DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109

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OFC. OF ENV.
QUALITY CONT.

December 9, 1991

Office of Environmental Quality Control
Central Pacific Plaza
220 South King Street, 4th Floor
Honolulu, Hawaii 96813

Subject: **LAHAINA WATER TREATMENT PLANT** **PN 92-1**
TMK 4-6-18:12 Lahaina, Maui, Hawaii

Gentlemen:

In accordance with the requirements of Chapter 343, HRS and Chapter 200 to Title 11, Administrative Rules, we hereby notify you that an Environmental Impact Statement will not be required for the subject project.

As the proposing agency, we are forwarding herewith one copy of OEQC Form 89-01 and for (4) copies of an Environmental Assessment (Negative Declaration) for the subject project showing that there will be no significant impact on the environment as a result of this project. These are respectfully submitted for your consideration.

Sincerely,

Rae M. Shikuma
Director

Encl: Publication Form
Four (4) Environmental Assessments

cip/hc

1991-12-23-MA-FEA

* Proposed Lahaina Water Treatment Plant *

ENVIRONMENTAL ASSESSMENT

December 1991

Prepared for:

County of Maui,
Department of Water Supply

Michael T. Munekiyo Consulting, Inc.

Proposed Lahaina Water Treatment Plant

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PREFACE

The County of Maui, Department of Water Supply proposes to fund the development of new water treatment facilities at Lahaina, Maui (TMK 4-6-18: por.12). Pursuant to Chapter 343, Hawaii Revised Statutes, and Chapter 200 of Title 11, Administrative Rules, Environmental Impact Statement Rules, this Environmental Assessment documents the project's technical characteristics and environmental impacts, and advances findings and conclusions relative to the significance of the project.

SUMMARY

Applicant and Landowner

The Applicant for the proposed project is the County of Maui, Department of Water Supply (DWS). The landowner of the affected property is the State of Hawaii.

Contact Person

For further information, contact Ms. Rae Shikuma, Director, County of Maui, Department of Water Supply, 200 S. High Street, Wailuku, Hawaii 96793, or at telephone (808) 243-7816.

Property Location and Description

The project site is located approximately 1,500 feet mauka (east) of the Lahainaluna High School campus, on lands owned by the State of Hawaii (TMK 4-6-18:12). The undeveloped site is adjacent to existing State and County water storage, treatment and distribution facilities. The northern limits of the site is defined by a steep cliff forming one side of the Kanaha Stream Valley. Open pasture and rangeland border the site to the south, east and west.

Proposed Action

The DWS proposes to construct a new water treatment plant (WTP) initially consisting of four (4) 0.5 million gallons per day (MGD) water treatment modules contained within a 5,500 square feet pre-fabricated metal building. In addition to the WTP building, a separate concrete masonry unit (CMU) building will be constructed to house the chlorinator and ammoniator units. The treatment building and appurtenant piping and treatment facilities will be constructed to accommodate an additional two (2) 0.5 MGD treatment modules to meet future needs. The ultimate capacity of the proposed water treatment plant therefore will be 2.5 MGD (with one treatment module serving as a standby unit).

In addition to the treatment plant, a new 1.0 million gallon (MG) finish water reservoir and a new 0.5 MG presedimentation reservoir will be constructed mauka of the treatment plant building. Other improvements proposed in connection with the new water treatment facilities include:

1. Widening and extension of the existing 8-foot wide paved access road to the site;

2. Sludge lagoons to receive backwash water from the treatment modules. The lagoons will allow for the separation of settleable solids (sludge) from the backwash;

3. Septic tank and leaching field to receive wastewater from the restroom and washdown facilities located within the treatment plant and chlorinator/ammoniator buildings; and

4. Chain link fencing to secure the proposed facilities.

Findings and Conclusion

The proposed WTP is intended to address water treatment requirements set forth by the EPA's Surface Water Treatment Rule. The benefits derived from this project is significant in terms of the public health and welfare, as treated water provided by the facility will meet the highest standards of water quality for surface source domestic consumption.

The proposed project will involve earthwork and building construction activities. In the short-term, these activities may create temporary nuisances normally associated with construction activities. Construction traffic, for example, will require access to the site through the Lahainaluna High School campus. Traffic will utilize a perimeter road which currently offers access to the existing State and County water facilities. With traffic monitoring normally conducted for construction activities of this nature, the short-term impacts to the School is not anticipated to be significant. The project site itself is removed from the School and adjacent urban residential areas, and construction activities at the site is not anticipated to adversely impact these uses.

From a long-term perspective, the use of the site for the proposed water treatment facilities is not anticipated to result in adverse environmental impacts. There are no surface archaeological features or rare/threatened species of fauna and flora at the site and the replacement of existing undeveloped lands with the WTP will not affect these environmental parameters. Ambient air and noise characteristics will not be altered as a result of the proposed WTP.

In an operational context, the proposed WTP will be fully automated and will require daily maintenance checks. These maintenance visits to the plant are not expected to create undue nuisance to the School or surrounding residential neighborhoods.

In light of the foregoing findings, it is concluded that the proposed action will not have any significant impacts. Accordingly, this Environmental Assessment will be filed as a Negative Declaration pursuant to Chapter 200 of Title 11, Administrative Rules, Environmental Impact Statement Rules.

Chapter I

Introduction and Background

I. INTRODUCTION AND BACKGROUND

The County of Maui Department of Water Supply (DWS) proposes to develop a new water treatment plant and associated storage and distribution facilities at Lahaina, Maui, Hawaii. To provide the context within which the proposed project is to be undertaken, this Chapter describes existing water system characteristics and reviews the regulatory framework which establishes the impetus for the proposed project.

A. EXISTING WATER SYSTEM

Water systems within the 296-square mile Lahaina Judicial District include agricultural water systems and private and public domestic water systems.

Agricultural water systems have been developed by Pioneer Mill Company, Ltd. (PMCO) and Maui Land & Pineapple Company, Inc. (MLP) to meet irrigation needs of their respective sugar cane and pineapple cultivation operations. These systems utilize surface water, high-level dike water and basal groundwater sources, and include transmission and storage facilities consisting of ditches, flumes, siphons, and reservoirs. The most notable component of the agricultural system in the Lahaina District is the Honokohau Ditch. The Ditch begins with a diversion at Honokohau Stream and winds through the mid-slopes of the West Maui foothills for a distance of about 12 miles, terminating near Lahaina Town. Both PMCO and MLP divert water from the ditch for irrigation purposes. In addition, the DWS diverts water from the Honokohau Ditch to serve its two domestic systems.

1. DWS Domestic Systems

The County's DWS operates the Honokohau and Lahaina-Alaeloa Water Systems within the Lahaina District. The Lahaina-Alaeloa Water System is the larger of the two DWS systems, and is divided into two subsystems, referred to as the "Northern Subsystem" and the "Southern Subsystem".

These subsystems are interconnected, but currently operate independently through the closure of selected system valves. The proposed Lahaina Water Treatment Plant (WTP) will become an integral part of the Lahaina-Alaeloa Water System's Southern Subsystem.

In 1989, the number of service connections to the Lahaina-Alaeloa system was 2,816, of which 2,459 connections were designated as active (paying) customers by DWS. The average consumption for the entire Lahaina-Alaeloa system was 4,280,350 gallons per day (GPD).

Northern Subsystem: The Northern Subsystem serves the area between Lahainaluna Road and Alaeloa (excluding the Kaanapali Resort). See Figure 1. Water for this subsystem is derived from the Honokohau Ditch through a diversion at Alaeloa, and from four (4) high-level basal wells in upper Napili. Reservoirs associated with this subsystem are located in Alaeloa (1.0 MG), Honokowai (2.0 MG), and Wahikuli (1.5 MG). Approximately 36,000 lineal feet of 16-inch main along Honoapiilani Highway connect these reservoirs between Alaeloa and Wahikuli. Improvements to the Northern Subsystem will be implemented to help meet the long-term water demands for the West Maui region.

Southern Subsystem: The other component of the Lahaina-Alaeloa System, the Southern Subsystem, serves Lahaina Town, between Lahainaluna Road and Puamana. See Figure 2. This system obtains its water from surface water originating in Kanaha Valley and four basal wells.

Water from the Kanaha Intake is shared under a three-party agreement among the State of Hawaii, the DWS and PMCO. Facilities shared by the three (3) parties utilizing the sources include the intake at Kanaha Stream, about three (3) miles inland at elevation 1,035 feet; a screen box at

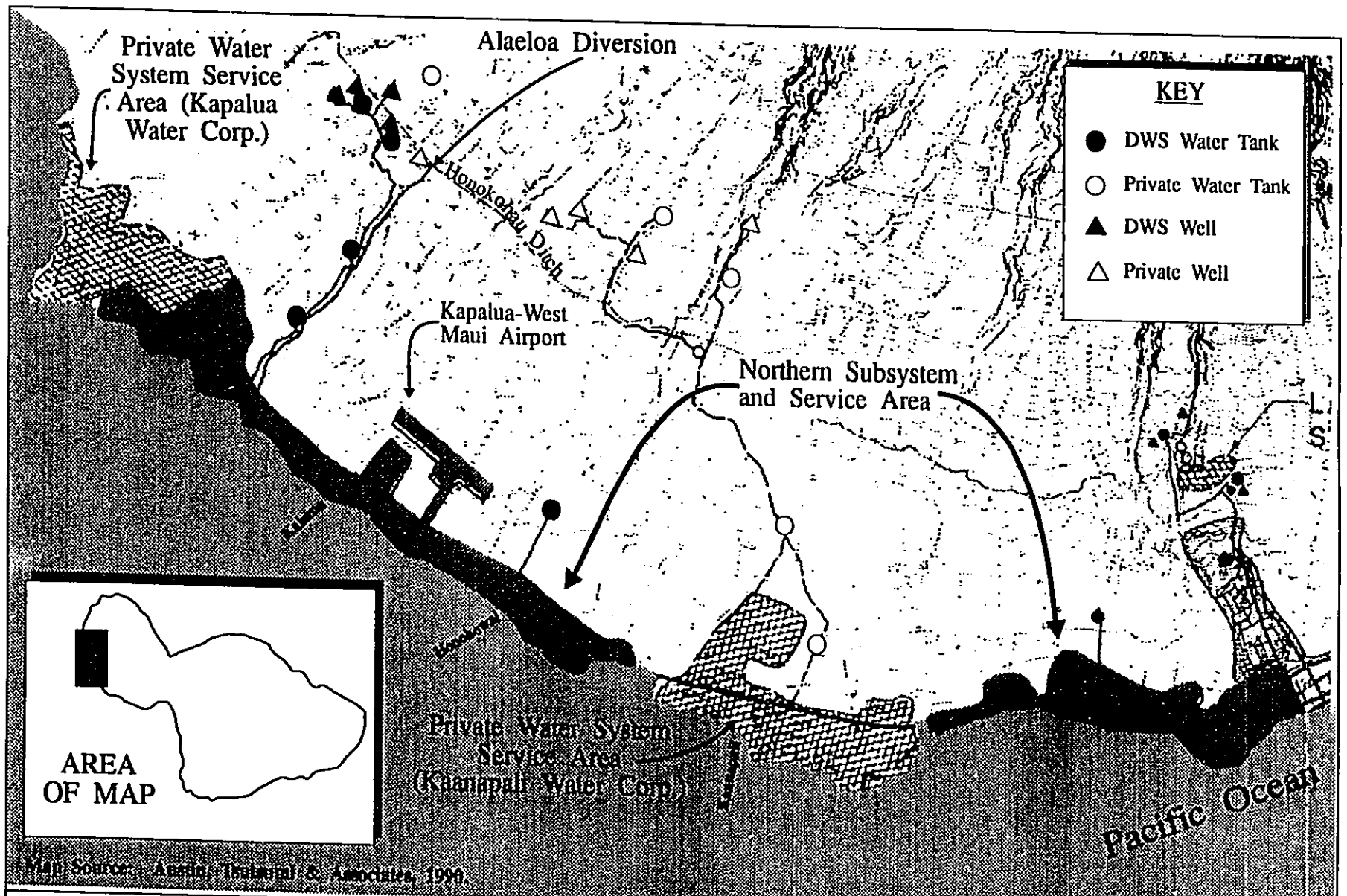


Figure 1

Lahaina Water Treatment Plant
Existing Northern Subsystem and Service Area

1000 0 2000 4000 Feet

Michael T. Munekiyo Consulting, Inc.

Prepared for: County of Maui, Department of Water Supply

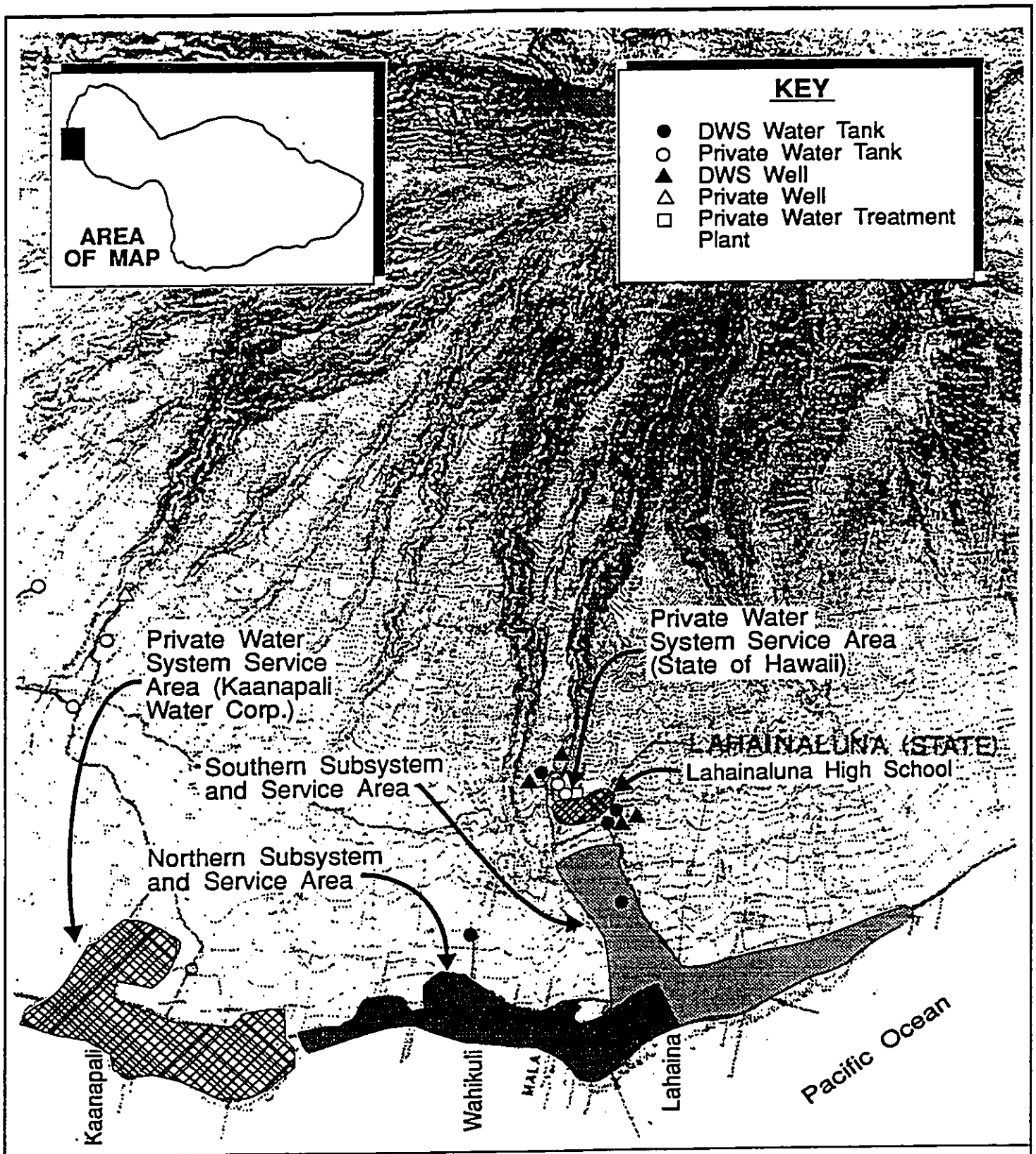


Figure 2 Lahaina Water Treatment Plant

Existing Southern Subsystem and Service Area

2000 8000
0 Feet
4000

Michael T. Munekiyo Consulting, Inc.

Prepared for: County of Maui, Department of Water Supply

elevation 800 feet; and about 2,065 lineal feet of 10-inch galvanized steel pipe from the intake to the screen box. The screen box, located above Lahainaluna High School, is the point of water distribution to the respective water users.

Water diverted for the State of Hawaii is used for Lahainaluna High School, and is treated through filtration by gravity filters and disinfection with chlorine. A 100,000 gallon steel tank provides the required storage for the school. The school uses approximately 0.35 to 0.45 MGD, of which 90% is attributed to non-potable irrigation use.

Water diverted to the DWS system is conveyed from the screen box through an 8-inch main to the 0.30 MG Kanaha Reservoir. Water from Kanaha Reservoir flows through 4,600 lineal feet of 16-inch, 12-inch and 8-inch mains to two (2) County reservoirs along Lahainaluna Road. The respective storage capacities of these reservoirs are 0.50 MG and 1.0 MG. The proposed WTP will be located adjacent to the State's filter and steel tank site mauka of Lahainaluna High School.

B. REGULATORY CONTEXT

Direct regulation of water systems and water quality are governed by the following laws and regulations: (1) Safe Drinking Water Act of 1974 (P.L. 93-523); (2) Chapter 340E, Hawaii Revised Statutes, Safe Drinking Water; (3) State Department of Health, Chapter 20 of Title 11, Administrative Rules, Potable Water Systems; and (4) Environmental Protection Agency Surface Water Treatment Rule (SWTR).

1. Safe Drinking Water Act

The Safe Drinking Water Act (42 USC 300) regulates public providers of drinking water. (Public systems are defined as those providing piped water

for human consumption that has at least fifteen (15) service connections, or regularly serves at least twenty five (25) people at least sixty (60) days a year.) The Act ensures that public systems providing drinking water are not detrimental to the public health by providing for:

a. The establishment of primary regulations for the protection of the public health;

b. Secondary regulations relating to the taste, odor and appearance of drinking water; and

c. Measures to protect underground drinking water sources.

Any proposed water treatment plant must comply with the provisions of the regulations mandated by the Safe Drinking Water Act.

2. ***Chapter 340E, Hawaii Revised Statutes, Safe Drinking Water***

Chapter 340E, Hawaii Revised Statutes, relating to Safe Drinking Water, is the enabling legislation implementing the Federal Safe Drinking Water Act. Chapter 340E provides for the establishment and enforcement of primary and secondary drinking water regulations for public water systems. These regulations are contained within Chapter 20 of Title 11, Administrative Rules, Potable Water Systems, which are summarized in the next section.

3. ***State Department of Health, Chapter 20 of Title 11, Administrative Rules, Potable Water Systems***

Chapter 20 of Title 11, Administrative Rules, establishes drinking water quality standards for the State of Hawaii in accordance with the Federal Safe Drinking Water Act. Maximum contaminant levels (MCL) for inorganic and organic chemicals, turbidity, coliform bacteria and radionuclides are established by Chapter 20.

In addition, Chapter 20 establishes sampling, analytical and reporting requirements for each contaminant parameter.

4. ***Surface Water Treatment Rule***

The U.S. Environmental Protection Agency's (EPA) Surface Water Treatment Rule (SWTR) (40 CFR Part 141, Sub-part H) became effective on December 31, 1990, and is designed to regulate surface domestic water sources. Under the SWTR, all surface water sources, unfiltered or filtered, must meet the SWTR's filtration and disinfection criteria and monitoring and reporting requirements by June 29, 1993. In general, the filtration and disinfection criteria provide for the control of Giardia cysts, viruses, turbidity, heterotrophic plate count bacteria, and Legionnella. The State Department of Health (DOH) is in the process of promulgating rules to implement the requirements of the SWTR. The DOH proposed rules is scheduled for review, public hearing and adoption in calendar year 1991. The proposed WTP project is designed to ensure full compliance with criteria established by the SWTR.

Chapter II

Description of the Proposed Project

II. DESCRIPTION OF THE PROPOSED PROJECT

A. PROJECT LOCATION AND LANDOWNERSHIP

The project site is located approximately 1,500 feet mauka (east) of the Lahainaluna High School campus, on lands owned by the State of Hawaii (TMK 4-6-18:12). See Figure 3. The undeveloped site is adjacent to existing Department of Education treatment and distribution facilities for Lahainaluna High School and the County's water storage and distribution facilities for the Southern Subsystem of the Lahaina-Alaeloa System. The northern limits of the site is defined by a steep cliff forming one side of the Kanaha Stream Valley. Open pasture and rangeland border the site to the south, east and west.

B. PROJECT NEED

The proposed WTP is designed to meet the water quality requirements of the SWTR and to improve the operating characteristics of the Southern Subsystem of the Lahaina-Alaeloa System. Problems attributed to the existing system include excessive turbidity during flood periods. In addition, storage capacity within the Southern Subsystem is estimated to be deficient by approximately 0.75 MG. The proposed project will include the addition of new storage capacity to reduce this deficiency.

The proposed project, in improving system capacities and efficiencies, will therefore help to meet the long-term water needs of the Southern Subsystem service area. The projected water demand for this service area is expected to increase from its present demand of 1.37 MGD to 1.66 MGD in the year 1995. While growth is expected to continue in the Lahaina District, demand for the Southern Subsystem is expected to stabilize at 1.66 MGD, with no foreseeable increase in demand expected through the year 2010. See Figure 4. In this regard, the project is considered an integral component of West Maui's long-range water master plan which will include improvements to both surface water and groundwater sources and facilities.

