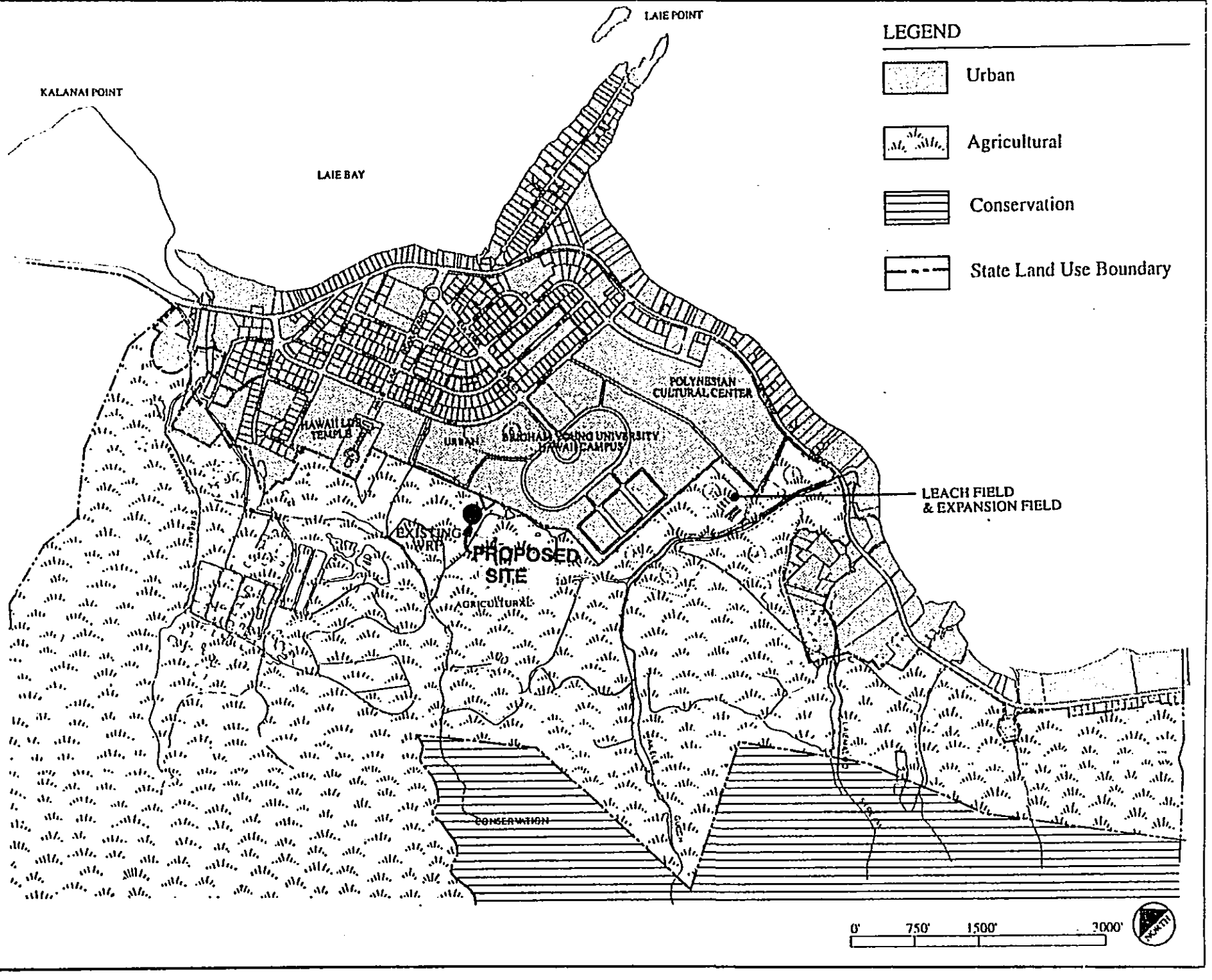
Laie Wastewater Collection System Expansion

STATE LAND USE DISTRICTS

Figure 4.2-1



The proposed project is in accordance with the following objectives of the City and County General Plan:

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.*
- *Policy 6 - Support programs to recover resources from solid waste and recycle wastewater.*

Objective C - To maintain a high level of service for all utilities

- *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.*

The proposed improvements will replace aging and poorly performing cesspool systems with a safer and more reliable wastewater collection and treatment system. The proposed project will provide a significant environmental and public health benefit by minimizing the potential for contamination from failing cesspools. Wastewater collected in the proposed system will be treated to a high level of purity before being recycled for irrigation and other non-potable uses. This additional source of non-potable water will reduce demands on potable water resources in the La'ie community.

4.4 CITY AND COUNTY ZONING

Zoning in the project area is depicted in **Figure 4.4-1, City and County Zoning Districts**. Zoning through which the new collection system will pass includes the following:

Preservation (P-2) - lands to be preserved and managed as major open space and recreation lands, and lands of scenic or other natural resource value.

Agricultural (AG-1 Restricted, AG-2 General) - The AG-1 Restricted Agricultural District zoning designation generally includes lands classified as "Prime" or "Unique" under the Agricultural Lands of Importance to the State of Hawaii (ALISH) system. The AG-2 General Agricultural District zoning designation includes lands to be conserved and protected for agricultural activities on smaller parcels of land.

Residential (R-5, R-7.5) - lands that are to be managed for urban residential development.

The proposed wastewater collection system improvements meet the definition of a "Type A Utility Installation" under the City and County of Honolulu Land Use Ordinance (LUO). This use is permitted in any City zoning district (LUO Table 21-3, and Sec. 21-5.650).

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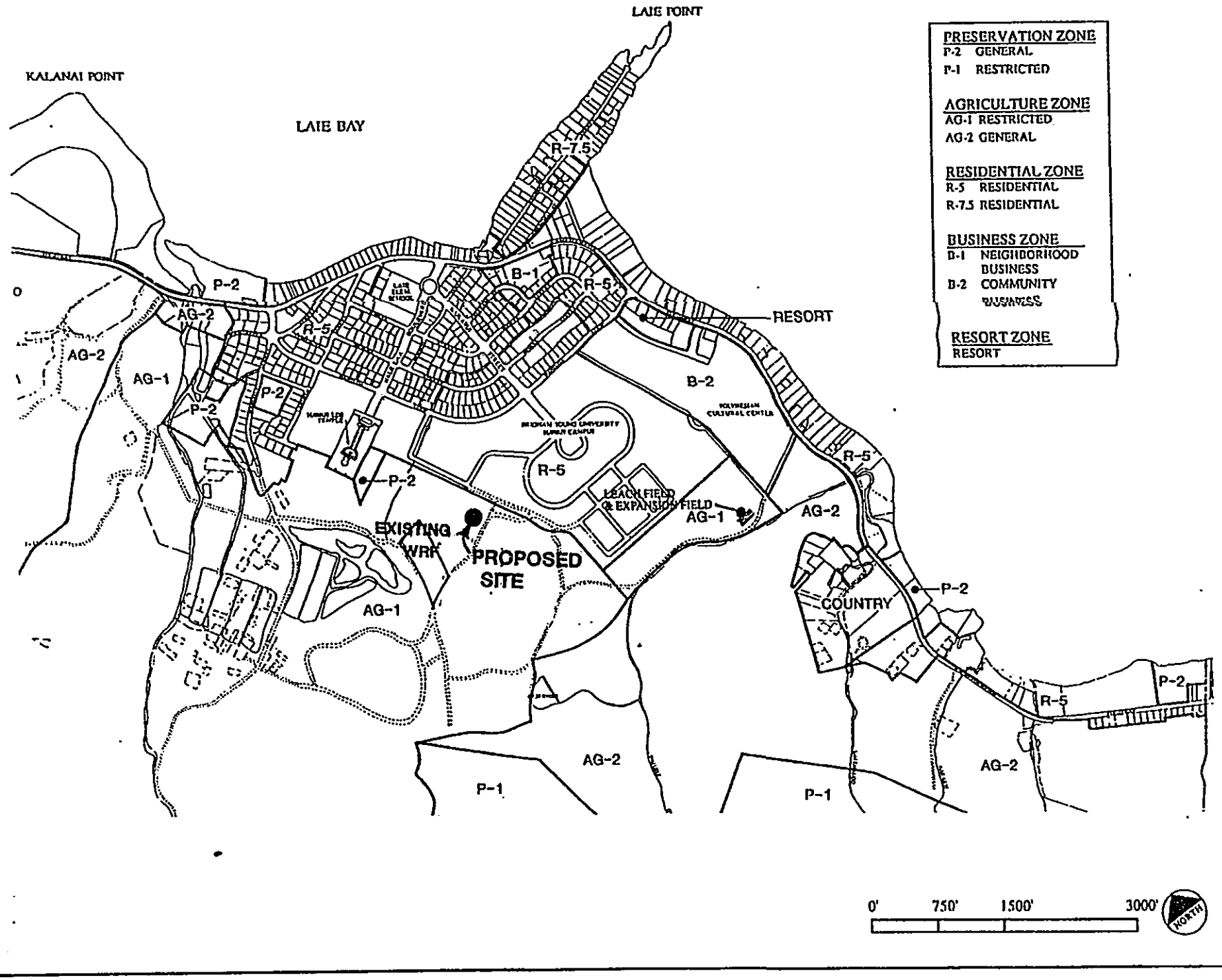
Lale Wastewater Collection System Expansion

CITY AND COUNTY ZONING DISTRICTS

Figure 4.4-1



PRESERVATION ZONE
P-2 GENERAL
P-1 RESTRICTED

AGRICULTURE ZONE
AG-1 RESTRICTED
AG-2 GENERAL

RESIDENTIAL ZONE
R-5 RESIDENTIAL
R-7.5 RESIDENTIAL

BUSINESS ZONE
B-1 NEIGHBORHOOD BUSINESS
B-2 COMMUNITY BUSINESS

RESORT ZONE
RESORT

4.5 KO'OLAU LOA SUSTAINABLE COMMUNITIES PLAN

The Ko'olau Loa Sustainable Communities Plan (City and County of Honolulu Ordinance 99-72) provides policies, guidelines, and conceptual schemes to serve as a guide for more detailed zoning maps and regulations and for public and private sector investment decisions. The proposed project is being developed in accordance with Section 4.3, Wastewater Treatment, of the Ko'olau Loa Sustainable Communities Plan. The following general policies apply to wastewater in Ko'olau Loa:

- Encourage coordination between public agencies and private landowners in addressing adequacy of wastewater treatment within the region. The planned expansion of the La'ie Water Reclamation Facility proposed for existing and future homes in La'ie should proceed in accordance with applicable State and Federal regulations and conditions of existing land use approvals.

- Provide collection systems, where practical, to eliminate individual cesspools, and to protect aquifers, streams, estuaries and near-shore waters from contamination.

- Replace outdated individual cesspools with septic tanks and leaching fields.

- Encourage water recycling at Kahuku Wastewater Treatment Plant.

- Treat and beneficially use, where feasible, reclaimed water for irrigation as a water conservation measure.

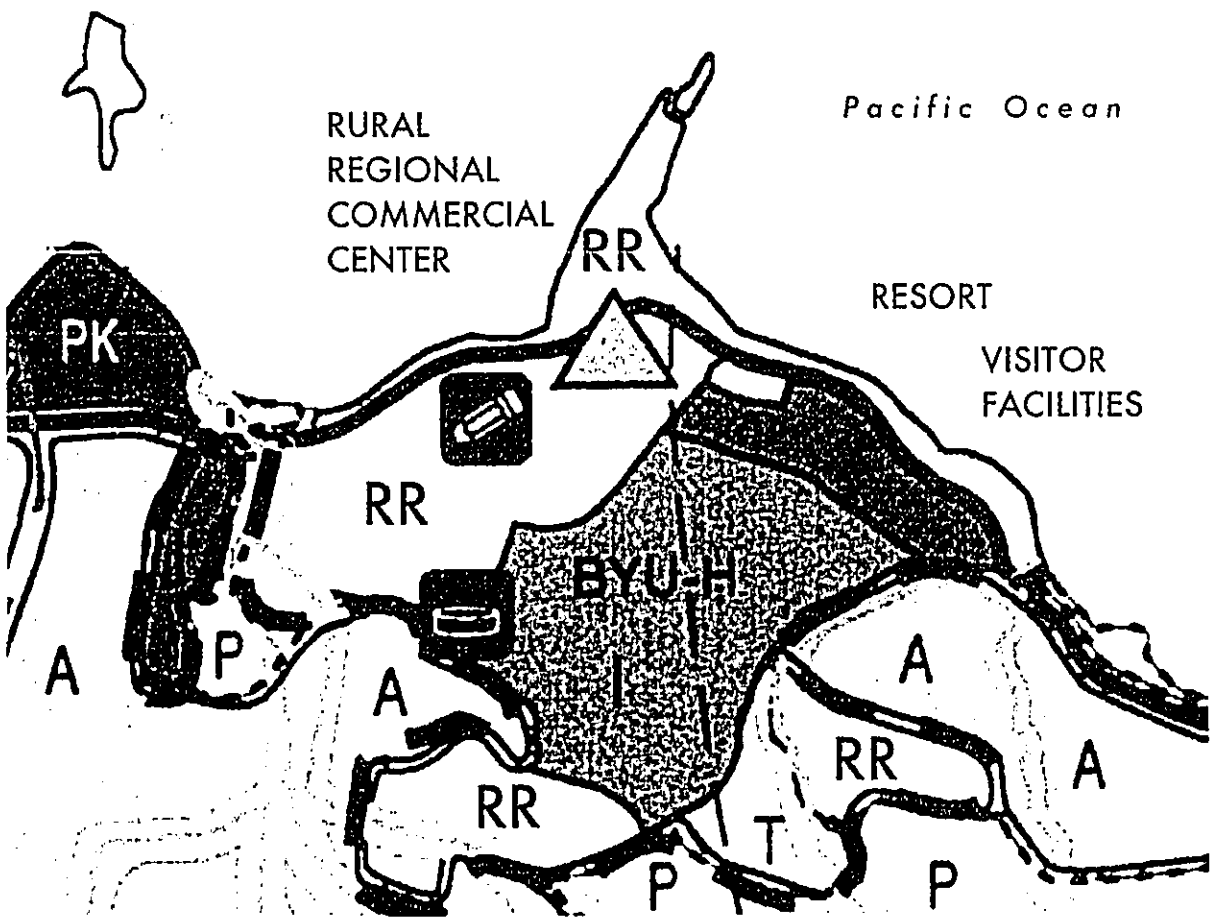
Land use designations under the Ko'olau Loa Sustainable Communities Plan are depicted in **Figure 4.5-1**.

4.6 SPECIAL MANAGEMENT AREA (SMA) RULES AND REGULATIONS

The City and County of Honolulu has designated the shoreline and certain inland areas of Oahu as being within the Special Management Area (SMA). SMA areas are defined sensitive environments that should be protected in accordance with the State's Coastal Zone Management policies, as set forth in Hawaii Revised Statutes (HRS), Section 205A, and Revised Ordinances of Honolulu (ROH), Chapter 25, Shoreline Management.

As depicted in **Figure 4.6-1, SMA Boundary**, a large portion of the proposed Phase II wastewater collection system improvements lie within the SMA area. Phase II improvements, however, are excluded from the definition of "development" subject to special management area permit requirements (Consultation with City and County of Honolulu, Department of Planning and Permitting, July 15, 2002. See also letter from DPP dated October 23, 2002, in Appendix F). ROH §25-1.3 states:

> *(2) "Development" does not include the following:*
> *(M) Installation of underground utility lines and appurtenant aboveground fixtures less than four feet in height along existing corridors;*



LEGEND

A Agricultural

I Institutional

Brigham Young University - Hawaii

P Preservation

PK Park

RR Rural Residential

T Technology Park

Wastewater Treatment Plant

Elementary School (State)

Source: *Ko'olau Loa Sustainable Communities Plan*, City & County of Honolulu, October 1999

Laie Wastewater Collection System Expansion

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KOOLAULOA SUSTAINABLE COMMUNITIES PLAN LAND USE DESIGNATIONS

Figure 4.5-1

(N) Structural and nonstructural improvements to existing single-family residences including additional dwelling units, where otherwise permissible;

All proposed collector mains will be installed subsurface along existing roadway corridors. thereby meeting the exclusion criteria under item (M). Laterals and grinder pumps installed on residential properties meet the SMA exclusion criteria according to item (N).

In addition, all proposed improvements are designed to conform to rules relating to shoreline setbacks (ROH Chapter 23). The Phase II wastewater collection system expansion will not encroach on the shoreline setback area. Grinder pumps and laterals will be installed a minimum of 55 feet inland from the highwater mark, as evidenced by the vegetation line or line of tidal debris. In locations where the shoreline is fixed by either a seawall, revetment, or natural rocky or coral shoreline, and a previously certified shoreline survey is available, grinder pumps and laterals will be installed a minimum of 40 feet from the previously certified shoreline. By conforming to these design criteria, the proposed activities will not require a shoreline setback variance (Consultation with City and County of Honolulu, Department of Planning and Permitting).

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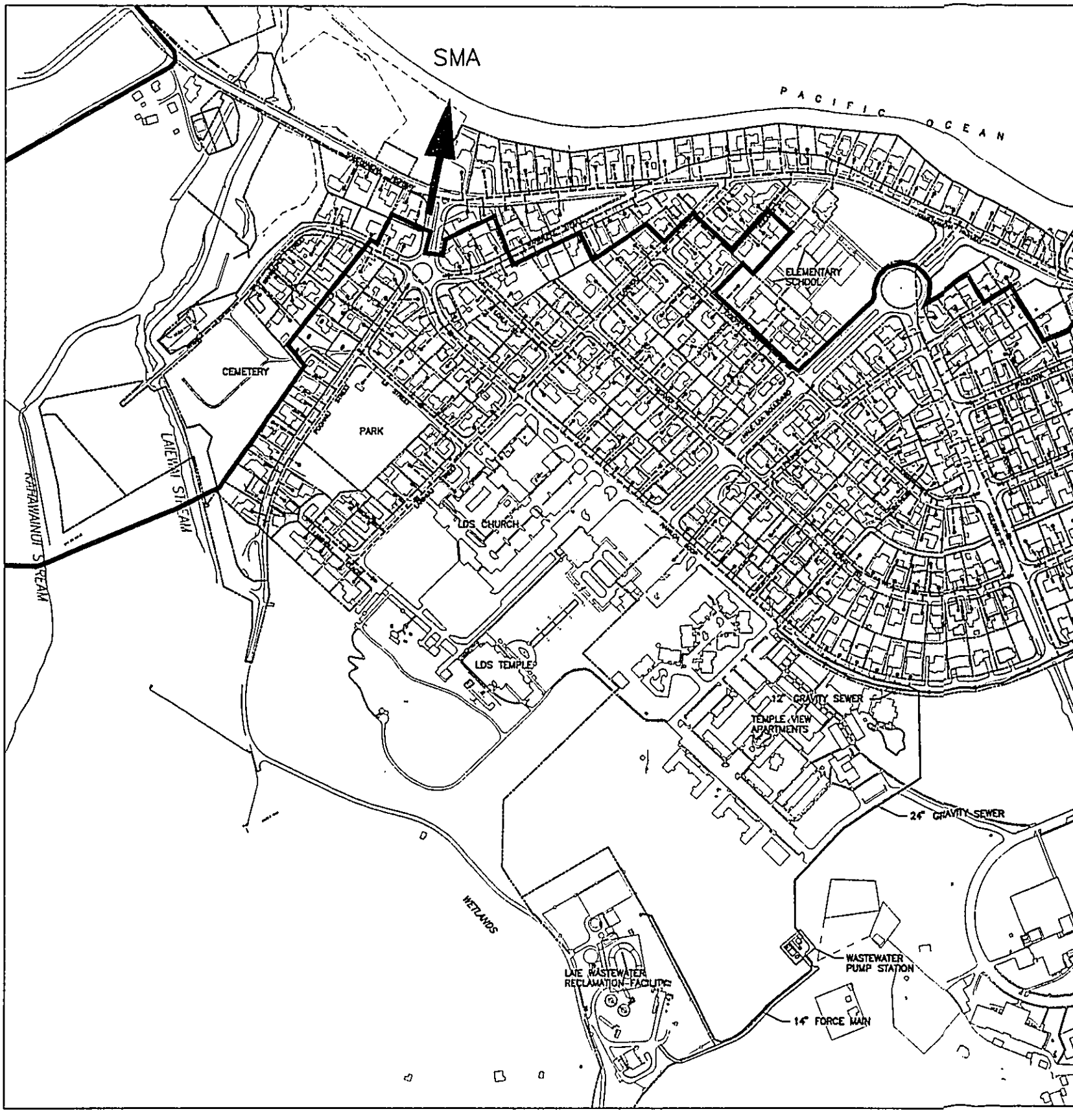

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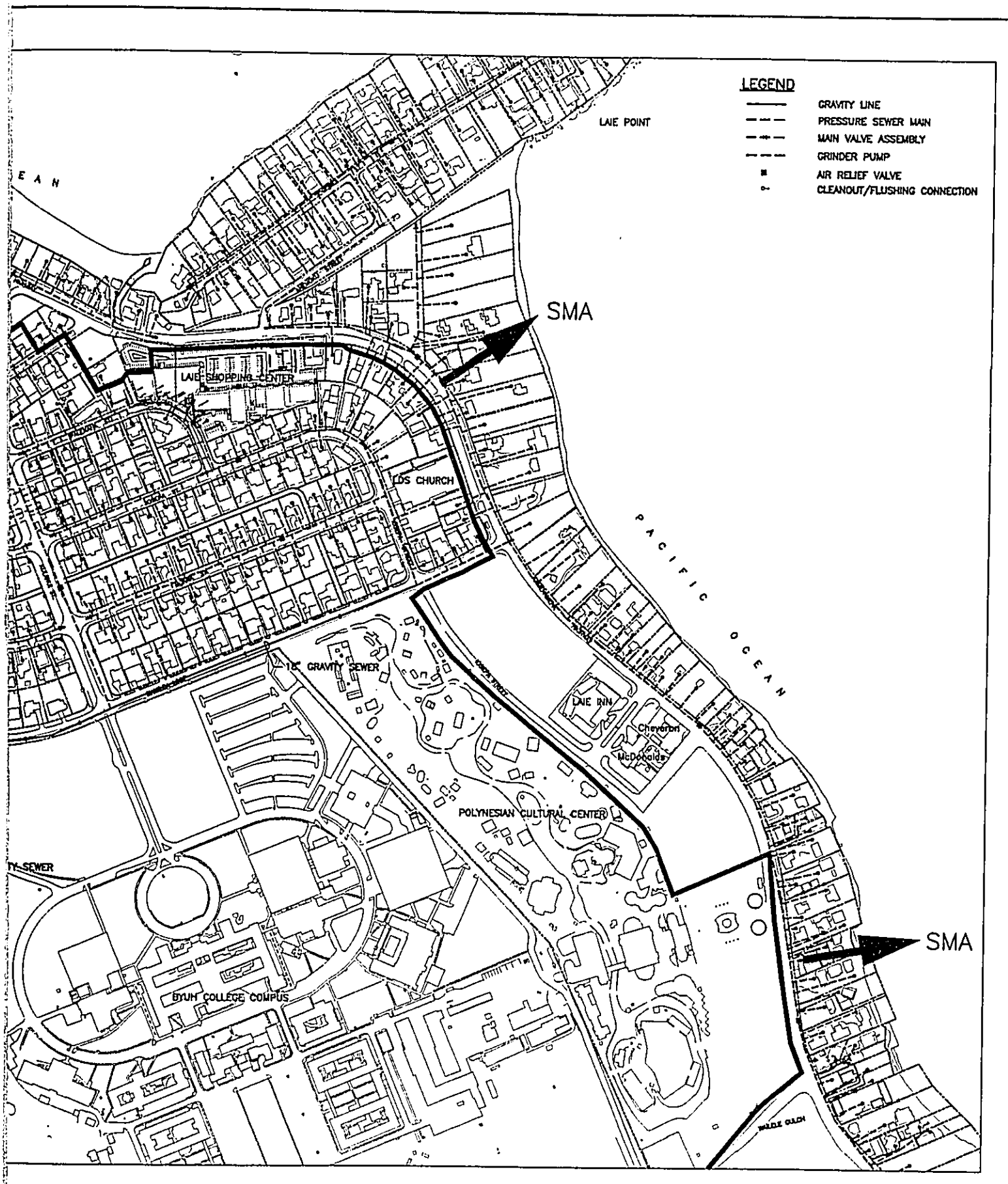

LAIE WASTEWATER COLLECTION SYSTEM EXPANSION PHASE II

SPECIAL MANAGEMENT AREA

Figure 4.6-1

3.3.7 FIRE, POLICE AND MEDICAL SERVICES

Fire protection service is provided through the Honolulu Fire Department's Kahuku and Hauula Fire Stations. Each fire station has one fire truck and is able to provide engine and medical services. Police protection services are provided by the Honolulu Police Department's Kahuku Substation. The Kahuku Hospital is located approximately five to ten minutes drive by car from La'ie and provides health care services.

Impacts and Mitigative Measures

The proposed project is not expected to have an adverse impact on fire, police and medical services. Fire apparatus access will be maintained throughout the construction site for the duration of the project. The Fire Communication Center will be notified of any interruption in the existing fire hydrant system during the project.

SECTION 5
Alternatives to Proposed Action

5.1 NO ACTION

If "No action" is taken, then the existing unsewered homes in the Laie area will continue to dispose of raw sewage through the use of cesspools and septic tanks. Since cesspools discharge wastewater directly into the ground, they will continue to be a potential source of groundwater and surface water contamination. The risk for contamination is increased further, because of the deterioration and poor performance of these cesspools. For these reasons, this alternative was rejected.

5.2 OPTIMIZE OPERATION OF EXISTING FACILITIES

This alternative would attempt to optimize the performance of the existing on-site cesspools. Experience has shown that little can be done to significantly improve older cesspools which have declined in capacity and require frequent pumping. Additionally, portions of the existing gravity collection system (Phase I construction) do not meet current City design standards. Many of these gravity lines have inadequate slopes resulting in flow velocities below that needed for scouring. For these reasons, this alternative was rejected.

5.3 CONVENTIONAL GRAVITY SEWER SYSTEM (COLLECTION SYSTEM) WITH MINIMAL GRINDER PUMPS

The principal components of this alternative are as follows:

Dual service lateral connections
All existing residential sewer lines replaced with City standard gravity lines
Semi-positive displacement grinder pumps
Minimum of 4 feet cover maintained for all piping
Minimum slopes to provide adequate scouring velocities of 2 feet per second

This is not a feasible alternative as the installation depths to achieve the necessary slopes are quite large, and therefore require conventional pump stations (deeper), resulting in overall higher costs. For example, to accommodate a gravity system, pipe depths at the Naniloa Pump Station would have to be 17 feet deep. Future repairing or replacing of the sewer lines will be very difficult and costly due to the depth, high water table, and relatively unstable soil conditions. Additionally, directional drilling can not be used for gravity sewer installations. The drilling procedure is not accurate enough for precise lines of grade required for gravity sewers.

This alternative was also considered in the Phase I Environmental Assessment and rejected for the reasons described above. The Phase I gravity main and pump station are constructed to accommodate a low-pressure collection system such as that designed for Phase II.

5.4 PARTIAL GRAVITY SEWER SYSTEM (COLLECTION SYSTEM)

The principal components of this alternative are as follows:

Dual service lateral connections.
All existing residential sewer lines will be replaced with either City Standard gravity lines or low pressure lines.
Maximum pipe depth (approx. 13 ft.) for this system is near the Naniloa Pump Station.
Grinder pump station with submersible grinder pump, level controller and alarm indication, check valve on discharge line and external control panel.

The blended gravity/grinder sewer system was considered, but was rejected as it would seem reasonable to either use a predominantly gravity system or a predominantly grinder system. Similar to the gravity system alternative, the blended system had high costs associated with the excavation and installation of the gravity lines.

SECTION 6
Necessary Permits and Approvals

6.1 CITY AND COUNTY OF HONOLULU

The following permits are required from the City and County of Honolulu, Department of Planning and Permitting:

- Building Permit
- Grading, Grubbing, Excavation and Stockpiling Permits
- Street Usage Permit

The following approvals/determinations are required by the City and County of Honolulu:

- Department of Design and Construction
- Department of Environmental Services
- Flood Determination in General Flood Plain District - Department of Planning and Permitting
- Landscaping Plan - Department of Planning and Permitting
- Special Management Area Determination (see **Section 4.6** of this document)

6.2 STATE OF HAWAII

The following permits are required by the State of Hawaii:

- NPDES Permit for Construction Related Discharges - Department of Health

The following approvals/review are required by the State of Hawaii:

- Air Pollution Control - Department of Health
- Archaeological Review - Department of Land and Natural Resources
- Community Noise Control - Department of Health
- Wastewater Systems - Department of Health
- Commission on Persons with Disabilities

6.3 FEDERAL AGENCIES

The proposed action does not require Federal permits or approvals.

6.4 UTILITY COMPANIES

Construction documents will be reviewed by the following private utility companies:

- Hawaiian Electric Company
- GTE Hawaiian Telephone Company Incorporated

SECTION 7
Organizations and Agencies Consulted During the Preparation of the Draft EA

7.1 CITY AND COUNTY OF HONOLULU

Department of Design and Construction
Department of Environmental Services
Department of Planning and Permitting

7.2 STATE OF HAWAII

Department of Health,
- Clean Water Branch
- Environmental Management Division

Department of Land and Natural Resources
- Historic Preservation Division

7.3 GOVERNMENT OFFICIALS

Ms. MaryAnne Long, Koolauloa Neighborhood Board, No. 28

7.4 PRIVATE ORGANIZATIONS / INDIVIDUALS

La'ie Community Association

In addition, a public information meeting attended by approximately 200 residents was held in January 2002 to explain the overall project, discuss financial impacts to homeowners, and solicit comments. (See Appendix G, *Kaleo O Koolauloa Community Newspaper*, January 17, 2002, Article: "City, State, HRI Share La'ie Sewer Info, Costs")

SECTION 8
Organizations and Agencies Consulted During the 30-Day DEA Review Period

8.1 CITY AND COUNTY OF HONOLULU

Board of Water Supply
Department of Design and Construction
Department of Environmental Services
Department of Planning and Permitting
Department of Transportation Services
Fire Department
Police Department

8.2 STATE OF HAWAII

Department of Accounting and General Services
Department of Business, Economic Development and Tourism
    Office of Planning
Department of Hawaiian Home Lands
Department of Health,
    Clean Water Branch
    Environmental Management Division
    Office of Environmental Quality Control
Department of Land and Natural Resources
    Commission on Water Resources Management
    Historic Preservation Division
    Land Division
Department of Transportation, Highways Division
University of Hawaii
    Environmental Center
    Water Resources Research Center

8.3 FEDERAL AGENCIES

Department of the Army, Corps of Engineers
US Fish and Wildlife Service

8.4 GOVERNMENT OFFICIALS

Representative Colleen Meyer, 46th Congressional District
Senator Bob Nakata, 23rd Senatorial District
Councilman Steve Holmes, Council District II
Ms. MaryAnne Long, Koolauloa Neighborhood Board, No. 28

8.5 UTILITY COMPANIES

Verizon Wireless
Hawaiian Electric Company, Inc.

8.6 PRIVATE ORGANIZATIONS / INDIVIDUALS

Life of the Land
Sierra Club

SECTION 9
Determination

The potential effects of the proposed project are evaluated based on the significance criteria in section 11-200-12 (Hawaii Administrative Rules, revised in 1996). The following is a summary of the potential effects of the action.

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

Proposed wastewater collection system improvements will be installed underground within existing traffic corridors. Development of the project will involve minimal loss or destruction of natural resources in the form of excavation work and the permanent occupation of underground corridors through which the wastewater lines will traverse. No loss or destruction of any cultural resource is anticipated to result from the project.

Surveys of botanical resources conducted in the project area found no threatened or endangered plant species. Faunal surveys noted the presence of four endangered and endemic waterfowl in the Poohaili Wetlands, mauka of the existing wastewater treatment facility. The proposed improvements are not located near the wetlands and will not involve the use or destruction of wetland habitat frequented by these birds. The replacement of existing aged cesspools with an improved wastewater collection and treatment system will eliminate a potential source of ground and surface water contamination that could affect wetland habitat and surface water resources.

A survey of historic and archaeological resources was also conducted in the project area during preparation of the Final Supplemental Environmental Impact Statement for the La'ie Water Reclamation Facility (Hawaii Reserves Inc. 1995). Archaeological sites known from the area have been mapped and recorded with the State Historic Preservation Division. An additional historic site, the Nioi Heiau Complex (SIHP No. 50-80-02-281) is located in the area, but is not near Phase II improvements and will not be affected by project activities.

Additionally, the project site contains Jaucas sand deposits, which are associated with traditional Hawaiian burial practices and commonly found to contain cultural deposits. A qualified archaeologist will be employed to monitor excavations in the Jaucas sand deposits along Naniloa Loop. Prior to beginning work in this area, an archaeological monitoring plan and burial treatment plan will be prepared by the archaeologist and submitted to SHPD for review.