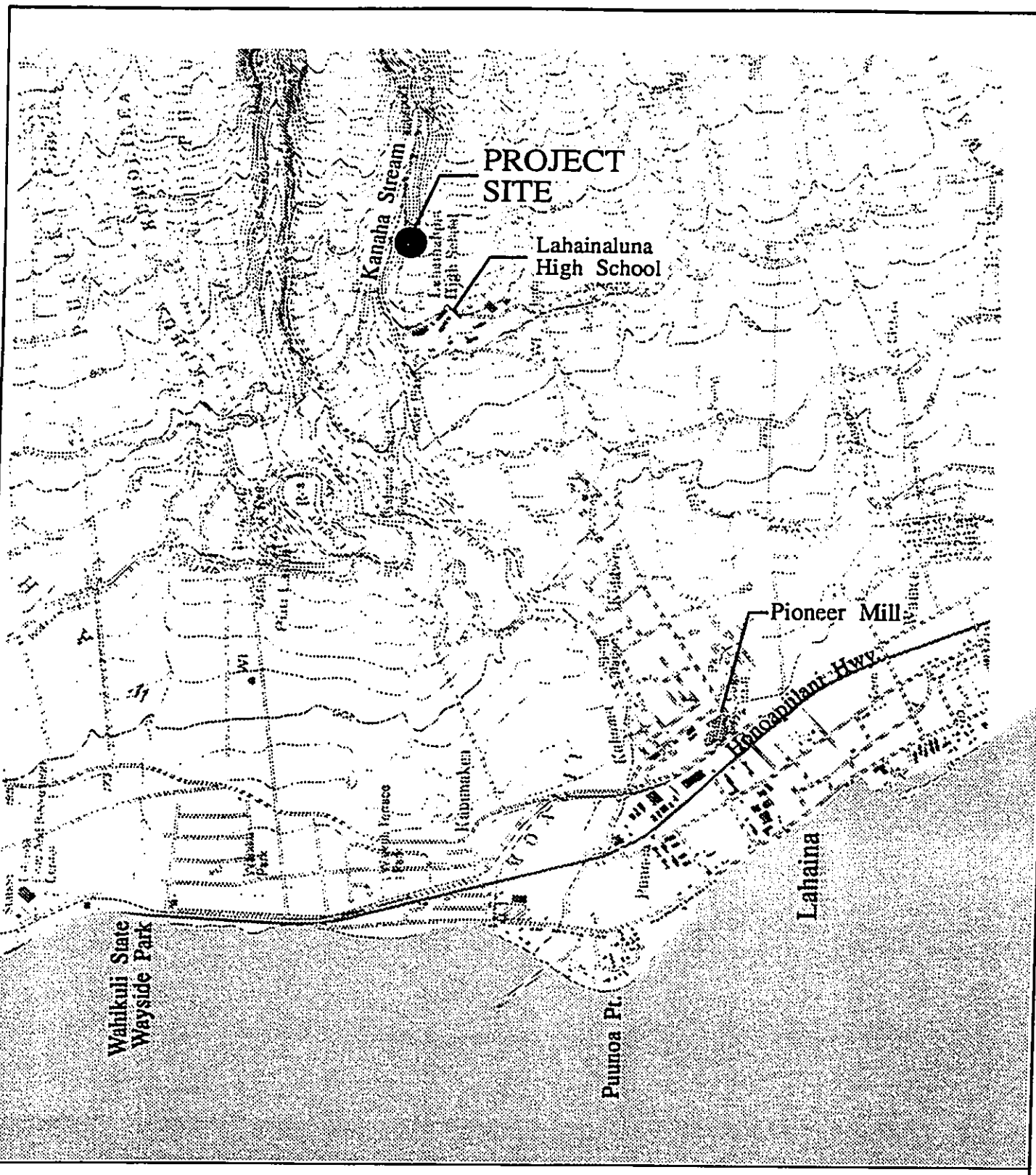


Figure 3 Lahaina Water Treatment Plant
Regional Location Map

1000 0 2000 4000 Feet

Michael T. Munekiyo Consulting, Inc.
Prepared for: County of Maui, Dept. of Water Supply

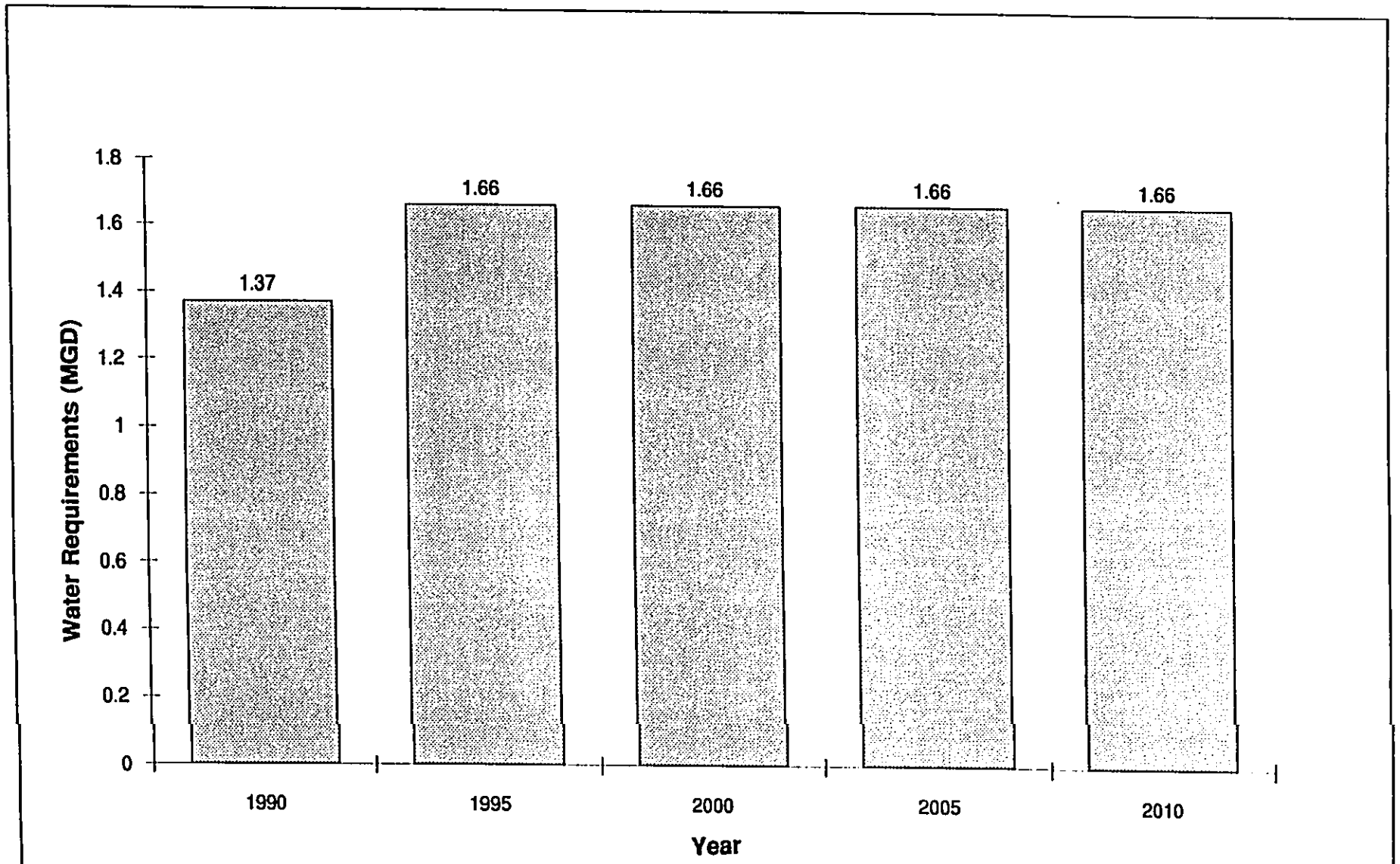


Figure 4

Lahaina Water Treatment Plant

Projected Water Demand for Southern Subsystem

Michael T. Munekiyo Consulting, Inc.

Prepared for: County of Maui, Department of Water Supply

C. WATER SOURCE AGREEMENT

Water diverted from the Kanaha Stream is allocated pursuant to a three party agreement executed by the State of Hawaii, County of Maui and Pioneer Mill Company, Ltd. in 1982. The agreement establishes priorities for water use from the Kanaha diversion intake which can accommodate a flow of up to 2.7 MGD. The allocations provide for guaranteed flows for Lahainaluna High School, the County and Pioneer Mill. The proposed project will not alter flow diversion at the Kanaha intake.

D. PROPOSED IMPROVEMENTS

The proposed 2.8-acre project site is adjacent to existing water system improvements which include a screen box, gravity filters and a 100,000 gallon steel tank (serving Lahainaluna High School), and the DWS' 300,000 gallon Kanaha Reservoir. The proposed WTP will be located adjacent to the existing Lahainaluna High School water treatment gravity filters which will continue in operation to meet the School's non-potable water needs.

The proposed WTP will initially consist of four individual water treatment modules, each with a treatment capacity of 0.5 MGD. A detailed engineering description of the WTP is contained in Appendix A. The modules will be housed within a pre-fabricated, rigid-frame, aluminum building, together with control room and chemical treatment facilities. See Figure 5. The treatment plant building will be approximately 20 feet high, with about 5,500 square feet of floor area. Filtered water will be chlorinated and stored within a clearwall located under the building. A separate concrete masonry unit building (adjacent to the treatment plant building) will house the chlorinator/ammoniator units. The chlorinator/ammoniator building will be 13 feet high, with 1,074 square feet of floor area.

The treatment plant building will incorporate provisions for future expansion to accommodate a higher demand. For this reason, floor area allocation for two

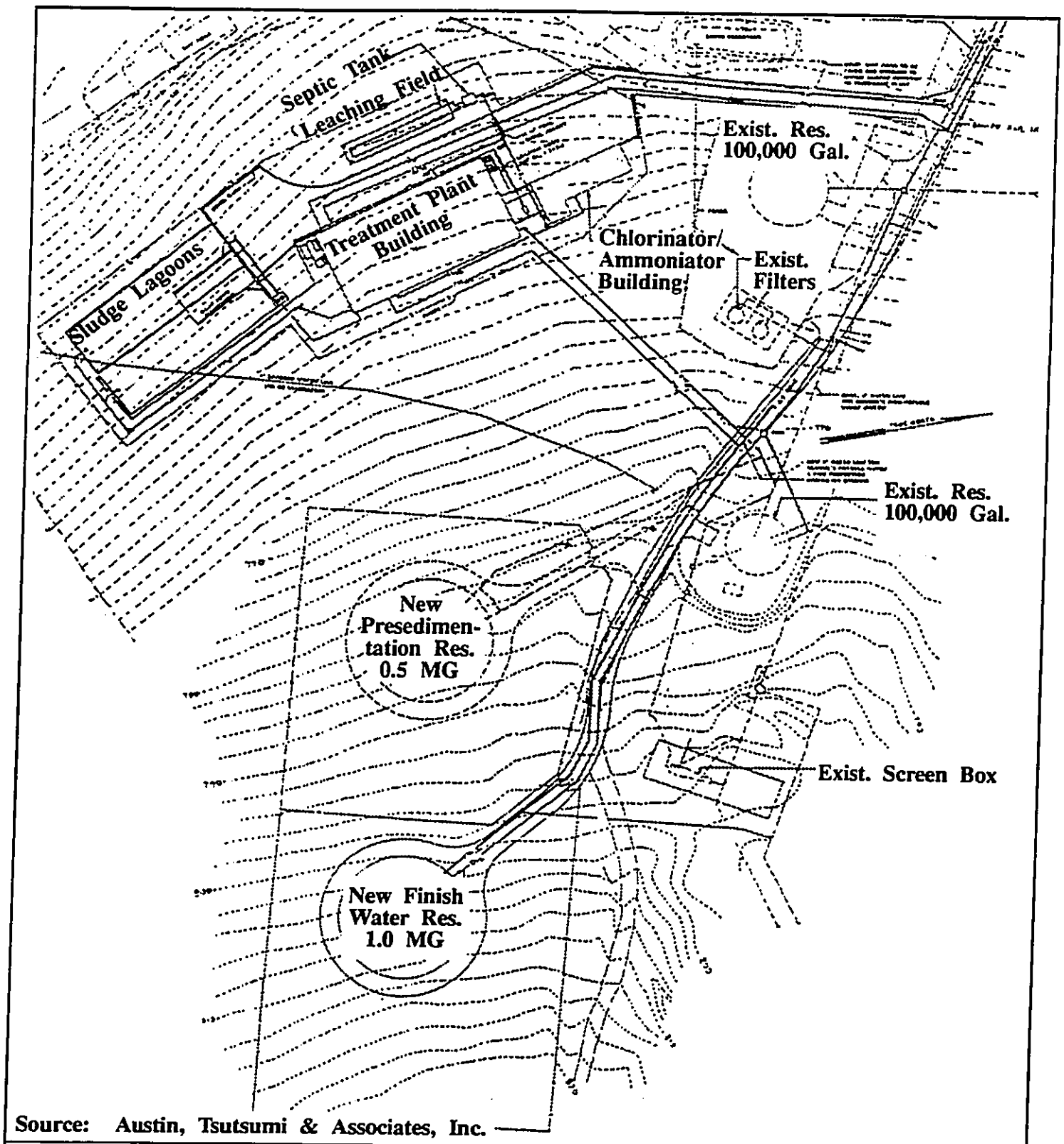


Figure 5 Lahaina Water Treatment Plant
Site Plan

0 20 40 80 Feet

Michael T. Munekiyo Consulting, Inc.

Prepared for: County of Maui, Department of Water Supply

additional 0.5 MGD treatment modules and associated piping connections will be provided within the building. The ultimate capacity of the WTP would therefore be 2.5 MGD (assuming one standby unit).

The treatment modules will employ a direct filtration process with flocculation and clarification occurring within a single-compartment adsorption clarifier. The second compartment of the module would be a mixed media filter. Chemical treatment would be incorporated as part of the overall treatment process.

The WTP will be fully automated and should require only brief, daily maintenance visits. A full-time operator will not be required for the facility.

The finish (treated) water will be pumped from the clearwall to a new 1.0 MG finish water reservoir located mauka of the fenced treatment plant building location. The elevation of the finish water reservoir would allow for gravity flow from the new reservoir to the DWS's Kanaha Reservoir.

A portion of the storage capacity in the finish water reservoir (300,000 gallons) will be available to the Lahainaluna High School for domestic and fire purposes. The school's domestic requirement of 100,000 gallons per day will therefore be fully provided through the proposed project.

In addition to the finish water reservoir, a new 0.5 MG presedimentation reservoir will be constructed (between the treatment plant building and finish water reservoir). The presedimentation reservoir will be designed to remove silt from the raw water by gravity settlement.

Other improvements proposed in connection with the new WTP facilities include:

1. Widening and extension of the existing paved access road to the site (from 8 feet to 12 feet in width);

2. Sludge lagoons to receive backwash water from the treatment modules and the overflow/washout water from the presedimentation reservoir. The lagoons will allow for the separation of settleable solids (sludge) from the backwash;

3. Septic tank and leaching field to receive wastewater from the restroom and washdown facilities located within the treatment plant and chlorinator/ammoniator buildings; and

4. Chain link fencing to secure the proposed facilities.

The estimated construction cost for the proposed improvements is $8.6 million. Costs would be shared among the DWS and the State Department of Education (DOE).

E. PRELIMINARY DEVELOPMENT SCHEDULE

The proposed project will be implemented to meet the EPA's June, 1993 implementation deadline. Construction, therefore, will be scheduled from April 1992 to May 1993. Testing of the WTP will follow the construction phase of the project.

Chapter III

Description of the Existing Environment

III. DESCRIPTION OF THE EXISTING ENVIRONMENT

A. PHYSICAL SETTING

1. Existing Land Use

The proposed WTP and attendant improvements will be located adjacent to existing water system improvements owned and maintained by the DWS, State of Hawaii and PMCo. The site for the new WTP and reservoirs are vacant and are covered with introduced species of grasses and weeds.

2. Climate

Like most areas of Hawaii, Lahaina's climate is relatively uniform year-round. Lahaina's tropical latitude, its position relative to storm tracts and the Pacific anticyclone, and the surrounding ocean combine to produce this stable climate. Variations in climate among different regions, then, is largely left to local terrain.

Average temperatures at the project site are approximately two (2) degrees Fahrenheit lower than at Lahaina. Temperatures for the site have been estimated by using the Lahaina Station as a base, and assuming that temperature decreases 3.3 degrees with every 1,000 feet of elevation (Environment Study Corp., 1979). August is historically the warmest month, while January and February are the coolest.

Rainfall at Lahaina is highly seasonal, with most precipitation occurring between October and April when winter storms hit the area. Situated on the leeward side of the West Maui Mountains, this region receives most of its rainfall in late afternoon and early evening, after seabreezes take moisture upslope during the day. Precipitation data collected at the Wahikuli Station (#364) show that on average January is the wettest month, with 3.31 inches of precipitation, while June is the driest, with just 0.25

inches. The average annual total is 18.5 inches.

The winds in the Lahaina area are also seasonal. The northeasterly tradewind occurs ninety (90) percent of the time during the summer, and just fifty (50) percent of the time in the winter. Wind patterns also vary on a daily basis, with tradewinds generally being stronger in the afternoon. During the day, winds blow onshore toward the warmer land mass. In the evening, the reverse occurs, as breezes blow toward the relatively warm ocean.

3. *Topography and Soils*

The proposed site is situated on moderately sloping lands at approximately 745-feet elevation. The Kanaha Gulch runs in an east to west direction, adjacent to the site proper. Terrain in the vicinity of the project site can be characterized as uniform and even, sloping approximately fifteen (15) percent.

At a regional scale, the topography of West Maui ranges from the gently sloping coastal areas to steep ridges and large amphitheater valleys. The maximum elevation of the West Maui Mountains is 5,788 feet at Puu Kukui. From the summit, streams flow in a radial pattern, indicating that the lava surface of the volcano set the original stream course.

Underlying the proposed site and surrounding lands is the Waiakoa-Keahua-Molokai soil association (See Figure 6). The soils belonging to this association are well-drained, moderately fine textured and are located on low uplands. They were formed in material weathered from basic igneous rocks and make up roughly fifteen (15) percent of the Island. Waiakoa soils comprise roughly thirty (30) percent of the association and have a surface layer of dark, reddish brown, friable silty clay loam. The subsoil is dark

LEGEND

① Pulehu-Ewa-Jaucas association

② Waiakoa-Keahua-Molokai association

③ Honolua-Olelo association

④ Rock land-Rough mountainous land association

⑤ Puu Pa-Kula-Pane association

⑥ *Hydrandepts-Tropaquods* association

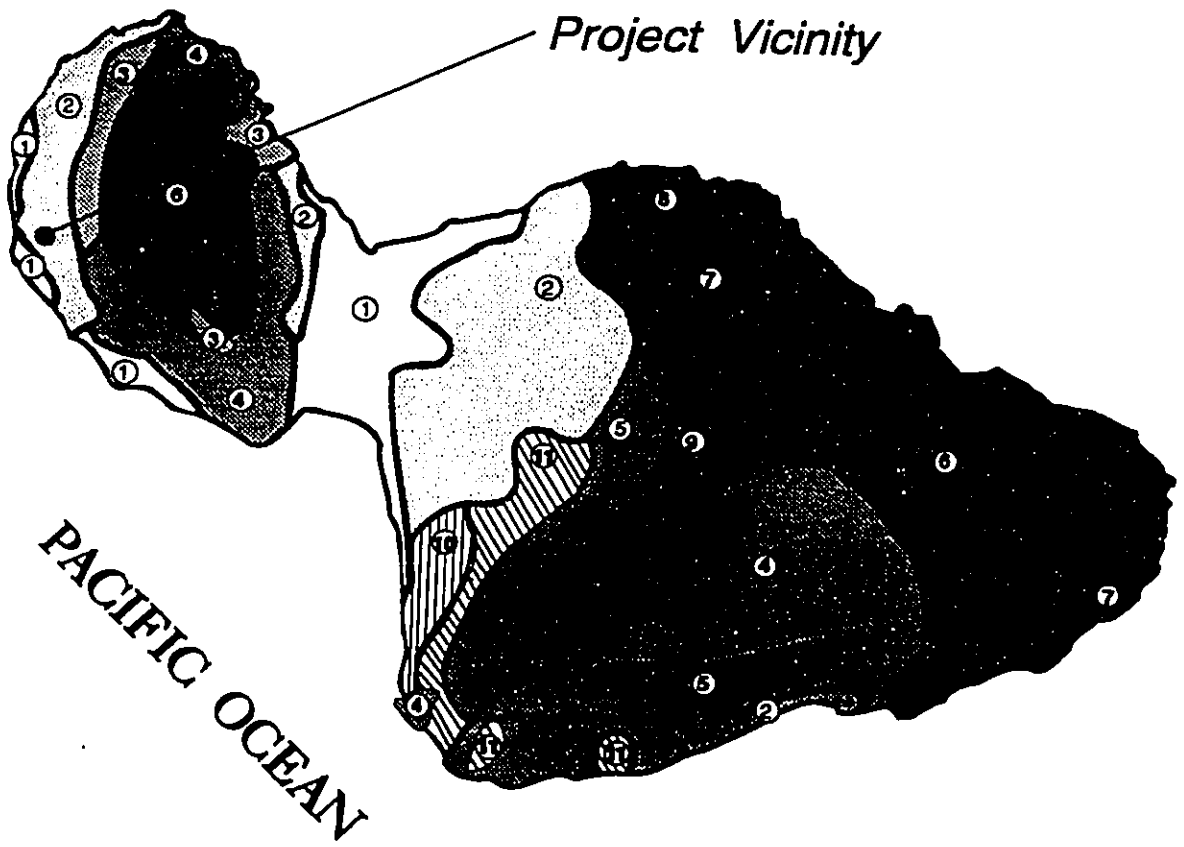
⑦ Hana-Makaalae-Kailua association

⑧ Pauwela-Haiku association

⑨ Laumaia-Kaipoipoi-Olinda association

⑩ Keawakapu-Makena association

⑪ Kamaole-Oanapuka association



Map Source: USDA Soil Conservation Service

Figure 6 Lahaina Water Treatment Plant
Soil Association Map

Michael T. Munekiyo Consulting, Inc.

Prepared for: County of Maui, Dept. of Water Supply

reddish-brown and very dark grayish-brown, friable silty clay loam. Keahua soils make up twenty (20) percent of the association and have a surface layer of dark reddish-brown, friable silty clay loam. Keahua subsoil is dark reddish-brown, firm silty clay loam. Molokai soils comprise an additional ten (10) percent of the association. These soils have a surface layer of dark reddish-brown, friable silty clay loam and a subsoil of dark-red and dusky-red, friable silty clay loam and clay loam. The remaining forty (40) percent of the association consists of Alaeloa, Haliimaile, Kahana, Koele, Lahaina, Paia, Wahikuli, Wailuku, and Wainee soils.

The particular soil type at the site of the proposed WTP is Lahaina Silty Clay, fifteen (15) to twenty-five (25) percent slope (LaD). See Figure 7. For this soil, runoff and the erosion hazard are moderate (U.S. Dept. of Agriculture Soil Conservation Service, 1972).

Lands underlying the project site are designated as "E" lands by the University of Hawaii Land Study Bureau. This classification system rates lands on a scale of "A" to "E", reflecting land productivity characteristics. Lands designated "A" are considered to be of highest productivity with "E"-rated lands ranked lowest.

4. *Flood and Tsunami Hazard*

The project site lies in an area of minimal flood and tsunami hazard as determined by the Flood Insurance Rate Maps. In particular, the site is located along the foothills of the West Maui Mountains, well beyond the coastal tsunami inundation areas. Moreover, the elevation and local terrain of the site provide for adequate drainage to preclude flooding from storm runoff.

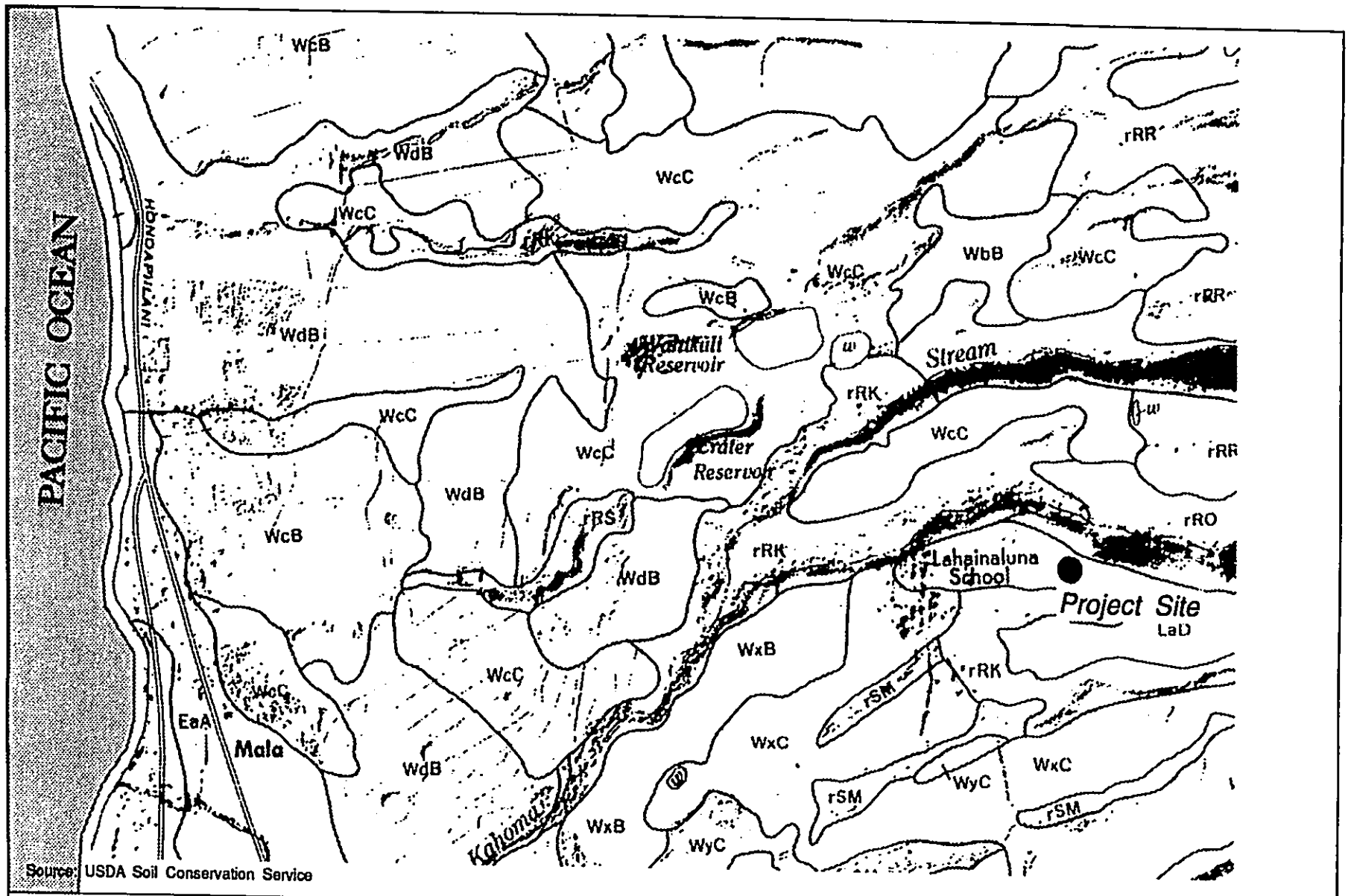


Figure 7

.25 1.0
0 Miles .50

Lahaina Water Treatment Plant
Soil Classifications at Project Site

Michael T. Munekiyo Consulting, Inc.
Prepared for: County of Maui, Dept. of Water Supply

5. *Geology*

The Lahaina District lies on the west side of a dome-shaped volcano referred to as the West Maui Mountains. The dome has been reduced by erosion -- from a summit altitude estimated to have been 7,000 feet -- to 5,788 feet at Puu Kukui.

The volcanic dome of the West Maui Mountains include several long, narrow valleys created by stream erosion. The sloping plains between valleys are eroded volcanic remnants which form valuable agricultural lands. Along the coastline and at the foot of the valley are relatively level lands created by sediment deposition.

Volcanic formations in the West Maui area are classified into three (3) stratigraphic units known as the Wailuku Basalt, Honolua Volcanic, and Lahaina Volcanic (Austin, Tsutsumi & Associates, 1991).

The bulk of the exposed lava belong to the Wailuku Basalt. Principal aquifers are located within the Wailuku Basalt because of the rock type's high permeability and numerous dikes. These aquifers are the source of domestic water for the West Maui area. Of the three stratigraphic units, the Wailuku Basalt is the oldest, with an estimated dated age of 1.58 to 1.97 million years.

Following a short period of volcanic inactivity, lava of the Honolua Volcanic emerged to form a 50 to 500 feet thick stratigraphic layer over most of the Wailuku dome. The massive rock formations of the Honolua series are much less permeable and are generally too discontinuous to function as aquifers. Age data places the occurrence of the Honolua Volcanic at about 1.5 million years ago. Following the period of the Honolua Volcanic, small periodic eruptions occurred, building isolated cones and forming short flows

along the western shoreline. These formations are attributed to the Lahaina Volcanic whose distribution is limited to the Lahaina vicinity. The deposits of the Lahaina series are not extensive enough to be used as water-bearing formations.

In addition to the three stratigraphic units described above, the region includes sedimentary alluvial deposits that cover the low coastal plain from Ukumehame to Lahaina Town. These sediments form a caprock which confine the basal aquifer underlying the coastal plains.

6. *Hydrology*

a. *Groundwater*

The hydrologic region of West Maui is referred to as the Lahaina Sector, which encompasses six (6) aquifer systems (Mink, 1990). See Table 1. The Lahaina District includes the region from

Table 1

WEST MAUI AQUIFER SYSTEMS	
Aquifer System	**Area (sq. mi.)**
Honokohau	13.23
Honolua	17.61
Honokowai	22.67
Launiupoko	18.29
Olowalu	6.81
Ukumehame	10.61
Source: Mink, John, 1990.	

Honokohau Valley in the north to Ukumehame Valley in the south.

Each of the aquifer systems encompass coastal basal and high-level dike-impounded waters.

Most of the shafts and drilled wells of the region are located on or near the coastal plain, tapping the underlying basal lens. The basal lens in the Lahaina Sector is not very thick due to the lack of an effective confining caprock. Maximum groundwater heights, in fact, are around five (5) feet above mean sea level. These Maui and Lanai type shafts were designed to keep chloride contents at reasonable levels by just skimming the surface of the lens.

Dike impounded aquifers can be found approximately 18,000 feet inland from shore in the Lahaina region. Dike-confined waters in the Lahaina Sector are tapped by tunnels in many of the larger valleys. Generally, the aquifers connect, though the connection may be very weak in some cases. Much water is stored in these compartments, and excess volumes escape either to other dike compartments or to streams.

Minor perched aquifers also exist in the region in the Honolua Volcanic. These waters seep into streams, contributing, for example, to the perennial flow of Honokohau Stream.

In 1987, 39 MGD of groundwater was available while 27.9 MGD were in use. By 2010, projections indicate a slight decrease to 25.7 MGD of groundwater in use due to reduction in use by PMCO, Ltd. (Maui County Departments of Planning and Water Supply, 1990).

b. ***Surface Water***

In 1987, all 56.2 MGD of available surface water in the Lahaina

District was in use. Pioneer Mill was by far the heaviest user, consuming 45.2 MGD. Other users are Maui Pineapple Co., Ltd. (4.5 MGD), Kapalua (3.6 MGD), Department of Water Supply (2.5 MGD), and other domestic users (0.4 MGD) (Maui County Departments of Planning and Water Supply, 1990).

Surface water in the region originates in the West Maui Mountains. Because of the region's location on the leeward side of the mountains, streamflows are mostly confined to the higher elevations.

Stream diversions make up the largest source of water supply in the region. Unlike ten (10) years ago, groundwater is used only sparingly for irrigation, though it still is the source of most domestic supply. Increasingly, however, surface water from Honokohau Ditch is being diverted for potable use.

The water source for the proposed WTP is the Kanaha Stream. Average streamflow just upstream of the Kanaha Intake is 5.0 MGD. Maximum flows have been recorded as high as 17.7 MGD, while minimum flows have been as low as 1.9 MGD. The capacity of the diversion intake and pipe system is 2.7 MGD.

As previously noted, the proposed project will address water quality problems associated with surface water domestic sources. Because of periods of heavy rainfall, turbidity is a primary concern in West Maui. Data for Kanaha Stream indicate an average turbidity of 1 to 2 Nephelometric Turbidity Units (NTU) during summer months and less than 10 NTU during the winter months (Camp Dresser & McKee, Inc., 1990). Turbidity peaks exceeding 100 NTU have been recorded, however. State Department of Health standards set the

mean tolerance level for turbidity at 5.0 NTU during the west season, and at 2.0 NTU during the dry season (Department of Health, 1988).

The color of Kanaha Stream waters was also tested. Color was not detected in majority of samples, but a maximum value of 35 color units (CU) was recorded. The Maximum Contaminant Level (MCL) established by the Department of Health is 15 CU. Total dissolved solids at Kanaha were in the 16 to 148 MG/L range at Kanaha.

7. Flora and Fauna

A flora and fauna survey of the site was conducted at the project site as part of previously proposed improvements by the DWS (Environment Impact Study Corp., 1979). Flora at the project site included numerous common weeds and shrubs, such as buffelgrass, milkweed, Spanish needle, castor bean, lantana, koa haole, and Ilima. There are no sensitive, rare or threatened species at the project site.

Avifauna common to the site and surrounding environs include the common mynah, Japanese white-eye, spotted dove, barred dove, house finch, and Pacific golden plover. The only endemic bird expected at the site is the Hawaiian owl or pueo. Mammals expected at the site include feral cat, house mouse, Norway rat, Polynesian rat, mongoose and pig. The project site is not considered a significant habitat for avifauna or wildlife.

8. Archaeological Resources

An archaeological inventory survey of the area concludes that the site has been extensively disturbed. Given the previous use of the site for ranching and by the Lahainaluna School, no surface archaeological features were recorded in the project area. See Appendix B.

9. *Air Quality*

There are no point sources of airborne emissions in the immediate vicinity of the project site, although the Pioneer Mill's raw sugar processing plant is located 1.6 miles west of the site. Mill operations do not affect air quality at the project site and the air quality in the project vicinity can be described as good. The site is located in proximity to lands utilized for sugar cane cultivation by Pioneer Mill. As such, the area is subject to dust and equipment emissions associated with agricultural activities. The burning of sugar cane in the nearby sugar fields may create temporary increases in airborne particulates, although this occurrence is intermittent and of temporary duration.

10. *Noise Characteristics*

The parcel is surrounded by open, undeveloped lands to the north, south, and east. Lahainaluna High School is located approximately 1,500 feet to the west. In this context, background noise at the site is limited to natural (e.g., wind) conditions.

B. *COMMUNITY SETTING*

1. *Land Use and Community Character*

The vast majority of lands in West Maui are either State designated "Conservation" or "Agricultural". Generally, "Conservation" lands occupy the higher elevations, while the "Agricultural" district spans the middle ground. Major exceptions to this trend are the Honolua Stream and Pohakupule Gulch areas where the "Conservation" district extends down to sea level.

"Urban" designated lands, then, are left to occupy the lower elevations along the coast. The communities of Kahana-Napili-Kapalua and Kaanapali contain Community Plan designations reflective of their resort nature. Lahaina, meanwhile, is more typical of a residential community. Single

family, business, light industrial, and agricultural zones prevail in Lahaina.

A key feature of the region is the town of Lahaina, which is designated a National Historic District as the one-time whaling capital of Hawaii. Today, it is the visitor industry that defines Lahaina Town and other coastal resort communities of West Maui.

Part of West Maui's attraction can be attributed to its year-round dry and warm climate, complemented by many white-sand beaches and scenic landscape. Most all of the visitor accommodations are located in Lahaina and the resort communities of Kaanapali, Kahana, Napili, and Kapalua. The privately owned and operated Kapalua-West Maui Airport at Mahinahina conveniently links the region to Oahu and other neighbor islands.

Sugar cane and pineapple fields occupy much of the land in the area. Pioneer Mill Company, Ltd., a vital part of the region's economy, is the State's smallest sugar plantation with approximately 6,800 acres in cultivation. MLP's fields sprawl along the slopes of the West Maui Mountains north of Lahaina.

2. ***Population***

Just as the visitor count has grown, the resident population of the region surrounding the project site has increased dramatically in the last two decades. Population gains were especially pronounced in the 1970s as the rapidly developing visitor industry attracted many new residents. The current resident population of the Lahaina District is estimated at 14,620. The current de facto population (resident plus non-resident) is estimated at 23,190 (Austin, Tsutsumi & Associates, 1991). The projected resident and de facto populations for the years 2000 and 2010 are 22,800 and 38,040,

respectively. The Lahaina Community Plan suggests a regional population of 20,000 by 2003.

Growth patterns at the County level exhibit a similar pattern. The County's 1980 resident population of 71,000 has since grown to the present 100,000. The estimated County population for the year 2010 is 145,200 (DBED, 1990).

3. *Economy*

The economy of Maui is heavily dependent upon the visitor industry. In 1989, for example, total visitor expenditures equalled $2.3 billion. The dependency on the visitor industry is especially evident in West Maui, which has emerged as one of the State's major resort destination areas. Hotels in West Maui typically boast higher occupancy rates than the rest of the Island, with Kaanapali hotels doing especially well.

Agriculture is another vital component of the West Maui economy. Sugar operations are handled by the Pioneer Mill Company, Ltd. In 1988, it produced 47,500 tons (16.2 percent of Maui's total) and employed 324 people. Given the declining fiscal viability of sugar cane production, Pioneer Mill is also testing other crops to supplement its sugar production, including cocoa and coffee (Maui News Supplement, 1990).

MLP's fields remain an important component of the region's agricultural base. In 1988, MLP entered the fresh fruit market, air shipping pineapples to the mainland in an effort to diversify its operations.

The availability of jobs, primarily in the service sector, has resulted in a labor shortage on Maui. During the first quarter of 1991, the County was fully employed (First Hawaiian Bank Research Dept., 1991). The opening

of several new, large hotels is expected to prolong the labor supply imbalance.

4. *Housing*

As with other regions of the Island, lack of affordable housing is considered a major issue in West Maui. The current unmet Island demand is estimated at 7,500 units. The development of the 3,900 unit Lahaina Master Planned Project will help to relieve the housing imbalance to some extent, though demand will still not be satisfied (PBR Hawaii, 1990).

5. *Police and Fire Protection*

The project site is within the Lahaina Police Station service area, which services all of the Lahaina district. The Lahaina Station is located in the Lahaina Civic Center complex at Wahikuli, and was built in the early 1970s. See Figure 8. The Lahaina Patrol includes 47 full-time personnel, including one (1) captain, one (1) lieutenant, police officers, public safety aides, and administrative support staff (County of Maui, 1990).

Fire prevention, suppression and protection services for the Lahaina District is provided by the Lahaina Fire Station, also located in the Lahaina Civic Center. The Station is staffed with nine (9) firefighters per 24-hour shift.

6. *Medical Facilities*

The only major medical facility on the Island is Maui Memorial Hospital, located approximately twenty (20) miles from Lahaina, midway between Wailuku and Kahului. The 145-bed facility provides general, acute, and emergency care services.

Private medical offices, however, are found in West Maui. For example, regular hours are offered by the Maui Medical Group, Lahaina Physicians,

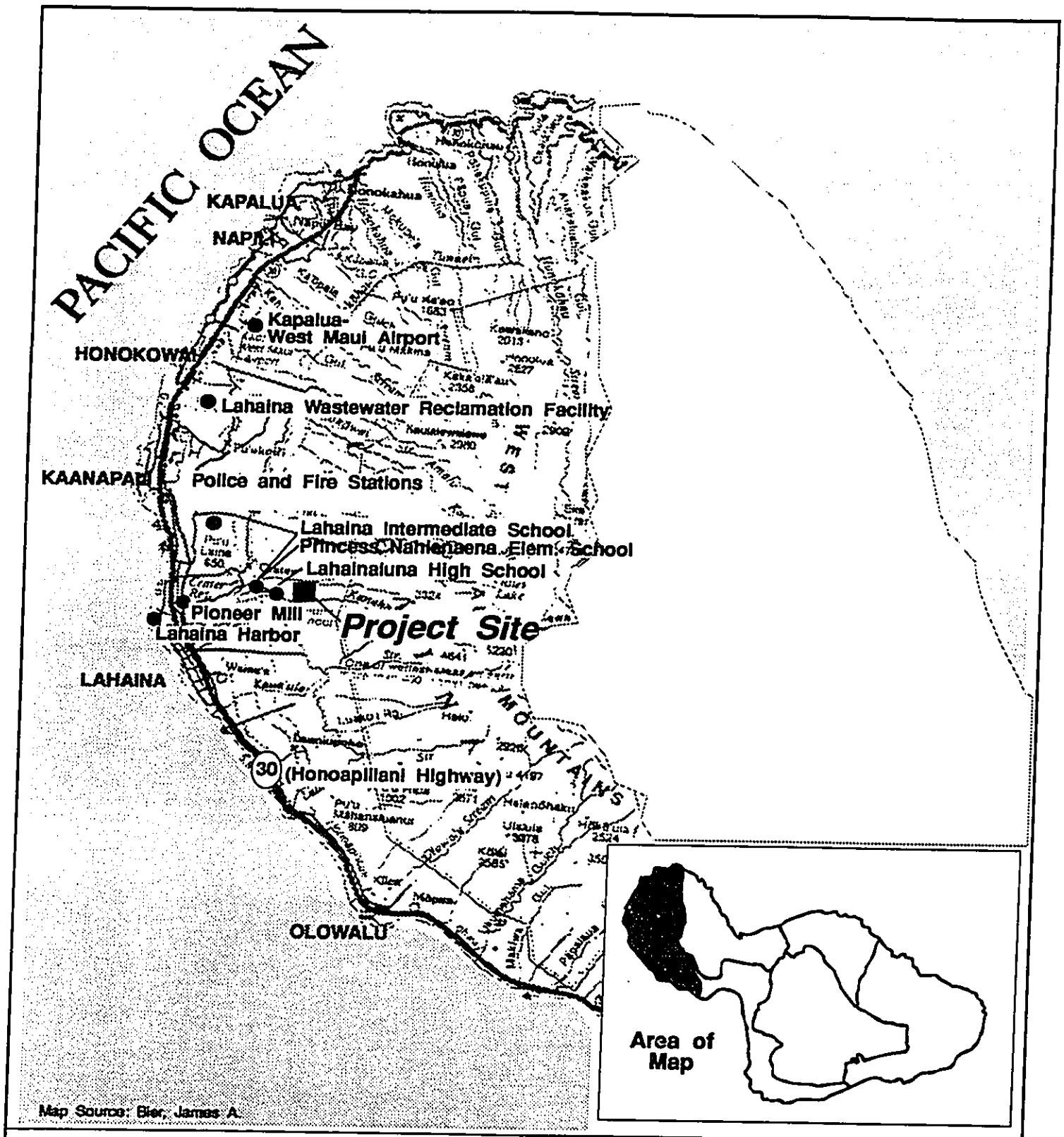


Figure 8 Lahaina Water Treatment Plant
Community Facilities Map

0 1 2 4 Miles
Approximate Scale

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Prepared for: County of Maui, Dept. of Water Supply

West Maui Healthcare Center, and Kaiser Permanente Lahaina Clinic.