A portion of the construction will involve extensive modification of the land surface and there is a possibility of encountering unknown or unexpected cultural features, deposits, or burials. If this situation occurs, work in the area will be suspended immediately until the monitoring archaeologist has the opportunity to evaluate the significance of the

findings. The Historic Preservation Division of the State DLNR would be immediately notified to determine the appropriate course of action.

(2) Curtails the range of beneficial uses of the environment:

The project will not curtail the range of beneficial uses of the environment. Wastewater collection pipes, grinder pumps, and low-pressure mains will be installed underground within existing traffic corridors where they will be out of sight and out of the way.

(3) Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in chapter 344, HRS:

The project will be undertaken in a manner that conforms with Chapter 344, HRS, State Environmental Policy. The proposed collection system will provide a significant environmental and public health benefit by minimizing the likelihood of ground and surface water contamination from the aged cesspools currently being used by the majority of homes and businesses in La'ie.

(4) Substantially affects the economic or social welfare of the community or State:

The proposed improvements to La'ie's wastewater collection system are not anticipated to have negative effects on the area's economic activities or the social welfare of the community or state. The proposed project will improve service reliability and sanitation conditions for wastewater disposal in the La'ie community.

(5) Substantially affects public health:

Only about 175 homes of the approximately 720 homes in the La'ie area are currently sewered. The vast majority of the remainder use aged cesspools that are performing poorly. The expansion of the existing wastewater collection system will allow previously discharged raw wastewater from unsewered homes to be collected and treated. Replacing existing cesspools with the proposed wastewater collection and treatment system will reduce the potential for ground and surface water contamination and thereby provide a significant improvement to public health.

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

The proposed improvements are being undertaken to service existing residential and commercial development. The upgraded wastewater collection system will not result in substantial secondary impacts, such as population changes or effects on other public facilities. The proposed improvements will not provide an impetus to additional growth, but will accommodate anticipated growth, in accordance with the Koolau Loa Sustainable Communities Plan.

(7) Involves a substantial degradation of environmental quality:

The proposed project is not anticipated to involve a substantial degradation of environmental quality. The project requires minimal clearing and grubbing during installation of wastewater collection lines and grinder pumps. The proposed

improvements will occur in areas that have already experienced extensive development and modification to the natural environment. The improved waster water collection system will result in improvements to environmental quality by eliminating the use of aged and potentially leaking cesspool systems.

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

Cumulative impacts result from a series of projects that individually do not generate significant adverse effects, but collectively add up to a significant negative impact on the environment. The La'ie Sewer Project, though broken down into two distinct phases, does not add up to a large, negative impact on the environment. In fact, both Phase I and Phase II of the La'ie Sewer Project, whether considered individually or jointly, will provide a benefit to the environment by upgrading and integratingthe aged sewer system with a new wastewater collection and reclamation system that treats effluent to reusable (R1) quality reuse water.

Although it is described within the overall framework of the La'ie Sewer Project, Phase II improvements remain a stand-alone project independent of the future improvements to the La'ie sewer system. Phase II is being developed to replace the existing use of individual cesspools with a more reliable and environmentally safer wastewater collection and treatment system. Phase II improvements do not involve a commitment to additional development or further expansion of sewer service.

With regard to possible future growth, the La'ie Sewer Project is proposed to meet existing wastewater service needs and to support the withdrawal of aging and leaking cesspools from service. The system is designed to carry capacity above existing levels in order to accommodate the possibility of future projected needs in La'ie, as planned in the *Ko'olauloa Sustainable Communities Plan* (KSCP).

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

While endangered and endemic waterfowl are known to frequent the wetland area mauka of the existing La'ie Water Reclamation Facility (LWRF), the proposed wastewater collection system improvements do not encroach on that habitat. An intervening mountain ridge separates the sewer service area from the wetland area. The proposed Phase II collection system will occupy areas that have been subject to substantial modification and use over time. No rare, threatened, or endangered species are known from the project site. The proposed project is not anticipated to have substantial effects on rare, threatened, or endangered species, or their habitats.

(10) Detrimentally affects air or water quality or ambient noise levels:

The project is not anticipated to result in significant adverse effects on the area's long-term air or water quality or ambient noise levels. The improvements are being developed in order to improve overall water quality and minimize potential contamination of surface and ground water sources through containment and treatment of waste water. Temporary noise impacts related to construction activities will occur, but will cease when the project is completed. Noise from the operation of the electric grinder pumps will be

very minor and well within the noise level standards for residential areas, as set forth in Hawaii Administrative Rules (HAR), Chapter 11-46, "Community Noise Control".

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

The project site is located in a special flood hazard area subject to inundation during 100-year flood conditions. Flood elevations in the collection system area are estimated at +10 to +11 feet msl with elevations of +12 msl at the coastline. The sewer collection system will be installed below the water table, so polyvinyl chloride (PVC) will be used for the pipe material to minimize infiltration and inflow, and to provide necessary pipe thickness and strength against hydraulic forces. The proposed improvements will not alter existing drainage patterns or shoreline configurations. The seismic rating for the project area according to the Uniform Building Code is Zone 2A, an area of moderate seismic activity.

(12) Substantially affects scenic vistas and viewplanes identified in county or states plans or studies:

There are no scenic vistas and viewplanes identified in the project area by the County or State. There will be no significant visual impacts associated with the proposed wastewater collection system. Proposed improvements will be installed underground where they will be out of sight. Temporary visual impacts will result from the operation of vehicles and heavy equipment during construction. However, these impacts will be temporary and will cease when the project is complete.

(13) Requires substantial energy consumption:

Construction activities associated with the project will require high, short-term energy use. Energy will also be required for operation of the grinder pumps, however the project is not anticipated to result in a substantial increase in energy consumption. Further, energy requirements for the project should be viewed in consideration of the public health and environmental benefits the proposed project will provide.

In accordance with the provisions set forth in Chapter 343, Hawaii Revised Statutes, this Environmental Assessment has determined that the project will not have significant adverse impacts to water quality, air quality, existing utilities, noise, archaeological sites, or wildlife habitat. Therefore, it is recommended that an Environmental Impact Statement (EIS) not be required and a Finding of No Significant Impact (FONSI) be issued for this project.

SECTION 10
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APPENDIX A

LA'IE SEWER SYSTEM TMK LIST

Appendix A
La'ie Wastewater Collection System Expansion, Phase II
TMK & Address List

5-5-11:49	135 Anemoku
5-5-11:52	136 Anemoku
5-5-11:17	140 Anemoku
5-5-11:14	165 Anemoku
5-5-4:02	220 Hale Laa
5-5-14:46	410 Iosepa
5-5-14:40	422/424 Iosepa
5-5-14:39	430 Iosepa
5-5-14:22	431 Iosepa
5-5-14:23	433 Iosepa
5-5-14:24	437 Iosepa
5-5-14:38	438 Iosepa
5-5-14:25	439 Iosepa
5-5-14:37	442 Iosepa
5-5-14:26	443 Iosepa
5-5-14:36	444 Iosepa
5-5-14:27	445 Iosepa
5-5-13:38	448 Iosepa
5-5-14:28	449 Iosepa
5-5-13:39	452 Iosepa
5-5-14:31	453 Iosepa
5-5-13-54-2	456 Iosepa
5-5-13:40	456 Iosepa
5-5-13:41	458 Iosepa
5-5-13:42	462 Iosepa
5-5-13:58	465 Iosepa
5-5-13:43	466 Iosepa
5-5-13:57	469 Iosepa
5-5-13:44	470 Iosepa
5-5-13:56	473 Iosepa
5-5-13:102	474 Iosepa
5-5-13:55	477 Iosepa
5-5-13:45	478 Iosepa
5-5-13:54	479 Iosepa
5-5-13-54-1	479 Iosepa
5-5-13:46	480 Iosepa
5-5-13:53	483 Iosepa
5-5-13:47	484 Iosepa
5-5-13:96	487 Iosepa
5-5-13:48	488 Iosepa
5-5-13:52	489 Iosepa
5-5-13:101	491 Iosepa
5-5-13:50	492A Iosepa
5-5-13:93	492B Iosepa
5-5-12:69	502 Iosepa
5-5-12:70	505 Iosepa
5-5-12:68	506 Iosepa
5-5-12:67	510 Iosepa
5-5-12:66	512 Iosepa
5-5-12:103	513 Iosepa
5-5-12:65	514 Iosepa
5-5-12:71	515 Iosepa
5-5-12:63	516 Iosepa
5-5-12:62	518 Iosepa
5-5-12:61	522 Iosepa
5-5-12:72	523 Iosepa
5-5-12:60	526 Iosepa
5-5-12:73	527 Iosepa
5-5-15:22	604 Iosepa
5-5-15:20	606 Iosepa
5-5-15:21	610 Iosepa
5-5-15:17	612 Iosepa
5-5-15:18	614 Iosepa
5-5-15:16	616 Iosepa
5-5-15:15	616A Iosepa
5-5-15:39	620 Iosepa
5-5-15:13	620 Iosepa
5-5-15:11	620C Iosepa
5-5-15:12	626 Iosepa
5-5-15:24	629 Iosepa
5-5-15:38	630B Iosepa
5-5-2:88	271 Kam
5-5-2:19	273 Kam
5-5-2:03	285 Kam
5-5-2:38	305 Kam
5-5-2:37	311 Kam
5-5-2:36	315 Kam
5-5-2:91	315 Kam
5-5-2:92	315 Kam
5-5-2:93	315 Kam
5-5-2:75	321 Kam
5-5-2:76	321A Kam
5-5-2:86	321B Kam
5-5-2:77	321C Kam
5-5-2:34	323 Kam
5-5-2:57	329 Kam
5-5-2:33	333 Kam
5-5-2:32	337 Kam
5-5-2:31	339 Kam
5-5-2:84	341 Kam
5-5-2:85	343 Kam
5-5-2:94	345 Kam

La'ie Wastewater Collection System Expansion, Phase II
TMK & Address List

5-5-2:30	347 Kam
5-5-2:95	349 Kam
5-5-2:29	351 Kam
5-5-2:28	355 Kam
5-5-2:27	363 Kam
5-5-2:83	365 Kam
5-5-2:82	367 Kam
5-5-2:26	369 Kam
5-5-6-30	370 Kam
5-5-6-28	370 Kam
5-5-2:25	371 Kam
5-5-2:24	377 Kam
5-5-2:23	381 Kam
5-5-2:06	385 Kam
5-5-2:90	385 Kam
5-5-2:07	389 Kam
5-5-2:54	391 Kam
5-5-2:08	395 Kam
5-5-2:45	397 Kam
5-5-2:44	405 Kam
5-5-2:64	409 Kam
5-5-2:43	411 Kam
5-5-2:42	415 Kam
5-5-2:87	415 Kam
5-5-2:41	421 Kam
5-5-2:40	425 Kam
5-5-2:69	427 Kam
5-5-2:20	435 Kam
5-5-2-11	437 Kam
5-5-2:10.11.20	437 Kam
5-5-14:16	454 Kam
5-5-2:61	457 Kam
5-5-2:74	459 Kam
5-5-2:12	459 Kam
5-5-14:13	470 Kam
5-5-2:21	473 Kam
5-5-14:12	474 Kam
5-5-14:52	476 Kam
5-5-2:22	479 Kam
5-5-14:11	480 Kam
5-5-14:10	484 Kam
5-5-2:46	485 Kam
5-5-2:52	487 Kam
5-5-2:51	487 Kam
5-5-2:50	487 Kam
5-5-2:49	487 Kam
5-5-2:48	487 Kam
5-5-2:47	487 Kam
5-5-14:09	490 Kam
5-5-11:1	491 Kam
5-5-11:2	491 Kam
5-5-14:08	494 Kam
5-5-11:5-1	497A Kam
5-5-11:5-2	497B Kam
5-5-11:5-3	497C Kam
5-5-11:5-4	497D Kam
5-5-11:6	501 Kam
5-5-14:07	502 Kam
5-5-11:7	503 Kam
5-5-14:06	510 Kam
5-5-14:01	510 Kam
5-5-14-32	510 Kam
5-5-17-5	510 Kam
5-5-17-6	510 Kam
5-5-6-33	510 Kam
5-5-6-26	510 Kam
5-5-6-25	510 Kam
5-5-6-24	510 Kam
5-5-6-31	510 Kam
5-5-6-21	510 Kam
5-5-6-19	510 Kam
5-5-6-13	510 Kam
5-5-11:65	539 Kam
5-5-11:66	541 Kam
5-5-11:66	541 Kam
5-5-11:67	543 Kam
5-5-11:68	545 Kam
5-5-13:75	546 Kam
5-5-11:70	547 Kam
5-5-3:201	551 Kam
5-5-3:202	555 Kam
5-5-3:205	557 Kam
5-5-3:18	559 Kam
5-5-3:203	561 Kam
5-5-3:52	563 Kam
5-5-3-50	565 Kam
5-5-3-51	565 Kam
5-5-3:49	573 Kam
5-5-3:48	575 Kam
5-5-3:47	579 Kam
5-5-3:46	583 Kam
5-5-3:45	587 Kam
5-5-3:44	591 Kam
5-5-3:43	593 Kam
5-5-3:28	597B Kam
5-5-3:26	599 Kam

La'ie Wastewater Collection System Expansion, Phase II
TMK & Address List

5-5-3:42	601 Kam
5-5-3:27	605 Kam
5-5-3:25	609 Kam
5-5-3:24	611 Kam
5-5-3:41	615 Kam
5-5-3:40	619 Kam
5-5-3:39	623 Kam
5-5-3:38	625 Kam
5-5-3:37	629 Kam
5-5-3:30	633 Kam
5-5-3:29	637 Kam
5-5-3:19	639 Kam
5-5-3:20	643 Kam
5-5-3:36	645 Kam
5-5-3:35	649 Kam
5-5-3:206	649 Kam
5-5-3:34	653 Kam
5-5-3:204	657A Kam
5-5-3:33	659A Kam
5-5-3:32	661 Kam
5-5-16:42	662 Kam
5-5-3:31	665 Kam
5-5-16:43	666 Kam
5-5-3:21	671 Kam
5-5-9:19	680 Kam
5-5-9:37	688 Kam
5-5-9:36	692 Kam
5-5-9:35	696 Kam
5-5-2:89	2xx Kam
5-5-2:65	Kam
5-5-15:32	105A Kulanui
5-5-15:31	105C Kulanui
5-5-15:30	105D Kulanui
5-5-13:88	130 Kulanui
5-5-12:105	131 Kulanui
5-5-12:85	133 Kulanui
5-5-13:85	146 Kulanui
5-5-12:81	149 Kulanui
5-5-12:82	155 Kulanui
5-5-13:68	156 Kulanui
5-5-13:94	158 Kulanui
5-5-12:83	159 Kulanui
5-5-12:84	163 Kulanui
5-5-13:51	164 Kulanui
5-5-6-35-1	200 Kulanui
5-5-3-35-2	200 Kulanui
5-5-6-35-3	200 Kulanui
5-5-6-35-4	200 Kulanui
5-5-6-35-5	200 Kulanui
5-5-6-35-6	200 Kulanui
5-5-6-35-7	200 Kulanui
5-5-6-35-8	200 Kulanui
5-5-6-35-9	200 Kulanui
5-5-6-35-10	200 Kulanui
5-5-6-35-11	200 Kulanui
5-5-6-35-12	200 Kulanui
5-5-6-35-13	200 Kulanui
5-5-6-35-14	200 Kulanui
5-5-6-35-15	200 Kulanui
5-5-6-35-16	200 Kulanui
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5-5-6-35-21	200 Kulanui
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5-5-6-35-23	200 Kulanui
5-5-6-35-24	200 Kulanui
5-5-6-35-25	200 Kulanui
5-5-6-32	220 Kulanui
5-5-6-5	220 Kulanui
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5-5-16-45-2	220 Kulanui
5-5-16-45-3	220 Kulanui
5-5-16-45-4	220 Kulanui
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5-5-15:23	Laie Elementary
5-5-15:33	Laie Elementary
5-5-15:27	22 Lanihuli
5-5-16:39-2	23 Lanihuli
5-5-16:39-3	25 Lanihuli
5-5-15:26	26 Lanihuli
5-5-15:25	30 Lanihuli
5-5-16:37	31 Lanihuli
5-5-16:36	35 Lanihuli
5-5-15:10	40 Lanihuli
5-5-16:34	41 Lanihuli
5-5-15:09	44 Lanihuli
5-5-16:33	45 Lanihuli
5-5-15:08	48 Lanihuli
5-5-16:30	49 Lanihuli
5-5-16:27	57 Lanihuli
5-5-16:26	61 Lanihuli
5-5-16:08	62 Lanihuli
5-5-16:25	63 Lanihuli
5-5-16:07	66 Lanihuli

La'ie Wastewater Collection System Expansion, Phase II
TMK & Address List

5-5-16:06	70 Lanihuli
5-5-17:12	81 Lanihuli
5-5-17:50	85 Lanihuli
5-5-17:11	85 Lanihuli
5-5-17:14	87A Lanihuli
5-5-17:15	87B Lanihuli
5-5-17:18	87C Lanihuli
5-5-17:10	89 Lanihuli
5-5-17:09	93 Lanihuli
5-5-17:08	99 Lanihuli
5-5-17:55	101 Lanihuli
5-5-17:54	103 Lanihuli
5-5-17:59	105 Lanihuli
5-5-17:58	111 Lanihuli
5-5-17:60	115 Lanihuli
5-5-4:05	123 Lanihuli
5-5-15:28	610 Lanihuli
5-5-17:52	641 Lanihuli
5-5-17:53	645 Lanihuli
5-5-4:09	645 Lanihuli
5-5-4:10	648 Lanihuli
5-5-17:02	651 Lanihuli
5-5-4:11	652 Lanihuli
5-5-16:50	642 Loala
5-5-16:48	644 Loala
5-5-16:24	645 Loala
5-5-16:23	647 Loala
5-5-16:19	650 Loala
5-5-16:22	653 Loala
5-5-16:21	654 Loala
5-5-14:41	423 Moana
5-5-14:51	426 Moana
5-5-14:45	428 Moana
5-5-14:42	429 Moana
5-5-14:44	430 Moana
5-5-14:43	433 Moana
5-5-13:37	437 Moana
5-5-13:36	441 Moana
5-5-13:22	442 Moana
5-5-13:35	445 Moana
5-5-13:21	446 Moana
5-5-13:20	450 Moana
5-5-13:34	451 Moana
5-5-13:19	452 Moana
5-5-13:33	455 Moana
5-5-13:18	456 Moana
5-5-13:32	457 Moana
5-5-13:17	458 Moana
5-5-13:16	462 Moana
5-5-13:31	463 Moana
5-5-13:15	466 Moana
5-5-13:30	467 Moana
5-5-13:14	470 Moana
5-5-13:29	471 Moana
5-5-13:23	474 Moana
5-5-13:28	475 Moana
5-5-13:24	478 Moana
5-5-13:27	479 Moana
5-5-13:25	482 Moana
5-5-13:26	483 Moana
5-5-12:38	502 Moana
5-5-12:90	502B Moana
5-5-12:39	503 Moana
5-5-12:37	506 Moana
5-5-12:86	506B Moana
5-5-12:40	507 Moana
5-5-12:36	510 Moana
5-5-12:41	511 Moana
5-5-12:35	514 Moana
5-5-12:93	515 Moana
5-5-12:34	516 Moana
5-5-12:42	517 Moana
5-5-12:33	518 Moana
5-5-12:98	519 Moana
5-5-12:43	521 Moana
5-5-12:32	522 Moana
5-5-12:44	523 Moana
5-5-12:31	524 Moana
5-5-12:104	525 Moana
5-5-12:30	526 Moana
5-5-12:45	527 Moana
5-5-12:29	530 Moana
5-5-12:46	531 Moana
5-5-12:28	534 Moana
5-5-12:48	535 Moana
5-5-12:27	538 Moana
5-5-12:49	539 Moana
5-5-12:26	542 Moana
5-5-12:94	542B Moana
5-5-12:50	543 Moana
5-5-12:99	546A Moana
5-5-12:25	546B Moana
5-5-12:59	547 Moana
5-5-12:24	550 Moana
5-5-12:52	551 Moana
5-5-12:22	554A Moana

La'ie Wastewater Collection System Expansion, Phase II
TMK & Address List

5-5-12:100	556 Moana
5-5-12:23	558 Moana
5-5-12:101	559 Moana
5-5-12:21	562 Moana
5-5-15:36	601 Moana
5-5-15:37	603 Moana
5-5-16:16	604 Moana
5-5-15:01	605 Moana
5-5-15:02	607 Moana
5-5-16:15	608 Moana
5-5-15:03	609 Moana
5-5-16:14-1	612A Moana
5-5-16:14-2	612B Moana
5-5-16:13	614 Moana
5-5-15:04	615 Moana
5-5-16:12	618 Moana
5-5-16:11	620 Moana
5-5-15:05	621 Moana
5-5-16:10	622 Moana
5-5-15:06	627 Moana
5-5-16:09	628 Moana
5-5-15:07	631 Moana
5-5-16:55	632 Moana
5-5-14:17	405 Naniloa
5-5-14:50	407 Naniloa
5-5-14:18	409 Naniloa
5-5-14:19	413 Naniloa
5-5-14:53	413 Naniloa
5-5-14:47	421 Naniloa
5-5-14:48	423 Naniloa
5-5-14:49	431 Naniloa
5-5-13:13	435 Naniloa
5-5-13:12	439 Naniloa
5-5-13:11	443 Naniloa
5-5-13:10	447 Naniloa
5-5-13:09	451 Naniloa
5-5-13:08	453 Naniloa
5-5-13:07	457 Naniloa
5-5-13:06	461 Naniloa
5-5-13:05	465 Naniloa
5-5-13:04	467 Naniloa
5-5-13:03	471 Naniloa
5-5-13:02	475 Naniloa
5-5-13:01	479 Naniloa
5-5-12:01	503 Naniloa
5-5-12:02	507 Naniloa
5-5-12:03	511 Naniloa
5-5-12:04	515 Naniloa
5-5-12:05	521 Naniloa
5-5-12:06	525 Naniloa
5-5-12:07	529 Naniloa
5-5-12:08	533 Naniloa
5-5-12:09	537 Naniloa
5-5-12:10	541 Naniloa
5-5-12:11	545 Naniloa
5-5-12:12	549 Naniloa
5-5-17-623	550 Naniloa
5-5-12:13	555 Naniloa
5-5-12:88	557 Naniloa
5-5-12:15	559 Naniloa
5-5-12:87	565 Naniloa
5-5-12:16	567 Naniloa
5-5-12:95	567B Naniloa
5-5-12:96	569 Naniloa
5-5-12:97	571 Naniloa
5-5-12:17	571 Naniloa
5-5-12:18	575 Naniloa
5-5-12:19	579 Naniloa
5-5-12:89	583A Naniloa
5-5-12:20	583B Naniloa
5-5-16:47	601 Naniloa
5-5-16:01	605 Naniloa
5-5-16:45	607A Naniloa
5-5-16:02	609 Naniloa
5-5-16:52	609B Naniloa
5-5-16:53	613 Naniloa
5-5-16:03	615 Naniloa
5-5-16:04	619 Naniloa
5-5-16:54	619A Naniloa
5-5-16:05	623 Naniloa
5-5-16:17	635 Naniloa
5-5-16:18	641 Naniloa
5-5-17:56	644 Naniloa
5-5-17:13	648 Naniloa
5-5-17:63	650 Naniloa
5-5-16:20	651 Naniloa
5-5-17:16	652 Naniloa
5-5-17:17	654 Naniloa
5-5-16:51	655 Naniloa
5-5-17:51	660 Naniloa
5-5-16:44	670 Naniloa
5-5-16:59	677B Naniloa
5-5-12:107	Naniloa
5-5-10:29	39 Naupaka
5-5-10:26	43 Naupaka
5-5-10:22	44 Naupaka

La'ie Wastewater Collection System Expansion, Phase II
TMK & Address List

5-5-10:2	44 Naupaka
5-5-10:25	47 Naupaka
5-5-10:24	51 Naupaka
5-5-10:23	53 Naupaka
5-5-10:4	54 Naupaka
5-5-10:19	57 Naupaka
5-5-10:18	59 Naupaka
5-5-10:5	60 Naupaka
5-5-10:16	61 Naupaka
5-5-10:33	64 Naupaka
5-5-10:6	66 Naupaka
5-5-10:36	66A Naupaka
5-5-10:7	68 Naupaka
5-5-10:15	69 Naupaka
5-5-10:32	70 Naupaka
5-5-10:14	71 Naupaka
5-5-10:31	72 Naupaka
5-5-10:30	74 Naupaka
5-5-10:13	75 Naupaka
5-5-10:8	76 Naupaka
5-5-10:9	78 Naupaka
5-5-10:34	80 Naupaka
5-5-10:12-1	81 Naupaka
5-5-10:12-2	81 Naupaka
5-5-10:12-3	81 Naupaka
5-5-10:10	82 Naupaka
5-5-10:27	84 Naupaka
5-5-10:11	85 Naupaka
5-5-10:28	88 Naupaka
5-5-11:53	89 Naupaka
5-5-11:23	90 Naupaka
5-5-11:24	91 Naupaka
5-5-11:78	92 Naupaka
5-5-11:25	95 Naupaka
5-5-11:60	97 Naupaka
5-5-11:22	98 Naupaka
5-5-11:74	99 Naupaka
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5-5-11:75	102 Naupaka
5-5-11:21	104 Naupaka
5-5-11:69	105 Naupaka
5-5-11:76	106 Naupaka
5-5-11:27	107 Naupaka
5-5-11:20	110 Naupaka
5-5-11:71	111 Naupaka
5-5-11:28	113 Naupaka
5-5-11:57	116A Naupaka
5-5-11:56	116B Naupaka
5-5-11:19	116C Naupaka
5-5-11:73	117 Naupaka
5-5-11:29	119 Naupaka
5-5-11:72	119 Naupaka
5-5-11:61	121 Naupaka
5-5-11:30	121 Naupaka
5-5-11:62	121C Naupaka
5-5-11:58	122 Naupaka
5-5-11:59	124 Naupaka
5-5-11:64	125 Naupaka
5-5-11:18	126 Naupaka
5-5-11:31	127 Naupaka
5-5-11:63	127 Naupaka
5-5-11:51	128 Naupaka
5-5-11:50	130 Naupaka
5-5-11:50	130 Naupaka
5-5-11:32	131 Naupaka
5-5-11:45	137 Naupaka
5-5-11:48	138 Naupaka
5-5-11:55	139 Naupaka
5-5-11:47	140 Naupaka
5-5-11:44-1	141 Naupaka
5-5-11:44-2	141 Naupaka
5-5-11:46	142 Naupaka
5-5-11:77	143 Naupaka
5-5-11:33	143 Naupaka
5-5-11:16	146 Naupaka
5-5-11:34	147 Naupaka
5-5-11:15	150 Naupaka
5-5-11:35	151 Naupaka
5-5-11:13	154 Naupaka
5-5-11:36	155 Naupaka
5-5-11:12	158 Naupaka
5-5-11:11	160 Naupaka
5-5-11:37	161 Naupaka
5-5-11:38	163 Naupaka
5-5-11:54	164 Naupaka
5-5-11:79	164 Naupaka
5-5-11:39	165 Naupaka
5-5-11:9	166 Naupaka
5-5-11:10	168 Naupaka
5-5-2:81	335 Pakelo
5-5-2:80	339 Pakelo
5-5-2:79	341 Pakelo
5-5-2:78	345 Pakelo
5-5-13:59	456 Palekana
5-5-13:60	464 Palekana
5-5-13:95	472 Palekana

La'ie Wastewater Collection System Expansion, Phase II
TMK & Address List

5-5-13:62	472 Palekana
5-5-13:74	475 Palekana
5-5-13:63	476 Palekana
5-5-13:72	479 Palekana
5-5-13:64	480 Palekana
5-5-13:98	482 Palekana
5-5-13:73	483 Palekana
5-5-13:65	484 Palekana
5-5-13:97	485 Palekana
5-5-13:66	486 Palekana
5-5-13:71	487 Palekana
5-5-13:103	488 Palekana
5-5-13:99	490 Palekana
5-5-13:70	491 Palekana
5-5-13:67	492 Palekana
5-5-13:69	495 Palekana
5-5-17:03	152 Poohaili
5-5-17:57	152 Poohaili
5-5-17:22	101 Poohaili
5-5-17:23	105 Poohaili
5-5-17:21	106 Poohaili
5-5-17:29	109 Poohaili
5-5-17:20	110 Poohaili
5-5-17:19	112 Poohaili
5-5-17:32	113 Poohaili
5-5-17:28	113 Poohaili
5-5-17:31	115 Poohaili
5-5-17:40	117 Poohaili
5-5-17:61(41)	125 Poohaili
5-5-17:42	131 Poohaili
5-5-17:43	133A&B Poohaili
5-5-17:44	135 Poohaili
5-5-17:45	141 Poohaili
5-5-17:46	145 Poohaili
5-5-17:04	148 Poohaili
5-5-17:62	149 Poohaili
5-5-17:47	149 Poohaili
5-5-17:48	149C Poohaili
5-5-17:49	149C Poohaili
5-5-13:92	117 Puuahi
5-5-13:81	118 Puuahi
5-5-13:91	121 Puuahi
5-5-13:82	122 Puuahi
5-5-13:83	124 Puuahi
5-5-13:90	125 Puuahi
5-5-13:100	126 Puuahi
5-5-13:89	127 Puuahi
5-5-13:84	132 Puuahi
5-5-12:80	142 Puuahi
5-5-12:78	145 Puuahi
5-5-12:79	146 Puuahi
5-5-12:92	147 Puuahi
5-5-12:77	149 Puuahi
5-5-12:51	172 Puuahi
5-5-12:106	174 Puuahi
5-5-12:74	150 Puuahi
5-5-12:108	157 Puuahi
5-5-12:75	158 Puuahi
5-5-12:76	159 Puuahi
5-5-12:56	162 Puuahi
5-5-12:102	162B Puuahi
5-5-12:55	163 Puuahi
5-5-12:57	166 Puuahi
5-5-12:54	167 Puuahi
5-5-12:58	170 Puuahi
5-5-12:53	173 Puuahi
5-5-13:77	Shopping Center
5-5-13:79	Shopping Center
5-5-13:78	Shopping Center
5-5-14:14	Stake Center
5-5-14:15	Stake Center
5-5-13:86	Vacant Vacant
5-5-13:80	Vacant Vacant
5-5-16:39-1	628 Wahinepee
5-5-16:38	634 Wahinepee
5-5-16:35	642 Wahinepee
5-5-16:32	646 Wahinepee
5-5-16:40	651 Wahinepee
5-5-16:31	652 Wahinepee
5-5-16:41	655 Wahinepee
5-5-16:29	656 Wahinepee
5-5-16:28	660 Wahinepee
5-5-16:58	661 Wahinepee
5-5-16:57	667 Wahinepee
5-5-16:56	669 Wahinepee
5-5-9:38	672 Wahinepee
5-5-17:24	690 Wahinepee
5-5-9:43	697 Wahinepee
5-5-17:25	702 Wahinepee
5-5-17:27	704 Wahinepee
5-5-9:44	705 Wahinepee
5-5-17:26	706 Wahinepee
5-5-17:34	706A Wahinepee
5-5-17:33	706B Wahinepee
5-5-17:36	706C Wahinepee
5-5-17:39	706D Wahinepee

La'ie Wastewater Collection System Expansion, Phase II
TMK & Address List

5-5-17:38	706E Wahinepee
5-5-17:37	706F Wahinepee
5-5-9-7	
5-5-10-3	
5-5-11:8	
5-5-11:4	
5-5-2:05	
5-5-2:04	
5-5-13-104	
5-5-14-21	
5-5-14-20	
5-5-6-34	
5-5-6-635	
5-5-2:02	
5-6-6-1	

APPENDIX B

EXHIBITS A AND G
from the
"COOPERATIVE AGREEMENT TO JOINTLY CONSTRUCT A COLLECTION SYSTEM AND TRANSFER THE LAIE WATER RECLAMATION FACILITY"

EXHIBIT A

PARCEL G-4

Land Situated at Laie, Koolauloa, Oahu, Hawaii

Being the Whole of Parcel F and a
Portion of Parcel G-3
Being Also a Portion of Royal Patent 7494,
Land Commission Award 8559-B, Apanas 35 and 36
To Wm. C. Lunalilo

Beginning at the Southwest corner of this parcel of land and on the Westerly boundary of Parcel G-5, the coordinates of said point of beginning referred to Government Survey Triangulation Station "LAIE 1" being 2,311.76 feet South and 5,727.62 feet West and running by azimuths measured clockwise from true South:

	Thence along Parcel H-2 and remainder of Land Commission Award 8559-B, Apanas 35 and 36 to Wm. C. Lunalilo on a curve to the right with a radius of 800.00 feet, the chord azimuth and distance being:
1. 217° 57' 08.5"	302.04 feet;
2. 190° 25' 45"	202.87 feet along remainder of Land Commission Award 8559-B, Apanas 35 and 36 to Wm. C. Lunalilo;
3. 196° 00'	268.00 feet along remainder of Land Commission Award 8559-B, Apanas 35 and 36 to Wm. C. Lunalilo;
4. 167° 37'	210.00 feet along remainder of Land Commission Award 8559-B, Apanas 35 and 36 to Wm. C. Lunalilo;
5. 176° 09'	86.10 feet along Parcel 7;
6. 270° 00'	400.98 feet along Parcel G-5;
7. 0° 00'	336.50 feet along Parcel G-5;

8.	2°	26'		564.57 feet	along Parcel G-5;
9.	96°	35'		203.80 feet	along Parcel G-5;
10.	71°	47'		154.00 feet	along Parcel G-5;
11.	63°	15'	30"	116.80 feet	along Parcel G-5;
12.	79°	27'	30"	58.60 feet	along Parcel G-5;
13.	91°	10'	30"	111.91 feet	along Parcel G-5 to the point of beginning and containing an area of 8.924 acres, more or less.