7. Recreational Facilities

West Maui is served by numerous recreational facilities offering diverse opportunities for the region's residents. See Table 2. There are seventeen (17) County parks and three (3) State beach parks in West Maui. Approximately one-third of the County parks are situated along the shoreline and are excellent swimming, diving, and snorkeling areas.

In addition, Kaanapali and Kapalua Resorts operate world-class golf courses which are available for public use.

8. Schools

The State of Hawaii, Department of Education operates four (4) public schools in West Maui. They are (with 1991 estimated enrollment shown in parenthesis): Lahainaluna High School (769); Lahaina Intermediate School (517); King Kamehameha Elementary School (691); and Princess Nahienaena Elementary School (401). All of the public schools are located within the Lahaina Town area.

The region is also served by privately operated pre-elementary and elementary schools.

Table 2

WEST MAUI RECREATIONAL RESOURCES		
State Beaches	**County Beaches**	**Other Facilities**
Papalaua State Wayside Park	Puamana Beach Park, Lahaina	Lahaina Civic Center
Launiupoko State Wayside Park	Lahaina Beach, Lahaina	Mala Boat Ramp
Wahikuli State Wayside Park	Puunoa Beach, Lahaina	Kelawea Park
	Hanakaoo Beach, Kaanapali	Paunau Park
	Kaanapali Beach, Kaanapali	Lahaina Boat Harbor
	Honokowai Beach Park, Honokowai	Lahaina Recreation Center
	Kahana Beach, Kahana	Maluulu O Lele Park
	Keonenui Beach, Alaeloa	
	Alaeloa Beach, Alaeloa	
	Honokeana, Honokeana	
	Napili Beach, Napili	
	Kapalua Beach, Kapalua	
	D.T. Fleming Beach Park, Honokahua	

Source: Helber, Hastert & Kimura, Planners, 1990.

C. INFRASTRUCTURE

1. Roadway System

Honoapiilani Highway (State Highway 30) is the main roadway serving the West Maui region. This highway is the only link between West Maui and the rest of the Island (although an unimproved segment of highway extends

around the north coast of the Island to Waihee, providing limited access).

Regionally, Honoapiilani Highway is the main arterial connecting Lahaina, Kaanapali, and Kapalua. The State of Hawaii is proposing a bypass highway to run mauka of the existing highway from Launiupoko to Honokowai in an effort to relieve congestion on Honoapiilani Highway.

Access to the project site will be via a paved service road from Lahainaluna High School (to be widened to a 12-feet width.) The major collector leading to the school is Lahainaluna Road.

2. ***Wastewater Systems***

The County's wastewater collection and transmission system and the Lahaina Wastewater Reclamation Facility (LWRF) accommodate the region's wastewater needs. The LWRF, located along Honoapiilani Highway just north of Kaanapali Resort, has a design capacity of 6.7 MGD. Currently, usage is at 5.2 MGD. With the proposed 3,900-unit HFDC project in Wahikuli and the proposed Kaanapali North Beach project, however, plant expansion will be necessary. The County is proposing to expand the LWRF to 9.0 MGD capacity.

3. ***Solid Waste Disposal***

With the closing of the Olowalu Landfill, all solid wastes generated in the Lahaina region are transported to the Central Maui Landfill in Puunene. In 1988, West Maui accounts for approximately twenty (20) percent of the volume entering the landfill.

4. ***Drainage System***

There are no drainage improvement in the vicinity of the project site. Existing runoff from the site sheet flows into the Kanaha Stream or towards

the Lahainaluna High School agricultural field. See Appendix C.

5. Electrical Power

Electrical power to the site is currently provided by Maui Electric Company, Ltd., via overhead poles.

Chapter IV

Potential Impacts and Mitigation Measures

IV. POTENTIAL IMPACTS AND MITIGATION MEASURES

A. IMPACTS TO THE PHYSICAL ENVIRONMENT

1. Topography/Landform

The proposed project will involve the clearing, grubbing and grading of approximately 2.8-acre of unused land located adjacent to existing waterworks above Lahainaluna High School. In general, finished contours will follow existing grades to minimize earthwork costs and maintain existing drainage patterns which tie into the immediate surrounding lands.

While terrain within the site will be locally modified to meet design requirements for treatment plant and accessory facilities, overall site development will not disturb the smooth and uniform east to west slopes characteristic of the foothill region of the West Maui Mountains.

2. Drainage and Erosion Control

Stormwater runoff from the site currently sheet flows downslope to the Kanaha Stream gulch or to the Lahainaluna High School agricultural field. With the proposed improvements, the runoff will be directed around and away from the WTP. Storm runoff from the site will be directed to two desilting basins located makai of the WTP. See Appendix C. Accordingly, the proposed WTP will not adversely impact adjacent and downstream properties.

Temporary and permanent erosion control measures will be implemented during the construction to minimize the impacts of erosion from the site. See Appendix D.

3. Flora and Fauna

There are no known rare, endangered or threatened species of flora within

or surrounding the project site. As such, the removal of existing vegetation is not considered an adverse impact to this component of the natural environment.

Similarly, there are no known rare, endangered or threatened species of avifauna and wildlife in the project vicinity. The displacement of approximately 2.8 acres of existing vegetation is not anticipated to adversely impact to the area's fauna and avifauna population.

4. ***Air Quality and Noise***

Air quality and noise parameters in the immediate vicinity of the project are anticipated to be affected by short-term construction activities. Earthwork operations, for example, will result in fugitive dust being generated. Similarly, noise will be generated from construction equipment such as bulldozers, loaders, and semi-trailers. Inasmuch as the project site sits in the midst of active agricultural lands, construction impacts are not considered adverse. Construction equipment such as materials-carrying trucks will need to utilize the service road which traverses the Lahainaluna High School campus. Access requirements for the contractor will need to be coordinated with school to assure that nuisance and student safety concerns are appropriately addressed.

On a long-term basis, the project will not generate adverse air quality or noise conditions. Treatment plant operations will not result in the release of noxious gases, particulates or odors.

5. ***Scenic and Open Space Resources***

The project site is not a part of a unique or valuable scenic resource. The location of the site, mauka of Lahainaluna High School, offers a locale visually screened from the school and the residential area to the west. The

WTP building and reservoir will be compatible in scale, mass and height with existing water system facilities located at the site. Accordingly, the proposed project is not anticipated to adversely impact the open space or scenic character of project site and environment.

6. *Archaeological Resources*

The project site has been previously disturbed and no surface archaeological features are found at the site. Due to the extensive disturbance of the project area, no further archaeological work is recommended.

B. *IMPACTS TO COMMUNITY SETTING*

1. *Population and Local Economy*

Long-term projected growth in population in the West Maui region is expected with economic development attributed to new residential and commercial development. Growth in the service sector is expected to continue to meet this growing residential population.

In addition, long-term growth in the local economy is expected to meet the anticipated growth in the visitor industry. Projected new visitor facilities for the region include the Kaanapali North Beach (3,200 visitor units), Ritz-Carlton-Kapalua (450 units) and the Maui Shores (304 units) (Hawaii Visitors Bureau, 1989).

Growth in water service demand within the Southern Subsystem through the year 2010 is expected to be nominal. However, the WTP will be designed to provide an opportunity to expand the WTP to an ultimate treatment capacity of 2.5 MGD. Improved drinking water quality resulting from the proposed project will promote the public health and welfare of the residents of the Lahaina district.

2. *Agriculture*

The project site is not utilized for cultivation of agricultural crops. The University of Hawaii Land Study Bureau (LSB) classifies the site as "E", indicating lands of lowest agricultural productivity. The removal of approximately 2.8 acres of "E" lands from the State Agricultural district is not considered significant.

3. *Public Services*

The proposed water treatment plant will be fully automated and is not expected to directly generate new permanent employment requirements in the region. As such, there are no anticipated project associated impacts upon public service needs, such as police and fire protection, medical facilities, recreational facilities and schools.

C. *IMPACTS TO DWS WATER SYSTEMS*

In assuring that water delivered by the Southern Subsystem complies with the requirements of the SWTR, the proposed WTP will improve the quality of water provided to service area customers. Specifically, the new plant will provide for filtration and disinfection to meet technical criteria for Giardia cysts, viruses, turbidity and bacteria. In addition, the proposed addition of the 1.0 MG finish water reservoir will reduce the existing deficiencies in the Southern Subsystem storage system. In general, the proposed project will provide for the long-term maintenance of the public health and safety and improve overall system performance.

D. *IMPACTS TO OTHER INFRASTRUCTURE SYSTEMS*

1. *Roadways*

Construction traffic will require access to the site through the Lahainaluna High School campus. Traffic will utilize a perimeter road which currently provides access to the existing State and County water facilities located

mauka of the school. Traffic monitoring and coordination with the school will minimize inconveniences normally associated with construction.

The existing 8-foot wide paved access road (mauka of the school) will be widened to facilitate access to the site. Inasmuch as the plant will be fully automated (requiring only daily maintenance checks), the project will not create adverse impacts upon the vehicle circulation patterns at the school.

2. ***Wastewater System***

The WTP will be equipped with restroom facilities for use by DWS maintenance personnel. A septic tank/leaching field system will be provided to receive wastewater from these facilities.

3. ***Solid Waste Disposal***

Dewatered sludge will be generated by the WTP. Based on a conservative raw water turbidity of 5 NTU and an average flow of 1.5 MGD, the annual sludge volume estimated to be generated by the WTP is approximately 44 cubic yards. Disposal of the sludge will be coordinated with the Solid Waste Management Division of the Department of Public Works.

Chapter V

Relationship to Land Use Plans, Policies, and Controls

V. RELATIONSHIP TO LAND USE PLANS, POLICIES, AND CONTROLS

A. STATE LAND USE DISTRICTS

Chapter 205, Hawaii Revised Statutes, relating to the Land Use Commission, establishes the four major land use districts in which all lands in the State are placed -- "Urban", "Rural", "Agricultural", and "Conservation". The subject property is located within the "Agricultural" district. See Figure 9.

Water treatment facilities are not a permitted use within the "Agricultural" district and, as such, the DWS will be required to obtain a Special Use Permit pursuant to Section 15-15-95 of the Hawaii Land Use Commission Rules. The LUC Rules provide that certain "unusual and reasonable" uses may be permitted within the "Agricultural" district. The proposed water treatment plant is consistent with the guidelines for determining an "unusual and reasonable" use as follows:

Guideline: The use shall not be contrary to the objectives sought to be accomplished by Chapters 205 and 205A, HRS, and the rules of the Commission.

Response: The general intent of the State Land Use law is "to preserve, protect and encourage the development of land in the State for those uses to which they are best suited in the interest of the public health and welfare of the State of Hawaii". Furthermore, pursuant to Chapter 205A, HRS, it is an objective of the State Coastal Zone Management Program to "provide public or private facilities and improvements important to the State's economy in suitable locations". As a facility deemed essential to maintaining the public health and welfare of the residents of Lahaina, the siting of the proposed improvements is suitable in terms of its relationship to the surrounding environment.

Guideline: The desired use would not adversely affect surrounding property.

Response: With the exception of the Lahainaluna High School campus, the lands surrounding the proposed water treatment plant are undeveloped and vacant. The proposed water treatment plant will not adversely impact the daily operations of the school. The treated

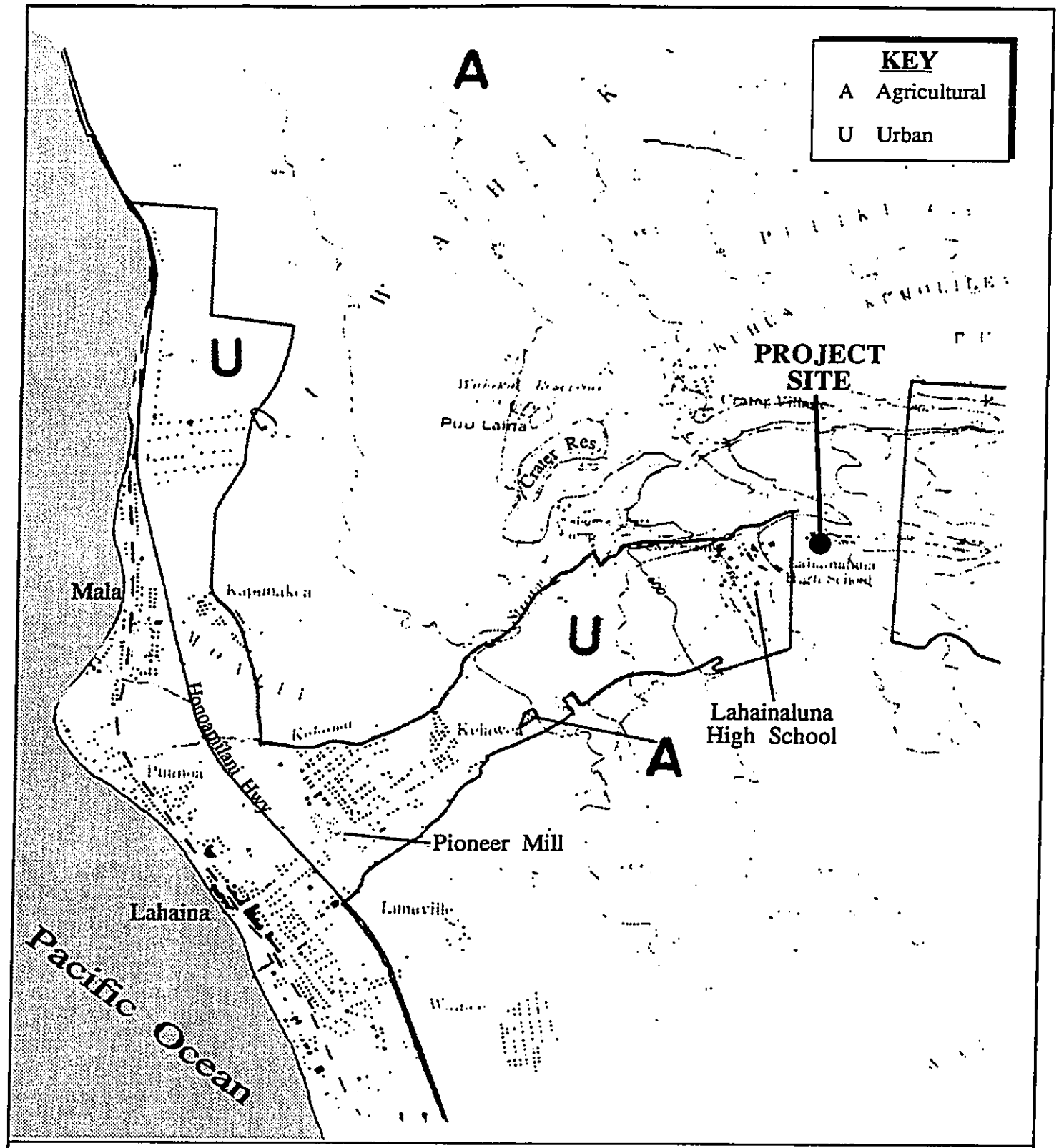

Figure 9 Lahaina Water Treatment Plant
State Land Use Classification

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Prepared for: County of Maui, Dept. of Water Supply

water provided to the school will meet the requirements of the SWTR to assure the long-term health and well-being of the school's staff and students.

Guidelines: The use would not unreasonably burden public agencies to provide roads and streets, sewers, water drainage and school improvements, and police and fire protection.

Response: The proposed water treatment plant will be a fully automated system requiring only daily maintenance checks. There will be no new employment or resident population increase directly attributable to the project. In this regard, the project will not impact public services and infrastructure in the vicinity of the project site.

Guideline: Unusual conditions, trends and needs have arisen since the district boundaries and rules were established.

Response: The implementation of the SWTR, effective December 31, 1990, requires the DWS to take appropriate measures to meet new surface water quality standards. The proposed site of the water treatment plant is considered the optimum location from a water system's engineering standpoint. Moreover, the siting of the plant at this location will not generate adverse environmental impacts.

Guideline: The land upon which the proposed use is sought is unsuited for the uses permitted within the district.

Response: The site selected for the proposed WTP is classified as "E" lands by the University of Hawaii Land Study Bureau. This designation indicates that the project site and the surrounding State "Agricultural" lands possess a low agricultural productivity value. The use of the site for a water treatment plant will not displace nor impact agricultural activity important to the Island's economy.

The Special Use Permit request will be reviewed and acted upon by the Maui Planning Commission.

B. *HAWAII STATE PLAN*

The Hawaii State Plan (HRS, Chapter 226) is a guide for the long-term development of the State. It identifies goals, objectives, policies, and priorities

which have been established as a basis for making decisions affecting the quality of life in Hawaii. The proposed treatment plant is consistent with and supports the following Hawaii State Plan objectives and policies (HRS, 1989 Supplement):

a. ***Facility systems -- water (Section 226-16)***

Objective:
Planning for the state's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capabilities.

Policies:
(i) Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use.

(ii) Support water supply services to areas experiencing critical water problems.

b. ***Socio-cultural advancement -- health (Section 226-20)***

Objective:
Planning for the state's socio-cultural advancement with regard to health shall be directed towards achievement of the following objectives: (1) Fulfillment of basic individual health needs of the general public, and (2) Maintenance of sanitary and environmentally healthful conditions in Hawaii's communities.

Policies:
(i) Provide services and activities that ensure sanitary conditions.

C. ***WATER RESOURCES FUNCTIONAL PLAN***

The Water Resources Functional Plan is one of nine (9) functional plans intended to elaborate on the Hawaii State Plan (HRS, Chapter 226), providing the link between the goals of the Plan and actual implementation. This functional plan is designed to provide guidelines for managing Hawaii's water resources to meet present and future needs and to improve the quality of life.

The proposed treatment plant supports and is consistent with the following Water Resources Functional Plan objectives and policies:

a. ***Municipal water***

Objective: Improve drinking water quality

Policies: (i) Ensure a satisfactory level of drinking water quality throughout the State.

(ii) Adopt and enforce drinking water standards for all domestic water systems, public and private.

The recommended actions regarding this objective include establishing State drinking water standards "no less stringent than those mandated under the Federal Safe Drinking Water Act", with provision for adequate enforcement.

D. GENERAL PLAN OF THE COUNTY OF MAUI

The General Plan of the County of Maui (1990 Update) provides long-term goals, objectives and policies directed toward the betterment of living conditions in the County. Addressed are social, environmental, and economic issues which influence both the quantity and quality of growth in Maui County.

Implementation of the General Plan would be facilitated by the proposed water treatment plant. The following General Plan objective and policy are addressed by this project:

Objective:
To provide an adequate supply of domestic and irrigation water to meet the needs of Maui County's residents.

Policy:
Meet or exceed Federal quality standards in our potable water.

E. *LAHAINA COMMUNITY PLAN*

Nine (9) community plan regions have been established in Maui County. Each region's growth and development is guided by a Community Plan, which contain objectives and policies drafted in accordance with the County General Plan. The purpose of the Community Plan is to outline a relatively detailed agenda for carrying out these objectives.

The proposed project falls within the jurisdiction of the Lahaina Community Plan, adopted in 1983. The proposed project would facilitate implementation of the Lahaina Community Plan by addressing the objective to "implement and expand the West Maui water development program projected by the County to meet future residential expansion needs and establish water treatment facilities where necessary...."

Maps are included within each Community Plan in order to capture spatially the intent of the plan. The project site is designated "Agriculture" by the Lahaina Community Plan Land Use map. See Figure 10.

F. *COUNTY WATER USE AND DEVELOPMENT PLAN*

The Maui County Water Use and Development Plan consists of a technical report and an executive summary. The Plan is based on the County's nine (9) Community Plans, and is to be used for guiding future land use planning, water source development, resource protection, and water quality goals (Department of Planning and Department of Water Supply, 1990).

Insofar as the proposed project's intent is to meet the new water quality standards established by the Federal government, the project is consistent with the Water Use and Development Plan.

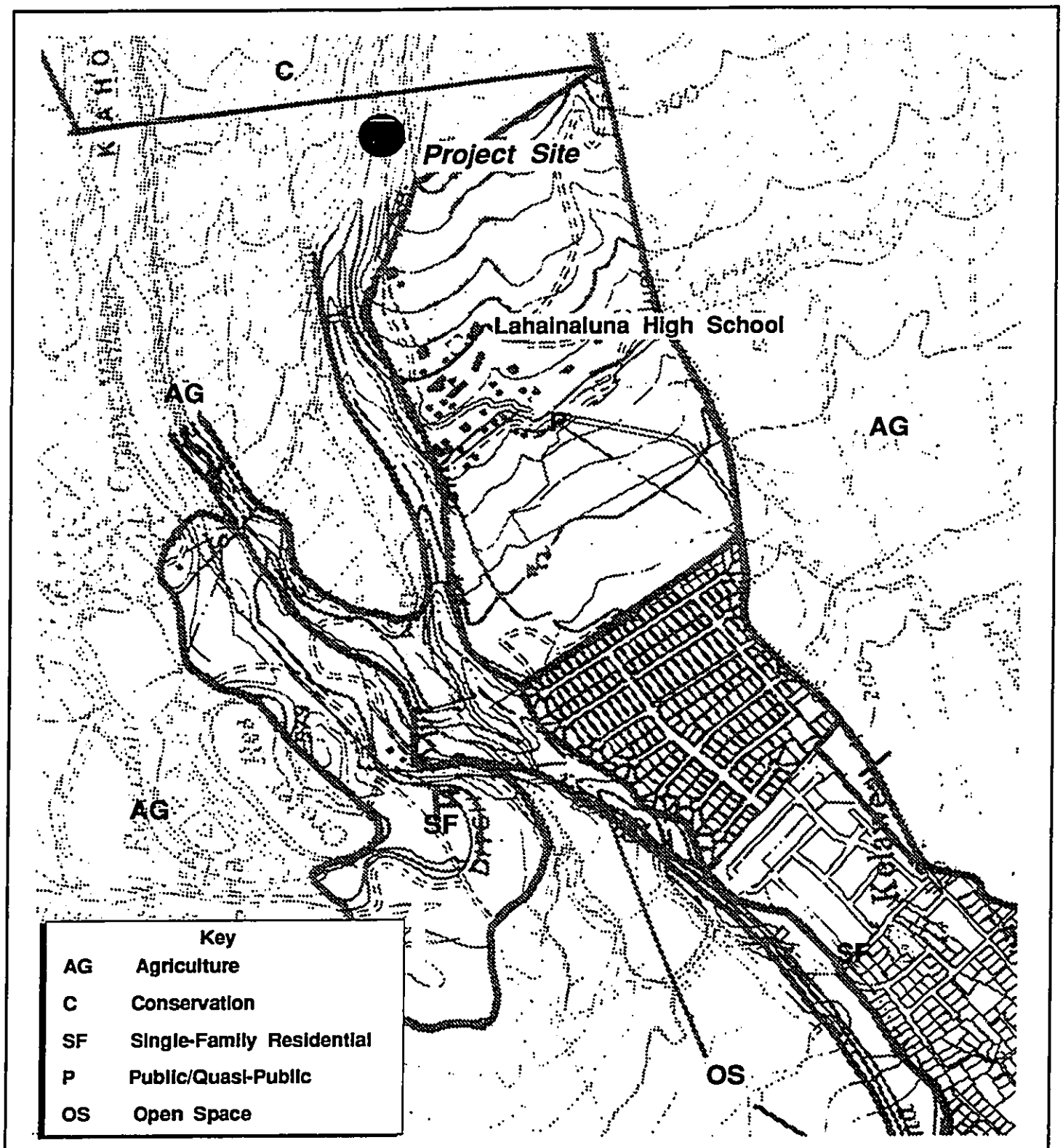

Figure 10 Lahaina Water Treatment Plant
Community Plan Designations
in Project Vicinity

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Prepared for: County of Maui, Dept. of Water Supply

G. *COASTAL ZONE MANAGEMENT (CZM) PROGRAM*

The Coastal Zone Management Program (HRS, Chapter 205A) is a comprehensive statement describing the objectives and policies for regulating public and private uses in the coastal zone management area. The CZM area is defined as "the waters from the shoreline to the seaward limit of the state's jurisdiction and all land areas excluding those lands designated as state forest reserves" (HRS Supp., Section 205A-1). The Hawaii CZM program is approved by the Federal government pursuant to Public Law No. 92-583.

The objectives of the Hawaii CZM program are as follows:

A. Provide coastal recreational opportunities accessible to the public;

B. Protect, preserve, and where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture;

C. Protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources;

D. Protect valuable coastal ecosystems from disruption and minimize adverse impacts on all coastal ecosystems;

E. Provide public or private facilities and improvements important to the state's economy in suitable locations;

F. Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, and subsidence; and

G. Improve the development review process, communication, and public participation in the management of coastal resources and hazards.

The proposed WTP is in keeping with the foregoing objectives.

The County of Maui's Special Management Area (SMA) permit procedures have been established within the framework of the CZM program. The subject parcel is not within the County SMA boundaries.

Chapter VI

Findings and Conclusion

VI. FINDINGS AND CONCLUSION

The proposed WTP is intended to address water treatment requirements set forth by the EPA's Surface Water Treatment Rule. The benefits derived from this project is significant in terms of the public health and welfare, as treated water provided by the facility will meet the highest standards of water quality for surface source domestic consumption.

The proposed project will involve earthwork and building construction activities. In the short-term, these activities may create temporary nuisances normally associated with construction activities. Construction traffic, for example, will require access to the site through the Lahainaluna High School campus. Traffic will utilize a perimeter road which currently offers access to the existing State and County water facilities. With traffic monitoring normally conducted for construction activities of this nature, the short-term impacts to the School is not anticipated to be significant. The project site itself is removed from the School and adjacent urban residential areas, and construction activities at the site are not anticipated to adversely impact these uses.

From a long-term perspective, the use of the site for the proposed water treatment facilities is not anticipated to result in adverse environmental impacts. There are no surface archaeological features or rare/threatened species of fauna and flora at the site and the replacement of existing undeveloped lands with the WTP will not affect these environmental parameters. Ambient air and noise characteristics will not be altered as a result of the proposed WTP.

In an operational context, the proposed WTP will be fully automated and will require daily maintenance checks. These maintenance visits to the plant are not expected to create undue nuisance to the School or surrounding residential neighborhoods.

In light of the foregoing findings, it is concluded that the proposed action will not result in any significant impacts. Accordingly, this Environmental Assessment will be filed as a Negative Declaration pursuant to Chapter 200 of Title 11, Administrative Rules, Environmental Impact Statement Rules.

Chapter VII

Agencies Contacted During the Preparation of the Environmental Assessment

VII. AGENCIES CONTACTED DURING THE PREPARATION OF THE ENVIRONMENTAL ASSESSMENT

The following agencies were contacted during the preparation of the Environmental Assessment:

1. U.S. Department of Agriculture
   Soil Conservation Service
2. U.S. Army Corps of Engineers
3. U.S. Department of the Interior
   Water Resources Division
4. State of Hawaii
   Department of Accounting and General Services
5. State of Hawaii
   Department of Agriculture
6. State of Hawaii
   Department of Education
7. State of Hawaii
   Department of Health
8. State of Hawaii
   Land and Natural Resources
9. Office of Environmental Quality Control
10. University of Hawaii
    Water Resources Research Center
11. County of Maui
    Department of Public Works
12. County of Maui
    Department of Planning
13. Maui Electric Company, Ltd.

14. Maui Land and Pineapple Co.

15. Pioneer Mill Company

16. West Maui Taxpayers Association

References

REFERENCES

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Appendices

Appendix A

Preliminary Engineering Report

AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

#M-90-507

November 27, 1991

LAHAINA WATER TREATMENT PLANT

The objective of this project is to construct a new Lahaina Water Treatment Plant (L-WTP) to treat the water from the Kanaha Stream surface water source. Treatment must conform to the State's new surface water treatment rule to be enforced in June of 1993.

A 10-inch galvanized steel pipe conveys surface water from the Kanaha Stream Intake, at elevation 1035 feet, to a screen box at elevation 800 feet. The water is distributed among Lahainaluna School, Department of Water Supply (DWS) and Pioneer Mill Company, Ltd. (PMCo) from this screen box.

Water for the school is diverted from the screen box to a 0.1 million gallon (MG) concrete tank just below the box. The water is then conveyed a short distance from this concrete tank to a gravity filter system for treatment (filtration and disinfection) prior to storage within an adjacent 0.1 MG bolted steel tank.

Water for DWS and PMCo flows from the screen box to a divider box just below the screen box. DWS's share is then diverted from the divider box to the 0.3 MG Kanaha Reservoir, near the bottom of Kanaha Stream, via an 8-inch water line. PMCo's share is ultimately conveyed from the divider box to their mill facilities.

The proposed L-WTP will be located adjacent to the existing Lahainaluna High School gravity filter fenced site. A new water line will tap into the existing screen box to convey water to a new 0.5 MGD presedimentation reservoir just above the L-WTP. A new waterline would convey water from this reservoir to the L-WTP. The school's gravity filters will remain operational to filter the 0.3 - 0.4 MGD of surface water for the school's non-potable usage. (Refer to Exhibit 1 for Project Site Plan and Exhibit 2 for Schematic Flow Diagram.)

The purpose of the presedimentation reservoir is to remove silt from the raw water, by gravity settlement within this reservoir, to optimize the treatment efficiency of the L-WTP and, resultantly, meet turbidity level requirements for the finished water. This capability is especially important during the rainy season when the turbidity level of the raw water is known to increase by over a hundred-fold over levels experienced during the dry season.

Another function of the presedimentation reservoir is to provide for a higher sustained flow to the L-WTP during low flow periods from the screen box. The stored water would supplement the reservoir inflow in providing for a higher sustained reservoir outflow.

The presedimentation reservoir will also receive the overflow/washout water from the finish water reservoir (as to be described hereinafter) via an interconnection of this overflow/washout line with the inlet line for the presedimentation reservoir. The rationale for this concept is to prevent off-site discharge of the finish water, an action which would require acquisition of an NPDES permit from the Department of Health.

The basic components within the 0.8 acre L-WTP fenced site will be two buildings, sludge lagoons, a septic tank/leaching field wastewater system and an access driveway. (Refer to Exhibit 3 for WTP Site Plan.)

The site will be landscaped for erosion control. Stormwater runoff, which currently sheet flows across the site, will be diverted around the site to the bottom corners of the graded area for the L-WTP. The runoff will then be diverted to desilting basins just below the L-WTP.

The current 8-foot wide paved access road to the 0.1 MG concrete tank will be widened and extended to the proposed facilities.

Four water treatment package plants, each with a treatment capacity of 0.5 MGD, will be housed within a pre-fabricated, rigid-frame, aluminum building, together with the control room and most of the chemical facilities. The finish floor elevation of this Treatment Plant (TP) building will be 745.0 feet. The TP building will be approximately 20 feet high, with about 5,500 square feet of floor area. Filtered water will be chlorinated and stored within a clearwell located under the building. The finish floor elevation of the clearwell will be approximately 732.0 feet. A separate concrete masonry unit (CMU)

building will house the chlorinator and ammoniator units. This Chlorinator/Ammoniator (C/A) building will have a finish floor elevation of 745.0 feet. The C/A building will be 13 feet high, with 1,074 square feet of floor area. (Refer to Exhibit 4 for floor plans and sections of the two buildings.)

A standby generator system, with diesel fuel day tank will be housed within weatherproof enclosures and installed just outside the TP building. The day tank will draw fuel from a buried, 1,000 gallon, double-wall, fiberglass, diesel fuel tank within the WTP site. This generator system will provide total standby power for the L-WTP. The buried fuel tank will have sufficient capacity to provide fuel for several days of standby power generation.

The sludge lagoons will be a dual cell system with a common wall. These lagoons will receive backwash water from the package plants and allow for separation of the settleable solids (sludge) from the liquid portion (decant) under quiescent conditions. The dual cell concept is to allow for dewatering of the sludge within the inactive cell by evaporation. The decant will be pumped to the raw water reservoir for recycling through the treatment process. The dewatered sludge would be subsequently hauled to a sanitary landfill for disposal. (Refer to Exhibit 5 for Sludge Lagoon Plan and Section.)

The lagoons will also receive the overflow/washout water from the presedimentation reservoir. The reason for this recycling concept is, as previously mentioned, to prevent off-site discharge, which would require an NPDES permit. The concern is not the raw water, but rather the finish water (from the finish water overflow/washout) and the decant (from the lagoons), which have been blended with the raw water. The objective of no finish water/decant off-site discharge will be achieved by this recycling concept.

The septic tank/leaching field system will receive wastewater from the rest room and washdown facilities within the two buildings. It is anticipated that the wastewater flow will be less than 100 gallons per day.

The L-WTP will operate at an approximate capacity of 1.2 million gallons per day (MGD) with 0.8 MGD of standby. Approximately 1.1 MGD of treated water will be used by the County and 0.1 MGD by Lahainaluna School.

The L-WTP will incorporate provisions for future expansion to accommodate a higher demand. These provisions will primarily be space allocation for two additional 0.5 MGD package plants, and associated piping connections. These two package plants would be adjacent to the initial four package plants, and within the same building. Based on one of these package plants being on standby, the ultimate capacity of the L-WTP would be 2.5 MGD (5 plants @ 0.5 MGD per plant). (Refer to building floor plan in Exhibit 4.)

The package plants will employ a direct filtration process with flocculation and clarification occurring within a single-compartment adsorption clarifier. The second compartment of the package plant would be a mixed media filter. Chemicals would be added before and after the package plants. (Refer to Exhibit 6 for WTP Process Schematic.)

The L-WTP will be fully automated and should require only brief, regularly scheduled maintenance visits. It is not the intent to have a full-shift operator at the L-WTP.

The finish water will be pumped from the clearwell to a 1.0 MG finish water reservoir above the 0.5 MG raw water reservoir. The location and elevation of the finish water reservoir would allow for gravity flow from this reservoir to a tap into DWS's existing water line to its Kanaha Reservoir. The L-WTP requires less than 0.04 MG of storage within this reservoir for backwashing the package plant filters with a minimum head of 40 feet at the backwash connection. The State requires 0.30 MG of storage to satisfy the Lahainaluna High School potable demand and fire protection requirements. The remaining storage is considered surplus storage to accommodate DWS's area-wide (Lahaina Southern District) storage requirements.

Water distributed among the three parties (i.e., Lahainaluna School, DWS and PMCo) would be metered and regulated by automatic control valves. (Refer to schematic flow diagram in Exhibit 2.)

A common drain line along the access road to the proposed facilities will convey overflow and washout untreated water from (i.e., not chemically altered) existing facilities to Kanaha Stream. These facilities include the screen box, 0.1 MG concrete reservoir and

0.1 MG steel reservoir. Overflow/washout water from these existing facilities currently discharges at various points along the top bank of Kanaha Stream.

The estimated mid-1992 construction cost for the L-WTP is $8.6 million. (Refer to Table 1 for cost itemization.) These costs would be shared among the two parties benefitting from the L-WTP: DWS and the State Department of Education (DOE). An agreement between DWS and DOE will establish the terms of cost sharing.

All of the proposed facilities (i.e., L-WTP, 1.0 MG finish water reservoir, 0.5 MG presedimentation reservoir and all interconnecting pipelines) will be within State-owned lands. Therefore, DWS would have to acquire easements from the State for these facilities.

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

Table 1
LAHAINA WATER TREATMENT PLANT (L-WTP)
COST ESTIMATE

TREATMENT FACILITY: ON-SITE WORK

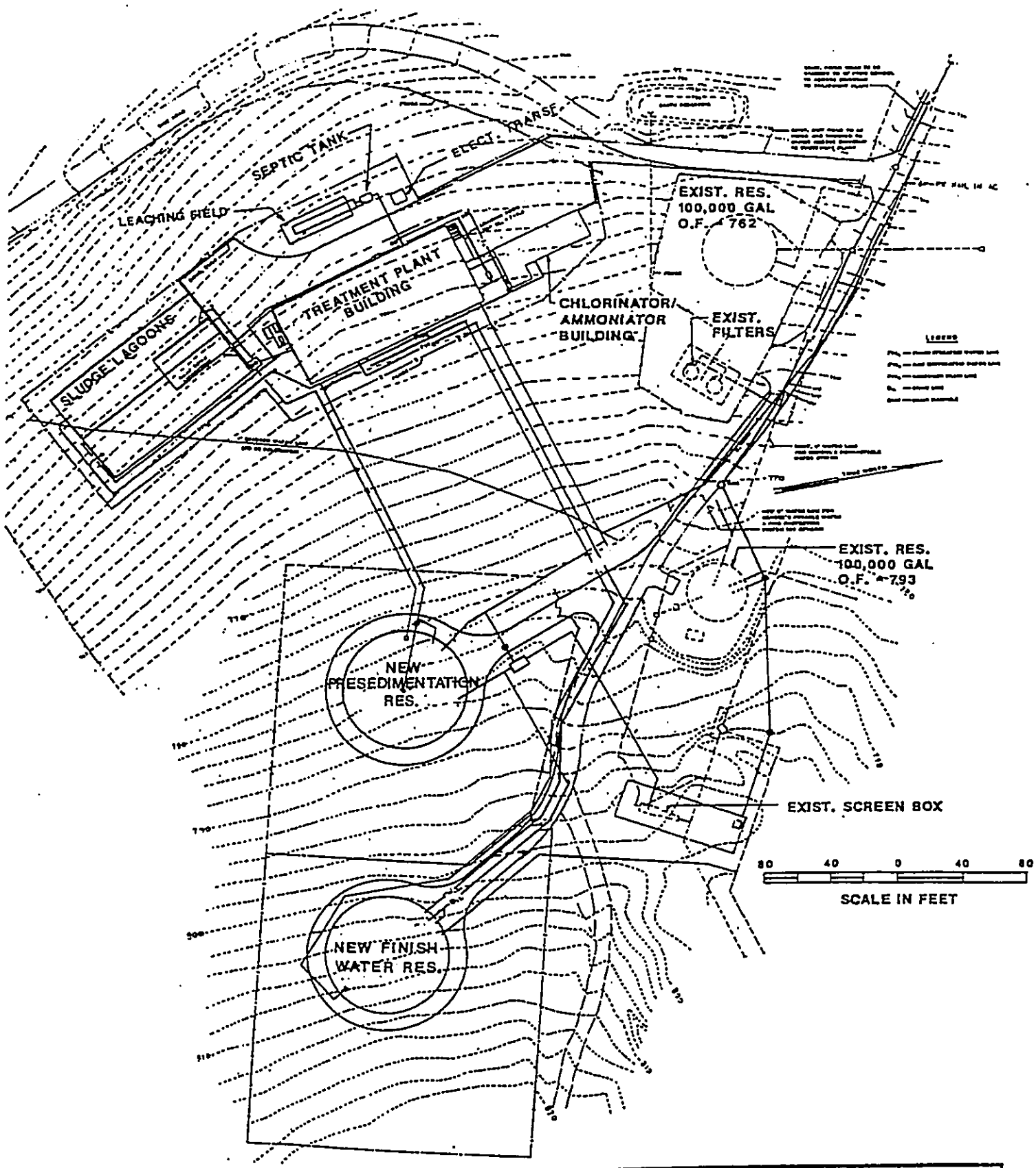
SITE WORK	
Clearing and Grubbing (1.9 AC @ $10,000.00/AC)	$ 19,000
Excavation (6,300 CY @ $20.00/CY)	126,000
Embankment (4,500 CY @ $3.00/CY)	13,500
Fine Grading (1,700 SY @ $2.00/SY)	3,400
Grassing (54,000 SF @ $0.20/SF)	10,800
Fence (870 LF @ $30.00/LF)	26,100
A.C. Pavement (930 SY @ $40.00/SY)	37,200
Gravel Fill (110 CY @ $70.00/CY)	7,700
Concrete Curb (360 LF @ $20.00/LF)	7,200
14 Ft. Wide Gate (1 EA @ $1,000.00)	1,000
TREATMENT PLANT BUILDING (5,500 SF @ $150.00/SF)	825,000
CHLORINATOR/AMMONIATOR BUILDING (1,074 SF @ $300/SF)	322,200
L-WTP CLEAR WELL	500,000
FOUR 0.5 MGD PACKAGE PLANTS	1,000,000
CHEMICAL SYSTEM	500,000
SLUDGE LAGOONS	300,000
MISCELLANEOUS EQUIPMENT	100,000
YARD PIPING	200,000
ELECTRICAL AND INSTRUMENTATION	500,000
MISCELLANEOUS INCLUDING TESTING & DISINFECTING	100,000
SEPTIC TANK/LEACHING FIELD	10,000
DESILTING BASINS	100,000
1991 CONSTRUCTION COST (On-Site Work)	$4,709,100

Table 1
LAHAINA WATER TREATMENT PLANT (L-WTP)
COST ESTIMATE
(Contd.)