Together with, and subject to a portion of Easement "D" for Road and Utility Purposes described as follows:

EASEMENT "D"
FOR ROAD AND UTILITY PURPOSES

Affecting Portions of Parcels G-4 and G-5

Beginning at the Southwest corner of this easement, being also the Southwest corner of Parcel G-4, the coordinates of said point of beginning referred to Government Survey Triangulation Station "LAIE 1" being 2,311.76 feet South and 5,727.62 feet West and running by azimuths measured clockwise from true South:

Along Parcel H-2 and remainder of Land Commission Award 8559-B, Apanas 35 and 36 to Wm. C. Lunalilo on a curve to the right with a radius of 800.00 feet, the chord azimuth and distance being:

1.	217°	57'	08.5"	302.04 feet;	
2.	190°	25'	45"	202.87 feet	along remainder of Land Commission Award 8559-B, Apanas 35 and 36 to Wm. C. Lunalilo;

3.	196°	00'		268.00 feet along remainder of Land Commission Award 8559-B, Apanas 35 and 36 to Wm. C. Lunalilo;
4.	167°	37'		210.00 feet along remainder of Land Commission Award 8559-B, Apanas 35 and 36 to Wm. C. Lunalilo;
5.	176°	09'		133.46 feet along remainder of Land Commission Award 8559-B, Apanas 35 and 36 to Wm. C. Lunalilo;
6.	330°	40'		53.23 feet along remainder of Parcel G-5;
7.	336°	40'		127.84 feet along remainders of Parcel G-5 and G-4;
8.	347°	35'		87.49 feet along remainder of Parcel G-4;
9.	8°	34'		228.95 feet along remainder of Parcel G-4;
10.	19°	47'	45"	191.26 feet along remainder of Parcel G-4;
11.	10°	25'	45"	230.00 feet along remainder of Parcel G-4;
12.	35°	00'		187.53 feet along remainder of Parcel G-4;
13.	91°	10'	30"	89.82 feet along Parcel G-5 to the point of beginning and containing an area of 1.180 acres, more or less.

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2924 MANOA ROAD
HONOLULU, HAWAII 96822-1255

PARCEL G-5
BRIGHAM YOUNG UNIVERSITY-HAWAII CAMPUS

Land Situated on the Southwest Side
Of Naniloa Loop,
At Laie, Koolauloa, Oahu, Hawaii

Being a Portion of Parcel G-3
Being Also a Portion of
Royal Patent 7494, Land Commission Award 8559-B,
Apanas 35 and 36 to Wm. C. Lunalilo;
And the Whole of:
Royal Patent 1302, Land Commission Award 4270,
Apana 1 to Keao;
Royal Patent 3508, Land Commission Award 3731,
Apana 4 to Ihupuu;
Royal Patents 3007 and 3095,
Land Commission Award 10928,
Apana 2 to Ulukou

Beginning at the Northeast corner of this parcel of land and on the South side of Naniloa Loop, being also the Northwest corner of Parcel A, the coordinates of said point of beginning referred to Government Survey Triangulation Station "LAIE 1" being 1,689.66 feet South and 2,455.98 feet West and running by azimuths measured clockwise from true South:

1. 346° 36' 1,587.29 feet along Parcel A;
2. 5° 05' 1,409.36 feet along Lot 2 and Parcel H-2;

Thence along Parcel H-2 and middle of stream for the next six courses, the direct azimuths and distances between points being:

3. 106° 35' 400.00 feet;
4. 120° 12' 436.00 feet;
5. 133° 35' 400.00 feet;

H. AU & ASSOCIATES, INC.
2924 MANOA ROAD
HONOLULU, HAWAII 96822-1758

6.	91°	20'	250.00	feet;
7.	105°	31'	255.00	feet;
8.	80°	48' 45"	320.29	feet;

Thence along Parcel H-2 on a curve to the right with a radius of 2,000.00 feet, the chord azimuth and distance being:

9.	118°	09' 30"	1,789.48	feet;
10.	106°	37'	308.96	feet along Parcel H-2;
11.	164°	40'	210.00	feet along Parcel H-2;
12.	261°	30'	207.94	feet along Parcel H-2;

Thence along Parcel H-2 on a curve to the right with a radius of 800.00 feet, the chord azimuth and distance being:

13.	187°	38' 22.5"	532.29	feet;
14.	271°	10' 30"	111.91	feet along Parcel G-4:
15.	259°	27' 30"	58.60	feet along Parcel G-4;
16.	243°	15' 30"	116.80	feet along Parcel G-4;
17.	251°	47'	154.00	feet along Parcel G-4;
18.	276°	35'	203.80	feet along Parcel G-4;
19.	182°	26'	564.57	feet along Parcel G-4;
20.	180°	00'	336.50	feet along Parcel G-4;
21.	90°	00'	400.98	feet along Parcel G-4;
22.	176°	09'	144.31	feet along Parcel 7;
23.	211°	05'	268.03	feet along Parcel 7;

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HONOLULU, HAWAII 96822-1755

24.	256°	05'	644.81 feet along Temple Lot;
25.	343°	08'	192.82 feet along Parcel G-2;
26.	300°	30'	62.48 feet along Parcel G-2;
27.	256°	00'	523.96 feet along Parcel G-2;
			Thence along Parcel G-2 on a curve to the left with a radius of 20.00 feet, the chord azimuth and distance being:
28.	208°	30'	29.49 feet to the Southwesterly side of Naniloa Loop;
29.	341°	00'	101.01 feet along the Southwesterly side of Naniloa Loop;
			Thence along the Southwest side of Naniloa Loop on a curve to the left with a radius of 935.00 feet, the chord azimuth and distance being:
30.	309°	15'	984.02 feet;
31.	277°	30'	851.66 feet along the South side of Naniloa Loop to the point of beginning and containing a net area of 205.799 acres, more or less after deducting the areas of Exclusion 1 (Royal Patent 918, Land Commission Award 3773, Apana 5 to Amaka), Exclusion 2 (Royal Patent 923, Land Commission Award 4283, Apana 2 to Koula) and Exclusion 3 (Royal Patent 918, Land Commission Award 3773, Apana 6 to Amaka).

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2924 MANOA ROAD

Subject however, to the following easements:

Easement "A" (44-Ft. Wide) for Roadway Purposes;
Easement "B" (44-Ft. Wide) for Roadway Purposes;
Easement "C" (44-Ft. Wide) for Roadway Purposes;
Hawaiian Electric Co. Power Line Easement (25-Ft. Wide).

Together with, and subject to a portion of Easement "D" for Road and Utility Purposes described as follows:

EASEMENT "D"
FOR ROAD AND UTILITY PURPOSES

Affecting Portions of Parcels G-4 and G-5

Beginning at the Southwest corner of this easement, being also the Southwest corner of Parcel G-4, the coordinates of said point of beginning referred to Government Survey Triangulation Station "LAIE 1" being 2,311.76 feet South and 5,727.62 feet West and running by azimuths measured clockwise from true South:

Along Parcel H-2 and remainder of Land Commission Award 8559-B, Apanas 35 and 36 to Wm. C. Lunalilo on a curve to the right with a radius of 800.00 feet, the chord azimuth and distance being:

1. 217° 57' 08.5" 302.04 feet;
2. 190° 25' 45" 202.87 feet along remainder of Land Commission Award 8559-B, Apanas 35 and 36 to Wm. C. Lunalilo;
3. 196° 00' 268.00 feet along remainder of Land Commission Award 8559-B, Apanas 35 and 36 to Wm. C. Lunalilo;
4. 167° 37' 210.00 feet along remainder of Land Commission Award 8559-B, Apanas 35 and 36 to Wm. C. Lunalilo;

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HONOLULU, HAWAII 96822-1755

5.	176°	09'		133.46 feet along remainder of Land Commission Award 8559-B, Apanas 35 and 36 to Wm. C.Lunalilo;
6.	330°	40'		53.23 feet along remainder of Parcel G-5;
7.	336°	40'		127.84 feet along remainders of Parcels G-5 and G-4;
8.	347°	35'		87.49 feet along remainder of Parcel G-4;
9.	8°	34'		228.95 feet along remainder of Parcel G-4;
10.	19°	47'	45"	191.26 feet along remainder of Parcel G-4;
11.	10°	25'	45"	230.00 feet along remainder of Parcel G-4;
12.	35°	00'		187.53 feet along remainder of Parcel G-4;
13.	91°	10'	30"	89.82 feet along Parcel G-5 to the point of beginning and containing an area of 1.180 acres, more or less.

HARRY S. H. AU
LICENSED PROFESSIONAL LAND SURVEYOR
No. 1561
HAWAII, U.S.A.

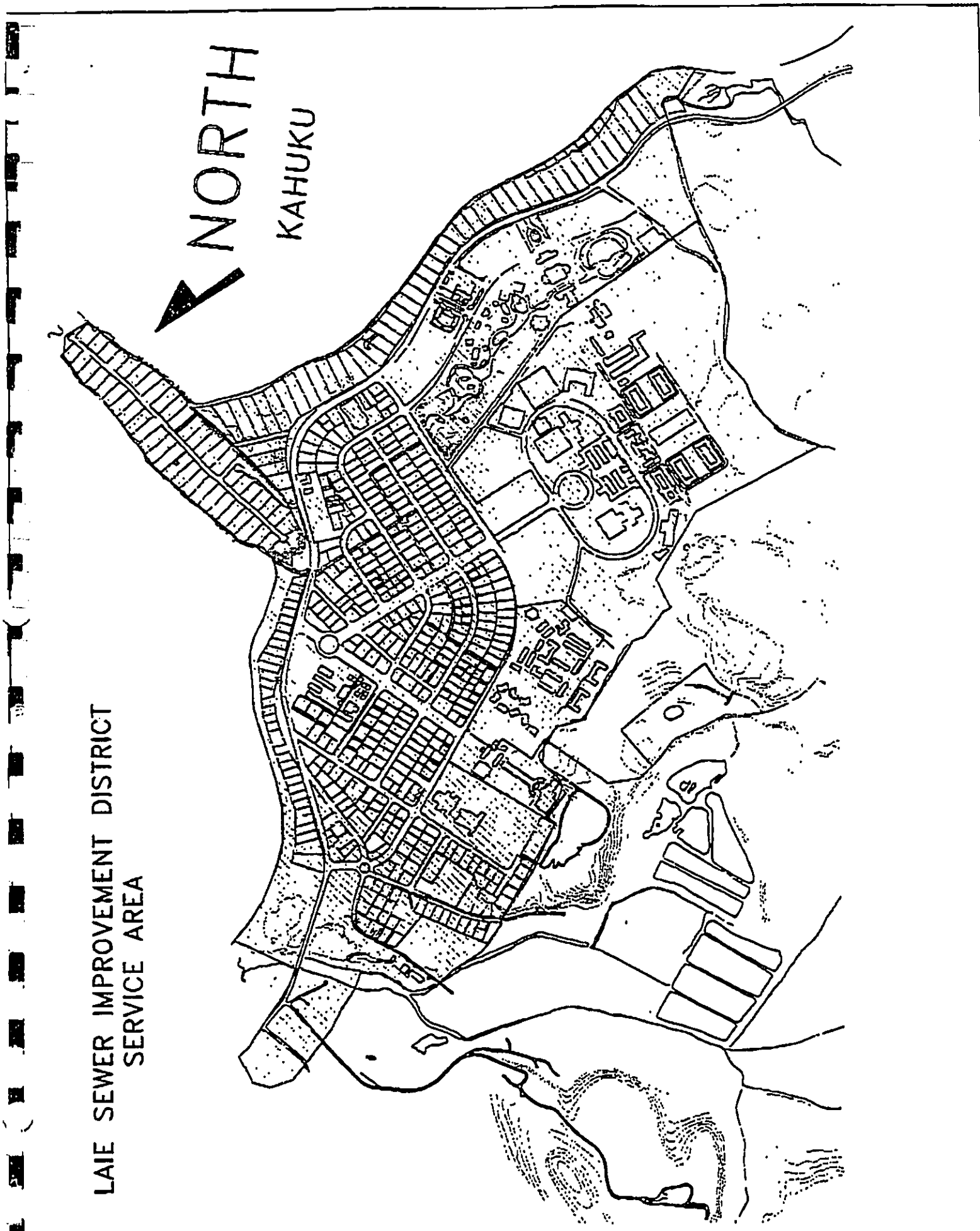
Description prepared by:

Harry S. H. Au
Licensed Professional Land Surveyor
Certificate No. 1561-S

December 28, 1998
Honolulu, Hawaii

H. AU & ASSOCIATES, INC.
2924 MANOA ROAD
HONOLULU, HAWAII 96822-1755

EXHIBIT G



LAIE SEWER IMPROVEMENT DISTRICT
SERVICE AREA

APPENDIX C

BIOLOGICAL STUDIES

Water Quality and Biology of Aquatic Environments in Kahawainui Stream and its Tributaries, Laie, Oahu

AECOS No. 639

WATER QUALITY AND BIOLOGY OF AQUATIC ENVIRONMENTS IN KAHAWAINUI STREAM AND ITS TRIBUTARIES, LA'IE, O'AHU

Prepared For:

James H. Pedersen Planning Consultant
P.O. Box 22
Volcano, Hawaii 96785

Prepared By:

AECOS, Inc.
970 N. Kalaheo Ave., Suite C311
Kailua, Hawaii 96734

August 1991
Revised and updated: January 1992

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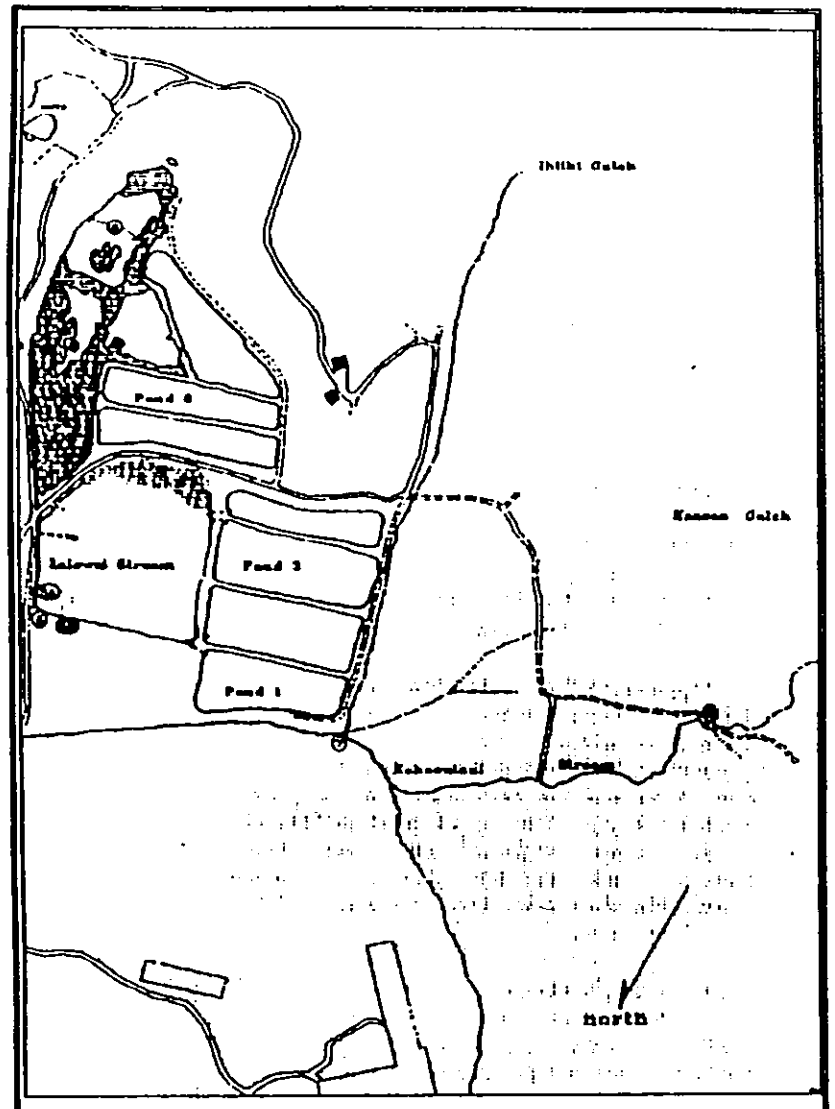

Figure 1B. Location map for middle Kahawainui Stream watershed stations and features.

water flow. Station 3 sampled the ponded water (a feature known in Hawaiian as a <u>muliwai</u>) at a point a short distance downstream of the Kamehameha Highway bridge.

From the Kamehameha Highway bridge to the first major fork, Kahawainui Stream is confined within a bermed flood basin constructed by the U. S. Army Corps of Engineers in the 1980s. Kahawainui Stream branches towards the north; the south fork is Laiewai Stream. Both forks are confined within levees and/or man-made channels across the floodplain. No part of Laiewai Stream below the marshland to the flood control basin has the appearance of a natural stream environment.

Three stations sampled Kahawainui Stream above the flood control basin: Station 6 located opposite a cemetery, Station 7 (see Figure 1B) located at a point where two drainage ditches (draining Ka'aoao and 'Ihi'ihi gulches) join Kahawainui Stream; and Station 8, located just above a road crossing at the upper end of the flood plain and upstream of most of the croplands on this watershed. After April, sampling for Station 6 was moved upstream some 230 feet (70 meters) to a concrete ford designated Station 6A.

Initially, three stations sampled the Laiewai drainage: Station 4 located along the drainage canal adjacent to a cemetery; Station 5, located at the upper end of this same canal where two ditches feed into the canal; and Station 9, located in a pond at the upper end of the marshland located behind Laie town. The La'ie WWTP effluent enters this marsh near its lower (downstream) end and about midway between Stations 5 and 9. The distance between the effluent discharge point (EDP) and Station 5 is approximately 950 feet (290 meters).

The marsh drainage is confined to a ditch and passes through three concrete pipe culverts. These are here designated culvert "A" (under the main access road to agriculture and aquaculture areas in the valley, located about 475 feet downstream from EDP), culvert "B" (under a private driveway, 580 feet downstream from EDP), and culvert "C" (directly downstream of Station 5 and 925 feet downstream from EDP). After March, this part of the drainage

of 1981, presumably as background for the U.S. Army Corps flood control project. The results are given here in Table 2. USFWS Stations 1 and 2 were in the muliwai of Kahawainui below Kamehameha Highway. Station 3 was located near our Station 3, but above Kamehameha Highway. Stations 3 through 5 were spread along the area now occupied by the flood control basin, with Station 5 at the fork where Kahawainui and Laiewai Streams join. Station 6 was located along Laiewai Stream just above our Station 4. Stations 7 and 8 were established along Wailele Stream south of La'ie.

Table 2. Results reported by USFWS (1984) for a one time sampling in Kahawainui, Laiewai, and Wailele streams at Laie, Oahu (March/April 1981).

Site No.[1]	1	2	3	4	5	6	7	8
Location[2]	mouth	3	3	basin	basin	4	Wailele	
	----- Kahawainui Stream ----					Laiewai Stream		
Temperature °C	26	26	26	26	23	23	21	23
Conductivity umhos	2500	3300	1350	650	410	410	90	90
pH	6.5	6.5	6.5	6.5	5.2	5.5	5.2	4.9
Ammonia mg/L	1.89	2.07	2.44	1.71	0.73	0.85	0.90	0.98
Nitrate mg/L	0	<1	<1	<1	2.0	2.0	1.0	1.0
Oxygen mg/L	--	--	--	--	1.8	1.6	6.1	9.0

1 - USFWS location number.
2 - Location relative to features and or stations used in the present survey.

Zions Security contracted to have water samples from the La'ie WWTP and the Kahawainui floodplain analyzed nine times between May 18 and October 16, 1990. Samples were analyzed by Food Quality Labs in Honolulu and are referred to herein as the Food Quality Labs samples. Most of samples

were from the Laiewai Stream portion of the drainage system, but included were samples from the WWTP, Kahawainui Stream above the flood basin, and from a variety of drainages feeding into Laiewai Stream from agriculture and aquaculture areas. On some occasions, a sample was collected from Kaliuwa'a Stream (Kaluanui, Sacred Falls). The results of microbiological analyses on these samples are given in Table 3. On four occasions, samples of the WWTP influent and effluent were collected and analyzed for BOD_5, non-filterable residue (NFR), total Kjeldahl nitrogen (TKN), and total phosphate (TP). These results are summarized in our Table 4.

Starting in July 1990, the chloride content was measured on most of the samples collected by Food Quality Labs. Values ranged from 37 to 224 ppm, all indicative of fresh waters. An October 16 sample from "Sacred Falls" gave a chloride concentration of 5,025 ppm, which would be clearly brackish (around 9 ppt salinity). This result would seem to indicate that the station was located in the estuary of Kaliuwa'a Stream. Samples from near the mouth of Kahawainui Stream (near our Station 3) were not collected after June 1990.

Another ongoing study under the direction of Bob Gearheart (Environmental Resources Engineering, Humboldt State University, California) sampled the marsh and drainage ditch on several occasions between October 1990 and January 1991. The focus of this study was on WWTP effluent impacts on the marsh environment. Analyses were performed by AECOS, Inc. Sampled were two marsh stations, one in the immediate vicinity of the WWTP effluent discharge (EDP) and one upstream to the southeast (Avea Farm), one station on Laiewai Stream (at our Station 5), and two stations in aquaculture ponds which drain into the marsh. Results of the microbiological analyses are summarized in Table 5. A series of samples were collected as well from along the shoreline of La'ie Bay for the Humboldt State University study but are not reported herein. On the four sampling dates, nutrients, pH, BOD, NFR, and conductivity were measured in addition to the microbiological analyses at the same stations (see Tables 6 and 7).

Table 3. (continues)

1 - Station numbers refer to stations designated for the present survey. EDP = effluent discharge point.
2 - MPN/100 ml.
3 - Membrane filter; No. per 100 ml.

Table 4. Analyses for BOD_5, NFR. TKN, and TP on Laie WWTP influent and effluent samples (Food Quality Labs).

Station Location	Date	BOD_5 mg/L	NFR mg/L	TKN mg/L	TP mg/L
WWTP Influent	6/13/90	13000	169	96	0.52
WWTP Effluent	"	670	139	114	0.50
WWTP Influent[1]	8/28/90	320	132	0.46	2.10
WWTP Effluent[1]	"	45	72	0.57	0.74
WWTP Influent	9/18/90	320	209	4.50	0.72
WWTP Effluent	"	78	15	3.63	0.34
WWTP Influent	10/16/90	320	112	38.6	0.85
WWTP Effluent	"	44	61	29.8	0.66

1 - labeled "24-hour composite"

Table 5. Microbiological results from the Humboldt State University samples of the Laie WWTP and Laiewai Stream.

Station Location[1]	Date	Coliforms total[2]	Coliforms fecal[2]	Entero-cocci[3]
Avea farm	10/26/90	--	2000	500
WWTP effluent at EDP	"	--	8000	< 2000
Station 5	"	--	1200	200
Avea farm	11/20/90	--	--	TNTC
WWTP effluent at EDP	"	--	--	216
Station 5	"	--	--	3600
WWTP effluent	12/19/90	3140000	2100000	7300
Avea farm	"	40000	1800	1100
WWTP effluent at EDP	"	2000000	1860000	15700
Station 5	"	560000	340000	3000
Pond 5	"	> 220000	100000	2100
Pond 6	"	2200	600	400
Avea farm	1/07/91	130000	1750	10900
WWTP effluent at EDP	"	30000	**	< 10
Station 5	"	120000	**	500
Pond 5	"	3000	**	600
Pond 6	"	1000	10	180
Avea farm	2/11/91	30000	3000	70
WWTP effluent at EDP	"	< 100	< 100	< 4
Station 5	"	30000	6000	< 10
Pond 5	"	1000	200	10
Pond 6	"	14000	TNTC	240

1 - Station numbers are those of the present study. EDP = WWTP effluent discharge point; Avea farm = edge of marsh 260 feet southeast (upstream) of EDP.

WATER QUALITY RESULTS

Temperature

Temperature measurements are presented in Table 8. Measurements showed a gradual warming at all locations through the month of May, and remained high through October 1991, declining through the wet season which encompasses the cooler months in Hawaii. Not unexpectedly, the temperature in Kahawainui Stream was usually lowest of the locations sampled, with the temperature of the water showing an increase in the downstream direction (Stations 8, 7, and 6). Highest temperatures were recorded in slower moving bodies of water such as the upper pond of the marsh (Station 9) and the muliwai below the flood basin pond (Station 3).

Temperature measurements were taken at several locations (mostly on Laiewai Stream) on April 20 as shown in Table 11. These show the expected patterns of increasing temperature with progressive solar input (from morning to afternoon) and conditions of water flow (higher temperatures occurred in downstream areas characterized by low velocity flow).

The Inland Water Criteria for temperature in freshwater streams (DOH, 1989) relate that the temperature "...shall not vary more than one degree Celsius from ambient conditions". All conditions measured here would be regarded as "ambient". The temperature of the water is an important consideration for other analytes measured in this study, such as oxygen content, but temperature itself is not a parameter of particular concern in this instance.

Turbidity

Turbidity is a measure of the lack of clarity of a water. Turbidity is actually a physical property and is measured using a nephelometric instrument: that is, an instrument which measures the amount of light scattered by (or reflected off) small particles in a water sample. The

nephelometer is calibrated with a standard sample and the units of measurement are nephelometric turbidity units (NTUs). These units do not relate directly to a specific amount of material suspended in the water, although such a relationship could be worked out if the nature of the material did not change.

Table 8. Temperature measurements (^{o}C) at all stream, pond, and marsh stations, March through December 1991.

	Sample Station						
	3 muliwai	4 Laiewai	5	6 -	7 Kahawainui	8 -	9 marsh
Mar. 5	no measurements taken						
Mar. 11	22	23	22.8	21.5	20.5	19.5	21.8
Mar. 19	20	21	21.8	18.5	--*	--*	20.2
Mar. 28	27	25	25.5	24.0	23.2	22.2	26.9
Apr. 15	27	26.5	26[1]	26	25.5	27	27.5
May 8	27	26	26[1]	27[2]	25.5	24	29
June 18	26	26	26.3[1]	25	24	22.5	26
July 22	27	27	26.5[1]	26.0	24.0	24.0	28
Aug. 12	27.5	25.5	27.5[1]	24.6	24.9	23.9	26.2
Sept. 9	27.5	26.0	28.0[1]	28.8	29.5	26.5	28.8
Oct. 7	27.8	28.0	27.8[1]	28.2	28	24.2	27.5
Nov. 22	28	28.5	28	27	25.5	24	28
Dec. 20	22.2	22.5	24	22	21	19	23

* Station could not be reached because of flooded roads
1 - Station 5A; Station 5B was 27.2 ^{o}C in April, 27 ^{o}C in May, 26 ^{o}C in June, 27 ^{o}C in July, 25.5 ^{o}C in August, 25.8 ^{o}C in September, 27.0 ^{o}C in October, 25.5 ^{o}C in November, and 22 ^{o}C in December.
2 - For Station 6A after April.

The turbidity at stations on Kahawainui Stream (such as Stations 7 and 8) declined after March, whereas ponded waters showed not much change in turbidity or even an increase in turbidity through much of the dry season. Station 5 was abandoned and two new stations added for the April 15 sampling: one station (5A) sampled the water which drained the marsh and the other (5B) sampled water which originated in the aquaculture ponds (primarily Ponds 1 and 2). The geometric means in Table 9 are calculated from the Station 5A data only. The Station 5B samples showed that the aquaculture pond drainage contributed much of the turbidity previously measured at Station 5. Geometric means calculated for Station 5B were 283 NTU for the dry season and 57.0 NTU for the wet season. Consistently high turbidities during the summer months contributed to the high dry season mean; for example, the turbidity on June 18 in the canal at Station 5B was 3700 NTU. The situation at Station 6 (and 6A) is unusual and discussed elsewhere (see page 20).

The specific criteria for turbidity in streams in the State Water Quality Standards (DOH, 1989) provide that the geometric mean of all measurements made from November through April (wet season) shall not exceed 5.0 NTU. The mean turbidity at all of the stations sampled in this study were two to three times the standard limit. The dry season (May through October) geometric mean not to be exceeded is 2.0 NTU. This criterion also was not met at any of the locations sampled regularly.

Dissolved Oxygen

Measurements of dissolved oxygen (DO) were taken at most stations on all but the initial visit to the area. During March through December, DO values measured in freshwater environments in the field ranged from 0.5 to 16 ppm (Table 10). The solubility of oxygen in water varies with water temperature -- warmer water holding less oxygen at saturation. At 20 ^{o}C the solubility of oxygen in fresh water is 9.09 ppm. At 27 ^{o}C, solubility drops to 7.97 ppm.

Table 10. Dissolved oxygen measurements (mg/l) at all Kahawainui and Laiewai stream and pond stations.

	Sample Station						
	3	4	5	6	7	8	9
	muliwai	Laiewai		-	Kahawainui	-	marsh
Mar. 5	no measurements taken						
Mar. 11	9.0	1.5	4.8	6.2	5.3	9.5	9.2
Mar. 19	7.8	1.5	5.6	10.0	--*	--*	7.5
Mar. 28	5.3	1.8	2.0	7.6	7.3	8.5	4.1
Apr. 15	6.4	1.7	0.6[1]	5.1	6.3	4.3	9.3
May 8	16	2.3	0.6[1]	10.2[2]	6.4	2.6	5.8
June 18	9.6	0.5	2.5[1]	7.0	3.4	3.9	3.5
July 22	10.0	1.2	1.8[1]	4.1	3.9	2.8	7.8
August 12	4.0	1.2	1.6[1]	3.7	3.5	6.8	6.9
Sept. 9	6.5	0.4	1.2[1]	5.7	7.2	3.5	7.2
Oct. 7	4.0	2.4	1.8[1]	4.2	7.5	0.7	10.0
Nov. 22	4.6	1.4	1.2[1]	6.8	6.9	7.3	11.8
Dec. 20	6.7	3.4	1.3[1]	7.7	7.9	8.4	10.6
Mean Values							
Dry[3]	8.4	1.3	1.6[1]	5.8	5.3	3.4	6.9
Wet[4]	6.6	1.9	1.0[1]	7.2	6.7	7.6	8.8

* Station could not be reached because of flooded roads
1 - Station 5A: Station 5B was 3.6 mg/L on April 15, 2.2 on May 8, 0.5 on June 18, 0.8 on July 22, 1.8 on August 12, 1.5 on September 9, 2.6 on October 7, 3.1 on November 22, and 4.5 on December 20.
2 - Measured at Station 6A from May 8 on.
3 - Dry season: May through October measurements excluding special sampling on April 1 and April 3.
4 - Wet season: March, April, November, and December measurements.

Table 11. Measurements of temperature, dissolved oxygen, and total chlorine residual at selected points along Laiewai and Kahawainui Streams on April 20, 1991.

Station/Location		time	temp. (°C)	DO (mg/L)	total residual chlorine (mg/L)
		morning			
4	Laiewai, canal	0852			0.1
5A	Above Sta 5	0930	25.5	0.45	0.2
5	Above culvert 'C'	0945	24.3	1.25	--
5B	Above Sta 5	0957	24.2	3.2	--
5	Above culvert 'C'	1003	24.0	3.7	--
	Above culvert 'A'	1016	25.3	0.65	0.17
	WWTP Effluent	1037	--	--	>6.0
35'	dwnstrm of effl.	1054	27.1	5.9	0.28
		afternoon			
6A	Above Sta. 6	1356	27.3	4.3	--
5A	Above Sta. 5	1410	27.0	0.36	--
5C	Below culvert 'C'	1415	26.1	1.95	--
4	Laiewai, canal	1428	25.7	1.51	0.18
3	muliwai	1442	30.5	5.9	0.08

Measurements of 5-day Biochemical Oxygen Demand (BOD_5) were made on samples collected from several stations monthly between April and December (Table 12). Included in the table are measurements of the WWTP effluent BOD, which was high relative to the other waters. Previous samples of the effluent have provided values between 22 and 670 mg/L for this effluent (Tables 4 and 6). After August, the WWTP effluent BOD increased substantially.

The BOD downstream of the effluent discharge point (Station 5A), was high relative to Kahawainui Stream (Stations 6 and 7) and increased slightly downstream. The increase may be attributed to the effluent from aquaculture ponds (Station 5B) which always had a higher BOD than the marsh drainage (which includes the WWTP effluent) when samples of the two waters collected just above their confluence are compared.