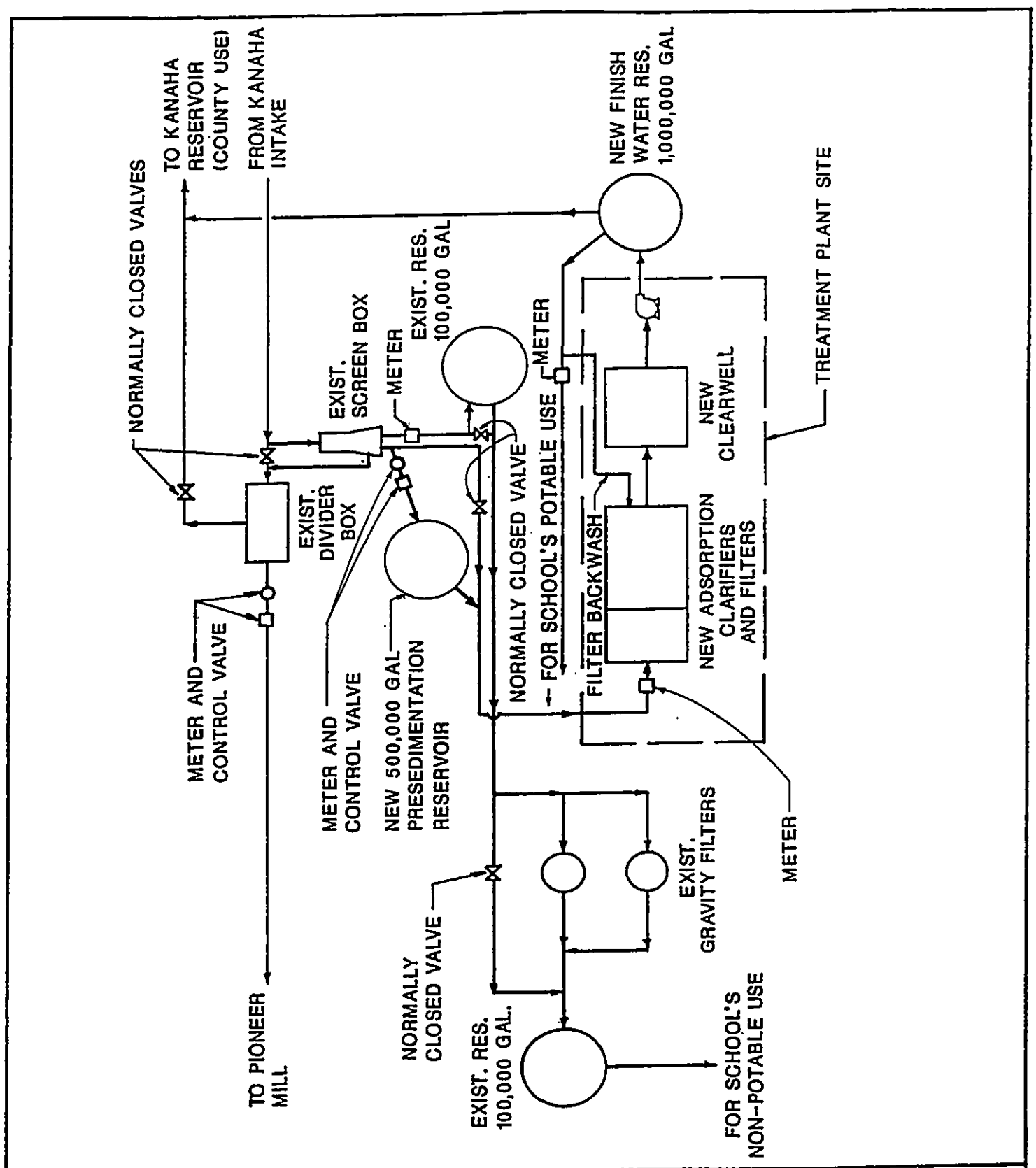
TREATMENT FACILITY: OFF-SITE WORK	
500,000 GALLON PRESEDIMENTATION CONCRETE RESERVOIR	$1,000,000
1,000,000 GALLON FINISH WATER CONCRETE RESERVOIR	1,400,000
16" RAW WATERLINE FROM TAP INTO EXISTING SCREEN BOX TO PRESEDIMENTATION RESERVOIR METER BOX (150 LF @ $140.00/LF)	21,000
12" RAW WATERLINE FROM PRESEDIMENTATION RESERVOIR TO L-WTP BUILDING (400 LF @ $100.00/LF)	40,000
12" FINISH WATERLINES BETWEEN L-WTP BUILDING AND FINISH WATER RESERVOIR (1,150 LF @ $100.00/LF)	115,000
12" FINISH WATERLINES FROM FINISH WATER RESERVOIR TO TAP INTO EXISTING COUNTY AND SCHOOL WATER LINES (500 LF @ $100.00/LF)	50,000
12" DRAIN LINES FROM FINISH WATER RESERVOIR TO PRESEDIMENTATION RESERVOIR AND FROM PRESEDIMENTATION RESERVOIR TO L-WTP BUILDING (475 LF @ $100.00/LF)	47,500
MINOR PIPING BETWEEN L-WTP FENCE LINE AND PRESEDIMENTATION RESERVOIR FENCE LINE	40,000
RAW WATER RESERVOIR, PIONEER MILL AND SCHOOL MAGNETIC FLOW METER ASSEMBLIES	150,000
SCHOOL'S MFM-MCT METER ASSEMBLY	50,000
12" DRAIN LINE FROM SCREEN BOX AND SCHOOL'S RESERVOIRS TO KANAHA STREAM (1,400 LF @ $100.00/LF)	140,000
A.C. PAVEMENT FROM L-WTP, PRESEDIMENTATION RESERVOIR AND FINISH WATER RESERVOIR FENCE LINES TO EXISTING PAVED ROAD (650 SY @ $50.00/SY)	32,500

Table 1
LAHAINA WATER TREATMENT PLANT (L-WTP)
COST ESTIMATE
(Contd.)

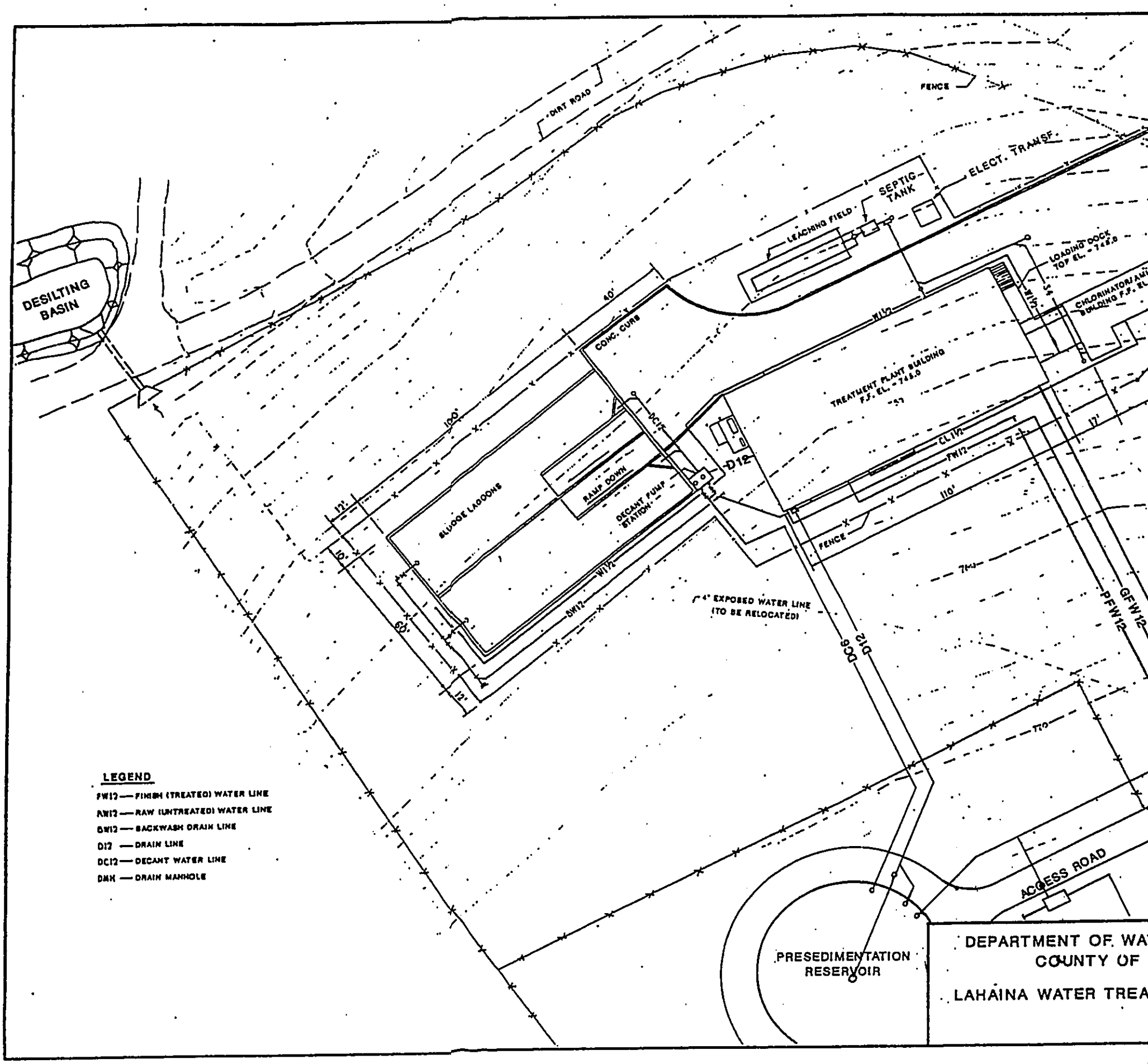
WIDENING OF PAVED ACCESS ROAD FROM SCHOOL TO END OF EXISTING PAVED ROAD (550 SY @ $40.00/SY)	22,000
1991 CONSTRUCTION COST *(Off-Site Work)*	$3,108,000
TOTAL (On- and Off-Site Work)	$7,817,100
CONTINGENCY + ESCALATION TO MID 1992 (10%)	781,710
1992 CONSTRUCTION COST	$8,598,810
SAY	$8,600,000



DEPARTMENT OF WATER SUPPLY COUNTY OF MAUI LAHAINA WATER TREATMENT PLANT	AUSTIN, TSUTSUMI, & ASSOC., INC. ENGINEERS, SURVEYORS • HAWAII PROJECT SITE PLAN	EXHIBIT 1



DEPARTMENT OF WATER SUPPLY COUNTY OF MAUI LAHAINA WATER TREATMENT PLANT	AUSTIN, TSUTSUMI, & ASSOC., INC. ENGINEERS SURVEYORS · HAWAII SCHEMATIC FLOW DIAGRAM	EXHIBIT 2



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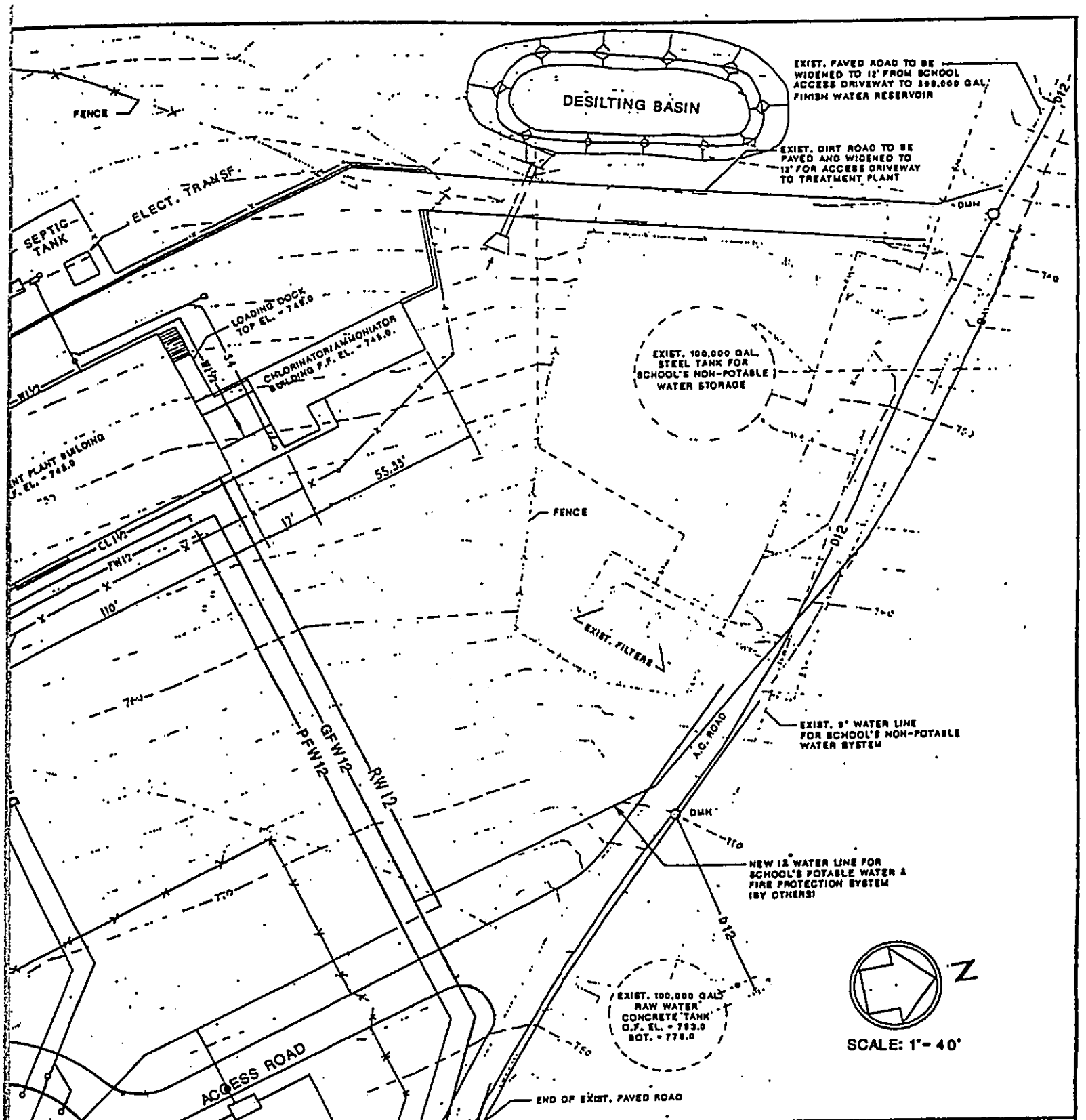


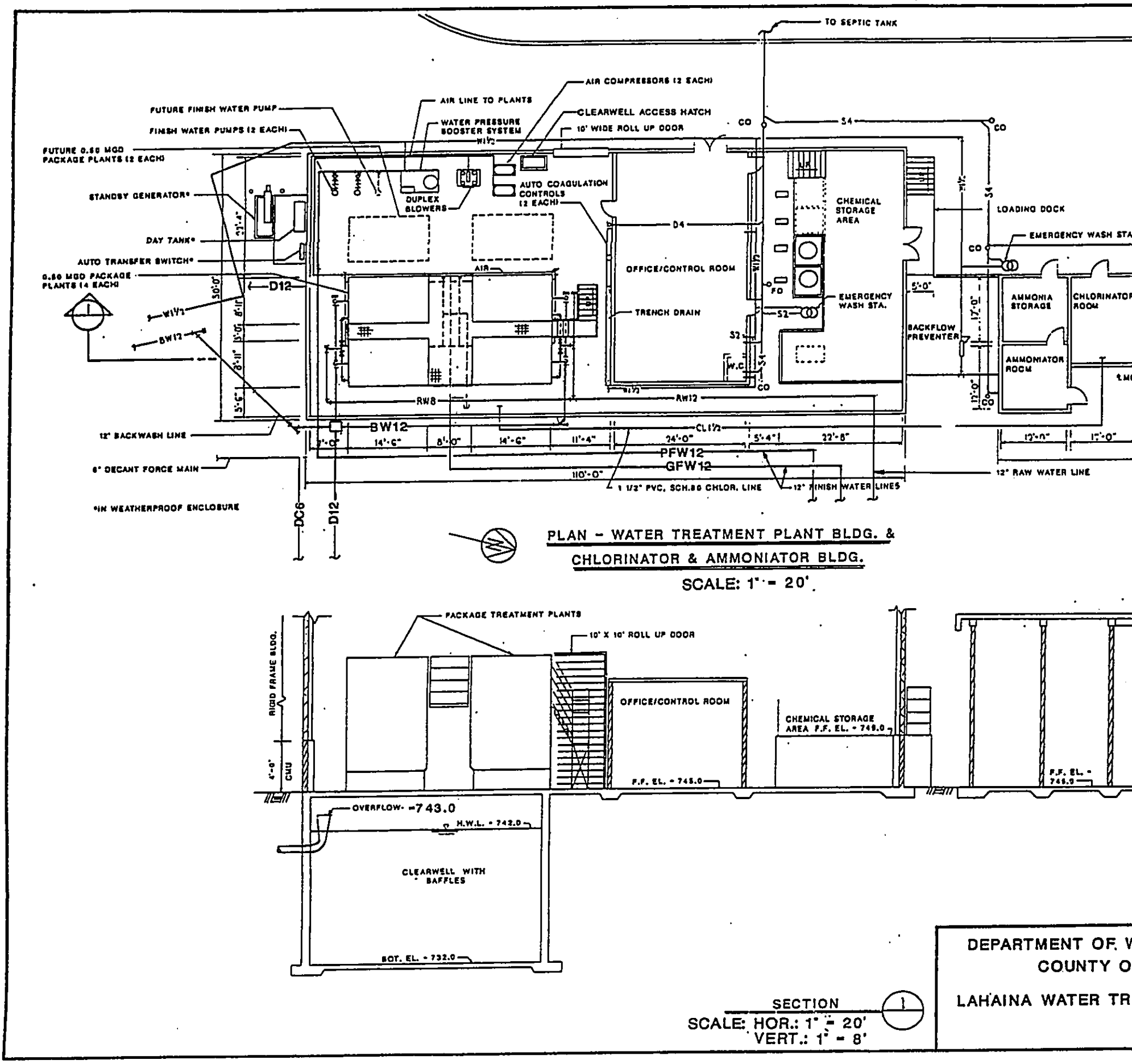
DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI

LAHAINA WATER TREATMENT PLANT

AUSTIN, TSUTSUMI, & ASSOC., INC.
ENGINEERS · SURVEYORS · HAWAII

SITE PLAN

EXHIBIT 3



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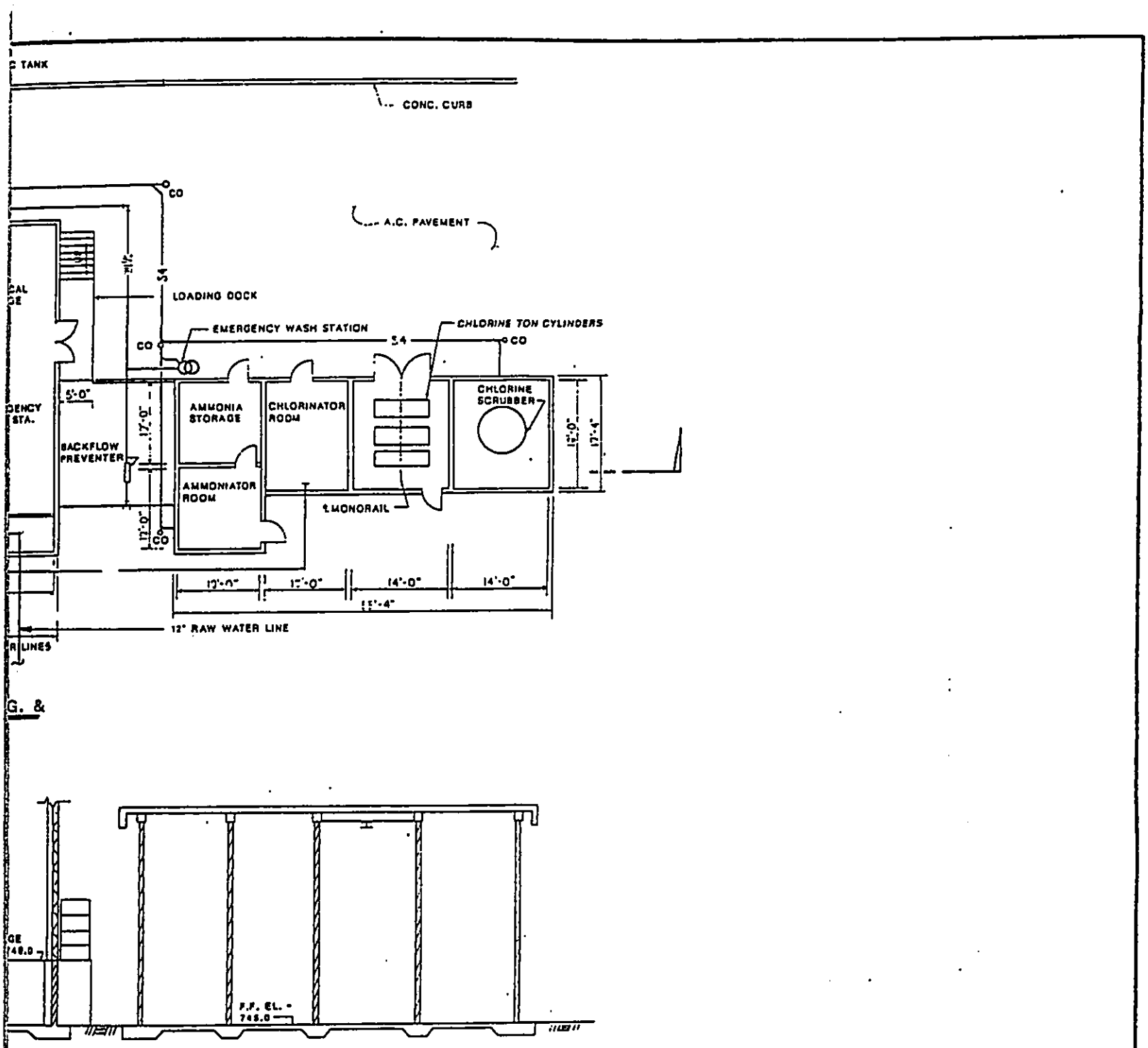
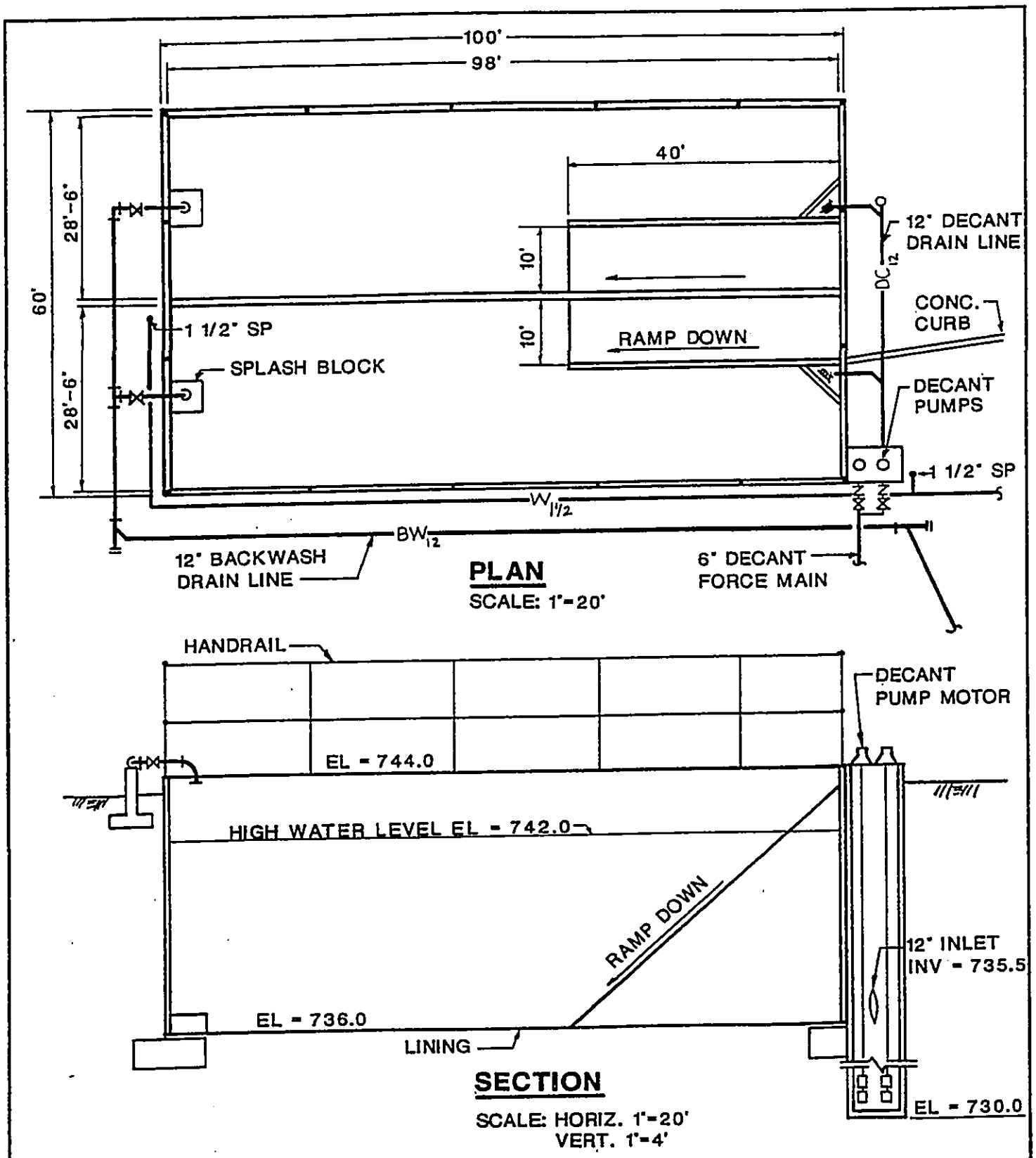