Table 12. Biological Oxygen Demand (BOD) of Kahawainui and Laiewai stream and pond stations measured monthly between April and December, 1991.

Station	BOD_5 (mg/L) 4/20	5/8	6/18	7/22	8/12	9/9	10/7
	Laiewai						
WWTP Effl.	22	16	25.7	74.6	--	2700	1950
5A	7.2	3.6	16.1	13.2	13.7	14.3	5.7
4	8.3	5.9	17.5	18.0	32.3	14.5	4.1
5B[1]	10	7.7	168	179	35.8	22.6	5.4
	Kahawainui						
7	2.3	--	2.1	29.8	1.5	< 1	1.3
6	1.6	12.8[2]	--	--	--	--	--
3	5.7	17.4[3]	10.4	8.2	2.4	4.1	3.6

Station	BOD_5 (mg/L) 12/20
	Laiewai
WWTP Effl.	3200
5A	2.1
4	4.0
5B[1]	12.3
	Kahawainui
7	< 1
3	--

1 - Aquaculture pond effluent above Station 5.
2 - Station 6A.
3 - Estimated; final DO reading <2.0 in bottle.

The water at Station 3 combines all of the flows entering from Kahawainui and Laiewai Streams. At the time the May 8 sample was collected, the muliwai was experiencing a phytoplankton bloom. Station 6A had been established upstream of Station 6 in order to ensure sampling of Kahawainui Stream above the muliwai. However, once the stream mouth was completely blocked by sand at the end of April, the level of water in the muliwai continued to rise and Station 6A was "incorporated" into the pond. Thus, the high BOD value obtained here. Sampling for BOD was discontinued after May at Station 6A; Station 7 was then sampled to characterize Kahawainui Stream. Although upstream of the muliwai and potential contamination from the aquaculture operations and WWTP effluent, the BOD at Station 7 was sometimes higher than the BOD in Laiewai Stream.

limit of 8.0. Like dissolved oxygen, the pH in these cases would show diel fluctuation, with the highest values reached in the late afternoon and the lowest values occurring just before sunrise.

Nutrients - Nitrate

Measurements of nitrate plus nitrite (herein usually referred to as "nitrate") are presented in Table 14 for the stream, marsh, and pond locations. Considerable temporal variation is shown at all locations which partly reflects the variation in rainfall and stream flows experienced during the survey period. However, sources of nitrates in the watershed appear to be numerous. Nitrate levels were highest in Kahawainui Stream below (or sometimes including) Station 8. The April 15 measurements revealed an exceptional jump in nitrates at both Stations 7 and 8. A similar increase in concentration appeared at Station 5 from July through September. The geometric means show the tendency for low nitrate levels to characterize Laiewai Stream and high values to characterize Kahawainui Stream, particularly at Station 7. However, the rise in nitrates after July at Station 5A on Laiewai Stream blurred this pattern somewhat.

Values in the channel draining aquaculture ponds (Station 5B) were of the same order of magnitude as the values measured at Station 5A, except the aquaculture drainage did not show the same sharp rise in nitrate plus nitrite concentration in July, August, and September. Consequently, the geometric means for Station 5B (0.025 mg N/L and 0.092 mg N/L for the dry and wet seasons respectively) were similar to those recorded for Station 5A only during the wet season.

The analysis of nitrate presented in Table 2 from USFWS (1984) is not sufficiently sensitive (detection limit close to 1 ppm) to be of comparative value. Nitrate values presented in Table 7 from the Humboldt State study demonstrate several characteristics of the aquatic systems with respect to nitrate. Note that nitrate concentration in the raw sewage is low and is increased in the waste stream

Table 14. Nitrate plus nitrite measurements (mg N/L) at all stream, pond, and marsh stations in March through November 1991.

	Sample Station						
	3	4	5	6	7	8	9
	muliwai	Laiewai		-	Kahawainui	-	marsh
Mar. 5	0.056	0.007	0.019	0.024	0.556	0.018	0.022
Mar. 11	0.156	0.012	0.022	0.204	0.222	0.003	0.027
Mar. 19	0.028	0.033	0.051	0.012	--*	--*	0.196
Mar. 28	0.128	0.022	0.017	0.311	0.342	0.322	0.235
Apr. 15	0.073	0.048	0.003[1]	0.389[2]	2.34	1.28	0.092
May 8	0.402	0.074	0.003[1]	0.395	2.21	0.134	0.112
June 18	0.299	0.001	0.011[1]	0.390	0.140	0.001	0.010
July 22	0.443	0.019	0.690[1]	0.068	0.302	0.005	0.002
Aug. 12	0.142	0.102	1.68[1]	0.495	0.603	0.010	0.001
Sept. 9	1.62	0.084	1.58[1]	0.372	0.630	0.018	0.004
Oct. 7	0.169	0.014	0.066[1]	0.129	0.120	0.002	0.001
Nov. 22	0.204	0.065	0.049[1]	0.563	0.788	0.031	0.002

Geometric mean							
Dry[3]	0.357	0.024	0.126[1]	0.251	0.443	0.010	0.004
Wet[4]	0.088	0.024	0.012[1]	0.126	0.600	0.059	0.030

* Station could not be reached because of flooded roads
1 - Station 5A; Station 5B was 0.058 mg N/L in April, 0.042 in May, 0.009 in June, 0.015 in July, 0.047 in August, 0.030 in September, 0.031 in October, and 0.147 in November.
2 - Samples from Sta. 6A after April.
3 - Dry season: May through October measurements.
4 - Wet season: March, April, and November measurements.

Table 16. Ammonia measurements (mg N/L) at all stream, pond, and marsh stations, for March through November 1991.

	Sample Station						
	3	4	5	6	7	8	9
	muliwai	Laiewai		-	Kahawainui	-	marsh
Mar. 5	7.65	7.80	7.90	5.48	0.122	0.019	0.193
Mar. 11	6.27	12.8	15.25	0.244	0.093	0.085	0.164
Mar. 19	0.792	3.80	7.85	0.016	--*	--*	0.322
Mar. 28	2.85	5.97	7.52	0.087	0.011	0.004	0.653
Apr. 15	2.21	4.58	6.55[1]	0.474	0.012	0.002	0.068
May 8	2.97	4.72	8.65[1]	0.212[2]	0.062	0.006	0.154
June 18	5.36	10.1	14.0[1]	0.159	0.037	0.075	0.028
July 22	4.67	11.1	11.1[1]	0.066	0.059	0.009	0.025
Aug. 12	5.10	9.47	9.22[1]	0.031	0.170	0.003	0.036
Sept. 9	5.15	9.1	13.4[1]	0.022	0.102	0.025	0.077
Oct. 7	4.49	8.33	7.16[1]	0.102	0.078	0.025	0.023
Nov. 22	3.39	8.22	10.9[1]	0.026	0.028	0.006	0.082

Geometric Mean							
Dry[3]	4.54	8.5	10.3[1]	0.07	0.065	0.012	0.048
Wet[4]	3.05	6.6	8.4[1]	0.17	0.033	0.010	0.163

* Station could not be reached because of flooded roads
1 - Station 5A; Station 5B on Apr. 15 was 0.37 mg N/L; on May 8 was 1.75, on June 18 was 5.01, on July 22 was 4.02, on August 12 was 1.21, on September 9 was 2.02, on October 7 was 1.28, and on November 22 was 0.987.
2 - All samples from May 8 on collected at Station 6A.
3 - Dry season: May through October measurements.
4 - Wet season: March, April, and November measurements.

ionized ammonia increases with increasing pH and increasing temperature. At a pH of 7.5 and a temperature of 26°C, 1.9% of the total ammonia nitrogen will be un-ionized ammonia (Boyd, 1979). If the pH is increased to 8.0, NH_3 rises to 5.7% of the total ammonia nitrogen.

Algae can be harmed or inhibited by ammonia nitrogen at concentrations on the order of 0.4 mg/L. The tolerance limit (96-hour TLm) reported for the snail, Physa heterostropha, is around 0.9 mg/L (Academy of Natural Sciences, 1960). Toxicity to fishes (short-term exposure) is in the range of 0.6 to 2.0 mg/L (total ammonia) according to the European Inland Fisheries Advisory Commission (1973). A concentration of 2.5 mg/L in the pH range from 7.4 to 8.5 has been considered generally harmful (McKee and Wolf, 1973). The toxicity of ammonia to fish is increased markedly at low tensions of dissolved oxygen, presumably because less CO_2 is excreted at the gills, raising the pH at the gill surface (and thus the concentration of un-ionized ammonia)(McKee and Wolf, 1973). This effect appears to be nullified in ponds where CO_2 concentrations are usually high when DO levels are low (Boyd, 1979).

The levels of total ammonia regularly measured in Laiewai Stream (Stations 4 and 5) are within concentrations expected to have acute and chronic effects on fresh water biota. Although only a fraction of this ammonia is present as toxic NH_3, the harmful concentrations provided above from the literature refer to total ammonia at pH and temperatures comparable to those measured in Laiewai Stream.

Nutrients - Total Nitrogen

Total nitrogen is a measure of all of the combined forms of nitrogen in the water, including ammonia, nitrate plus nitrite, and organic nitrogen (dissolved and particulate). Total N values (Table 17) are dominated in Laiewai Stream (Stations 4 and 5) and at Station 3 by the high ammonia levels in these waters. Similar values are given in Table 7 covering the period from October 1990 to February

Table 19. Total phosphorus measurements (mg P/L) at all stream, pond, and marsh stations in March through November 1991.

	Sample Station						
	3	4	5	6	7	8	9
	muliwai	Laiewai		- Kahawainui -			marsh
Mar. 5	0.765	1.14	1.36	0.887	0.039	0.020	0.185
Mar. 11	0.763	2.19	2.68	0.067	0.065	0.034	0.091
Mar. 19	0.25	1.11	2.44	0.089	--*	--*	0.052
Mar. 28	0.362	0.882	1.31	0.019	0.016	0.017	0.280
Apr. 15	0.697	1.12	1.52[1]	0.152	0.034	0.026	0.078
May 8	0.883	1.81	2.38[1]	0.669[2]	0.007	0.014	0.062
June 18	1.81	2.69	4.15[1]	0.204	0.078	0.146	0.189
July 22	1.68	3.55	3.00[1]	0.042	0.036	0.032	0.213
Aug. 12	1.02	2.52	2.60[1]	0.037	0.217	0.012	0.301
Sept. 9	1.23	2.78	3.37[1]	0.032	0.013	0.028	0.376
Oct. 7	0.907	1.70	1.45[1]	0.028	0.018	0.424	0.194
Nov. 22	0.958	3.10	4.94[1]	0.024	0.019	0.012	0.198

Geometric Mean							
Dry[3]	1.20	2.43	2.69[1]	0.073	0.065	0.038	0.195
Wet[4]	0.57	1.43	2.74[1]	0.169	0.033	0.020	0.149

* Station could not be reached because of flooded roads
1 - Station 5A; Station 5B on Apr. 15 was 0.740 mg P/L, on May 8 was 0.669, on June 18 was 10.9, on July 22 was 11.7, on August 12 was 1.88, on September 9 was 2.03, and on November 22 was 0.438
2 - Measured at Station 6A from May 8 onwards.
3 - Dry season: May through October measurements
4 - Wet season: March, April, and November measurements.

Nutrients - Total Phosphorus

Total phosphorus is a measure of all of the species of phosphorus in the water sample: inorganic orthophosphate, dissolved organic phosphates, and particulate organic phosphates. Measurements of total phosphorus are presented in Table 19. Total phosphorus is consistently highest in the samples from Laiewai Stream and may be interpreted as a signal of the WWTP discharge. Similar values were obtained in October 1990 through January 1991 measurements as presented here in Table 7. Values reported by Food Quality Labs (Table 4) for the WWTP influent and effluent are generally low by comparison. Concentrations in the muliwai (Station 3) are greater on average during the dry season than the wet season, probably reflecting changes in the relative contributions of water flow from Laiewai and Kahawainui Streams.

The mean values for Station 4 were 2.4 ppm (dry season) and 1.4 ppm (wet season); for Kahawainui Stream, mean values were under 0.2 ppm (under 0.07 ppm if Station 6 is disregarded). Total P is clearly higher at the upper end of the marsh (mean of 0.125 ppm) than in Kahawainui Stream, but well below aquatic systems directly influenced by the WWTP effluent. The total phosphorus at Station 5B, representing aquaculture pond drainages, was not substantially different from the total phosphorus at Station 5A during the dry season (geometric mean at 5B = 2.5 ppm). Insufficient data exists to generalize on the wet season phosphate levels at Station 5B. Dry season levels at most locations are greater than wet season levels.

The State of Hawaii, Water Quality Criteria (DOH, 1989) for total phosphorus in streams are shown in Table 15. The geometric means for all of the stations exceed the 0.030 mg P/L set as the limit on the dry season geometric mean for streams. Only the upper part of Kahawainui Stream (Stations 7 and 8) did not exceed the wet season criterion of 0.050 mg P/L. The other criteria are likewise exceeded at most stations except perhaps those on upper Kahawainui Stream. The marsh above the WWTP effluent pipe (Station 9) generally exceeded the water quality criteria for total phosphorus.

Table 21. Enterococci measurements at all stream, pond, and marsh stations in 1991. Table values are (MF) colonies per 100 ml. except as noted.

	Sample Station						
	3 muliwai	4	5 Laiewai	6 -	7 Kahawainui	8 -	9 marsh
Mar. 5	60	230	220	260	320	50	50
Mar. 11	50	75	800	3800	480	430	80
Mar. 19	10000	5000	6100	7700	--*	--*	700[1]
Mar. 28	400	700	800	2000	1900	--	--
Apr. 20	130	260	400[2]	172	390	170	40
May 8	< 100	< 100	< 100[2]	600	200	400	30
June 18	< 10	520	420[2]	480	410	130	260
July 22	< 100	400	200[2]	400	< 100	100	< 100
Aug. 12	72	1400	< 100[2]	900	1200	1700	27
Sept. 9	100	2600	3400[2]	470	510	500	63
Oct. 7	260	730	510[2]	630	570	20000	72
Nov. 22	550	570	930[2]	6000	990	1300	135
Dec. 20	4200	120	290[2]	570	420	520	81
Geometric mean							
Dry[3]	123	888	618[2]	560	531	703	72
Wet[4]	448	377	476[2]	1368	601	301	103

* Station could not be reached because of flooded roads
1 - colonies poorly defined.
2 - at Station 5A; Station 5B was 160 colonies/100 ml on April 20, 200 colonies/100 ml on May 8, < 1000 on June 18, 7000 per 100 ml on July 22, 3600 on August 12, 2000 on September 9, 7100 on October 7, TNTC on November 22, and 210 on December 20.
3 - Dry season: May through October measurements
4 - Wet season: March, April, November and December measurements.

should not be surprising. The chlorination of the effluent should reduce or eliminate bacteria from the WWTP discharge. Also, residual chlorine may sometimes be present in the effluent (and has been detected downstream at Station 3; see Table 11), and this chlorine would further reduce bacteria counts in the water.

The highest mean fecal coliform counts were from Station 6 (6A for the dry season mean), a station not directly influenced by WWTP effluent. The next highest means occurred at Stations 7 and 8 on Kahawainui Stream. Comparable values were found at Stations 4 and 3. For enterococci, the results are extremely variable, with considerable range typifying all of the locations.

Although other evidence (notably high ammonia) was cited above as indicating the possibility that Station 6 water quality is occasionally influenced by water from the Laiewai branch of the flood basin, the single value at Station 6 responsible for the highest mean enterococci occurring at Station 6 was the March 19 measurement, taken during high stream flow (i.e., the wettest period during March and April). Thus, the March 19 value represents a time when Station 6 water was free from potential mixing with Laiewai Stream water. The Station 7 enterococci measurement on this date confirms that the high values in Kahawainui Stream are not coming from the WWTP effluent.

Only the station at the back of the marsh (Station 9) can be said to be characterized by low fecal coliform and enterococci levels with any regularity. This fact would seem to contribute to the presumption that much of the marsh is hydrologically isolated from the WWTP discharge which enters close to the northern end (the outlet) of the marsh. The Humboldt State measurements taken at "Avea farm" some 260 feet (80 meters) "upstream" of the effluent discharge point (EDP) did seem to indicate sewage pollution in this area on the basis of relatively high fecal coliform and enterococci concentrations (Table 5). Station 9 is over 800 feet (250 m) from the EDP. It is worth noting that the highest concentrations of enterococci at Station 9 coincided with the period of greatest runoff from the watershed (March 19 sampling). Although fecal coliform was also high on this

of stream water influence on the nearshore area. However, dissolved oxygen did not vary substantially at Station 2, except for one elevated value obtained on March 11.

One would expect pH to increase to the average pH of around 8.2 for seawater once the stream flow becomes blocked. In fact, the pH tended to remain above 8.0 under all conditions encountered. The mean of the pH measurements was essentially the same for the dry season and the wet season data.

Table 23. Temperature (^{o}C) and Dissolved Oxygen (mg O_2/L) measurements at La'ie Bay stations.

	Temperature Sample Station 1	2	DO Sample Station 1	2
Mar. 5	not measured		not measured	
Mar. 11	23	23	11.8	11.8
Mar. 19	20	21.2	7.2	7.6
Mar. 28	25	25	6.8	7.2
Apr. 15	--	25.5	--	7.2
May 8	--	25	--	6.1
June 18	--	26	--	6.3
July 22	--	28	--	6.2
August 12	--	26.7	--	6.1
September 9	--	28.0	--	6.4
October 7	--	27.5	--	7.2
November 22	--	27	--	6.5
December 20	--	23	--	7.2

The relationship between nutrients detected along the shoreline of Laie Bay near the stream mouth and stream out-

Table 24. Turbidity (NTU) and pH (pH units) measurements at La'ie Bay (ocean shoreline) stations.

	Turbidity Sample Station 1	2	pH Sample Station 1	2
Mar. 5	0.53	1.37	not measured	
Mar. 11	0.81	0.77	8.07	8.08
Mar. 19	22.0	11.3	8.21	8.12
Mar. 28	4.58	10.7	8.04	8.33
Apr. 15	--	7.06	--	8.40
May 8	--	3.02	--	8.41
June 18	--	1.18	--	8.12
July 22	--	3.81	--	8.16
August 12	--	1.91	--	8.01
September 9	--	1.12	--	8.17
October 7	--	5.87	--	8.16
November 22	--	7.52	--	8.13
December 20	--	3.41	--	8.22
Mean Values				
Dry[1]	--	2.4	--	8.17
Wet[2]	2.6	4.2	8.10	8.21

1 - Dry season: May through October measurements; geometric mean for turbidity.
2 - Wet season: March, April, November and December measurements; geometric mean for turbidity.

flow is not as obvious as with the other parameters. When, on March 19, stream flow into the bay was considerable, and the salinity and turbidity of the samples were indicative of brackish water, the ammonia concentration was high (although much less than the muliwai sample on this date) (Table 25). As the stream mouth became blocked over the period through

muliwai. Further, no seasonal difference in total phosphorus is evident in the geometric means.

Table 27. Fecal coliforms and enterococci measurements at Laie Bay (ocean shoreline) stations.

	Fecal coliforms Sample Station 1	Fecal coliforms Sample Station 2	Enterococci Sample Station 1	Enterococci Sample Station 2
Mar. 5	< 1	< 1	< 1	< 1
Mar. 11	< 1	< 1	< 1	< 1
Mar. 19	1200	500	3200	960
Apr. 15	--	30	--	--
Apr. 20	--	--	--	14
May 8	--	< 1	--	< 1
June 18	--	< 1	--	< 2
July 22	--	12	--	5
August 12	--	< 10	--	< 2
September 9	--	< 1	--	1
October 7	--	< 1	--	1
November 22	--	340	--	140
December 20	--	190	--	110
Geometric means				
Dry[1]	--	--	--	--
Wet[2]	--	318	--	245

1 - Dry season: May through October measurements
2 - Wet season: March, April, November, and December measurements.

For these samples, the presence of fecal coliforms and fecal streptococci appear to be directly related to the movement of stream water into the Bay (Table 27). Fecal bacteria were absent or not abundant in samples from days when the stream mouth was completely blocked by sand.

The State of Hawaii, Water Quality Standards which would apply to the La'ie Bay stations are not the same as those discussed above for inland waters. The waters of the bay are designated Class A, open coastal waters. For all of the parameters, the criteria are more stringent than the corresponding inland waters criteria. However, our stations are representative of a small part of La'ie Bay, and in part apparently influenced at times by stream outflow. Thus, for some parameters, comparison with the open coastal waters criteria can be expected to produce noncompliance. Because the geometric means for the nutrients do not show seasonal trends (suggesting that, on balance, stream outflow has no strong influence on these means), the means might well be characteristic of the coastal waters and could be compared with the standards (see Table 28).

Table 28. State of Hawaii, Water Quality Criteria (Nutrients only) for Open Coastal Waters (DOH, 1989).

Parameter	Geometric mean not to exceed the given value	Not to exceed the given value more than ten percent of the time	Not to exceed the given value more than two percent of the time
$NO_3 + NO_2$ (mg N/L)	0.0035 **0.005**	0.010 **0.014**	0.020 **0.025**
Total N (mg N/L)	0.110 **0.150**	0.180 **0.250**	0.250 **0.350**
Total P (mg P/L)	0.016 **0.020**	0.030 **0.040**	0.045 **0.060**

Criteria in bold type "wet criteria" apply to coastal waters which receive more than 3 mgd fresh water discharge per shoreline mile; others are "dry criteria" and apply when coastal waters receive less than 3 mgd of fresh water per coastal mile.

DISCUSSION

The focus in this section of the report is on describing the streams and other aquatic environments of the Kahawainui floodplain using both the biological and water quality observations made during the period from March through December, 1991. The month of March represented an exceptionally wet period with respect to rainfall received by the watershed at La'ie. April and May covered the transition from wet season conditions to dry season conditions. Conditions remained generally dry through the late November, when the rains returned. The observations cover three-quarters of an annual period, and a wide range of weather conditions effecting the aquatic environments at La'ie. Continuation of the monitoring program on a monthly basis produced observations which modified some of the interpretations and conclusions reached earlier, and revealed variabilities in water quality measurements that themselves may be a significant characteristic of the aquatic environments on this watershed.

Upper Kahawainui Stream

Flow in Kahawainui Stream appears to be interrupted above and within the reach at Station 8. That is, between rainy periods, portions of the stream bed are without water. In early March, the water at Station 8 appeared to be essentially stagnant. After the heavy rains in mid and late March, this condition gradually returned. By May, aquatic features at this location were limited to a series of isolated pools in the boulder-filled bed of the stream.

As the environment changed from that of a flowing stream to one of small ponds, the water quality changed as well. Oxygen, temperature, and pH fluctuated more widely. These changes were probably accompanied by changes in the biota, although this aspect was not studied. In late March, the nitrate concentration started to rise, reaching a peak in April, then decreasing through May. Measurements after May gave low nitrate concentrations. The increase in nitrate accompanied the reduction in stream flow.

Lower Kahawainui Stream

Kahawainui Stream reaches the floodplain (elevation less than 20 feet) about midway between Stations 8 and 7. Portions of the stream flowing across the floodplain provide natural appearing aquatic habitat, although the stream is generally confined by levees. This lower reach is dominated by long, shallow pools with rock and sediment bottoms. Riffle areas separate the pools. At Station 6, the stream becomes an arm of the flood basin and mulivai: ponded water behind the beach berm which blocks the mouth during periods of low flow. Water was noted to back up above Station 6A in May, after the beach berm was fully formed (see below).

In many respects, the water quality in Kahawainui Stream is typical of lowland streams on Oahu. High turbidities occur during brief periods of strong flow associated with major rainfall events. Oxygen, temperature, and pH appear generally normal, although biologically stressful levels may occur in the dry season pools as water flow declines. Dissolved nitrates tend to be high in Kahawainui, particularly at Station 7. Nitrates increased substantially in April as the water at Stations 7 and 8 began to stagnate. However, nitrate concentrations at Station 7 were always substantially greater than at Station 8 located upstream. The source of the high nitrate may be agricultural fields adjacent to the stream. Also, a number of intermittent streams join Kahawainui between Stations 7 and 8.

Measurements of fecal coliform bacteria and fecal streptococci in Kahawainui Stream demonstrate that the La'ie WWTP is not the only source of these indicators of fecal contamination on the watershed. Average values for fecal bacteria counts at Stations 7 and 8 are as high or higher than average counts from parts of Laiewai Stream which receive the WWTP effluent.

Fishes noted to be present in this part of Kahawainui Stream include the common guppy (Poecilia reticulata), the tilapia (Orechromis mossambica), and Chinese catfish (Clarias fuscus). These are introduced (non-native) species.

also be present. All three species are introduced fishes which are extremely common in lowland streams on Oahu. A conspicuous invertebrate found in these waters is the apple snail (Pomacea sp.), a large introduced species. The red-colored eggs of this snail were observed on water hyacinth plants during March. Individuals were extremely abundant between Stations 5 and 4 throughout the summer months. This snail was noted in August in the muliwai to extend downstream to about midway between Stations 4 and 3.

The Marsh

The marshland located behind La'ie is perhaps the most interesting aquatic environment on the Kahawainui floodplain. The marsh is dominated by California grass (Brachiaria mutica) and cattail (Typha latifolia), but includes three large open bodies of water. Adjacent to the marsh on the west are three aquaculture ponds. Similar marshy land (without California grass) probably characterized the entire floodplain prior to development of wetland agriculture (taro) by the Hawaiians, and later transformations into aquaculture and agriculture parcels through filling, dredging, and draining. However, the existing marsh appears to be developing in the remnants of three former ponds with the present open water areas being the deeper, central portions of these former ponds. Water depths are on the order of 4 to 6 feet and the depth of mud bottom varies between 1 and 2 feet (Humboldt State University, in prep.).

The water quality station regularly sampled during this study (Station 9) was at the shore of a pond at the south end of the marsh. This station should be removed from any water quality influence by the WWTP effluent which discharges into the north end of the marsh approximately 450 feet above the outlet. Water quality data appear to substantiate this assumption. The primary indicators of sewage (ammonia, phosphates, and fecal bacteria) do not show the elevated levels seen at stations downstream of the WWTP discharge. During the study, both ammonia and phosphorus were high relative to unpolluted stream samples (e.g., Station 8), but the marsh pond does receive flow from a nearby aquaculture pond (see Table 7). Average fecal

coliforms and fecal streptococci values were lowest at this station of all the fresh water stations sampled in the study.

The portion of the marsh receiving the WWTP effluent and areas downstream of the effluent discharge point (EDP) are densely covered by California grass (Brachiaria mutica) which forms a floating mat on the water surface. The dense mat of grass makes difficult observations of aquatic fauna, but mosquito larvae were found to be abundant 30 meters below the outfall. Young bullfrogs (Rana catesbiana) and a pond snail (Physella sp.) were observed here as well. The grass above the water surface harbors an abundance of spiders and insects, particularly earwigs (Dermaptera) but several other species as well. The abundance of arthropods appears to be greater than would normally be encountered in dense grass, and is probably tied somehow to the high level of particulate organics in the water below. The presence of mosquito larvae, despite the high concentrations of ammonia and at least occasional chlorine residual in the water may be because these aquatic larvae are air-breathing. The mosquito larva (and pupal stage) lives largely at the surface, drawing in air through a breathing tube (or tubes in the case of the pupa)(Frost, 1959). No fishes were seen here, but would have been easily missed within the tangle of stems and roots. The abundance of mosquito larvae might be an indication that predators (the common fresh water fishes) are absent.

Laiewai Stream

Laiewai Stream is a series of drainage ditches which serve the area between the marsh and the muliwai of Kahawainui Stream. If there was ever a natural stream in this area, it would have probably been the drainage from 'Ihi'ihi Gulch across the floodplain. The present configuration includes three small drainages above our Station 5. One drains the marshland and adjacent aquaculture ponds (Ponds 5 through 7) and includes the La'ie WWTP effluent; one drains a small wetland below aquaculture Pond 4 and appears to receive water draining from Ponds 3 and 4 as well as overflow from 'Ihi'ihi Gulch during exceptional

the WWTP discharge pipe, but not as dramatically as might be expected considering that the concentration of total ammonia is some three times greater at Station 5A than at Station 3. And, during the period of May through July, un-ionized ammonia was greatest in the lower muliwai (Station 3) where rising pH resulted from the high primary productivity in the stagnant water.

Table 31. Concentration of NH_3 from pH, temperature, and total ammonia concentrations in Laiewai Stream.

	un-ionized ammonia (ppm)		
	Sta. 3	Sta. 4	Sta. 5
Mar. 11	0.13	0.14	0.18
Mar. 19	0.01	<0.02	<0.01
Mar. 28	0.09	0.11	0.15
Apr. 15	0.14	0.07	0.16[1]
May 8	1.34	0.10	0.17
June 18	0.35	0.10	0.16
July 22	0.40	0.08	0.09
Aug. 12	0.13	0.12	0.10
Sep. 9	0.05	0.06	0.09
Oct. 7	0.10	0.14	0.14
Nov. 22	0.11	0.13	0.14

[1] - Station 5A from April 15 on.

Comparison of Table 31 with Table 16 shows how small a proportion of total ammonia is the toxic NH_3 under the conditions of pH and temperature measured most of the time (< 1 to 2 %). However, when the water tends toward stagnation in the muliwai during the dry season, un-ionized ammonia can comprise a far greater proportion of total ammonia. As phytoplankton productivity increases in the

still water of the muliwai, a daytime rise in pH occurs. On May 8, with the pH at nearly 9.1, the percentage of un-ionized ammonia in solution was calculated to be some 45% of total ammonia (at 27 ^{o}C). The pH is not likely to rise this high above Station 5 or at the north end of the marsh where ammonia concentrations are sometimes greater than 10 ppm. However, where phytoplankton-rich water from the aquaculture ponds combines with the WWTP effluent at Station 5, high pH values are possible.

The lethal concentration of NH_3 for trout (which are extremely sensitive) is reported to be as low as 0.05 ppm (Herbert and Vandyke, 1964). Studies with mosquito fish (Gambusia) by Wallen et al. (1957) show much higher doses (3 to 11 ppm) for 24-, 48-, and 96-hour TLm's (median tolerance limit). Threshold concentrations proposed for various fishes as presented in Tsai (1975) range from 0.1 to 2.1 ppm.

Aquaculture Ponds

The other branches (drainage ditches) of Laiewai Stream drain areas northwest of the marsh. The flows are perennial because they originate from the aquaculture ponds, into which ground water is pumped regularly. Flows enter the marsh drainage canal just below culvert "A" and at Station 5 (just above culvert "C"). Samples collected from Ponds 5 and 6 for the Humboldt State University study (Table 7) and the analyses of samples from Station 5B provide a general characterization of the pond effluents.

The pond water is slightly warmer and considerably more turbid than the receiving water. High turbidity is probably due to phytoplankton abundance, but activities of the prawn that is cultured in the ponds may also contribute significantly to the turbidity of the effluent. Slightly elevated pH and BOD are presumably also indications of phytoplankton productivity within the ponds.

The nitrate and ammonia content of the pond effluent is variable, but mostly under 0.05 ppm NO_3-N and 2 ppm NH_4-N. This level of ammonia is high relative to unpolluted stream

WWTP effluent. No native species were observed in the stream system, but this fact cannot be attributed to the WWTP discharge. Native aquatic animals are usually absent from modified stream systems in urban and agriculture areas on O'ahu.

Water quality measurements revealed that sources of "pollutants" were not limited to the WWTP effluent. Many non-point sources of phytoplankton nutrients and fecal bacteria appear to be present on this watershed. A complete assessment of the impacts of these other pollutant sources relative to the WWTP effluent would require estimates of mass loadings. Nonetheless, the results presented here suggest that while the planned diversion of the WWTP from the Laiewai wetlands will produce improvements in Laiewai Stream and lower Kahawainui Stream, water quality problems within the system will continue as a consequence of the non-point sources. Regular monitoring for a period of time after the diversion will provide information valuable to a perspective of the relative impacts of point source and non-point source pollutants of the Kahawainui Stream system with potential application to other Oahu streams.

The impact on La'ie Bay of the stream, or more specifically, the waste stream from the La'ie WWTP, can be addressed only tentatively. Many stations positioned along and off the shore would be required to define the influence of flow or seepage from Kahawainui on water quality in La'ie Bay. Measurements at a single station along the shore at or adjacent to the mouth of the stream suggest that parameters such as turbidity and microbes (coliforms and enterococci were measured) are tied to outflow from the stream. That is, without surface flow, occurences of fecal bacteria and/or suspended solids in La'ie Bay do not derive from Kahawainui Stream.

Other important water quality considerations, such as the nutrients, appear not to be tied to the observed surface flow of water from the stream. Average values at the shore are nearly the same in dry and wet seasons, or are slightly higher in the dry season. This result might indicate that nutrient concentrations in La'ie Bay are not strongly influenced by the stream. However, average nutrient values

tend to be higher in the muliwai in the dry season than in the wet season, reflecting presumably the greater proportion of WWTP effluent as well as non-point sources in the water flowing into the pond. Thus, the shoreline concentrations under low stream flow could represent seepage through the beach of a water with a relatively "high" concentration of nutrients; under high outflow conditions, values obtained at the shore reflect the contribution of a more dilute water flowing into the Bay.