1	DEPARTMENT OF WATER SUPPLY COUNTY OF MAUI LAHAINA WATER TREATMENT PLANT	AUSTIN, TSUTSUMI, & ASSOC., INC. ENGINEERS. SURVEYORS • HAWAII BUILDING FLOOR PLAN AND SECTION	EXHIBIT 4



DEPARTMENT OF WATER SUPPLY COUNTY OF MAUI LAHAINA WATER TREATMENT PLANT	AUSTIN, TSUTSUMI, & ASSOC., INC. ENGINEERS SURVEYORS · HAWAII SLUDGE LAGOON PLAN AND SECTION	EXHIBIT 5

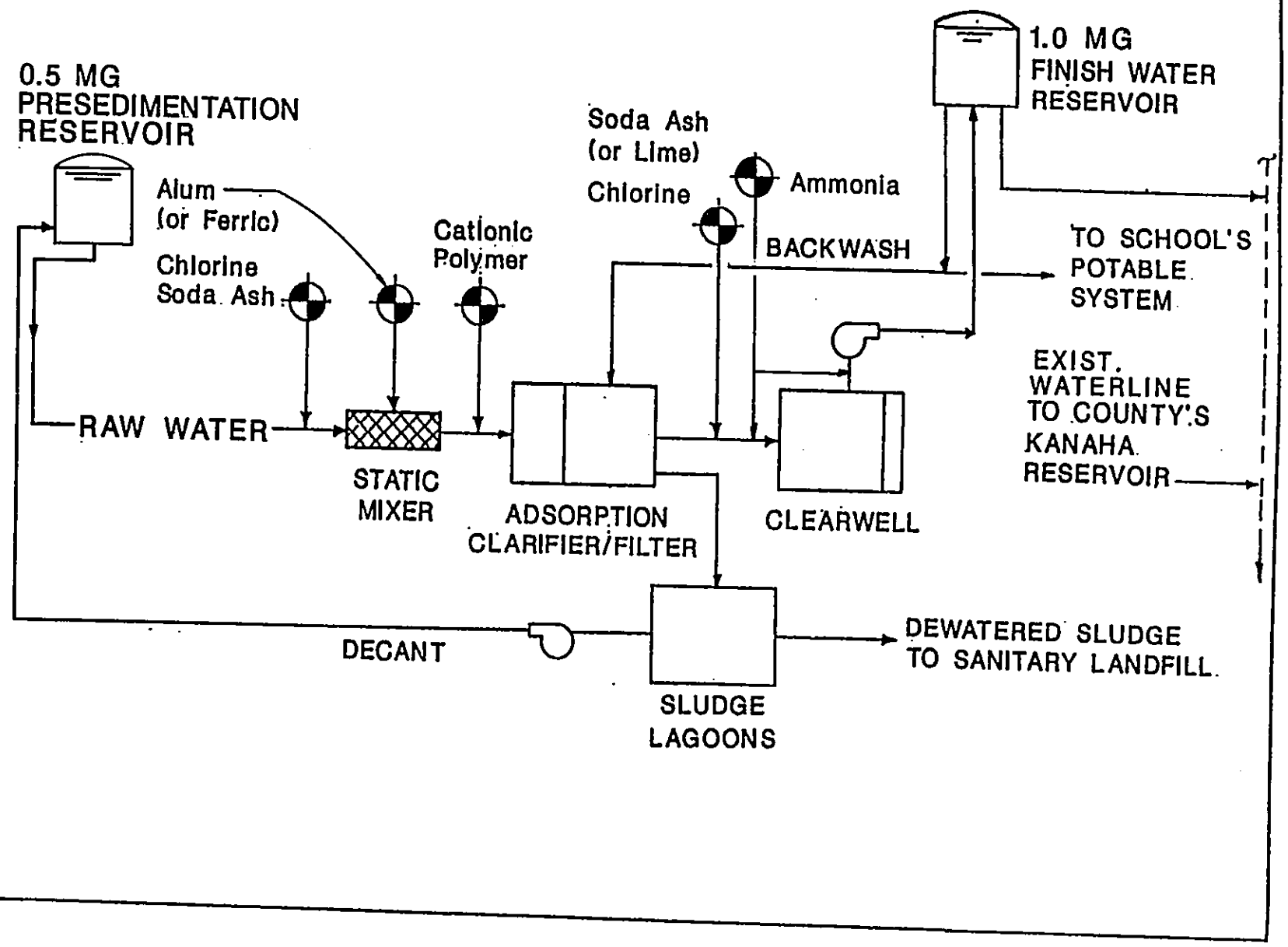
DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI

LAHAINA WATER TREATMENT PLANT

WATER TREATMENT PLANT
PROCESS SCHEMATIC

AUSTIN, TSUTSUMI, & ASSOC., INC.
ENGINEERS, SURVEYORS • HAWAII

EXHIBIT 6



Appendix B

Archaeological Reconaissance Report

BISHOP MUSEUM
1525 BERNICE STREET • P.O. BOX 19000-A • HONOLULU, HAWAI'I • 96817-0916 • (808) 847-3511 • FAX (808) 841-8968

September 11, 1991

Mr. Michael T. Munekiyo
MTM Consulting
2035 Main Street
Wailuku, Hawai'i 96793

Dear Mr. Munekiyo:

Subject: Archaeological Survey of the Proposed Lahainaluna Reservoir and Treatment Facility, Lahaina, Maui

On August 28, 1991, Aki Sinoto and Jeffrey Pantaleo of the Applied Research Group, Bishop Museum, conducted an archaeological surface survey for the proposed reservoir and water treatment facility in Lahaina, Maui Island. This work involved a walk-through survey to determine the presence of any archaeological sites to formulate recommendations for any subsequent work.

The project area is located east (*mauka*) of Lahainaluna High School and north of Kanaha Gulch (Figure 1). The topography of the project area is a moderately sloping ridgetop with gulches located to the north and south. Vegetation consists of *kiawe* (Prosopis pallida), *koa haole* (Leucaena leucocephala), *klu* (Acacia farnesiana), and various dry grasses.

Results of the survey indicate that the project area has previously been extensively cleared, most likely for pasture land. Due to recent brush fires, major portions of the project area were easily accessible and ground visibility was excellent. Recent and old barbed-wire fences were observed within and along the boundaries of the project area. A historic (c.1930's) stone and masonry foundation was located in the proposed new reservoir site area (Figure 2). This hexagonal-shaped feature with two internal parallel walls, is constructed of cement and dressed basalt boulders. It measures 4.0 m long, 4.0 m wide, and 1.0 m high, with associated round nails, nuts and bolts, and milled lumber. Additional inquiry and documents search at the Lahainaluna School and Pioneer Mill indicated that this feature is most likely a foundation for a water tank for ranching activities or the teachers cottages associated with the Lahainaluna School. No other surface features were located during the survey. Several modern water-related structures, including water tanks, siphon, and chlorinator, are located adjacent to the project area.

The Museum's previous historical study indicates intensive land use as early as 1831 (Hurst 1990). Inspection of exposed embankments along road cuts and open backhoe trenches indicates minimal potential for subsurface remains.

No further archaeological work prior to construction nor archaeological monitoring during construction is recommended. If any features are encountered during construction activities, the Maui Island archaeologist from the Historic Preservation Division, State Dept. of Land and Natural Resources should be contacted.

If you have any questions, please contact Aki Sinoto or myself at 847-8284.

Sincerely,

Jeffrey Pantaleo

Jeffrey Pantaleo, M.A.
Public Archaeology Section
Applied Research Group

attachments

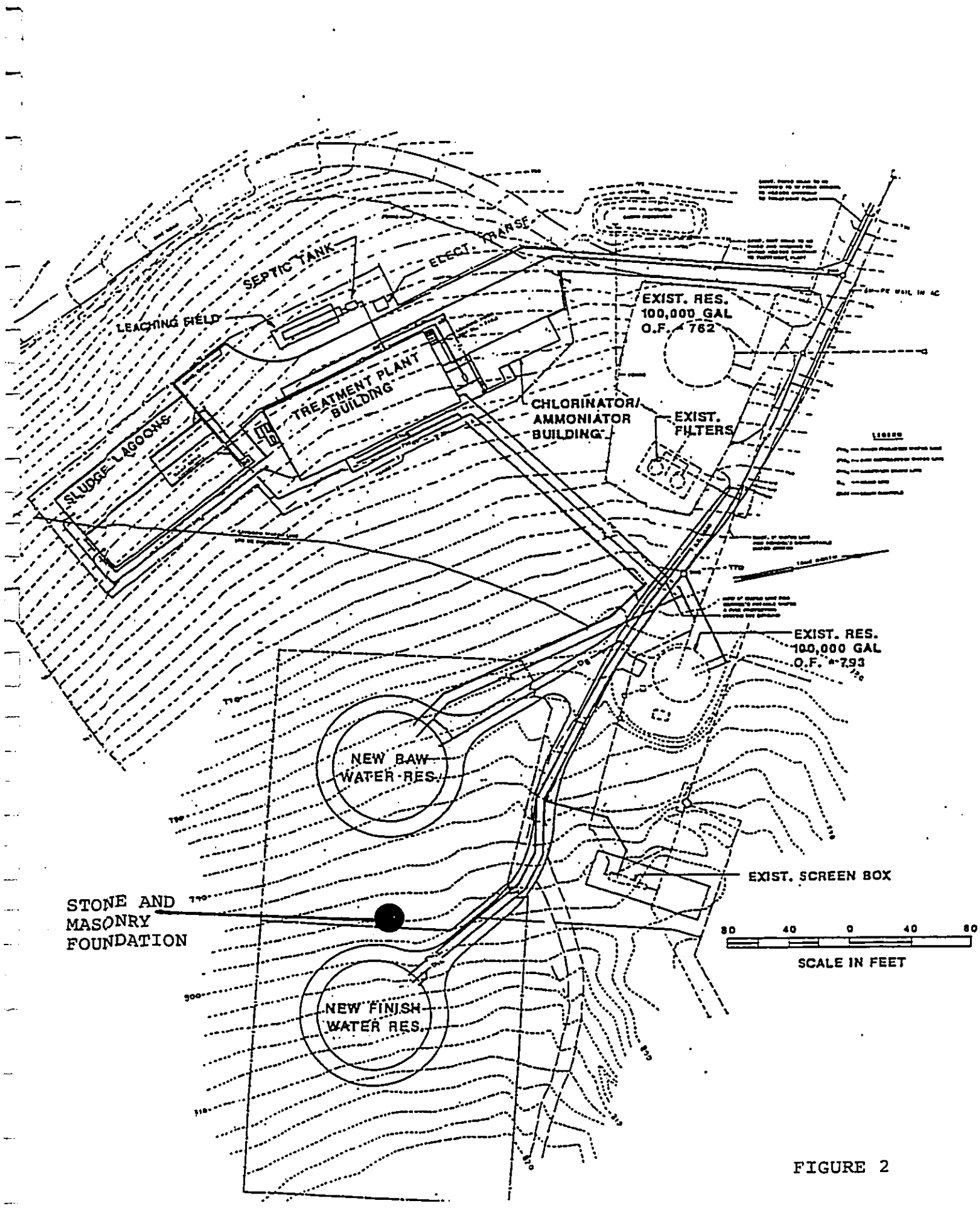


FIGURE 2

Appendix C

Preliminary Grading and Drainage Report

PRELIMINARY GRADING AND DRAINAGE REPORT

FOR THE

LAHAINA WATER TREATMENT PLANT

LAHAINA, MAUI, HAWAII

Prepared for

Department of Water Supply

County of Maui

Prepared By
Austin, Tsutsumi & Associates, Inc.
Engineers • Surveyors
Honolulu • Wailuku • Hilo, Hawaii

PRELIMINARY GRADING AND DRAINAGE REPORT

FOR THE

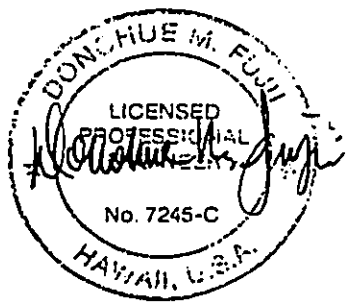
LAHAINA WATER TREATMENT PLANT

LAHAINA, MAUI, HAWAII

Prepared for

Department of Water Supply

County of Maui



Prepared By
Austin, Tsutsumi & Associates, Inc.
Engineers • Surveyors
Honolulu • Wailuku • Hilo, Hawaii

November 1991

CONTENTS

AUSTIN, TSUTSUMI & ASSOCIATES, INC. CIVIL ENGINEERS • SURVEYORS
CONTINUING THE ENGINEERING PRACTICE FOUNDED BY H. A. R. AUSTIN IN 1934

TED S. KAWAHIGASHI, P.E.
GEORGE M. NEUFFER, P.E.
KENNETH K. KUROKAWA, P.E.
THOMAS S. OTAGURO
IVAN K. NAKATSUKA, P.E.

PRELIMINARY GRADING AND DRAINAGE REPORT

FOR THE

LAHAINA WATER TREATMENT PLANT

LAHAINA, MAUI, HAWAII

TMK: 4-6-18:12

I. INTRODUCTION

The purpose of this report is to present an evaluation of the proposed grading and drainage scheme for the proposed Lahaina Water Treatment Plant, and to set forth the hydrologic criteria that will be used in the design of the drainage system. In addition to the proposed grading and drainage plan, descriptions of the project and of the existing site conditions are also provided.

II. PROPOSED PROJECT

A. Location

The proposed project is located above the town of Lahaina, in the district of West Maui on the island of Maui. (See Exhibit 1.) The project site, designated by Tax Map Key No. 4-6-18, Parcel 12, is within the State "Agricultural" district. The Lahaina Community Plan designates the project site as "Agriculture".

The 2.8 acre project site is bordered by the Lahainaluna High School to the west; the Kanaha Stream to the north; and the West Maui Mountains to the east. Located directly west of the project site is the Lahainaluna High

REPLY TO:
501 SUMNER STREET, SUITE 521 • HONOLULU, HAWAII 96817-5031
PHONE 808/533-3646 • FAX NO. 526-1267

OFFICES IN:
HONOLULU, HAWAII
WAILUKU, MAUI, HAWAII • HILO, HAWAII

School agricultural fields, and located directly north is the Lahainaluna High School gravity filter site.

B. Project Description

The proposed Lahaina Water Treatment Plant (L-WTP) is a domestic water treatment plant constructed to treat water from the Kanaha Stream surface water source. Treatment must conform to the State's new surface water treatment rule to be enforced in June of 1993.

The basic components within the L-WTP fenced site will be two buildings, sludge lagoons, a septic tank/leaching field wastewater system and an access driveway. Access to the project will be provided by an existing paved access road to the existing 0.1 MG concrete tank. This road, which is currently 8 feet wide, will be widened to 12 feet and extended to the proposed facilities. (See Exhibit 2.)

The raw water for the L-WTP will flow from an existing screen/splitter box at overflow elevation 800 feet to a presedimentation reservoir, with an overflow elevation of 792.0 feet, located above the fenced L-WTP site.

The finish water from the L-WTP will be pumped from the plant's clearwell to a finish water reservoir, with an overflow elevation of 822.0 feet, which is also located above the fenced L-WTP site.

III. EXISTING CONDITIONS

A. Topography and Soil Conditions

The project site is presently overgrown with exotic grasses and weeds. The site has an approximate existing slope of 21 percent with elevations ranging from 740 feet to 810 feet above mean sea level.

The soil series for the general area, as identified in the Soil Survey by the U.S. Department of Agriculture Soil Conservation Service, is Lahaina silty

clay (LaD), with slopes of 15 to 25 percent. This soil series includes small areas where most of the surface layer and, in places, part of the subsoil, has been removed by erosion. Runoff is medium and water erosion is moderate.

B. Climate and Rainfall

Lahaina is generally sunny and warm throughout the year. The temperature averages 77 degrees, with a median annual rainfall of 15-20 inches. The Lahaina area has a climate typical of areas in the Hawaiian Islands sheltered from the prevailing northeasterly tradewinds. As is the case with many leeward areas, Lahaina is subject to diurnal wind variations resulting from temperature changes over the land mass and the ocean plane. During the rainy season, October to April, the wind condition will vary with occasional strong southerly winds accompanying cyclonic "Kona" storms.

C. Drainage

With the project site being highly overgrown, the majority of the off-site and on-site runoff percolates into the existing ground. The remaining runoff, if any, sheet flows into the Kanaha Stream Gulch, or towards the Lahaina-luna High School agricultural field.

IV. HYDROLOGIC ANALYSIS

The storm water runoff quantity was computed by using the Rational Formula:

$$Q = CIA$$

Where:

Q = storm runoff quantity, cfs

C = runoff coefficient

I = rainfall intensity in inches per hour for a duration equal to the time of concentration (Tc)

A = drainage (watershed) area, acres

Applicable sections of the "Storm Drainage Standards", City and County of Honolulu, May 1988, were used as a reference. The rainfall intensity for a 10-year recurrence interval was interpolated from the "Rainfall Frequency Atlas of the Hawaiian Islands", by the U.S. Department of Commerce, Weather Bureau.

The project area was divided into four tributary areas. (See Exhibit 3 for Drainage Runoff Plan.)

Factors used in the calculation of the runoff for the Lahaina Water Treatment Plant were as follows:

Factors	Undeveloped				Developed			
Drain Area No.	1	2	3	4	1	2	3	4
C	0.50	0.50	0.50	0.50	0.61	0.55	0.61	0.59
i (Intensity of 1-hour rainfall, inches, Tm=10 years	2.50	2.50	2.50	2.50	2.50	2.50	2.50	2.50
A (acres)	0.45	2.33	0.69	0.70	0.45	2.33	0.69	0.70
Tc (min)	5	5	5	5	5	5	5	5
Correction factor	2.75	2.75	2.75	2.75	2.75	2.75	2.75	2.75
I (in./hr.,- Tm=10 years)	6.88	6.88	6.88	6.88	6.88	6.88	6.88	6.88

Storm Runoff Quantity								
Factors	Undeveloped				Developed			
Drain Area No.	1	2	3	4	1	2	3	4
Q (cfs)	1.55	8.02	2.37	2.41	1.89	8.82	2.90	2.84
Total Q (cfs)	13.35				16.45			
Say (cfs)	14				16			

Based upon a 10-year design storm, the proposed project will generate approximately 16 cubic feet per second (cfs) of storm runoff, which is an increase of 2 cfs over the runoff presently generated at the site.

V. GRADING AND DRAINAGE PLAN

The proposed grading plan for the Lahaina Water Treatment Plant will require cutting and filling sections of the existing site approximately 10 to 12 feet to satisfy proposed finish floor elevations. The finish floor elevations of the two proposed buildings will be 745.0 feet above mean sea level. The bottom floor elevation of the raw water reservoir will be 774.0 feet above sea level. The bottom floor elevation of the finish water reservoir will be 802.0 feet above sea level. Approximately 2.8 acres of land will be graded. Proposed earth swales and concrete curbs near the water treatment building will direct the storm runoff around and away from the treatment facilities. Storm runoff will discharge at the two bottom corners of the graded area into two desilting basins.