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Botanical Survey, Laie Wastewater Treatment Plant Project
Laie, Hawaii

BOTANICAL SURVEY
LA'IE WATER RECLAMATION FACILITY
KO'OLAU LOA DISTRICT, ISLAND OF O'AHU

by

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Prepared for: GROUP 70 INTERNATIONAL, INC.

November 1993

INTRODUCTION

A new wastewater treatment system is planned for La'ie on land presently in agricultural use. The proposed facility will be located on the southern portion of the La'ie community. The water reclamation facility will be sited on fallow fields and a small planting of coconut trees. The irrigation water storage reservoirs, which will hold the treated water, will be sited on banana and papaya fields. The proposed La'ie Water Reclamation Facility will accommodate the planned development of a new residential area and limited commercial and institutional facilities expansion in La'ie.

Field studies to assess the botanical resources found on the water reclamation facility as well as the irrigation water storage reservoirs' site were conducted on 24 August 1993 and on 04 November 1993. The primary objectives of the survey were to: 1) describe the major vegetation types; 2) inventory the flora, 3) search for threatened and endangered species as well as rare and vulnerable plants; and 4) identify areas of potential environmental problems or concerns and propose appropriate mitigation measures.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area. Topographic maps and a recent colored aerial photograph (1" = 400') were examined to determine vegetation cover patterns, terrain

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ironwood. Small rows of wild cane (Saccharum spontaneum), often used as a windbreak planting, can also be found alongside the banana and papaya fields.

Mixed Forest and Scrub Vegetation

The reservoirs' site and the water reclamation facility abut two coral outcrops. These remnants of a coral reef formed in shallow ocean water during the time the ocean was at a higher level (Foote et al. 1972). The smaller coral outcrop to the north of the reservoirs supports koa-haole shrubs, 12 to 15 ft. tall, with a dense understory of Guinea grass along the edges of the outcrop. The larger outcrop found between the water reclamation facility and the reservoirs supports somewhat taller koa-haole (12 to 20 ft.), a few trees of Chinese banyan (Ficus microcarpa), and dense hau thickets (Hibiscus tiliaceus). The understory plant cover is sparse, with litter from the plants above and the weathered coralline substrate (karst) the most prominent features. Other species found occasionally in this vegetation type include noni (Morinda citrifolia), castorbean, Christmas berry (Schinus terebinthifolius), huehue haole (Passiflora suberosa), koali, and kaunaoa-pehu (Cassytha filiformis).

On the mauka (western) border of the water reclamation facility is a band of ironwood trees. Under the ironwood trees, the ground cover is sparse since the fallen "needles" tend to form a thick mat which smothers other smaller species. In the open, sunny patches upslope of the trees, the vegetation consists of California grass with scattered Christmas berry shrubs. Other plants found here include koa-haole, guava, owi (Stachytarpheta dichotoma), Java plum, and sour grass (Digitaria insularis).

DISCUSSION AND RECOMMENDATIONS

Old field or fallow field vegetation is found on the proposed La'ie Water Reclamation Facility; a few rows of coconut trees also occur here. On the site of the irrigation water storage reservoirs, the vegetation consists of actively cultivated fields of banana and papaya. The usual mix of weedy species associated with agricultural lands is found on the water reclamation site and the reservoirs' site. Uncultivated lands, that is, the coral outcroppings and the foothills mauka of the water reclamation site, support a mixed forest and koa-haole scrub.

A total of 76 plant species were inventoried on the two sites. Of these, 67 (88%) are introduced or alien species; 3 (4%) are originally of Polynesian introduction; and 6 (8%) are native. The six native plants are all indigenous species, that is, they are native to the Hawaiian Islands and also elsewhere. None of the plants found during the survey are listed threatened and endangered species; nor are any proposed or candidate for such status (U.S. Fish and Wildlife Service 1989, 1990, 1992). None of the plants are considered rare and/or vulnerable (Wagner et al. 1990). Introduced species form the dominant vegetaion types on the two sites.

Given the findings above, the proposed project should not have a significant negative impact on the botanical resources of the two sites or to the plant populations within the region. There are no botanical reasons to impose any restrictions, conditions, or impediments to the development of the two sites.

Soil erosion is of some concern, especially on the water reclamation facility site. Although the soils are well-drained, heavy rainfall can cause erosion on the more steeply sloping areas. It is recommended that disturbed areas be revegetated and landscaped as soon as possible to prevent soil loss. Ironwood trees can be planted to help screen parts of the water reclamation facility from view.

Scientific name	Common name	Status	Vegetation type: ag	Vegetation type: f-s
Chloris barbata (L.) Sw.	swollen fingergrass, mau'ulei	X	+	-
Chloris divaricata R. Br.	stargrass	X	+	-
Cynodon dactylon (L.) Pers.	Bermuda grass, manienie	X	+	-
Dichanthium aristatum (Poir.) Hubb.	Wildergrass	X	+	-
Digitaria ciliaris (Retz) Koeler	crabgrass	X	+	+
Digitaria insularis (L.) Mez ex Ekman	sour grass	X	-	+
Echinochloa colona (L.) Link	jungle rice	X	+	+
Eleusine indica (L.) Gaertn.	wiregrass, goosegrass	X	+	-
Panicum maximum Jacq.	Guinea grass	X	+	+
Paspalum conjugatum Bergius	Hilo grass, mau'u Hilo	X	+	+
Paspalum fimbriatum Kunth	Panama paspalum, fimbriate paspalum	X	+	-
Paspalum scrobiculatum L.	ricegrass	I?	+	-
Pennisetum purpureum Schumach.	Napier grass, elephant grass	X	+	+
Saccharum officinarum L.	sugar cane, ko	P	+	-
Saccharum spontaneum L.	wild cane	X	+	-
Setaria verticillata (L.) P. Beauv.	bristly foxtail	X	+	-
Sorghum halpense (L.) Pers.	Johnson grass	X	+	+
DICOTS				
AMARANTHACEAE (Amaranth Family)				
Amaranthus spinosus L.	spiny amaranth, pakai kuku	X	-	-
Amaranthus viridus L.	slender amaranth, pakai	X	-	-
ANACARDIACEAE (Mango Family)				
Schinus terebinthifolius Raddi	Christmas berry	X	+	+
ANNONACEAE (Custard-apple Family)				
Annona muricata L.	soursop	X	+	-

Scientific name	Common name	Status	Vegetation type: ag	Vegetation type: f-s
ARALIACEAE (Ginseng Family)				
Schefflera actinophylla (Endl.) Harms	octopus tree, umbrella tree	X	+	+
ASTERACEAE (Sunflower Family)				
Bidens alba var. radiata (Schultz-Bip.) Ballard ex Melchert	white-flowered beggar's tick	X	+	+
Conyza bonariensis (L.) Cronq.	hairy horseweed, lani wela	X	+	-
Emilia fosbergii Nicolson	pualele	X	+	-
Emilia sonchifolia (L.) DC.	lilac pualele	X	+	-
Wedelia trilobata (L.) Hitchc.	wedelia	X	-	-
CARICACEAE (Papaya Family)				
Carica papaya L.	papaya, mikana	X	+	-
CASUARINACEAE (Ironwood Family)				
Casuarina equisetifolia L.	ironwood, paina	X	-	+
CONVOLVULACEAE (Morning-glory Family)				
Ipomoea alba L.	moonflower, koali pehu	X	+	-
Ipomoea indica (J. Burm.) Merr.	koali	I	+	-
Ipomoea obscura (L.) Ker-Gawl.	field bindweed	X	-	-
Ipomoea triloba L.	little bell, pink bindweed	X	+	-
CUCURBITACEAE (Squash Family)				
Momordica charantia L.	wild bittermelon	X	-	-
EUPHORBIACEAE (Spurge Family)				
Chamaesyce hirta (L.) Millsp.	hairy spurge	X	-	-
Chamaesyce hypericifolia (L.) Millsp.	graceful spurge	X	-	-
Chamaesyce prostrata (Aiton) Small	prostrate spurge	X	-	-

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Report on a Faunal Survey of Wetland Habitat Associated with the Laie Wastewater Treatment Plan Project, Laie, Hawaii

SURVEY OF THE AVIFAUNA AND FERAL MAMMALS FOR THE LAIE WATER RECLAMATION FACILITY, LAIE, OAHU

Prepared for

Group 70

by

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25 August 1993

INTRODUCTION

The purpose of this report is to summarize the findings of a one day (23 August 1993) bird and mammal field survey of approximately 15 acres for the proposed Laie Water Reclamation Facility at Laie, Oahu (Fig. 1). Also included are references to pertinent literature as well as unpublished faunal reports.

The objectives of the field survey were to:

1- Document what bird and mammal species occur on the property or may likely be found there given the type of habitats available.

2- Provide some baseline data on the relative (estimated) abundance of each species.

3- Determine the presence or likely occurrence of any native fauna particularly any that are considered "Endangered" or "Threatened".

4- Evaluate the quality of the habitat for native wildlife and note any special or unique habitat features that may require protection.

forage in this area. The introduced Common Barn Owl (Tyto alba) is often mistaken for the Pueo and is more likely to be seen.

Resident Endemic (Native) Waterbirds:

The project site contained no habitat suitable for waterbirds. The drainage ditches in this region were mostly dry. Following Periods of heavy rainfall there may be temporary suitable habitat in these ditches for waterbirds such as the endemic and endangered Koloa (Anas wyvilliana) and the indigenous Black-crowned Night Heron (Nycticorax nycticorax). These two species are quite opportunistic and will forage in a wide variety of wetland habitats.

Migratory Indigenous (Native) Birds:

Migratory shorebirds winter in Hawaii between the months of August through May. Some juveniles will stay through the summer months as well (Johnson and Johnson 1983). Of all the shorebird species which occur in Hawaii, the Pacific Golden Plover (Pluvialis fulva), also known in the older literature as Lesser Golden Plover (pluvialis dominica fulva), is the most abundant. Plover prefer open areas such as exposed intertidal reef, rocky shorelines, mud flats, lawns, plowed fields, pastures, upland grasslands and roadsides.

Their diet consists primarily of insects and other invertebrates. They arrive in Hawaii in early August and depart to their arctic breeding grounds during the last week of April (Johnson et al. 1981). Plover are extremely site-faithful on their Hawaiian wintering grounds and most establish foraging territories which they defend vigorously. Such behavior makes it possible to acquire a fairly good estimate of the abundance of plover in any one area. These populations likewise remain relatively stable over many years (Johnson et al. 1989). Three plover were recorded on the survey. These birds were found along the roadside makai of the fields recently planted with papayas. Ruddy Turnstone (Arenaria interpres) were not observed but will also utilize open fields.

Resident Indigenous (Native) seabirds:

No nesting seabirds were observed on the property. The presence of predators probably renders this site unsuitable. One male Great Frigatebird (Fregata minor) was seen flying overhead.

Exotic (Introduced) Birds:

A total of 12 species of exotic birds were recorded during the field survey (Table 1). The most abundant were Red-vented Bulbul (Pycnonotus cafer), Zebra Dove (Geopelia striata) and Japanese White-

3- No native waterbird species were recorded. The endemic endangered Koloa and the indigenous Black-crowned Night Heron may forage in the drainage ditches in this region following periods of significant rainfall. These ditches were mostly dry during this survey.

4- Three Pacific Golden Plover were the only migratory shorebirds recorded on the survey. The Ruddy Turnstone may also occur in open fields in this region.

5- The property supports the typical array of exotic birds one would expect at this locality and in this type of habitat on Oahu. No particularly unusual or unexpected species were found. Some birds that usually can be found in this environment were not recorded. This may be due to several factors some of which are: survey too brief, too few individuals to detect or presently no localized populations of these species. Red-vented Bulbul were particularly abundant. This pestivorous species has caused damage to agricultural and flower crops on Oahu.

6- A trapping program would be required in order to obtain more definitive data on mammals. The brief observations of this

survey did not reveal any unusual observations of mammals. It is likely that the number of rats, cats, mice and mongoose are typical of similar habitats elsewhere. The endangered Hawaiian Hoary Bat was not recorded at this site but it is known from Oahu. The potential for this species at this site is unknown due to our limited knowledge of this animals distribution and ecology.

7- No special or unique habitat essential for native birds were found on the survey. The drainage ditches north and south of the property may provide limited temporary foraging opportunities for native waterbirds such as Koloa and Black-crowned Night Heron.

8- If ponds or collection basins are created as part of the proposed development this resource may also be exploited by waterbirds such as American Coot (Fulica americana alai) and Black-necked Stilt (Himantopus mexicanus knudseni). These two federally listed endangered species prefer ponds and other flooded habitats. The endangered Common Moorhen (Gallinula chloropus sandvicensis) is shy and normally uses ponds with emergent shoreline vegetation.

KEY TO TABLE 1

Relative (estimated) abundance = Number observed on eight minute counts in appropriate habitat.

A = abundant (10+)

C = common (5-10)

U = uncommon (less than 5)

R = recorded only once on survey or not on census stations

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APPENDIX D

ARCHAEOLOGICAL STUDIES

Archaeological and Historical Assessment Study-Water Reclamation Facility

Archaeological and Historical Assessment Study Laie Wastewater Reclamation Facility

Land of Laie
Koolauloa District, Island of Oahu

PHRI Paul H. Rosendahl, Ph.D., Inc.
Archaeological • Historical • Cultural Resource Management Studies & Services

Report 1325-110893

Archaeological and Historical Assessment Study Laie Wastewater Reclamation Facility

Land of Laie
Koolauloa District, Island of Oahu

BY

Susan T. Goodfellow, Ph.D. • Laboratory Director
and
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NOVEMBER 1993

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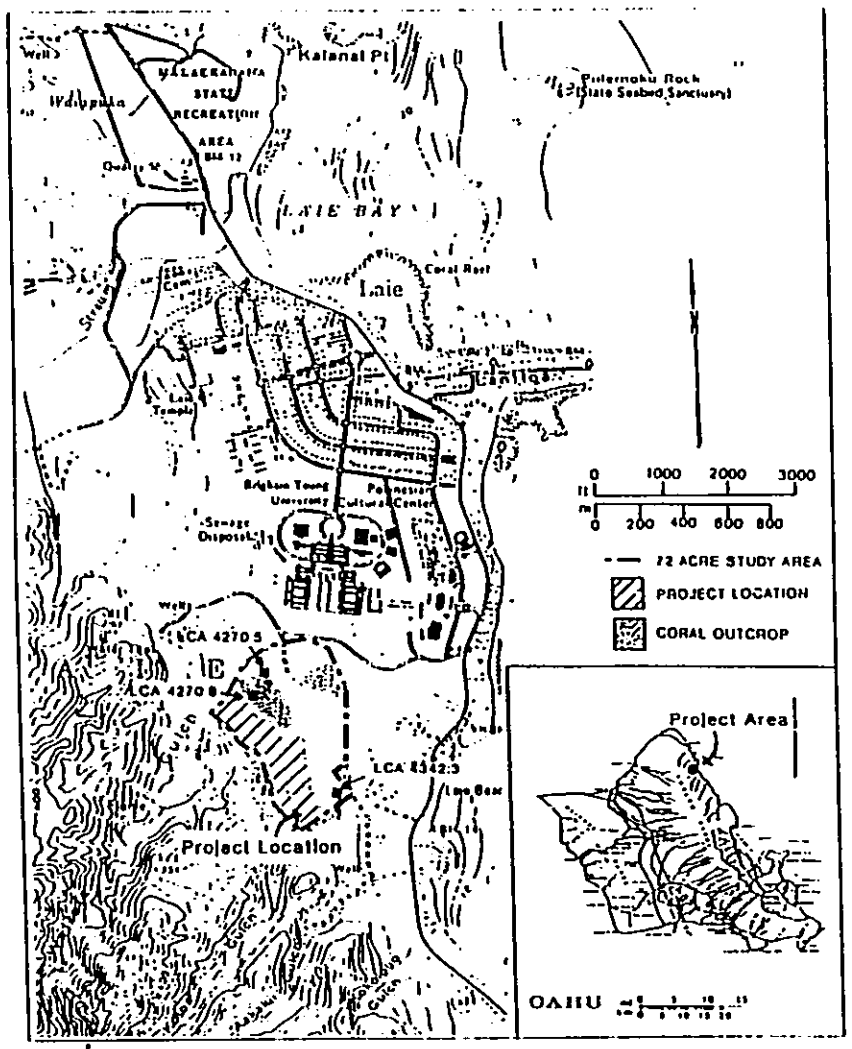

Figure 1. Project Area and LCA Locations

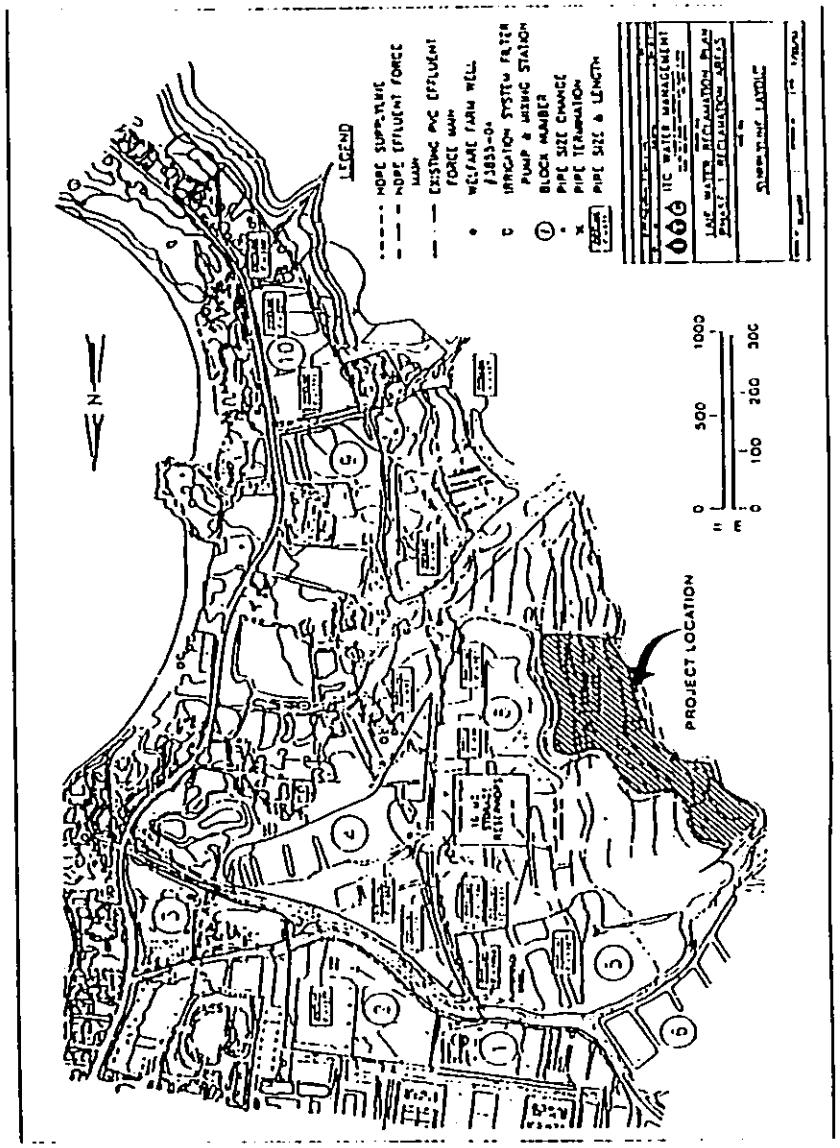

Figure 2. Project Area, Detail

1992) (Figure 1). The following information on these awards was provided by PIIRI Cultural Resources Specialist Kepa Maly*:

L.CA 4270 - Keao
Native Register Vol. 4:235

I ka po'e Ho'onā kuleana. Aloha 'oukou, ke ha'i aku nei au i kuleana; 5 lo'i kalo, aia i Puapua nei; 1 lo'i aia i Kawai'eli; 1 ho'okāhi moku weuweu aia i Kapaka; 1 moku weuweu aia i ka'ili o Kauakāhi; 3 moku weuweu aia i Pōhakumo'o; 1 moku mo'o aia i ka Haumalo'o, 1 moku weuweu aia mauka i ka Haumalo'o, 5 koa aia ma ka Haumalo'o, aia ma Hukukae. Mai nā mākua a me nā kūpuna.

L.a'ie Ianuali 5, 1848

Na Keao X hailona

To the people who quiet land titles. Greetings to you, I now tell you of my land claim: 5 taro pond fields are at Puapua; 1 pond is at Kawai'eli; 1 grass parcel [pasture] is at Kapaka; 1 pasture is in the land parcel of Kauakāhi; 3 pastures are at Pōhalumo'o; 1 dry land cultivated parcel [moku mo'o] is at Kahaumalo'o; 1 pasture is at upland Kahaumalo'o; there are also 5 koa [trees] at Kahaumalo'o at Hukukae [?spelling]. Land is from the parents and grandparents.

L.a'ie, January 5, 1848

By Keao X his mark

L.CA 4270 - Keao
Foreign Testimony, Vol. 11:308

Ma'i'i sworn: Says he knows the 6 kalo [taro] patches of claimant in La'ie. They are bounded on Hau'ula side by Konohiki [chief's land agent]; mauka by Koi's land; Waialua side by Kahua'ilua's land; makai by Kalua's land.

Claimant has also 4 pieces of kula [dry land agricultural parcels] land, planted. The first piece is bounded mauka by Kahili's land, on the other sides by the Konohiki; planted with tobacco. The second piece is bounded on all sides by the Konohiki; planted with tobacco. The third piece is planted with wauke [for kapa making]; bounded on all sides by the Konohiki. The fourth piece is planted with coffee trees; bounded on all sides by the Konohiki.

* *On Figure 1, two parcels of LCA 4270 are shown (Parcels 3 and 6). However, it is not clear in the LCA testimonies how the parcels were used.*

Claimant has a house site distinct from his land, not enclosed. He derived the land from his ancestors and has held it 4 years. The agent of the Konohiki had no other objection to this claim than to No. 3696, page 281. The objection from LCA No. 3696 states:

John Harbottle, agent for C. Kana'ina objected to this claim and to all others on La'ie on the ground of an arrangement said to have been made between Kana'ina and the maka'āinanas in regards to their lands (LCA 3696, Foreign Testimony Vol. 11:281).

L.CA 4342 - Kapuaokahala
Jan. 10, 1848 Native Register, Vol. 4:285

E nā Luna Ho'onā Kuleana 'Āina e, Aloha 'oukou me ka mahalo 'ia Owau nei o Kapuaokahala, ke ha'i aku nei au i ko'u kuleana 'āina ma Malaekahana, he 'āina kula, he 'umi māla ma Pāmoa, ho'okāhi kula ma kauhiloa, 'elima māla ma Makanikeo lo'i, he kula 'āina ma Umauma'alaea, ho'okāhi māla ma Kūkuluamalolo, aia mauka he mau māla 'awa 'elua Aia ma La'ie ia wahi o'u, 'ehā lo'i. He kau li'ili'i ka waiho ana o kēia mau lo'i o'u. E pili ana kekāhi 'ao'ao me ko Keli'iwaiwai'ole, 'oia lo'i e pili ana kāhi lo'i me ko Pulehu, e pili ana kāhi lo'i me ko Māhoe, e pili ana kāhi lo'i me Kokalimakāhi no Mat o Kamehameha II mai ko'u noho kuleana ana mai

Na Kapuaokahala

O Land Commissioners who Quiet Title Land Claims, Respectful greetings to you. I am Kapuaokahala and I tell you of my land claim at Malaekahana, it is a kula [dry land] parcel. There are ten māla [garden plots] at Pāmoa; there is one kula at Kauhiloa; there are five garden plots at Makanikeo's lo'i; there is a kula land at Umauma'alaea; there is one māla at Kūkuluamalolo; and in the uplands are two 'awa patches. There at La'ie my place consists of four lo'i [pond fields]. There locations of my lo'i are scattered. One is along side Keli'iwaiwai'ole's; a lo'i is along the lo'i of Pūlehu, a lo'i is along side Māhoe's, and another is along side Kokalimakāhi's. My right to dwelling has come from Kamehameha II.

By Kapuaokahala

L.CA 4342 - Kapuaokahala
(Deceased) Foreign Testimony, Vol. 11:295

Kalimakuhi sworn says he knows the land of claimant in La'ie. It consisted of 4 kalo patches which did not belong to Cl. He got leave from other people to plant on their patches, and when he died the patches reverted to them.

Witness knows the land of claimant in Malaekahana. It consists of 4 separate pieces of kula land. The first piece is planted in wauke etc., and

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Archaeological Survey of the Laie Sewer Plant with Historical Background on Laie Ahupua'a

Archaeological Survey of the Lā'ie

Sewer Plant with Historical Background

on Lā'ie Ahupua'a

by

Hallett H. Hammatt, Ph.D.

Prepared for

Mr. James Pedersen

Prepared by

Cultural Surveys Hawaii
September 1991

Abstract

An archaeological survey was conducted of a 6-acre parcel surrounding the existing Lā'ie Sewer Plant. This parcel is proposed for expansion of the existing facilities No archaeological or historical sites were found and no sites have been previously recorded in this area. In conjunction with this survey an archaeological/historical review was conducted to locate and describe archaeologically sensitive areas within the *ahupua'a* of Lā'ie. These areas include: 1) former *lo'i* at Kaho'oleināpea Stream, 2) *lo'i* along Kōloa Stream, 3) Wailele Stream *lo'i*, 4) *lo'i* on the flatlands around the Mormon temple, 5) Kahawainui Stream *lo'i* , 6) Paeo fishpond, 7) Waikuukuu (a limestone crevice), 8) Moohehiki *Heiau*, 9) Nioi *Heiau* , and 10) the Ko'olau Railroad Line. Most of the surface features of these site areas have been destroyed by development except for areas *mauka* of the floodplains (upper Wailele, Kahawainui and Kōloa Stream valleys). However, terrace remnants survive in the Kahawainui floodplain (from rice cultivation?)and some developed areas may have intact buried sediments which are significant for chronology and human paleoecology.

List of Figures

I. Introduction, Scope of Work

This project included overview research o the history of Lā'ie to designate existing and former site areas Fieldwork was limited to a 6-acre parcel surrounding the present Lā'ie Sewer Plant which is proposed for plant expansion (Figs 1 through 3)

1 Literature search of relevant documents related to past land use, history and previous archaeological studies in Lā'ie.

2. Archaeological inventory survey of the 6-acre parcel adjacent to the existing sewer plant and including the existing sewer plant.

3. Preparation of a report detailing all findings to be included as part of an Environmental Assessment Study.

4. Coordinate our Scope and Findings with the State Historic Preservation Division as appropriate.

The background search is intended to be a general overview of Lā'ie *ahupua'a*. Historic maps and Land Commission Award documents, as well as commonly available references were consulted.

This overview is not exhaustive and considerably more information is available which was not consulted or only briefly examined. For example, although study of Land Commission Award testimonies could result in reconstruction of many traditional *'ili* names and Hawaiian subsistence. One major source - Mormon church records - could prove to be a wealth of information on the transformation of an isolated Hawaiian settlement into a thriving modern community

Although much of modern Lā'ie shows no surviving surface remnants of

prehistoric or early historic periods, considerable significant buried evidence of former land use may survive in selected areas

The texts consulted are listed in the References Cited section of this report. Maps consulted include the Jackson (Alexander) map of 1884 (Fig. 4), the 1922 USGS Map (Fig 5), a map of La'ie Town by Al Ivins dated 1927 (Fig. 6), the 1929 USGS map of La'ie (Fig. 7), and a recent master plan map of La'ie (Fig. 8).

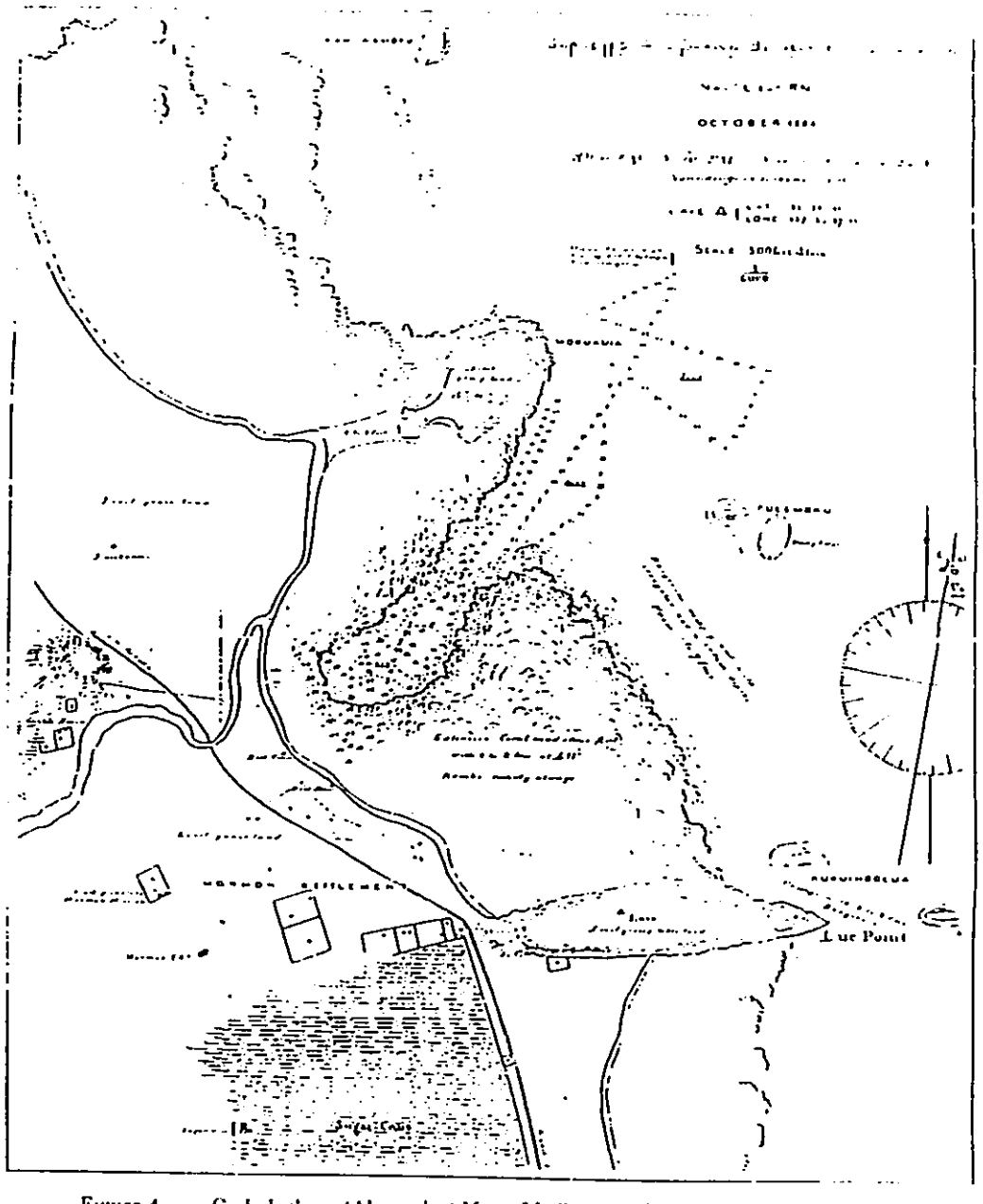

Figure 4 G J Jackson (Alexander) Map of La'ie 1884 (Reg # 1347)

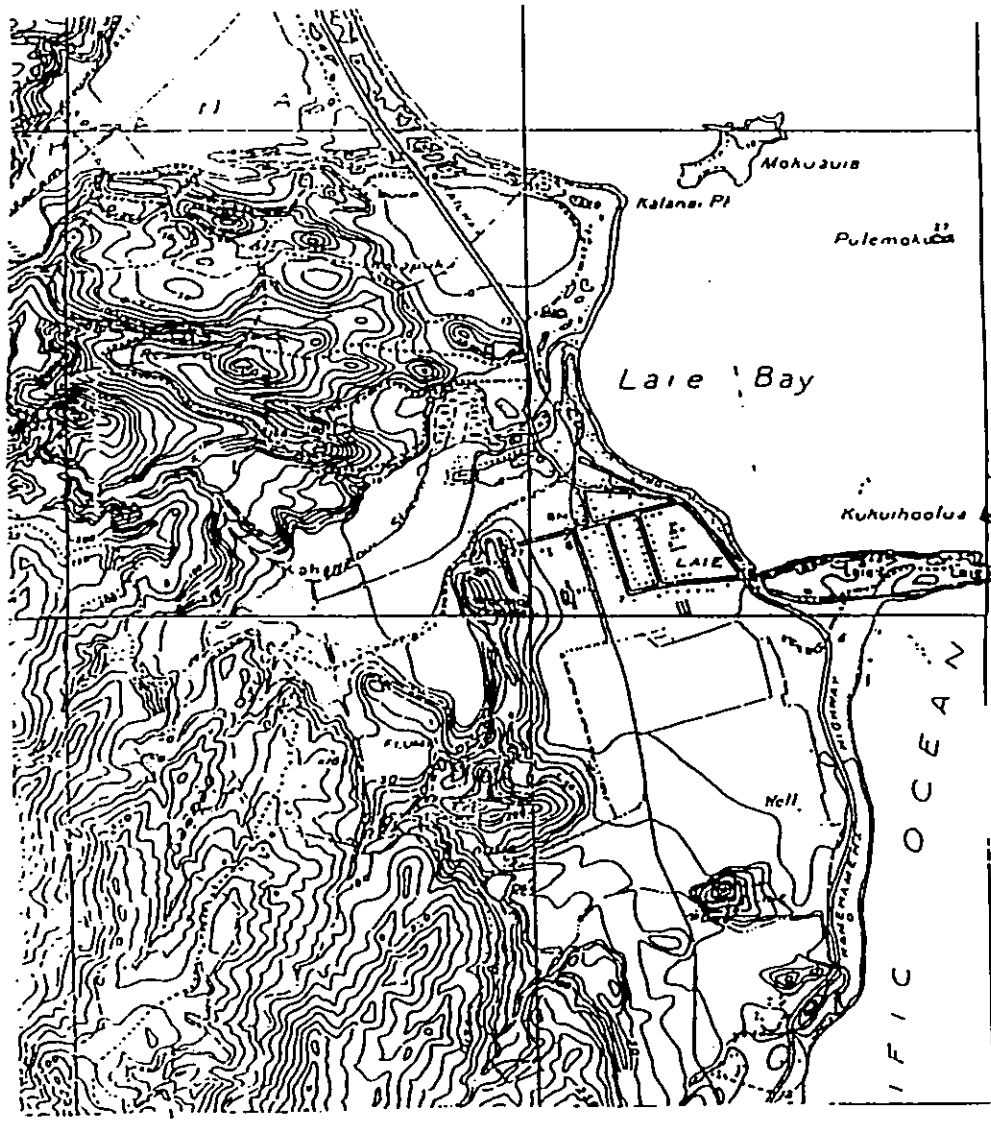

Figure 7 USGS Map of La'ie 1929

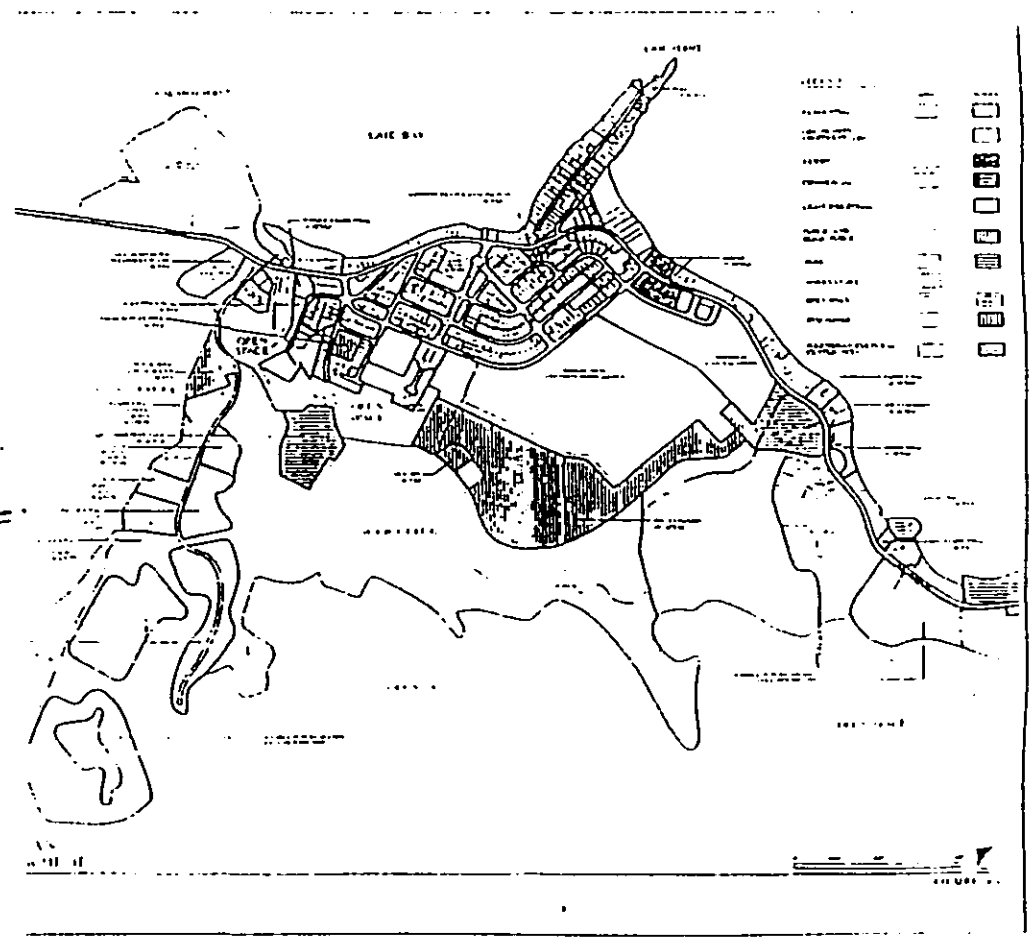

Figure 8 Recent Master Plan Map of La'ie

However, the lot adjoining it to the north is indicated as having more graves, possibly having functioned as a long-term burial place. A prehistoric cultural layer was found in one nearby locality at the base of the limestone scarp and was dated by C14 to A.D 1415 to 1645. A later historic-era occupation is interpreted as being connected to Hawaiian inhabitants and is associated with the surrounding graves outside the fenced cemetery (Bath, 1985).

B. Documentary Sources for Past Land Use and History

The sources consulted for the present study are not all that is available for the *ahupua'a*, but they do represent most of what is shown in existing documents and what has been available to the author through various contacts. The documents which are used here to interpret Lā'ie land use patterns other than the archaeological sources listed above are as follows:

1. G.J. Jackson map of Lā'ie Bay (Reg. #1347), dated 1884.
2. USGS Map of O'ahu showing Lā'ie Bay, dated 1922.
3. Map of Lā'ie Town by A.I. Ivins, dated 1927 (from Zion Securities).
4. USGS map of Lā'ie, dated 1929.
5. Lā'ie Tax maps showing Land Commission Awards.
6. Land Commission Awards for Lā'ie (selective).
7. Modern plan map for Lā'ie (recent, but no date).
8. 1990 aerial photograph of Lā'ie, supplied by R.M. Towill.

C. Archaeological Sites with Their Present Condition

The known archaeological sites in the areas *mauka* of the immediate shoreline are listed below with observations on history and present condition as

documented in the sources listed above (see Fig. 9):

1 Taro terraces at Kahooleināpea Stream adjacent to Mālaekahana. The area is called Wailele and is in the lower part of Kahawainui Stream (now cane land; from Handy, 1940:89-96). Kaho'oleināpea Stream is not shown on the USGS map but is assumed to be the short tributary entering Kahawainui stream from the north near its outlet to the ocean.

This area is not shown on Jackson's 1884 map or on any more recent maps as wetland taro and there is no other known source that shows *lo'i* land here The terraces were probably destroyed by cane cultivation and later land modification. There are two Land Commission Awards on the north side of Kahawainui Stream in this general location (LCA 2346 and LCA 3859). The testimony for these should be consulted to determine whether they were house lots or *lo'i*.

2 Taro terraces about 2 miles inland along Kōloa Stream at the south end of the *ahupua'a*. In one area there are 15 terraces, in another there are 11 terraces. There are associated dwelling sites and the area is covered with large mango trees (Handy, 1940:89-90).

This terraced land in Kōloa Stream valley does not show on the early maps, however, its existence is well documented in Land Commission Awards which are distributed near the mouth of the stream (called Lā'iemaloo Stream on the tax map) and refer to *lo'i* as well as sweet potato plantings (for example Testimony for LCA 3939). Other testimonies mention *lo'i*, *wauke*, and sweet potato in upper Kōloa Gulch. The tax map for the upper part of the gulch does not show the mapped location of LCAs but lists 17 unlocated awards. These are assumed to be in Kōloa Gulch or possibly the next small valley to the north, Wailele Stream. What is the disposition of these agricultural sites? Jackson's map of 1884 shows cane fields *mauka* of the beach road in all *makai* areas of Kōloa Stream. It is probable that the *makai* lands of this complex were modified by cane planting

to the south of the cemetery which may mean that the eastern portion of this *lo'i* land may have been drained and planted in cane. However, the western and southern portions of this wetland survive today as ponds as shown on the 1990 aerial photo. The central portion which is in pasture today shows clear vegetation lines marking the old terraces on the aerial photo. It appears that the traditional irrigated wetlands were confined mainly to the south side of the Kahawainui Stream. Only four Land Commission Awards are shown on the floodplain at the north side of the stream. Taro cultivation certainly traditionally extended far up the stream valley.

6 Paeo Fishpond (Site 277) is described by McAllister (1933) as having been a horseshoe-shaped pond at the mountain side of the bridge on the Kahuku side of Lā'ie. In 1933, it was reported as dry and overgrown with weeds. McAllister also mentioned the association of the legendary goddess Huawahine (Haowahine?) to this pond. She divided her time between this pond and Kawainui pond in Kailua. On the north side of the pond was said to be a chalice-shaped stone, 3 feet high, where Huawahine combed her long hair.

The pond is not shown on the 1884 Jackson map. On the 1922 USGS map is the clear outline of a circular marsh area (with enclosing walls?) by a north meander of Paeo Pond which had filled in by the early 1920s. The 1929 USGS map shows a slightly less defined but longer marsh area with a house at the southern end and the center of the meander as dry land. Clearly, the meander channel of the stream had been cut off early in the 20th century and the pond began the slow process of in-filling.

There is apparently no surface trace of the pond today (Ahlo and Hommon, 1981) and modern disturbance has been extensive in this area. However, as Neller (1984.17) and Bath (1985) both state, it is likely that buried sediments associated with this pond still exist and until the area is tested this potential cannot be

dismissed. Today, there is a small pond on the north side of Kahawainui Stream at the site of the former pond. The relationship of this modern pond to the ancient one is unclear. Bath (1984.6) is puzzled that the ancient parcel does not appear on Jackson's 1884 map and considered that it may have been covered by that time. The present author is of the opinion that the outline shown on the 1922 USGS map is convincing as the remnant of a pond and that the pond was extant in the late 19th century and Jackson simply did not show it.

7 Waikuukuu (Site 276) located on the Kahuku side of the old Paeo fishpond, is a narrow crevice with water at the bottom. The water level was affected by tides and the depths of the water in Waiapuka (McAllister, 1933).

This feature is thought to have been modified in modern times and may be presently used for sewage disposal (Ahlo and Hommon, 1981).

8. Moohehiki *heiau*, Site 283. McAllister describes this site as having been "in the taro patches on the sea side of the Mormon Temple. The slight elevation of the ground, the occasional sound of the drums, and the name are all the traces that remain according to the oldest Hawaiians of the District" (McAllister, 1933).

A quick inspection of some LCA Testimonies produced no reference to this name. The structure or place does not appear on any old maps and all traces of it appear to be lost-possibly destroyed by cane cultivation.

9 Nioi *heiau*, Site 281. McAllister describes this as being on a small limestone ridge on mountain side of the temple. In the early 1930s all that remained were "disturbed coral platforms." It was said to have been dismantled by the plantation and was originally built on the Kahuku side of a coral outcrop. The *heiau* was one for offering of human sacrifice. "On the Kahuna side of the ridge are several rock shelters which were probably used as abodes of the *kahunas*" (McAllister, 1933).

This site does not appear on any of the early maps but the limestone ridge is still present behind the temple. Judging from the 1990 aerial photograph the area has been heavily modified. Since human sacrifice is mentioned, this *heiau*

may have been a *luakini* class temple.

10 The Ko'olau Railroad Line. As pointed out by Neller (1984) portions of a sugar train berm still exist in Lā'ie. Neller found a segment paralleling Kamehameha Highway on the *makai* side.

This railroad berm is not shown on Jackson's 1884 map but (unlike Paea fishpond) is assumed not to be extant at that time. This line was built within a few years of 1900 and eventually extended southward to Kahana, a distance of 11 miles. This line was intended to be part of an ambitious plan for a trans-Ko'olau Railroad but these grandiose plans never materialized and the train was used to haul cane to the Kahuku Mill (Condé and Best, 1973). The controlling company was called the Ko'olau Railway Company.

The railroad is shown on the 1922 USGS map and on the 1929 USGS map as well as on the 1927 Lā'ie Town map. By 1928 there were two spur lines: one which went up Kahawainui Valley on the south side of the floodplain wetland agricultural plots and the other extending *mauka* south of the temple to a well and reservoir at the north side of Wailele Gulch. These spurs, as well as cane land shown on the historic maps, give a good indication of the extent of sugar growing in Lā'ie. The railroad berm followed a route through Lā'ie which is far *mauka* of the present coast road. Much of its former route has been covered by residential development.

D. Sugar Growing in Lā'ie

The Lā'ie Sugar Plantation was founded in the mid- to late- nineteenth century by the Mormon missionaries. The Mormons arrived in Lā'ie in the 1850s

and by 1865 had purchased 6,000 acres of the *ahupua'a*, mostly in the *makai* section. By 1884 the Lā'ie Plantation had large tracts of cane south of the Mormon settlement. Jackson's 1884 map shows cane fields *mauka* of the beach road and south of the mission settlement. This map also shows a sugar mill at the *mauka* end of the fields. The maximum extent of sugar planting in Lā'ie is not shown on any map in the author's possession but it is apparent that most of the cultivated fields were in the southern dryer portion of the *ahupua'a* (Lā'iemaloo) and probably in the kula land above the Kahawainui Stream floodplain (served by the northern spur of the Ko'olau Railway which went to the base of this valley). Expansion of sugar planting was mainly to the south of the community of Lā'ie. The enterprise involved reservoirs and ditch systems for field irrigation, as shown on the 1929 USGS map. Except for some areas south of the Mormon Temple, sugar was probably never planted in the irrigated wetland taro lands of the Kahawainui floodplain (Lā'iewai) and the systems of *'auwai* and terraces survived the plantation modifications. In many cases the traditional *'auwai* systems south of the temple were probably adapted for sugar irrigation.

The 1927 map of Lā'ie Town shows the plantation infrastructure as well as fields south and west of the 30 or so extant taro terraces. Three fields are shown along with a Filipino Camp of 23 houses and a *mauka* camp of 17 houses. This era must have been the apex of the Lā'ie Sugar Plantation. In 1931, leases of the Lā'ie Plantation fields were assigned to the Kahuku Plantation (Condé and Best, 1973), and sugar growing in Lā'ie continued only for twenty or so years after that

and their associated sediments are important for reconstructing past land use and chronology

Clearly, all lands which have been dredged or mixed to coral substrate (fairly shallow in La'ie) have lost all potential archaeological value. This would include all heavily modified lands and dredged aquaculture ponds.

There is another factor in historic preservation concerns: structures associated with the early sugar industry in Hawai'i have matured beyond the 50-year (and in some cases 100-year) age mark which may qualify them as significant historic sites. These structures include ditches, railroad berms and other works of engineering, as well as locations of former camps in which tangible remains may survive on or below the surface. These features are known to exist in La'ie.

IV. Survey Results

A. Description of the Project Area

The entire project area is located on a limestone knoll 50 feet above the flood plain within the boundary fence of the recently expanded but existing sewer plant *mauka* of the BYU Campus (Fig 10). The west portion is occupied by the existing plant which includes a building, filtration tanks and a pond. To the southeast a new tank is under construction and there are exposed construction cuts through the clay and limestone sediments and the surrounding terrain has been recently graded to expose the clay topsoil The north section of the parcel is, in places, heavily vegetated but the bulk of the ground surface has been previously graded and cultivated Vegetation consists of *koa haole*, feral cassava, bananas, vines and California grass. This area, according to Mr. Kleinman of Zion Securities, who accompanied the Cultural Surveys Hawaii crew on the survey was farmed until recently. Modern trash, car parts, etc. were observed under the vegetation mat.

According to the Plant Manager, the present plant has been in operation since 1983 and the former plant (which appears on the 1983 USGS Kahuku Quad Map) was located approximately 1,000 feet to the east.

B. Results

The only undisturbed land within the project area is a small portion of limestone outcrop surrounding 5 banyan trees to the east of the existing pond. No archaeological or historic materials were observed here. Other portions of the property to the east which were recently graded were inspected for evidence of archaeological and historic occupation debris [illegible] found

V. References Cited

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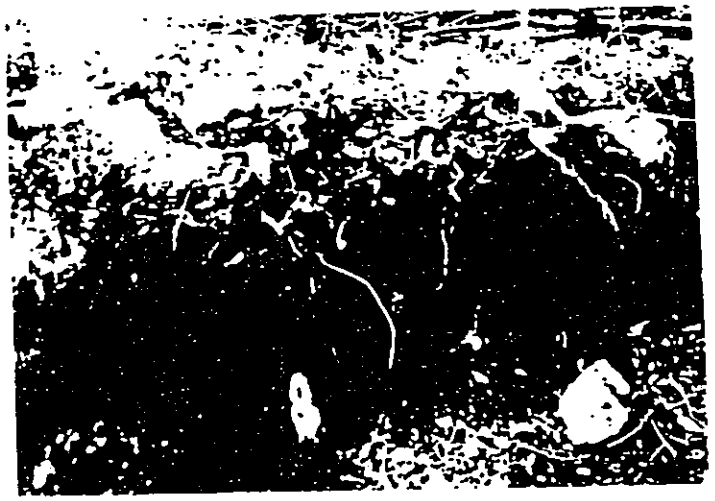

Figure 13 Recent Cut in Decomposed Limestone Showing Bedrock South of Sewer Plant

Figure 14 Existing Sewer Plant, View to South

APPENDIX E

CORRESPONDENCE

BEN. AMIN J. CAYETANO
GOVERNOR OF HAWAII

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
Kakuhihewa Building, Room 555
601 Kamokila Boulevard
Kapolei, Hawaii 96707

TIMOTHY E. JOHNS, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTIES
JAMES E. KAMELAMELA

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
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STATE PARKS
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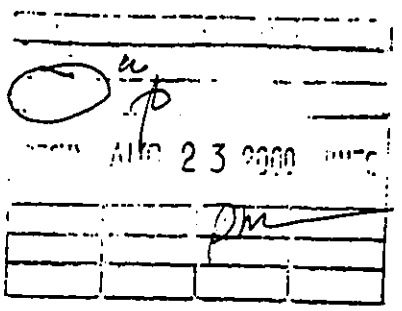

August 16, 2000

Mr. Derek Mukai
R.M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96717-4941

LOG NO:25967
DOC NO: 0008SC01

Dear Mr. Mukai:

SUBJECT: Chapter 6E-42 Historic Preservation Review of a Draft Environmental Assessment (DEA) for Laie Wastewater Collection System Expansion, Phase I

Thank you for the opportunity to comment on the DEA prepared for the proposed expansion of the Laie Wastewater Collection System in La`ie, O`ahu. The Phase I expansion is intended to establish new sewer connection points for several existing wastewater systems in La`ie. The proposed actions include the following: construction of a new Brigham Young University Hawai`i (BYUH) pump station; a new pump station access road through existing Poohaili Street; installation of a 12-inch diameter force main; installation of a trunk sewer line from the pump station to Naniloa Loop; installation of a trunk sewer main along Naniloa Loop from around Hale Laa Street to Iosepa Street. .

As noted in the subject DEA, our office has previously reviewed reports and fieldwork documenting the number and kinds of historic properties in the La`ie area. We note, however, that the discussion presented on pages 3-6 through 3-8, and Figure 3.2-1, lack some available information. Our records indicate that an additional historic site, the Nioi Heiau complex (SIHP No. 50-80-02-281) is adjacent to the project area, and includes SIHP Nos. –4458 and 4460. Only Site –4458 is depicted on your figures and discussed in the text. You are correct, however, in stating that these and the other previously identified historic sites lie outside the project area as shown in the DEA.

The 12-inch pipeline section between the Laie Water Reclamation Facility (LWRF) and the proposed pump station will pass through previously surveyed areas that were also under sugar cane cultivation. The soils in this area include clays, loams, and silts. Consequently, we believe that this portion of the proposed project will have "no effect" on significant historic sites since none are known to be present nor are any likely to be present, due to past land alterations.

However, we are concerned about the section of the trunk sewer main along Naniloa Loop because at least a portion of the main may run through Jaucas sands deposits. Jaucas sands are known to contain significant historic sites such as subsurface cultural deposits and human burials. Human burials were uncovered during construction work at La'ie Elementary School. Consequently, we believe that the installation of a sewer main may potentially have an "adverse effect" on significant historic sites in this area. Therefore, we would recommend that a qualified archaeologist conduct archaeological monitoring during excavations in the Jaucas sands deposits. Prior to beginning work, an acceptable archaeological monitoring plan must be submitted to our office for review and approval. An acceptable archaeological monitoring plan will have the following components:

> (1) The kinds of remains that are anticipated and where in the construction area the remains are likely to be found; (2) How the remains and deposits will be documented; (3) How the expected types of remains will be treated; (4) The archaeologist conducting the monitoring has the authority to halt construction in the immediate area of a find in order to carry out the plan; (5) A coordination meeting between the archaeologist and construction crew is scheduled, so that the construction team is aware of the plan; (6) What laboratory work will be done on remains that are collected; (7) A schedule for report preparation; and (8) Details concerning the archiving of any collections that are made.

Thus, if an acceptable archaeological monitoring plan is implemented for the construction of the sewer main along Naniloa Loop, we believe that the proposed Phase I expansions to the La'ie Wastewater Collection System will have "no adverse effect" on significant historic sites.

As a further aid to developing a comprehensive and accurate monitoring plan, we would also request any additional information on soils testing and geology that you may have available.

Should you have any questions, please feel free to contact Sara Collins at 692-8026.

Aloha,

DON HIBBARD, Administrator
State Historic Preservation Division

SC:an

c: Chair, O'ahu Island Burial Council
Kala'au Wahilani, Burial Sites Program

APPENDIX F

COMMENTS AND RESPONSES TO THE
DRAFT ENVIRONMENTAL ASSESSMENT
30-DAY PUBLIC REVIEW PERIOD

DEPARTMENT OF THE ARMY
U. S. ARMY ENGINEER DISTRICT, HONOLULU
FT. SHAFTER, HAWAII 96858-5440

REPLY TO
ATTENTION OF

August 26, 2002

Regulatory Branch

Mr. Jim Niermann, Planner
R.M. Towill Corporation
420 Waiakamilo Road
Honolulu, Hawaii 96817-4941

Dear Mr. Niermann:

This letter responds to your request for comments on the Draft Environmental Assessment for the La'ie Waste Water Collection System Expansion, Phase 2, dated August 22, 2002. Based on the information you provided I have determined that there are no waters of the United States including wetlands at the project site and therefore a Department of the Army (DA) permit will not be required for this project.

If you have any questions concerning this determination, please contact William Lennan of my staff at 438-6986 or FAX 438-4060, and reference File No. 200200510.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

420 Waiakamilo Road
Suite 411
Honolulu Hawaii 96817-4941
Telephone 808 842 1133
Fax 808 842 1937
eMail rmtowill@hawaii.rr.com

R. M. TOWILL CORPORATION
SINCE 1930

Planning
Engineering
Environmental Services
Photogrammetry
Surveying
Construction Management

November 20, 2002

Mr. George P. Young
Chief, Regulatory Branch
U.S. Army Engineer District, Honolulu
Ft. Shafter, Hawaii 96858

Environmental Assessment for the La'ie Waste Water Collection System Expansion, Phase 2
La'ie, *Koolauloa District*, Oahu

Dear Mr. Young:

Thank you for your letter dated August 26, 2002 responding to requests for comments on the Draft EA for the proposed Laie Wastewater Collection System Expansion. We acknowledge that you have no comments on the project at this time.

Should you have any questions or require additional information in the future, please do not hesitate to contact me at 842-1133.

Very truly yours,

Jim Niermann
Planner

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BENJAMIN J. CAYETANO
GOVERNOR

MARY ALICE EVANS
COMPTROLLER

DEAN H. SEKI
ACTING DEPUTY COMPTROLLER

STATE OF HAWAII
DEPARTMENT OF ACCOUNTING AND GENERAL SERVICES
P.O. BOX 119, HONOLULU, HAWAII 96810

LETTER NO. PWD02.P436

AUG 30 2002

Mr. Jim Niermann
R. M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

Dear: Mr. Niermann:

Subject: Laie Wastewater Collection System
Expansion, Phase 2
Draft Environmental Assessment

Thank you for the opportunity to review the Laie Wastewater Collection System, Phase 2 Draft Environmental Assessment project.

This project does not impact any of the Department of Accounting and General Services' projects or existing facilities. Therefore, we have no comments to offer.

Should you have any questions, please have your staff call Mr. Allen Yamanoha of the Planning Branch at 586-0488.

Sincerely,

HAROLD SONOMURA
Acting Public Works Administrator

AY:mo

420 Waiakamilo Road
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Construction Management

November 20, 2002

Mr. Harold Sonomura
Acting Public Works Administrator
Department of Accounting and General Services
P.O. Box 119
Honolulu, HI 96810

Environmental Assessment for the La'ie Waste Water Collection System Expansion, Phase 2
La'ie, Koolauloa District, Oahu

Dear Mr. Sonomura:

Thank you for your letter dated August 30, 2002 responding to requests for comments on the Draft EA for the proposed Laie Wastewater Collection System Expansion. We acknowledge that you have no comments on the project at this time.

Should you have any questions or require additional information in the future, please do not hesitate to contact me at 842-1133.

Very truly yours,

Jim Niermann
Planner

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BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
File:

02-225/cpo

October 3, 2002

Mr. Jim Niermann, Planner
R.M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

Dear Mr. Niermann:

Subject: Draft Environmental Assessment (DEA)
La'ie Wastewater Collection System Expansion, Phase 2
Tax Map Key: 5-5-011:049

Thank you for the opportunity to review and comment on the subject proposal. The DEA was routed to the various branches of the Environmental Health Administration. We have the following comments:

Wastewater Branch (WWB)

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, "Wastewater Systems." We reserve the right to review the detailed wastewater plans for conformance to applicable rules.

If you have any questions, please contact the Wastewater Branch at (808) 586-4294.

Safe Drinking Water Branch (SDWB)

The DEA should state the anticipated wastewater flow increase, as properties connect into the system. If flow increase is incremental, the increments should be stated and described.

Effluent disposal is not addressed in the DEA. Effluent disposal is likely the most significant, long-term factor that will cause environmental impact. The method and extent of effluent disposal should be fully discussed, which should at least include the aspects of irrigation, infiltration, recharge, and affected land areas. Effluent disposal is a limiting factor for sewage-system expansion.

The DEA should identify that Hawaii Reserves, Inc. is responsible for implementation and compliance with the Environmental Water Quality Monitoring Plan for the La'ie Water Reclamation Facility, dated August 2000. This monitoring plan comprehensively addresses (1) groundwater monitoring wells and piezometers, (2) groundwater and surface water monitoring for the drain field, (3) groundwater monitoring for recycled water irrigation, and (4) effluent quality monitoring for the La'ie Water Reclamation Facility.

If you have any questions, please contact the Safe Drinking Water Branch at (808) 586-4258.

Clean Air Branch (CAB)

Control of Fugitive Dust

There is a significant potential for fugitive dust emissions during the various phases of project activities that would impact nearby residents and thoroughfares. Provided that the mitigative measures concerning short-term air quality (Section 3.1.8) proposed in the Final Environmental Assessment portion of the application are adequate for compliance of Hawaii Administrative Rules, Section 11-60.1-33, on Fugitive Dust, the Clean Air Branch has no further comments.

If you have any questions regarding these issues on fugitive dust, please contact the Clean Air Branch at (808) 586-4200.

Environmental Planning Office (EPO)

La'ie Bay and Kahawainui Stream are currently listed as impaired water bodies under section 303(d) of the Clean Water Act. Under this section, the Department of Health (DOH) must establish Total Maximum Daily Loads (TMDLs) for pollutants that cause these impairments (nutrients and turbidity in the stream; chlorophyll a, nitrogen, phosphorous, and turbidity in the bay). TMDLs suggest how the existing pollutant loads may be reduced in order for water quality standards to be attained. Although these TMDLs are yet to be established and implemented, a first step in achieving TMDL objectives would be to prevent any project-related increases in pollutant loads.

Section 3.1.4 of the DEA (Hydrology) states, "During construction, the implementation of appropriate Best Management Practices (BMP) by the contractor will minimize the impacts from construction dewatering and the disposal of hydrotesting water, muck, and slurry.... Replacement of the existing cesspool system with the new wastewater collection system will improve conditions by eliminating the potential for pollutant seepage from leaking cesspools."

Section 3.1.7 of the DEA (Water Quality) states, "No adverse impacts to water quality are anticipated from construction of this project. The proposed upgrades will benefit environmental conditions by eliminating or substantially reducing the potential for leaks or spills from aging cesspools. The impact of small amounts of suspended sediment entering the ocean waters as a result of construction activities is anticipated to be negligible. Runoff from construction areas will be regulated under NPDES permit conditions. Best Management Practices (BMPs) will be

employed to prevent soil loss and sediment discharges from work sites (See Section 2.5, Best Management Practices)."

Section 3.3.3 of the DEA (Drainage System) states, "The proposed project will have proper drainage controls to accommodate additional runoff. Control of the runoff will be through storm drainage facilities, swales, detention basins, and pits as needed. No adverse impacts to the existing drainage systems are anticipated." Additional runoff implies increases in pollutant loads - thus we suggest that the nature of this "additional runoff" be clarified. Is it runoff generated during project construction or runoff resulting from post-project alteration of surface cover and drainage patterns?

These three excerpts suggest that the proposed project would involve short- and long-term changes in pollutant loading of impaired receiving waters. Section 2.5 of the DEA (Best Management Practices) outlines the short-term guidelines and measures that would be employed to manage these changes "during all periods of construction activity." We suggest that the environmental assessment include more discussion of long-term, post-construction BMPs to be employed over the entire project life-cycle. We also suggest that pollutant leaks or spills from existing cesspools would only be eliminated if these existing facilities are pumped out and reconnections are prevented.

As TMDLs are developed for La'ie Bay and Kahawainui Stream, we encourage the Department of Design and Construction and Hawaii Reserves, Inc. to participate in the TMDL planning process. We also suggest consultation with the DOH Clean Water Branch, Engineering Section, about how water pollution control permitting for the proposed project may be linked with TMDL implementation.

If you have any questions or would like more information on the TMDL program, please call David Penn at (808) 586-4337.

Sincerely,

GARY GILL
Deputy Director
Environmental Health Administration

c: WWB
SDWB
CAB
EPO

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

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DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801

In reply, please refer to:
File:

02-225A/epo

October 8, 2002

Mr. Jim Niermann, Planner
R.M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

Dear Mr. Niermann:

Subject: Additional Comments to Draft Environmental Assessment (DEA)
La'ie Wastewater Collection System Expansion, Phase 2
Tax Map Key: 5-5-011:049

In addition to our comments to the subject DEA, as per letter dated October 4, 2002, we would like to add the following:

If the applicant plans to install Underground Storage Tanks (UST) as part of the La'ie Wastewater Collection System Expansion, Phase II, they will be subject to federal and state UST requirements. The State UST rules, Chapter 11-281, entitled "Underground Storage Tanks", became effective on January 28, 2000, and a permit is now required from the Solid and Hazardous Waste Branch Section, for the installation and operation of new USTs. Also, permits must be obtained from the applicable building and fire safety authorities before installation of any USTs.

If you have any questions or would like more information, please call Roxanne Kwan at (808) 586-4226.

Sincerely,

for GARY GILL
Deputy Director
Environmental Health Administration

c: SHWB

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Planning
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Surveying
Construction Management

November 20, 2002

Mr. Gary Gill, Deputy Director
Environmental Health Administration
State Department of Health (DOH)
P.O. Box 3378
Honolulu, HI 96801-3378

Environmental Assessment for the La'ie Waste Water Collection System Expansion, Phase 2
La'ie, Koolauloa District, Oahu

Dear Mr. Gill:

Thank you for your letters dated October 3, and October 8, 2002 responding to requests for comments on the Draft EA for the proposed Laie Wastewater Collection System Expansion. In response to your comments, we offer the following information:

Wastewater Branch
All wastewater plans will conform to applicable provisions of DOH's Administrative Rules, Chapter 11-62, "Wastewater Systems."

Safe Drinking Water Branch
The new collection system will provide the benefit of replacing over 500 cesspool and septic systems, the majority of which are aged and deteriorating, with a modern sewer collection and treatment system. Instead of raw sewage being released into the ground, sewage and wastewater will be collected and treated at the La'ie Water Reclamation Facility (LWRF). The facility is designed to treat wastewater to R-1 levels. R-1 water, the highest level of treatment for reclaimed water, is oxidized, filtered, and disinfected at the facility, and used for irrigation at various locations in the La'ie area. Treated water will be discharged in compliance with the facility's current NPDES individual permit administered by DOH, Clean Water Branch.

The proposed grinder pump system has been designed well within the limits of the peak design capacity of the LWRF. The LWRF is sized for a design average flow of 0.90 million gallons per day (mgd), and peak wet weather flow of 5.58 mgd. Currently, the treatment facility handles a design average flow of approximately 0.30 mgd. The new grinder system has a design average flow of 13,760 gallons per day (gpd) and a design peak flow of 0.681 mgd. Wastewater flows from the new grinder system are not anticipated to exceed the design average of 13,760 gpd. Incremental increases comprising this amount are described in the following table and in Section 2.2 of the Final EA.

Incremental Flow Increases from the New Grinder Pump System

Area	Description	Flow Rate (gpd)
Base Bid	All residential areas mauka of Kamehameha Highway	11,200
Additive #1	Ocean-front residences between Laie Point and Hukilau Beach Park	640
Additive #2	Makai residences situated south of Laie Point between Anemoku Road and Naniloa Loop Road.	320
Additive #3	Ocean-front residences between Naniloa Loop and Laie Beach Park.	960
Additive #4	Residences on Laie Point.	640
	Total Anticipated Flow	**13,760**

Ownership and operation of the wastewater system, including the LWRF, will be transferred from Hawaii Reserves, Inc. (HRI), to the City and County of Honolulu as part of the *Cooperative Agreement to Jointly Construct a Collection System and Transfer the Laie Wastewater Reclamation Facility.* HRI and the City will continue to comply with the requirements of the *Environmental Water Quality Monitoring (EWQM) Plan for the La'ie Water Reclamation Facility*, dated August 2002. Prior to the transfer of LWRF ownership, an additional agreement will be established between HRI and the City to assign specific responsibilities for EWQM plan requirements as required by the State Department of Health. This information is included in Section 3.3.4 of the Final EA.

Clean Air Branch

The contractor will undertake mitigation measures described in Section 3.1.8 of the Draft and Final EA to ensure that the project complies with Hawaii Administrative Rules, Section 11-60.1-33, related to fugitive dust control.

Environmental Planning Office

The "additional runoff" referred to in Section 3.3.3 of the DEA, pertains solely to construction-related discharges. These discharges will be mitigated in compliance with National Pollutant Discharge Elimination System (NPDES) permit coverage. No long-term alteration of surface cover or drainage patterns will result from this project. Following construction, work areas will be re-paved and re-landscaped to pre-existing conditions.

The proposed expansion of the Laie waste water collection system is expected to have a positive effect on water quality over the long term. As noted in Sections 3.1.4 - Hydrology, and 3.1.7 - Water Quality, of the EA, the replacement of the existing cesspool system with the new waste water collection system will benefit environmental conditions by eliminating the potential for pollutant seepage from aging and leaking cesspools.

Regarding the elimination of leaks and spills from existing cesspools, after connection is made to the new waste water collection system, individual homeowners will be responsible for the abandonment or removal of their cesspools in compliance with the Uniform Plumbing Code (UPC). Section 722.2 of the UPC states:

> "Every cesspool, septic tank, and seepage pit which has been abandoned or has been discontinued otherwise from further use or to which no waste or soil pipe from a plumbing fixture is connected, shall have the sewage removed therefrom and be completely filled with earth, sand, gravel, concrete, or other approved material."

Upon project completion, the entire system, including sewer mains, laterals, grinder pumps and pump control panels, will be maintained by the City & County of Honolulu. Wastewater collected in the proposed system will be conveyed to the existing Lai'e Wastewater Treatment Facility where it will be treated and discharged in compliance with the facility's current NPDES individual permit.

Underground Storage Tanks
The proposed project does not involve the installation of underground storage tanks.

Should you have questions or require additional information, please do not hesitate to contact me at 842-1133.

Very truly yours,

Jim Niermann
Planner

K:\ww\18401\doc\EA\PH2\Correspondence\DOH-EHA.wpd

BENJAMIN J. CAYETANO
GOVERNOR

GENEVIEVE SALMONSON
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENT QUALITY CONTROL
235 SOUTH BERETANIA STREET
SUITE 702
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

September 20, 2002

Mr. Po Chan
Department of Design and Construction
City and County of Honolulu
650 South King Street, 11th Floor
Honolulu, Hawai'i 96813

Dr. Leighton Lum
R.M. Towill Corporation
420 Waiakamilo Road, No. 411
Honolulu, Hawai'i 96817

Dear Messrs. Chan and Lum:

Having reviewed the draft environmental assessment for the La'ie Wastewater Collection System Expansion, Phase II, Tax Map Key 5-5, various parcels, in the judicial district of Ko'olauloa, we offer the following comments for your consideration and response:

1. *CONSULTATION AND MITIGATION*: While the Office generally supports the change from cesspools to a sewer collection system, the action may have potential environmental and cultural impacts in the form of excavation through Jaucas sand (associated with traditional Hawaiian burial practices and cultural deposits) and possibly on the temporary blocking of access to makai areas such as La'ie point due to construction. Page 7-1 notes organizations and agencies consulted - please clarify if this was compiled as a list of agencies who were actually consulted prior to the issuance of the draft EA in compliance with Section 11-200-9(a), Hawai'i Administrative Rules.
2. *LANDSCAPING WITH NATIVE PLANTS*: Section 103D-407, Hawai'i Revised Statutes requires the use of native Hawaiian plants. Please consider the use of native flora in landscaping. Our website at http://www.state.hi.us/health/oeqc/index.html contains an online book entitled "How to Plant a Native Hawaiian Garden" by Kenneth Nagata.
3. *USE OF GLASSPHALT*: Section 103D-408, Hawai'i Revised Statutes requires the use of recyled glass in paving materials. Please consider using glass-asphalt aggregate for paving purposes.

If there are any questions, please call Leslie Segundo, Environmental Health Specialist, at (808) 586-4185. Thank you for the opportunity to comment.

Sincerely,

for GENEVIEVE SALMONSON
Director

c: Hawai'i Reserves Incorporated, 55-510 Kamehameha Highway, La'ie, Hawai'i 96762-1193

420 Waiakamilo Road
Suite 411
Honolulu Hawaii 96817-4941
Telephone 808 842 1133
Fax 808 842 1937
eMail rmtowill@hawaii.rr.com

R. M. TOWILL CORPORATION
SINCE 1930

Planning
Engineering
Environmental Services
Photogrammetry
Surveying
Construction Management

November 20, 2002

Ms. Genevieve Salmonson, Director
Office of Environmental Quality Control
State of Hawaii
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Environmental Assessment for the La'ie Waste Water Collection System Expansion, Phase 2
La'ie, Koolauloa District, Oahu

Dear Ms. Salmonson:

Thank you for your letter dated September 20, 2002 responding to requests for comments on the Draft EA for the proposed Laie Wastewater Collection System Expansion. In response to your comments (*in italic*), we offer the following information:

1. Consultation and Mitigation:
...the action may have potential environmental and cultural impacts in the form of excavation through Jaucas sand (associated with traditional Hawaiian burial practices and cultural deposits)...

Jaucas sand deposits are a common soil type along coastal areas of Oahu. To minimize adverse environmental impacts in areas containing Jaucas sand, project activities will be conducted in compliance with all applicable state and county environmental regulations. Further, in accordance with recommendations of the State Historic Preservation Division, an archaeologist will be employed to monitor excavations in project areas containing Jaucas sand. Prior to beginning work, an archaeological monitoring plan and burial treatment plan will be prepared by the archaeologist and submitted to SHPD for review and approval. This information is included in Section 3.2.2 of the EA.

...and possibly on the temporary blocking of access to makai areas such as La'ie point due to construction.

Proposed project activities will require extensive work within roadway corridors throughout La'ie. Sewer main installation will occur within roadway shoulders. Construction will not involve excavation within lanes of travel on Kamehameha Highway. However, construction staging and work activities will take place immediately adjacent to Kamehameha Highway and other roadways, and may result in traffic slow downs from temporary detours and the presence of large, slow-moving vehicles and heavy equipment. On residential streets, excavation will occur within the travel lane, thus requiring temporary detours for motor vehicle, bicycle, and pedestrian traffic. Detours can be accommodated within the existing street widths, and will not require re-routing of traffic.

Traffic control barricades, cones, signage, and lighting will be used as necessary to alert drivers and delineate construction boundaries. Approach signs and a flag person will be positioned to direct

traffic through temporary traffic control zones as necessary. Officers from HPD will be employed to direct traffic at intersections. To minimize traffic impacts to the nearby residents, the contractor will schedule heavy truck activity as much as possible between the hours of 9:00 a.m. and 3:00 p.m. on weekdays. The HPD will be notified prior to periods of heavy truck activity or during transport and operation of heavy equipment.

The proposed project is not expected to have significant adverse impacts on traffic.. To mitigate short-term construction related traffic impacts, the Contractor will be required to follow State and City traffic control regulations. This information is included in Section 3.3 of the EA.

Page 7-1 notes organizations and agencies consulted - please clarify if this was compiled as a list of agencies who were actually consulted prior to the issuance of the draft EA in compliance with Section 11-200-9(a), Hawai'i Administrative Rules.

Section 7 of the EA lists those agencies to whom a copy of the Draft EA was sent for comment. Agencies and organizations consulted during the preparation of the Draft EA include the following:

La'ie Community Association
Koolauloa Neighborhood Board, No. 28
Department of Planning & Permitting (agency responsible for the County's General Plan)
Department of Environmental Services
State Department of Health, Clean Water Branch
State Historic Preservation Division

In addition, a public information meeting attended by approximately 200 residents was held in January 2002 to explain the overall project, discuss financial impacts to homeowners, and solicit comments. This information will be included in the Final EA.

2. ***Landscaping with Native Plants:*** *...Please consider the use of native flora in landscaping...*

The project contractor will consider the use native flora in project landscaping as practicable based on professional experience and site conditions. This information will be included in Section 3.1.6 of the Final EA.

3. ***Use of Glassphalt:*** *...Please consider using glass-asphalt aggregate for paving purposes.*

The project contractor will consider the use of glass-asphalt aggregate for paving purposes as practicable based on professional experience and site conditions.

Should you have questions or require additional information, please do not hesitate to contact me at 842-1133.

Very truly yours,

Jim Niermann
Planner

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BENJAMIN J. CAYETANO
GOVERNOR

BRUCE S. ANDERSON, Ph.D., M.P.H.
DIRECTOR OF HEALTH

STATE OF HAWAII
DEPARTMENT OF HEALTH
P.O. BOX 3378
HONOLULU, HAWAII 96801-3378

In reply, please refer to:
EMD / CWB

October 21, 2002

10015PKP.02

Mr. Jim Niermann
Planner
R.M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

WES		KTS	
R-F		NM	
RTT		BRT	
REC'D OCT 24 2002 RMTC			

Dear Mr. Niermann:

Subject: **Draft Environmental Assessment**
Laie Waste Water Collection System Expansion, Phase 2

The Department of Health, Clean Water Branch (CWB) has reviewed the subject document and has the following comments:

1. The Army Corps of Engineers should be contacted to identify whether a Federal permit (including a Department of Army permit) is required for this project. If it is determined that a Federal permit is required for the subject project, then a Section 401 Water Quality Certification would also be required from our office.

2. If the project involves any of the following activities during construction, a National Pollutant Discharges Elimination System (NPDES) permit is required for each of the activities:

   a. Construction activities, including clearing, grading, and excavation that result in the disturbance of equal to or greater than five (5) acres of total land area. The total land area includes a contiguous area where multiple separate and distinct construction activities may be taking place at different times on different schedules under a larger common plan of development or sale. An NPDES permit is required before the commencement of the construction activities.

      Note: After March 10, 2003, an NPDES permit will be required for construction activities, including clearing, grading, and excavation that result in the disturbance of one (1) acre or more.

b. Discharge of hydrotesting water.

c. Discharge of treated construction dewatering effluent.

The CWB requires that Notices of Intent (NOI) for NPDES general permits be submitted 30 days before the commencement of the respective activities. The proposed amendments to Hawaii Administrative Rules, Chapter 11-55 may require a copy of the NOI or NPDES permit application to be submitted to the State Department of Land and Natural Resources, State Historic Preservation Division. The NOI forms can be picked up at our office or downloaded from our website at *http://www.state.hi.us/doh/eh/cwb/forms/index.html.*

Should you have any questions, please contact Ms. Kris Poentis of the Engineering Section, CWB, at 586-4309.

Sincerely,

DENIS R. LAU, P.E., CHIEF
Clean Water Branch

KP:ndp

420 Waiakamilo Road
Suite 411
Honolulu Hawaii 96817-4941
Telephone 808 842 1133
Fax 808 842 1937
eMail rmtowill@hawaii.rr.com

R. M. TOWILL CORPORATION
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Photogrammetry
Surveying
Construction Management

November 20, 2002

Mr. Denis R. Lau, P.E., Chief
Clean Water Branch
State Department of Health
P.O. Box 3378
Honolulu, HI 96801-3378

Environmental Assessment for the La'ie Waste Water Collection System Expansion, Phase 2
La'ie, Koolauloa District, Oahu

Dear Mr. Lau:

Thank you for your letter dated October 21, 2002 responding to requests for comments on the Draft EA for the proposed Laie Wastewater Collection System Expansion. In response to your comments, we offer the following information:

1. The Army Corps of Engineers (ACOE) has reviewed the project and determined that there are no waters of the United States, including wetlands, at the project site and that a Department of the Army (DA) permit is not required. Correspondence from the ACOE is included in the Final EA.

2. Prior to commencement of construction, an NPDES permit will be obtained from your office for discharges related to construction stormwater, construction dewatering effluent, and hydrotesting water. The Notice of Intent for NPDES general permit coverage will be submitted 30 days prior to the commencement of respective activities.

Should you have questions or require additional information, please do not hesitate to contact me at 842-1133.

Very truly yours,

Jim Niermann
Planner

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

September 13, 2002

LD-NAV
L-1475/1327/1593

Ref.: LAIEWWCSYSTEM.RCM

R. M. Towill Corporation
Jim Niermann
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

Dear Mr. Niermann:

Subject: Draft Environmental Assessment for the Proposed La'ie Waste Water Collection System Expansion, Phase 2, Island of Oahu, Hawaii (8/02)

Thank you for distributing one (1) copy of the subject Draft Environmental Assessment (DEA) to the Department of Land and Natural Resources' (DLNR) Land Division.

The DLNR Land Division made available the one (12) copy of the DEA covering the proposed project to the following DLNR Divisions for their review and comment:

- Division of Aquatic Resources
- Division of Forestry & Wildlife
- Division of State Parks
- Commission on Water Resource Management
- Land Division Planning and Technical Services
- Land Division Engineering Branch
- Oahu District Land Office

Attached herewith is a copy of the Land Division Engineering Branch comment.

Based on the attached responses the Department has no other comment to offer on the subject matter. Should the Land Division receive additional comments, they will be forwarded to your office at that time.

Should you have any questions, please feel free to contact Nicholas A. Vaccaro of the Land Division Support Services Branch at 587-0438.

Very truly yours,

Charlene E. Unoki

for DIERDRE S. MAMIYA
Administrator

C: Oahu District Land Office

2002 AUG 29 P 4:21

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

August 26, 2002

LD-NAV
LAIEWWCSYSTEM.CMT

L-1327
Suspense Date: 9/9/02

MEMORANDUM:

~~TO:~~ FROM:

XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
Division of Boating and Ocean Recreation
XXX Commission on Water Resource Management
Land Division Branches:
XXX Planning and Technical Services
XXX Engineering Branch
✓ XXX Oahu District Land Office

TO: ~~FROM:~~ Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Draft Environmental Assessment for Proposed La'ie Waste Water Collection System Expansion, Phase 2, Island of Oahu, Hawaii (August 2002)

Please review the subject Final Environmental Impact Statement and submit your written comment and recommendation (if any) on Division letterhead signed and dated on or before the suspense date.

NOTE: One (1) document covering the subject proposed project is available for your review in the Land Division Office, room 220.

Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

(✓) We have no comments.

( ) Comments attached.

Date: 8/28/02

Signed: for

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
CONSERVATION AND
RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND DIVISION
STATE PARKS
WATER RESOURCE MANAGEMENT

2002 SEP -4 P 3:53

August 26, 2002

LD-NAV
LAIEWWCSYSTEM.CMT

L-1327
Suspense Date: 9/9/02

MEMORANDUM:

TO:
XXX Division of Aquatic Resources
XXX Division of Forestry & Wildlife
XXX Division of State Parks
Division of Boating and Ocean Recreation
XXX Commission on Water Resource Management
Land Division Branches:
XXX Planning and Technical Services
✔ XXX Engineering Branch
XXX Oahu District Land Office

FROM: for Dierdre S. Mamiya, Administrator
Land Division

SUBJECT: Draft Environmental Assessment for Proposed La'ie Waste Water Collection System Expansion, Phase 2, Island of Oahu, Hawaii (August 2002)

Please review the subject Final Environmental Impact Statement and submit your written comment and recommendation (if any) on Division letterhead signed and dated on or before the suspense date.

NOTE: One (1) document covering the subject proposed project is available for your review in the Land Division Office, room 220.

Should you need more time to review the subject matter, please contact Nick Vaccaro at ext.: 7-0438.

If this office does not receive your comments by the suspense date, we will assume there are no comments.

( ) We have no comments.

(X) Comments attached.

Date: _____

Signed: Eric T. Yuasa

'02 AUG 28 AM 11:38 WATER & LAND

DEPARTMENT OF LAND AND NATURAL RESOURCES
Land Division
Engineering Branch

LD-NAV
LAEIWWCSYSTEM.CMT

COMMENTS

Please note that the proposed project site is located in the following Flood Zones:

1. Zone X (Not shaded) - an area determined to be outside the 500-year floodplain.
2. Zone AE - an area where flood elevations are determined.
3. Zone VE - an area of coastal flooding with velocity hazard (wave action); base flood elevations are determined.
4. Zone AH - an area with flood depths of 1 to 3 feet (usually areas of ponding) base flood elevations are determined.

The project must comply with rules and regulations of the National Flood Insurance Program (NFIP) and all applicable County Flood Ordinances. If there are questions regarding the NFIP, please contact the State Coordinator, Mr. Sterling Yong, of the Department of Land and Natural Resources at 587-0248.

Signed: Eric T. Yuasa
ANDREW M. MONDEN, CHIEF ENGINEER

Date: 9/4/07

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
LAND DIVISION
P.O. BOX 621
HONOLULU, HAWAII 96809

September 16, 2002

LD-NAV
Ref.: LAIEWWCSYSTEM.RCM2
L-1778

R. M. Towill Corporation
Jim Niermann
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

Dear Mr. Niermann:

Subject: Draft Environmental Assessment for the Proposed La'ie Waste Water Collection System Expansion, Phase 2, Island of Oahu, Hawaii (8/02)

This is a follow-up to our letter (Ref.: LAIEWWCSYSTEM.RCM) to you dated September 13, 2002, pertaining to the subject matter.

Attached herewith is a copy of the Commission on Water Resource Management's comment, related to water resources.

The Department of Land and Natural Resources has no other comment to offer.

Should you have any questions, please feel free to contact Nicholas A. Vaccaro of the Land Division Support Services Branch at 587-0438.

Very truly yours,

for DIERDRE S. MAMIYA
Administrator

C: Oahu District Land Office
Commission on Water Resource Management

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN
CHAIRPERSON

BRUCE S. ANDERSON
MEREDITH J. CHING
CLAYTON W. DELA CRUZ
BRIAN C. NISHIDA
HERBERT M. RICHARDS, JR.

LINNEL T. NISHIOKA
DEPUTY DIRECTOR

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

September 10, 2002

TO: Ms. Dede Mamiya, Administrator
Land Division

FROM: Linnel T. Nishioka, Deputy Director
Commission on Water Resource Management (CWRM)

SUBJECT: Draft EA for Proposed Laie Waste Water Collection System Expansion, Phase 2

FILE NO.: LAIEWWCSYSTEM.CMT

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas, which are important for the maintenance of streams and the replenishment of aquifers.

[ ] We recommend coordination with the county government to incorporate this project into the county's Water Use and Development Plan.

[ ] We recommend coordination with the Land Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

[x] We are concerned about the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

[ ] A Well Construction Permit and/or a Pump Installation Permit from the Commission would be required before ground water is developed as a source of supply for the project.

[ ] The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the Commission would be required prior to use of this source.

[ ] Groundwater withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

[ ] We are concerned about the potential for degradation of instream uses from development on highly erodible slopes adjacent to streams within or near the project. We recommend that approvals for this project be conditioned upon a review by the corresponding county's Building Department and the developer's acceptance of any resulting requirements related to erosion control.

[ ] If the proposed project includes construction of a stream diversion, the project may require a stream diversion works permit and amend the instream flow standard for the affected stream(s).

[ ] If the proposed project alters the bed and banks of a stream channel, the project may require a stream channel alteration permit.

[x] OTHER:

With regard to nonpotable water service, it is the policy of the Commission on Water Resource Management (Commission) to promote the viable and appropriate reuse of reclaimed water in so far as it does not compromise beneficial uses of existing water resources.

If there are any questions, please contact Ryan Imata at 587-0255.

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November 20, 2002

Ms. Dierdre Mamiya, Administrator
Land Division
Department of Land & Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

Attention Mr. Andrew M. Monden, Chief Engineer, Engineering Branch

Environmental Assessment for the La'ie Waste Water Collection System Expansion, Phase 2
La'ie, Koolauloa District, Oahu

Dear Ms. Mamiya:

Thank you for your letters dated September 13, 2002, and September 16, 2002 responding to requests for comments on the Draft EA for the proposed Laie Wastewater Collection System Expansion.

In response to comments from the Land Division Engineering Branch we offer the following information:

- The project will comply with rules and regulations of the National Flood Insurance Program (NFIP) and all applicable County Flood Ordinances.

Our response to comments forwarded in your letter of September 16, 2002 from the Commission on Water Resources Management (CWRM) will be addressed directly to the CWRM.

Should you have questions or require additional information, please do not hesitate to contact me at 842-1133.

Very truly yours,

Jim Niermann
Planner

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BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

GILBERT S. COLOMA-AGARAN, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCES MANAGEMENT

DEPUTIES
ERIC T. HIRANO
LINNEL NISHIOKA

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

HISTORIC PRESERVATION DIVISION
KAKUHIHEWA BUILDING, ROOM 555
601 KAMOKILA BOULEVARD
KAPOLEI, HAWAII 96707

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
LAND
STATE PARKS

September 9, 2002

Jim Niermann
R. M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817

LOG NO: 30681
DOC NO: 0209EJ07

Dear Mr. Niermann

SUBJECT: Chapter 6E-8 Historic Preservation Review - Draft Environmental Assessment (DEA) for the Proposed La`ie Waste Water Collection System Expansion, Phase II
La`ie, Ko`olauloa, O`ahu
TMK: (1) 5-5; 5-6 various

Thank you for the opportunity to comment on the DEA prepared for the proposed La`ie Wastewater Collection System Expansion Phase II. The Phase II expansion is intended to develop areas of La`ie that are not currently connected to the LWRF. Planned improvements include installation of individual grinder pumps on residential properties and low pressure collector mains to collect and convey sewage to the pump station and reclamation facility. Our office commented on the DEA for Phase I of this project and our comments are included as Appendix D of the current DEA for Phase II.

Section 3.2.2, Historic, Archaeological, and Cultural Resources, summarizes the numbers and kinds of historic properties in the La`ie area. Our comments on the Nioi Heiau Complex, provided on the Phase I DEA, have been incorporated in the text but are still absent from the summary table of sites (Table 3.2.1). Nonetheless, we agree that no known historic sites are located within the project area for Phase II. However, a portion of the project area is underlain by Jaucus sand deposits which are known to contain buried historic deposits including human burials. Several human burials have been found in sand substrates nearby. Consequently, we believe that improvements proposed during the Phase II expansion may potentially have an "adverse effect" on significant historic sites in this area. Therefore, we would recommend that a qualified archaeologist conduct archaeological monitoring during excavations in the Jaucas sands deposits. Prior to beginning work, an acceptable archaeological monitoring plan must be submitted to our office for review and approval. An acceptable archaeological mentoring plan will have the following components:

1) the kinds of remains that are anticipated and where in the construction area the remains are likely to be found; 2) how the expected types of remains will be documented; 3) how the expected types of remains will be treated; 4) the archaeologist conducting the monitoring has the authority to halt construction in the immediate area of a find in order to carry out the plan; 5)a coordination meeting between the archaeologist and construction crew is scheduled, so that the construction team is aware of the plan; 6) what laboratory work will be done on remains that are collected; 7) a schedule for report preparation; and 8) details concerning the archiving of any collections that are made.

Thus if an acceptable archaeological monitoring plan is implemented for the Phase 2 improvements, we believe that the proposed Phase II expansions to the La`ie Wastewater Collection System will have "no adverse effect" on significant historic sites.

We also note that our earlier comments on the Phase I improvements also requested archaeological monitoring. We have not yet received an archaeological monitoring plan for review and acceptance for the Phase I.

Should you have any questions about archaeology, please feel free to call Sara Collins at 692-8026 or Elaine Jourdane at 692-8027. Should you have any questions about burial matters, please feel free to contact Kana'i Kapeliela at 692-8037. Should you have any questions about cultural matters, please feel free to contact Kai Markell at 587-0008.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

c: Mr. A. Van Horn Diamond, Chair, O`ahu Island Burial Council
Mr. Kana`i Kapeliela, Acting Director, Burial Sites Program

420 Waiakamilo Road
Suite 411
Honolulu Hawaii 96817-4941
Telephone 808 842 1133
Fax 808 842 1937
eMail rmtowill@hawaii.rr.com

R. M. TOWILL CORPORATION
SINCE 1930

Planning
Engineering
Environmental Services
Photogrammetry
Surveying
Construction Management

November 20, 2002

Dr. Don Hibbard, Administrator
State Historic Preservation Division
Kakuhihewa Building, Room 555
601 Kamo
kila Boulevard
Kapolei, Hawaii 96707

Environmental Assessment for the La'ie Waste Water Collection System Expansion, Phase 2
La'ie, Koolauloa District, Oahu

Dear Dr. Hibbard:

Thank you for your letter dated September 9, 2002 responding to requests for comments on the Draft EA for the proposed Laie Wastewater Collection System Expansion. In response to your comments we offer the following information:

- Comments on the Nioi Heiau Complex, previously provided by your office, will be added to the summary table of sites (Table 3.2-1).
- We note your determination that improvements proposed during the Phase 2 expansion may potentially have an "adverse effect" on as yet unknown and undiscovered significant historic sites in Jaucas sand deposits in the project area. Per your recommendation, an archaeological monitoring plan and burial treatment plan for the project will be prepared by a qualified archaeologist and submitted to your office for review and approval prior to the start of construction.
- In addition, we note your previous request for archaeological monitoring of Phase 1 improvements. An archaeological monitoring plan for Phase I will also be submitted to your office for review and acceptance.
- Finally, we note your determination that with implementation of an acceptable archaeological monitoring plan, the proposed Phase 2 expansion of the La'ie Waste Water Collection System will have "no adverse effect" on significant historic sites.

Should you have questions or require additional information, please do not hesitate to contact me at 842-1133.

Very truly yours,

Jim Niermann
Planner

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STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT
P.O. BOX 621
HONOLULU, HAWAII 96809

August 30, 2002

Mr. Jim Niermann
R.M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, HI 96817

Dear Mr. Niermann:

Draft EA for La'ie Waste Water Collection System Expansion, Phase 2

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas, which are important for the maintenance of streams and the replenishment of aquifers.

[ ] We recommend coordination with the county government to incorporate this project into the county's Water Use and Development Plan.

[ ] We recommend coordination with the Land Division of the State Department of Land and Natural Resources to incorporate this project into the State Water Projects Plan.

[x] We are concerned about the potential for ground or surface water degradation/contamination and recommend that approvals for this project be conditioned upon a review by the State Department of Health and the developer's acceptance of any resulting requirements related to water quality.

[ ] A Well Construction Permit and/or a Pump Installation Permit from the Commission would be required before ground water is developed as a source of supply for the project.

[ ] The proposed water supply source for the project is located in a designated water management area, and a Water Use Permit from the Commission would be required prior to use of this source.

[ ] Groundwater withdrawals from this project may affect streamflows, which may require an instream flow standard amendment.

[ ] We are concerned about the potential for degradation of instream uses from development on highly erodible slopes adjacent to streams within or near the project. We recommend that approvals for this project be conditioned upon a review by the corresponding county's Building Department and the developer's acceptance of any resulting requirements related to erosion control.

[ ] If the proposed project includes construction of a stream diversion, the project may require a stream diversion works permit and amend the instream flow standard for the affected stream(s).

[ ] If the proposed project alters the bed and banks of a stream channel, the project may require a stream channel alteration permit.

[ ] OTHER:

If there are any questions, please contact Ryan Imata at 587-0255.

Sincerely,

LINNEL T. NISHIOKA
Deputy Director

c: DLNR, Land Division

420 Waiakamilo Road
Suite 411
Honolulu Hawaii 96817-4941
Telephone 808 842 1133
Fax 808 842 1937
eMail rmtowill@hawaii.rr.com

R. M. TOWILL CORPORATION
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Surveying
Construction Management

November 20, 2002

Ms. Linnel T. Nishioka, Deputy Director
Commission on Water Resource Management
Department of Land & Natural Resources
State of Hawaii
P.O. Box 621
Honolulu, Hawaii 96809

Environmental Assessment for the La'ie Waste Water Collection System Expansion, Phase 2
La'ie, Koolauloa District, Oahu

Dear Ms. Nishioka:

Thank you for your letter dated August 30, 2002 and additional comments dated September 10, 2002 forwarded through the Land Division regarding the Draft EA for the subject project. In response we offer the following information:

We note that it is the policy of the Commission on Water Resource Management to promote the use of reclaimed water as long as it does not compromise beneficial uses of existing water resources or degrade or otherwise endanger the quality of water recharge areas or water sources.

The proposed waste water collection system is being developed to prevent raw sewage from unsewered homes from being discharged into the ground and affecting the groundwater table. Upgrading the existing sewer collection system and extending the system throughout the community will allow for wastewater to be collected and treated to a high level (R-1) of treatment. R-1 water will be reused for irrigation and to provide the Laie community with another water resource.

The State Department of Health (DOH), Clean Water Branch has been consulted during the planning and design of this project. Project activities and operation of the system following project completion will comply with DOH regulations as set forth in Hawaii Administrative Rules, Title 11 Chapter 54 - Water Quality Standards, and Chapter 55 - Water Pollution Controls.

Should you have questions or require additional information, please do not hesitate to contact me at 842-1133.

Very truly yours,

Jim Niermann
Planner

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DEPARTMENT OF DESIGN AND CONSTRUCTION

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 11TH FLOOR
HONOLULU, HAWAII 96813
Phone: (808) 523-4564 • Fax: (808) 523-4567
Web site: www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

RAE M. LOUI, P.E.
DIRECTOR

ERIC G. CRISPIN, AIA
DEPUTY DIRECTOR

GEORGE T. TAMASHIRO, P.E.
ASSISTANT DIRECTOR

WW.P 02-370

September 27, 2002

R. M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

Attn: Mr. Jim Niermann, Planner

To All Concerned:

Subject: Laie Waste Water Collection System Expansion, Phase 2, DEA

This letter supersedes our letter WW.P02-360, dated September 18, 2002, same subject.

The following changes to subject Draft Environmental Assessment applies:

Delete Paragraph 2.4 SYSTEM OWNERSHIP, OPERATION AND MAINTENANCE in its entirety and add the following:

The new collection system is being developed by a Consultant, R. M. Towill, Corp., for the City and HRI. A Grant of Easement is being prepared as part of a "Cooperative Agreement to Jointly Construct a Collection System and Transfer the Laie Water Reclamation Facility", whereby, the Grantor, Hawaii Reserves, Inc., as agent for Property Reserves, Inc, collectively called the GRANTOR, and the City and County of Honolulu, herein called the GRANTEE. The GRANTOR shall grant and convey unto the GRANTEE its successors and assigns forever, the right of perpetual easement to lay, maintain, operate, repair or remove sewer pipelines, conduits below the surface and the right of entry upon the Grantor's land for the aforesaid purposes, over across, through and under a portion of that certain property situated at Laie, Koolauloa, Oahu, Hawaii, as indicated in the Cooperative Agreement, under Exhibit A.

The Project will also directly impact portions of private property throughout the service area (Laie Sewer Improvement District), attached as Exhibit G. Use of private land will be addressed as follows:

The service area consists of several roadways and other attendant properties privately owned by an affiliate of co-sponsor Hawaii Reserves, Inc. (HRI). HRI will either facilitate the dedication without reimbursement or conveyance of easements in consultation with the City for properties necessary for the project.

Grinder pumps and laterals will be placed on property owned by customers of the new system. Participating customers will voluntarily convey a "Right-of-Entry in Gross" agreement as part of the project.

Customers not voluntarily conveying a "Right-of-Entry in Gross" shall install, own, operate and maintain the grinder pumps and laterals placed within their property. The balance of properties will remain private.

Upon project completion, the complete system, including sewer mains, laterals, grinder pumps and pump control panels, will be owned, operated and maintain by the City under the terms of the cooperative agreement with HRI, to include those areas where participating customers have voluntarily conveyed a "Right-of-Entry in Gross" agreement.

REASON/COMMENTS: The above changes have been coordinated with responsible representatives of the CITY and HRI.

If there are any questions, please contact Richard Leong, Wastewater Division, Planning Branch at 527-5863.

Very truly yours,

RAE M. LOUI, P.E.
Director

Attachment

cc: OEQC
HRI
Wastewater Design Branch
Wastewater Planning Branch

420 Waiakamilo Road
Suite 411
Honolulu Hawaii 96817-4941
Telephone 808 842 1133
Fax 808 842 1937
eMail rmtowill@hawaii.rr.com

R. M. TOWILL CORPORATION
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November 20, 2002

Ms. Rae M. Loui, PE, Director
Department of Design & Construction
City and County of Honolulu
650 S. King St., 11th Floor
Honolulu, HI 96813

Environmental Assessment for the La'ie Waste Water Collection System Expansion, Phase 2
La'ie, Koolauloa District, Oahu

Dear Ms. Loui:

Thank you for your letter dated September 27, 2002 responding to requests for comments on the Draft EA for the proposed Laie Wastewater Collection System Expansion. In response to your comments we offer the following information:

Paragraph 2.4 SYSTEM OWNERSHIP, OPERATION AND MAINTENANCE will be deleted in its entirety and the text recommended in your letter dated September 27, 2002 will be inserted in the Final EA. Exhibits A and G from the Cooperative Agreement will be included in the Final EA as Appendix B.

Should you have questions or require additional information, please do not hesitate to contact me or Mr. Kyle Yukumoto at 842-1133.

Very truly yours,

Jim Niermann
Planner

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BOARD OF WATER SUPPLY

CITY AND COUNTY OF HONOLULU
630 SOUTH BERETANIA STREET
HONOLULU, HI 96843

September 6, 2002

Mr. Jim Niermann
R.M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

Dear Mr. Niermann:

Subject: Your Letter of August 22, 2002 on the Draft Environmental Assessment for the Proposed Laie Wastewater Collection System Expansion, Phase 2

Thank you for the opportunity to review the subject document for the proposed Wastewater Collection Expansion.

The construction drawings should be submitted for our review and approval.

If you have any questions, please contact Joseph Kaakua at 527-6123.

Very truly yours,

for CLIFFORD S. JAMILE
Manager and Chief Engineer

420 Waiakamilo Road
Suite 411
Honolulu Hawaii 96817-4941
Telephone 808 842 1133
Fax 808 842 1937
eMail rmtowill@hawaii.rr.com

R. M. TOWILL CORPORATION
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November 20, 2002

Mr. Clifford S. Jamile, Chief Engineer
Board of Water Supply
City & County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96843

Environmental Assessment for the La'ie Waste Water Collection System Expansion, Phase 2
La'ie, Koolauloa District, Oahu

Dear Mr. Jamile:

Thank you for your letter dated September 6, 2002 responding to requests for comments on the Draft EA for the proposed Laie Wastewater Collection System Expansion. In response to your comments, we offer the following information:

- Construction drawings will be sent to the BWS for review and approval.

Should you have questions or require additional information, please do not hesitate to contact me at 842-1133.

Very truly yours,

Jim Niermann
Planner

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FIRE DEPARTMENT
CITY AND COUNTY OF HONOLULU
3375 KOAPAKA STREET, SUITE H425
HONOLULU, HAWAII 96819-1869

JEREMY HARRIS
MAYOR

ATTILIO K. LEONARDI
FIRE CHIEF

JOHN CLARK
DEPUTY FIRE CHIEF

September 9, 2002

Mr. Jim Niermann, Planner
R. M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817

Dear Mr. Niermann:

Subject: Public Review of Draft Environmental Assessment (EA) for Proposed La'ie Wastewater Collection System Expansion, Phase II

We received your letter dated August 22, 2002, regarding the Draft Environmental Assessment for the subject project. The proposed project will not have an adverse impact on services provided by the Honolulu Fire Department, however, we request that the following be complied with:

1. Maintain fire apparatus access throughout the construction site for the duration of the project.

2. Notify the Fire Communication Center (523-4411) of any interruption in the existing fire hydrant system during the project.

Should you have any questions, please call Battalion Chief Kenneth Silva of our Fire Prevention Bureau at 831-7778.

Sincerely,

ATTILIO K. LEONARDI
Fire Chief

AKL/KB:jl

420 Waiakamilo Road
Suite 411
Honolulu Hawaii 96817-4941
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Fax 808 842 1937
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R. M. TOWILL CORPORATION
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Surveying
Construction Management

November 20, 2002

Mr. Attilio K. Leonardi, Chief
Fire Department
City & County of Honolulu
3375 Koapaka Street, Suite H425
Honolulu, HI 96819

Environmental Assessment for the La'ie Waste Water Collection System Expansion, Phase 2
La'ie, Koolauloa District, Oahu

Dear Chief Leonardi:

Thank you for your letter dated September 9, 2002 responding to requests for comments on the Draft EA for the proposed Laie Wastewater Collection System Expansion. In response to your comments we offer the following information:

- We acknowledge that you do not anticipate the proposed project to adversely impact services provided by the Honolulu Fire Department.
- Fire apparatus access will be maintained throughout the construction site for the duration of the project.
- The Fire Communication Center will be notified of any interruption in the existing fire hydrant system during the project.

Should you have questions or require additional information, please do not hesitate to contact me at 842-1133.

Very truly yours,

Jim Niermann
Planner

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DEPARTMENT OF PLANNING AND PERMITTING

CITY AND COUNTY OF HONOLULU

650 SOUTH KING STREET, 7TH FLOOR • HONOLULU, HAWAII 96813
Phone: (808) 523-4414 • Fax: (808) 527-6743

JEREMY HARRIS
MAYOR

RANDALL K. FUJIKI, AIA
DIRECTOR

LORETTA K.C. CHEE
DEPUTY DIRECTOR

02WWB229 (TC)
2002/ELOG-2417

October 23, 2002

Mr. Jim Niermann, Planner
R. M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

Dear Mr. Niermann:

La'ie Waste Water Collection System Expansion, Phase 2
Public Review of the Draft Environmental Assessment
TMK: 5-5-002 Various and 5-5-017 Various

Thank you for the opportunity to review the subject Draft Environmental Assessment (DEA). Departmental comments are listed below by reviewing divisions.

Comments from Planning Division

1. The proposed project is consistent with the Objectives and Policies of the Transportation and Utilities section of the General Plan as outlined in Section 4.3 of the Draft Environmental Assessment.

2. The proposed project is also consistent with the General Policies of Section 4.3. (Wastewater Treatment) of the Ko'olau Loa Sustainable Communities Plan as outlined in Section 4.5 of the Draft Environmental Assessment.

3. The Department of Planning and Permitting (DPP) notes that Phase I included the La'ie Wastewater Pump Station, which is a type of project that needed to be shown on the Public Infrastructure Map. The Public Infrastructure Map revision for the La'ie Wastewater Pump Station was adopted via Resolution No. 00-264 by the City Council on 12/1/00. The proposed project, Phase II, involves expansion of the wastewater collection system to the remaining developed areas of La'ie that are not currently connected to the La'ie Water Reclamation Facility. Phase II is not a type of public infrastructure project that needs to be shown on the Public Infrastructure Map.

4. The proposed wastewater collection system expansion project would be a benefit to the environment by replacing existing cesspools that are aged and/or failing. The proposed action should reduce the potential for ground and surface water contamination, which would further benefit public health.

Should you have any questions, please contact Matt Higashida of our staff at 527-6056.

Comments from Land Use Permits Division

We have reviewed the DEA for the above-referenced project and confirm that a Special Management Area (SMA) Use Permit need not be required for the proposed collection system expansion, pursuant to Section 25-1.3(2)(m), ROH.

Relative to archaeological impacts, we should point out a potential problem with the study and survey attached to the DEA (Appendix C). These documents are 9 and 11 years old, and only involved the STP expansion site. Because of the time elapsed and limited study area, we recommend SHPD be consulted regarding the adequacy of these studies in disclosing potential impacts.

If there are any questions, please call Steve Tagawa at 523-4817.

Comments from Site Development Division

Section 6.1: DPP issues Grading, Grubbing, Excavation, and Stockpiling Permits, not Department of Design and Construction.

If you have any questions, please contact Ms. Tessa Ching at 523-4956.

Sincerely yours,

RANDALL K. FUJIKI, AIA
Director of Planning and Permitting

DMN:dl
[182275]

420 Waiakamilo Road
Suite 411
Honolulu Hawaii 96817-4941
Telephone 808 842 1133
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November 20, 2002

Mr. Randall K. Fujiki, AIA, Director
Department of Planning & Permitting (DPP)
City and County of Honolulu
650 S. King St., 7th Floor
Honolulu, HI 96813

Environmental Assessment for the La'ie Waste Water Collection System Expansion, Phase 2
La'ie, Koolauloa District, Oahu

Dear Mr. Fujiki:

Thank you for your letter dated October 23, 2002 responding to requests for comments on the Draft EA for the proposed Laie Wastewater Collection System Expansion. In response to your comments we offer the following information:

- We note your determination that the project does not require a Special Management Area Use Permit per Section 25-1.3(2)(m), ROH.

- Regarding the archaeological studies used for the project, the State Historic Preservation Division (SHPD) was consulted during the preparation of the Draft EA (personal meeting with Sara Collins and Elaine Jourdane, May 13, 2002). The SHPD has determined that no additional archaeological studies are required for this project. An archaeological monitoring plan is being prepared for review and approval by SHPD as a condition of their "no effect" determination. This information is included in the Final EA.

- Section 6.1 of the EA will be revised with respect to DPP administration of Grading, Grubbing, Excavation, and Stockpiling Permits.

Should you have questions or require additional information, please do not hesitate to contact me or Mr. Kyle Yukumoto at 842-1133.

Very truly yours,

Jim Niermann
Planner

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POLICE DEPARTMENT

CITY AND COUNTY OF HONOLULU

801 SOUTH BERETANIA STREET
HONOLULU, HAWAII 96813 - AREA CODE (808) 529-3111
http://www.honolulupd.org
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JEREMY HARRIS
MAYOR

LEE D. DONOHUE
CHIEF

ROBERT AU
GLEN KAJIYAMA
DEPUTY CHIEFS

OUR REFERENCE CS-KP

October 21, 2002

WES		KTS	
R-F		NM	
RTT		BRT	

REC'D OCT 24 2002 RMTC

ATP | AP | JN

Mr. Jim Niermann, Planner
R. M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817

Dear Mr. Niermann:

Thank you for the opportunity to review and comment on the Draft Environmental Assessment for the proposed La'ie Waste Water Collection System Expansion, Phase 2.

There should be no significant long-range impacts as a result of this project. However, we anticipate an impact on calls for service for traffic-related complaints during its construction. Therefore, in an effort to minimize these types of calls, please have the contractor call Lieutenant James Addison of the Kaneohe Police Station at 247-2166.

If there are any questions, please call Ms. Carol Sodetani of the Support Services Bureau at 529-3658.

Sincerely,

LEE D. DONOHUE
Chief of Police

By a a/c
KARL GODSEY
Assistant Chief of Police
Support Services Bureau

Serving and Protecting with Aloha

420 Waiakamilo Road
Suite 411
Honolulu Hawaii 96817-4941
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November 20, 2002

Mr. Karl Godsey
Assistant Chief of Police
Support Services Bureau
Honolulu Police Department
801 South Beretania Street
Honolulu, HI 96813

Environmental Assessment for the La'ie Waste Water Collection System Expansion, Phase 2
La'ie, Koolauloa District, Oahu

Dear Mr. Godsey:

Thank you for your letter dated October 21, 2002 responding to requests for comments on the Draft EA for the proposed Laie Wastewater Collection System Expansion. In response to your comments we offer the following information:

- We acknowledge that you do not anticipate the proposed project to have significant long-range impacts.

- Regarding short-term impacts on calls for service realted to traffic complaints, the contractor will be advised to contact Lieutenant James Addison of the Kaneohe Police Station prior to construction.

Should you have questions or require additional information, please do not hesitate to contact me at 842-1133.

Very truly yours,

Jim Niermann
Planner

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DEPARTMENT OF TRANSPORTATION SERVICES
CITY AND COUNTY OF HONOLULU
650 SOUTH KING STREET, 3RD FLOOR • HONOLULU, HAWAII 96813
TELEPHONE: (808) 523-4529 • FAX: (808) 523-4730 • INTERNET: www.co.honolulu.hi.us

JEREMY HARRIS
MAYOR

CHERYL D. SOON
DIRECTOR

GEORGE "KEOKI" MIYAMOTO
DEPUTY DIRECTOR

October 24, 2002

TPD9/02-03534R

Mr. Jim Niermann, Planner
R.M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

Dear Mr. Niermann:

Subject: Laie Wastewater Collection System Expansion, Phase II

In response to your August 22, 2002 letter, we reviewed the draft environmental assessment (EA) for the subject project.

The following comments are provided regarding Section **3.3.1 Traffic and Transportation Systems**, which appears on Page 3-16 of the draft EA:

1. A map that clearly identifies the roadways that will be affected by the project should be included in this section.

2. The statement is made that the proposed project activities will require extensive work within roadway corridors throughout Laie. Therefore, the discussion in this section should detail the type of work to be done within the roadway right-of-way, its effect on traffic (vehicular, pedestrian, bicycle etc.), and mitigative measures proposed to minimize the project's impact on traffic and area residents.

3. All proposed traffic controls (including temporary roadway detours) necessary to complete the project should be designed to minimize any impacts on continued traffic flow. Furthermore, roadway closures should be avoided, unless absolutely necessary.

4. It is stated that the contractor will schedule heavy truck activity as much as possible between the hours of 9:00 a.m. and 3:00 p.m. on weekdays. However, heavy truck activity should also be scheduled so as not to interfere with after school traffic, both pedestrian and vehicular, for safety reasons. Therefore, the hours of heavy truck activity should be adjusted to avoid the after school traffic. Also, it is recommended that the

commitment to mitigate the impact on the nearby residents be strengthened by limiting the scheduling of heavy truck activity to 9:00 a.m. to just before the end of the school day, unless absolutely necessary.

5. The last paragraph in this section states that the proposed project is not expected to have significant adverse impacts on traffic, nor will it result in an increase in the number of vehicular trips in the area. This statement should be discussed further. It appears that there would be a large amount of detouring of traffic as a result of this project. Also, the number of vehicular trips in the area would increase during the construction phase.

6. The Oahu Transit Services-TheHandi-Van should be notified prior to the commencement of construction activities.

Should you have any questions regarding these comments, please contact Faith Miyamoto of the Transportation Planning Division at 527-6976.

Sincerely,

CHERYL D. SOON
Director

420 Waiakamilo Road
Suite 411
Honolulu Hawaii 96817-4941
Telephone 808 842 1133
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November 20, 2002

Ms. Cheryl D. Soon
Department of Transportation Services
City and County of Honolulu
650 S. King St., 3rd Floor
Honolulu, HI 96813

Environmental Assessment for the La'ie Waste Water Collection System Expansion, Phase 2
La'ie, Koolauloa District, Oahu

Dear Ms. Soon:

Thank you for your letter dated October 24, 2002 responding to requests for comments on the Draft EA for the proposed Laie Wastewater Collection System Expansion. In response to your comments we offer the following information:

- A Map of the roadways affected by the project will be included in Section 3.3.1.

- Detail has been added to the discussion in Section 3.3.regarding the types of construction activities to be undertaken within the right-of-way. Impacts to vehicle, bicycle, and pedestrian traffic, and mitigation measures are described in Section 3.3.1 of the Draft and Final EA.

- All proposed traffic controls will be designed to minimize impacts on continued traffic flow. This language will be added to the Final EA.

- Heavy truck activity in the vicinity of La'ie Elementary School will be scheduled so as not to interfere with after-school traffic. Heavy truck traffic on residential streets will be scheduled as much as possible from 9:00 a.m. to just before the end of the school day. As noted in Section 3.3.1 of the EA, the Honolulu Police Department (HPD) will be notified prior to periods of heavy truck activity or during transport and operation of heavy equipment.

- The proposed project is expected to have short-term impacts in the form of traffic slow-downs from temporary detours and the presence of large, slow-moving vehicles and heavy equipment on area roadways. The project will also result in a temporary increase in vehicle trips attributable to workers traveling to and from the work site, and the use of construction vehicles during the course of work. All construction-related traffic impacts will cease upon project completion.

Short-term construction-related impacts will be mitigated by restricting the hours of construction vehicle activity to non-peak traffic periods, and by the use of traffic control measures including signs, cones, flag men, and police officers to direct traffic. With the proposed mitigation measures in place, significant short-term adverse impacts to traffic are not anticipated.

Long-term impacts to traffic may result from the need to conduct future repairs or replacement of the waste water collection system mains within existing roadway corridors. Future maintenance activities would create impacts similar to those anticipated from the proposed project and would be mitigated by employing traffic control measures, scheduling construction activities, and otherwise ensuring that the contractor follows Sate and City traffic control regulations.

Based on these findings, no significant adverse impacts are expected to result from this project.

Should you have questions or require additional information, please do not hesitate to contact me or Mr. Kyle Yukumoto at 842-1133.

Very truly yours,

Jim Niermann
Planner

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Hawaiian Electric Company, Inc. • PO Box 2750 • Honolulu, HI 96840-0001

GEN-6 (EIS)

October 18, 2002

Mr. Jim Niermann, Planner
R.M. Towill Corporation
420 Waiakamilo Road - Suite 411
Honolulu, Hawaii 96817-4941

Dear Mr. Niermann:

Re: La'ie Waste Water Collection System Expansion, Phase 2

Thank you for the opportunity to review and comment on the August 2002 Draft EA for the La'ie Waste Water Collection System Expansion, Phase 2, proposed by the City and County of Honolulu's Department of Design and Construction.

According to the study, each lot will have its own grinder pump station. The grinder pumps should be powered by the individual customers and metered together with their routine electrical service.

Our point of contact for this project, and the originator of these comments, is Enrique Che (543-7281), Director of Planning & Design, Customer Installations. I suggest that your staff deal directly with Enrique to coordinate HECO's participation in this project.

Sincerely,

Kirk Tomita
Senior Environmental Scientist

cc: OEQC
E. Che

420 Waiakamilo Road
Suite 411
Honolulu Hawaii 96817-4941
Telephone 808 842 1133
Fax 808 842 1937
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November 20, 2002

Mr. Kirk Tomita
Senior Environmental Scientist
Hawaiian Electric Company, Inc. (HECO)
P.O. Box 2750
Honolulu, HI 96840

Environmental Assessment for the La'ie Waste Water Collection System Expansion, Phase 2
La'ie, Koolauloa District, Oahu

Dear Mr. Tomita:

Thank you for your letter dated October 18, 2002 responding to requests for comments on the Draft EA for the proposed Laie Wastewater Collection System Expansion. In response to your comments, we offer the following information:

- Each lot will have its own grinder pump. The grinder pumps will be powered by the individual customers and metered together with their routine electrical service.

- Our staff will work directly with Mr. Enrique Che, HECO Director of Planning and Design, Customer Installations on issues related to electrical design and service connection.

Should you have questions or require additional information, please do not hesitate to contact me at 842-1133.

Very truly yours,

Jim Niermann
Planner

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verizon

Verizon Hawaii Inc.
P.O. Box 2200
Honolulu, HI 96841

August 28, 2002

R.M. Towill Corporation
420 Waiakamilo Road, Suite 411
Honolulu, Hawaii 96817-4941

Attention: Jim Niermann

Subject: Public Review of Draft Environmental Assessment (EA) for proposed Laie Wastewater Collection System Expansion, Phase 2

Dear Jim,

Thank you for the opportunity to review the above subject Draft Environmental Assessment. As noted in Section 3.3.5, Verizon Hawaii has existing aerial and underground facilities within the project area that serve the community of Laie. We do not anticipate any conflicts with the proposed project. However, the contractor for the project will need to come to our office for an excavation permit prior to the start of construction.

If you have any questions, please contact Garret Hayashi at 840-1438.

Sincerely,

Jill Z. Lee
Section Manager - OSP Engineering

cc: File (Laie)

420 Waiakamilo Road
Suite 411
Honolulu Hawaii 96817-4941
Telephone 808 842 1133
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November 20, 2002

Ms. Jill Z. Lee
Section Manager - OSP Engineering
Verizon Hawaii, Inc.
P.O. Box 2200
Honolulu, HI 96841

Environmental Assessment for the La'ie Waste Water Collection System Expansion, Phase 2
La'ie, Koolauloa District, Oahu

Dear Ms. Lee:

Thank you for your letter dated August 28, 2002 responding to requests for comments on the Draft EA for the proposed Laie Wastewater Collection System Expansion. In response to your comments, we offer the following information:

- We note that you do not anticipate the project to result in any conflicts with Verizon facilities or operations.
- The contractor will contact your office to obtain an excavation permit prior to the start of construction.

Should you have questions or require additional information, please do not hesitate to contact me at 842-1133.

Very truly yours,

Jim Niermann
Planner

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APPENDIX G

Kaleo O Koolauloa Community Newspaper
January 17, 2002, Article:
"City, State, HRI Share La'ie Sewer Info, Costs"

The following article is reprinted from: *Kaleo O Koolauloa Community Newspaper*, January 17, 2002:

City, State, HRI Share La'ie Sewer Info, Costs

La'ie single-dwelling home owners recently learned that a proposed new $17 million City and County of Honolulu sewer system covering the medium-density residential sections of the community will cost each approximately $3,500-$6,000 in City assessments and owner-related installation costs, depending on lot size and other variables.

Project purposes
Over 200 residents attended a special informational meeting on January 8, 2002, sponsored by La'ie Community Association in the elementary school cafeteria, at which representatives from the City's Department of Environmental Services (DES), the State Department of Health (DoH) and Hawai'i Reserves, Inc. (HRI) explained the overall project, timing, and financial impact on homeowners.

HRI President and CEO Eric Beaver outlined the scope of the project, going back to a 1992 amendment to the City's Development Plan to allow more housing in La'ie that was linked with a requirement to formulate an offer to extend the sewer collection system throughout the community.

Beaver noted HRI has worked closely with the City to not only extend the system, but also to replace the aging original portion which was installed about 40 years ago. "There has been a tremendous amount of effort, by many people, to bring this project to this point. After expanding the [treatment] plant to bring it into compliance, and updating the La'ie Master Plan through the participation of the Master Plan Citizens Advisory Group, we are now poised to extend wastewater collection services through all of La'ie."

"This project is the next logical step in the implementation of the La'ie Master Plan. I have been personally involved with this effort since its inception and can attest that with the unprecedented cooperation of the Harris Administration, the City Council and the on-going support of the La'ie community, we will not see a better deal for sewer service."

"This project is a key step in paving the way for La'ie to move forward," Beaver said, adding that the new system will also enhance property values. "For example, home improvements will now be possible and, where square footage meets City requirements, residents will be able to subdivide their lots."

Environmental Benefits
Beaver also pointed out that the new system will help improve and protect environmental health. For example, Dennis Tulang, Chief of the DoH Wastewater Branch, explained that records show more than 20% of the cesspools in the unsewered portion of La'ie are failing.
Tulang defined a "failing cesspool" as one that has to be pumped at least once a year. "That is a problem." Consequently, he continued, the DoH has declared all of O'ahu a "critical wastewater area." He added that eventually the ban on new cesspools will be extended to the neighbor islands.

"Essentially, we're taking raw, untreated sewage and discharging it into a hole in the ground," he said, explaining that cesspools in low-lying communities such as La'ie – even if they're seldom pumped – can basically affect the groundwater table and the quality of near-shore waters. "This project is highly beneficial to the homeowners, and it's certainly a benefit to the overall public, in terms of public health."

More importantly, Tulang pointed out that homeowners will be required to hook up where the system is available.

"Building modifications trigger requirement to upgrade cesspools to septic tanks," he said. In other words, "cesspools can restrict your ability to expand. By hooking up to the sewer, you eliminate all of these restrictions."

Two-phase construction and low-pressure technology
DES Director Tim Steinberger explained that the new sewer system will be constructed in two phases:

Phase I, which is already underway, includes building a new sewer main along Naniloa Loop from Iosepa St. to the Temple View Apartment (TVA) complex and from there mauka to a new pump station and the La'ie Water Reclamation Facility (LWRF). The new pump station will replace existing ones on Moana St. and by TVA. Phase I will take about a year to complete, Steinberger said, adding that construction work will temporarily cause traffic and other adjustments.

Phase II – to be funded through the establishment of a City Sewer Improvement District (SID) – could start in about 18 months and take approximately one year to complete. This phase includes replacing the existing collection system and extending it throughout the community. To keep costs as low as possible – especially given the low-lying topography of La'ie, and the expensive cost of excavating a gravity system – Steinberger said the City will install and maintain low-pressure pumps on each lot.

He explained such pumps have been used successfully on the mainland for about 20 years and at other Hawai'i locations for the past seven years, including several at the Polynesian Cultural Center's Ali'i Lu'au restroom and two other homes in La'ie.

Steinberger added that while the City will install the pumps and laterals to the sewer lines in the streets, homeowners must pay for installing the electrical and plumbing hookups from their houses to the pumps, as well as the cost of filling in their old cesspools.

Who pays what? And when?
Expanding on how much homeowners must pay, Beaver pointed out that the City and HRI will evenly divide approximately 93% of the projected $17 million sewer project costs, with homeowners to pay the remaining 7%. He said homeowner costs fall into three categories:

City SID assessments, which the City Council sets by ordinance, and other installation costs. City assessments are set at 25¢ per square foot of lot size based on the lowest figure in set increments, with different increments for R5 and R7.5 zoned homes. For example, a property owner whose R5 lot contains between 5,000-9,999 square feet (sf) will pay a $1,250 assessment (25¢ x 5,000 = $1,250); and the owner of a property between 10,000-14,999 sf. will pay a $2,500 assessment. Most homes in La'ie are zoned R5.

In an R7.5 zoned example, an owner whose lot is between 7,500-14,999 sf. will pay a $1,875 assessment (25¢ x 7,500 = $1,875). Most homes on La'ie Point and some along the makai side of Kamehameha Highway are zoned R7.5.

Beaver said when the assessments come due, at least a year-and-a-half from now, owners will have the option to pay a single lump sum, or spread the amount, plus interest, over 20 years in annual billings.

For example, a 5,000 sf. R5 lot owner would pay the City approximately $105 each year; a

10,000 sf. R5 owner would pay approximately $210 a year; a 10,000 sf. R7.5 owner would pay approximately $155 a year; and a 15,000 sf. R7.5 owner would pay about $315 if he elects the annual payment method.

Beaver said the City allows qualified low-income, totally disabled and 65-plus elderly to defer the assessments in certain cases; but the costs will be passed along to a future property owner.

Other installation costs: Referring to the other one-time installation costs, Beaver roughly projected having a licensed plumber install house-to-pump connections will cost approximately $500; having a licensed electrician install a power panel and connection to the pump will cost about $1,000; and backfilling a cesspool about $750 – or a total of approximately $2,250.

"Please be aware that these are estimates only. The actual costs will vary depending upon the size and configuration of your lot," Beaver stressed, adding that HRI will work with major contractors to achieve one-time economies of scale: These will be based on several hundreds of anticipated hookups during the initial installation that might result in discounted rates for connecting house plumbing and electrical to pumps, and filling in cesspools.

He added that homeowners can arrange their own finances at the appropriate time, or that the City also offers low-interest loans to qualified residents, depending on their annual income and family size, to help finance these other installation costs.

Combining the assessment and other installation costs, Beaver estimated total costs for a homeowner whose R5-zoned lot is no larger than 9,999 sf. would total approximately $3,500; and an R5 lot no larger than 14,999 sf. would total roughly $4,750.

Monthly sewer service fees: Tim Houghton, Executive Assistant to the City DES Director, explained that once Phase II is complete, homeowners will also be responsible for monthly service charges, which for the past 10 years have averaged about $33 across O'ahu. Houghton said Honolulu's fees are average, by national standards.

Houghton added that HRI will continue to bill sewer customers in the area under contract to the City.

"Let me state affirmatively, at this point, that this is the best deal we've seen for sewer service," Beaver said. "Again, the cooperative participation of the City makes a Sewer Improvement District possible, and that brings the cost way down for the homeowners.

City SID process
Steinberger again took the floor to explain that the City's SID process, which usually takes about 15 months to complete, including adopting resolutions, holding several public hearings at which any resident can give testimony, engaging consultants and adopting their plans, calling for and awarding bids, and formally setting the assessment rates.

City Councilmember Steve Holmes, who was at the meeting, later pointed out that since "this is a political process decided by politicians, not engineers," and also because this is an election year in which all of the Council members must stand down due to term limits, it could take even longer.

Questions and Answers
Following a short refreshment break, concerned homeowners had the opportunity to ask their questions, including:

Q: *Can recently installed septic tanks be 'grandfathered' in?*

A: "There's no grandfathering," responded Tulang. "If a sewer system is available, you have to hook up." When one resident who installed a new septic tank in 1993 complained, however, Tulang added that "you might be able to go through a variance process."

Q: *Who's responsible for the areas around the low-pressure pumps?*
A: Homeowners need to cut the grass, but the City will maintain the pump and repair it, if necessary. Steinberger pointed out, however, that the pumps have gone for years with little or no maintenance in other areas.

Q: *Who is liable if someone is injured because of the low-pressure pump?*
A: The DES officials said they would have to check with City Counsel.

Q: *Do multiple units require multiple pumps?*
A: Most likely; but City engineers will determine if duplexes, apartments and other multiple units can use a single, larger capacity pump.

Q: *Who pays for the electricity to run the pump?*
A: Homeowners or tenants pay their respective electrical bills, but Steinberger said the City will credit them approximately $2-3 per month on their sewer collection bills for electricity so their charges are equitable with others.

Q: *If the City Council doesn't approve the SID, are we still obligated?*
A: "If the Improvement District doesn't go through, we cannot spend the money," Steinberger said.

Q: *How close will the pump be to the house?* Resident **Bob Coleman,** for example, noted that "the closer it is to the home, the cheaper it is for the homeowner."
A: Steinberger replied that individual owners will have input in where the pumps are located, and that engineers will work with them to determine the most feasible location. However, they must be accessible for servicing.

Q: *Will the DOH allow for new construction before the project is pau?*
A: "Yes," said Tulang, "as long as your cesspool is not failing."

Q: *Is the pump quiet?*
A: HRI Engineering Director **Jeff Tyau,** who has a pump located near his bedroom window behind his house on Iosepa St., said he never notices it.

Q: *What if the pump fails?*
A: The City will replace it.

Q: *Will I have to take down any boundary walls?*
A: Steinberger said the pipe is small, and that the City will work with homeowners, in most cases, to tunnel under existing walls.

Q: *What happens when electrical power fails?*
A: Steinberger, who said this is usually the number-one question, reported this has not been a problem on the mainland. "These pumps have adequate capacity [about 75 gallons] to hold up to two days, depending on usage," he said, noting that Hawaiian Electric estimates the average outage on O'ahu lasts less than a day. For longer outages, he added, "a crew would come out with a generator to pump the systems down. We're trying to think of everything that would go wrong with these things."

Q: *Can existing septic tanks be used as a back-up?*

A: No. Steinberger said in mainland examples they do not do this. He also cited the possibility of owner liability if an old system is left unsealed and/or unfilled, and someone gets hurt.

Q: *Will the new system open La'ie up to V.A.* [Veterans Administration] *financing?*
A: Houghton said he will check; but local Realtor **Choon James** said "the reason we can't get V.A. loans is the private water system."

Q: *How about homes on agricultural zoned lots?*
A: "Ag lots have been excluded out of Improvement Districts due to higher costs," Steinberger said. Councilmember Holmes added that the City would consider installing a new sewer phase if zoning on such agricultural property ever changes to residential use.

Q: *When will the City take over the La'ie wastewater treatment plant?*
A: September 2003. Steinberger explained the City is working with HRI on staffing the LWRF at that point

Q: *Are the pumps childproof?*
A: Yes. They are locked.

Q: *Haven't existing sewer customers been paying all along for future improvements?*
A: No, customers have not paid into a reserve account. Tyau added current fees do not cover operational costs, and there are no reserve funds; but the existing system needs to be replaced, and the SID makes now the best opportunity to do so.

Q: *Why does La'ie Point have to be included?* **Bobby Chang**, for example, said the cesspool at his parent's home on the Point has not been pumped in over 45 years and he feels the near-shore water quality is good.
A: Tulang reiterated that the wastewater eventually goes into the ocean. "This is generally not good for the environment," he said, but added that he doesn't have specific evidence, so it would be a community decision.

Q: *Will the City Council pass the SID?*
A: Councilmember Holmes replied that decision "is made by politicians, not engineers." He added that all of the current Councilmembers must stand down due to term limits before the process is complete, so new people will make the final decision.

Q: *When the new housing is built, will those owners have to pay sewer assessments?*
A: Beaver said the costs of all infrastructure improvements will be built into the sale price, as it usually is with all housing projects.
As people left the meeting about two-and-a-half hours after it began, some said the estimated costs to individual homeowners were less than they expected. Several said they thought it was a good deal, and others also said they looked forward to hooking their houses up to the new sewer system.

Individual homeowners with questions can also contact HRI at 808-293-9201.