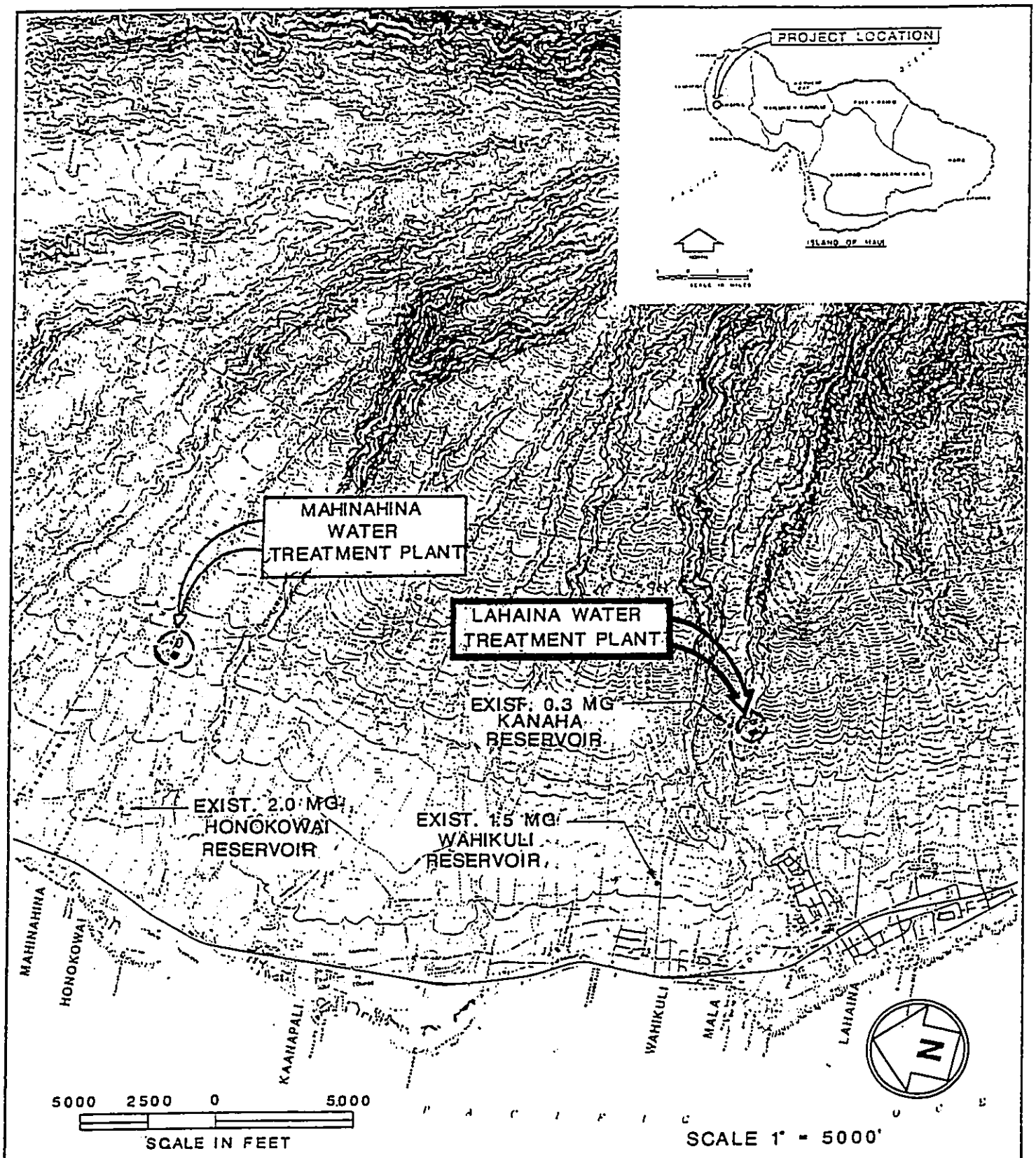
Off-site runoff will be diverted around the proposed site by earth swales. A portion of the off-site runoff will discharge into the desilting basins. The remaining runoff will follow existing surface drainage patterns. (See Exhibit 4 for Grading Plan.)

VI. EROSION CONTROL

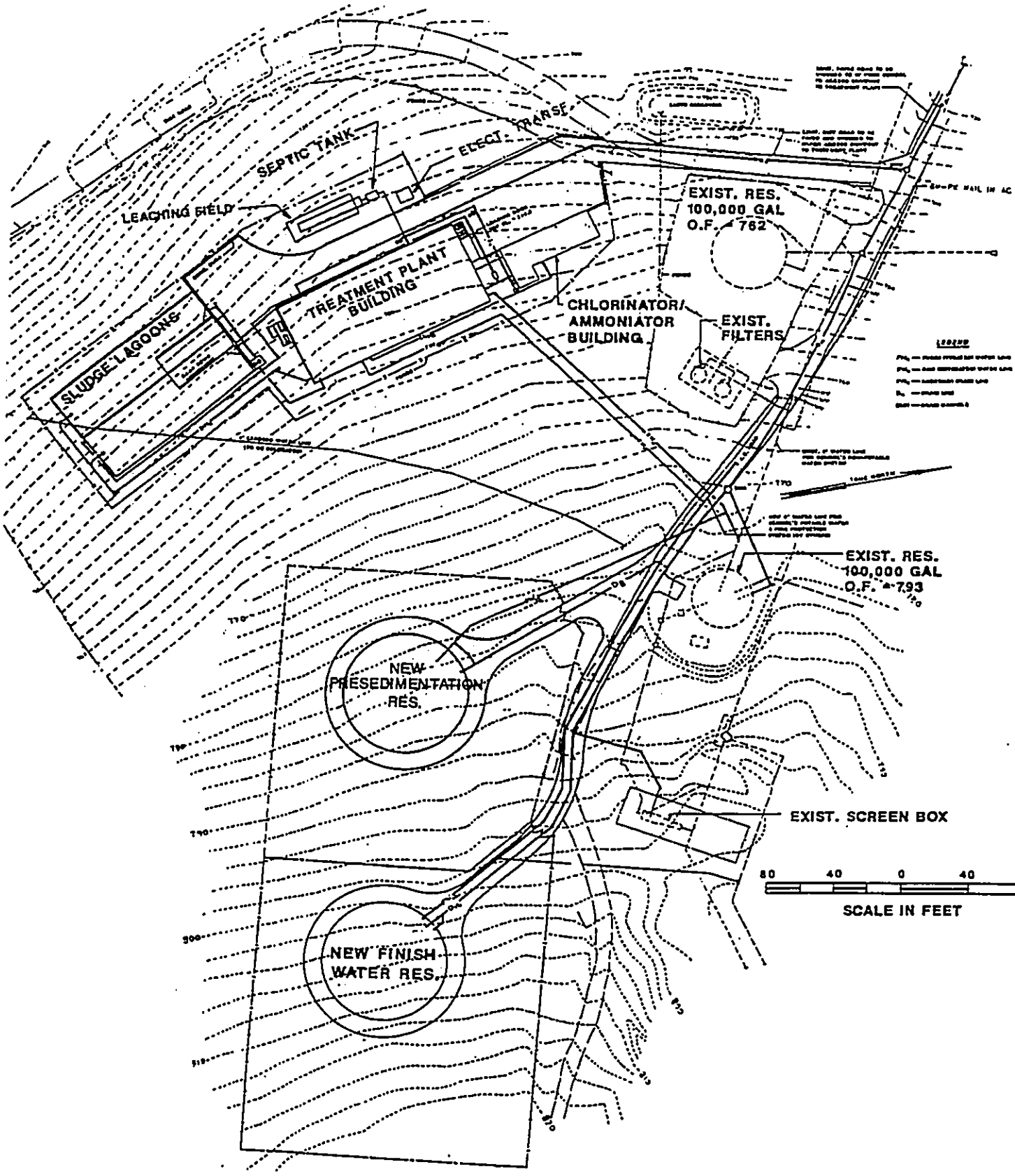
Severe erosion hazards are not expected during construction, due to the size of the project area and the highly overgrown adjacent areas. However, erosion control measures, such as providing two desilting basins, will be implemented for storage of sediment contained in runoff water created by possible heavy rainstorms. Should construction be delayed for an extended length of time, protective vegetative cover will be established to minimize soil loss.

VII. CONCLUSION

The proposed grading and drainage scheme for the Lahaina Water Treatment Plant will be designed to produce no adverse effect by storm runoff to adjacent properties and the Lahainaluna High School. Soil loss will be minimized during the construction period by implementing appropriate erosion control measures. Dust will also be minimized during construction by the implementation of water sprinkling. All drainage improvements will conform to County Standards and will be coordinated with the Department of Public Works, County of Maui.

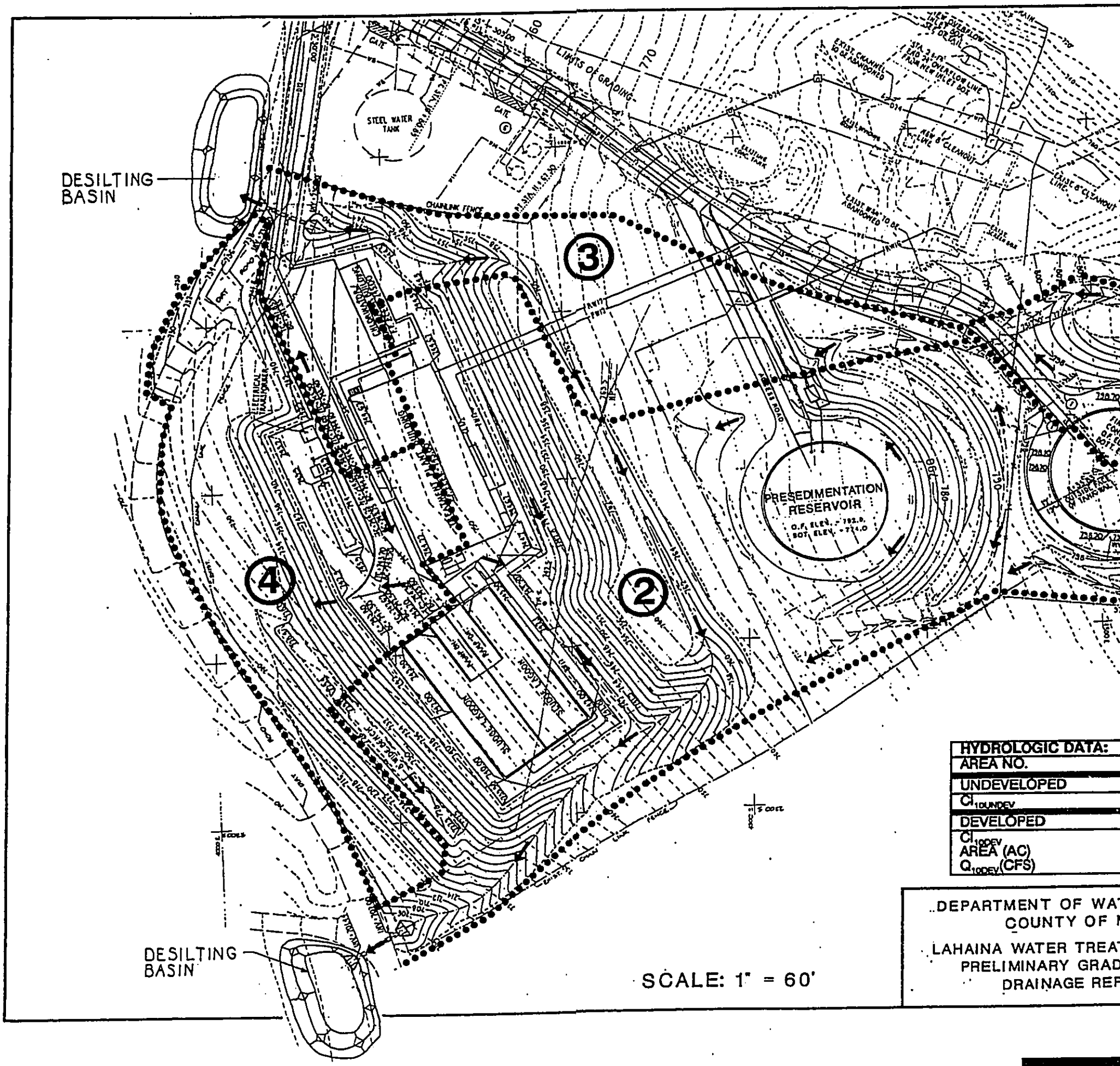


DEPARTMENT OF WATER SUPPLY COUNTY OF MAUI LAHAINA WATER TREATMENT PLANT PRELIMINARY GRADING AND DRAINAGE REPORT	AUSTIN, TSUTSUMI, & ASSOC., INC. ENGINEERS SURVEYORS • HAWAII **LOCATION MAP**	EXHIBIT 1



DEPARTMENT OF WATER SUPPLY COUNTY OF MAUI LAHAINA WATER TREATMENT PLANT PRELIMINARY GRADING AND DRAINAGE REPORT	AUSTIN, TSUTSUMI, & ASSOC., INC. ENGINEERS, SURVEYORS • HAWAII PROJECT SITE PLAN	EXHIBIT 2

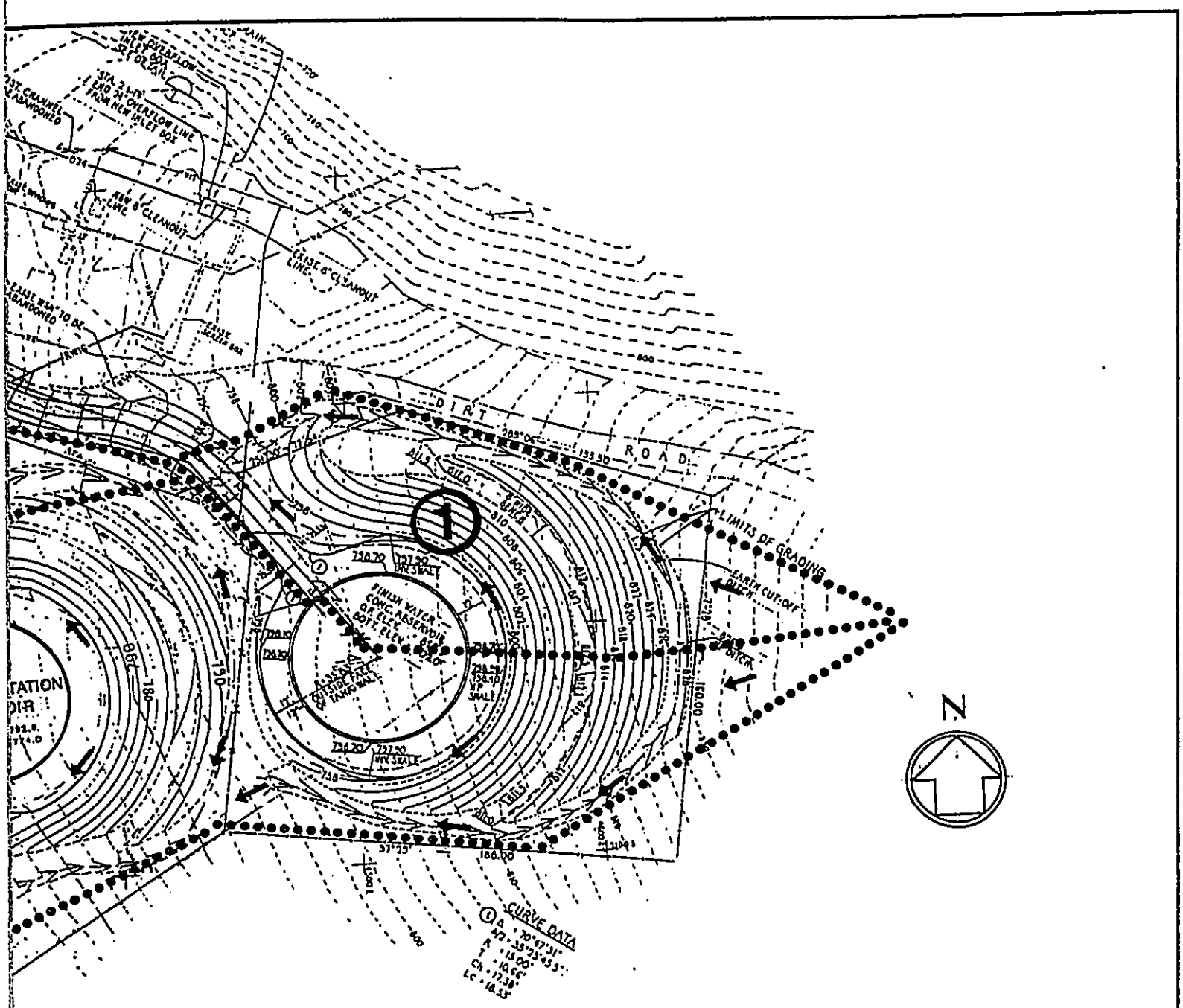
DOCUMENT CAPTURED AS RECEIVED



HYDROLOGIC DATA:
AREA NO.
UNDEVELOPED
$CI_{10UNDEV}$
DEVELOPED
CI_{100EV}
AREA (AC)
Q_{100EV} (CFS)

DEPARTMENT OF WA
COUNTY OF
LAHAINA WATER TREA
PRELIMINARY GRAD
DRAINAGE REP

DOCUMENT CAPTURED AS RECEIVED



HYDROLOGIC DATA:				
AREA NO.	1	2	3	4
UNDEVELOPED				
$CI_{10UNDEV}$	3.44	3.44	3.44	3.44
DEVELOPED				
CI_{10DEV}	4.20	3.78	4.20	4.06
AREA (AC)	0.45	2.33	0.69	0.70
Q_{100EV}(CFS)	1.89	8.82	2.90	2.84

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI

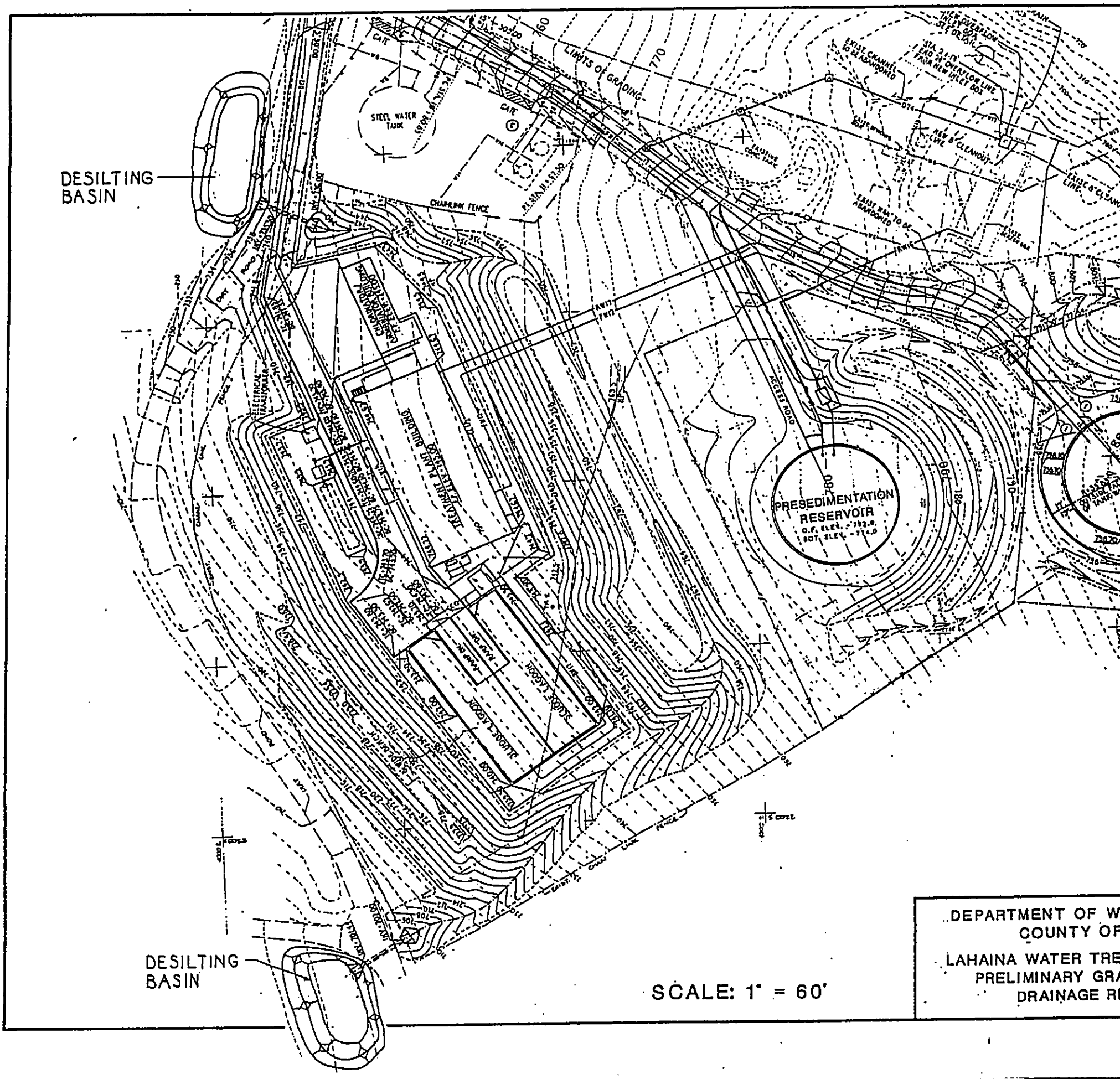
LAHAINA WATER TREATMENT PLANT
PRELIMINARY GRADING AND
DRAINAGE REPORT

AUSTIN, TSUTSUMI, & ASSOC., INC.
ENGINEERS. SURVEYORS • HAWAII

DRAINAGE RUNOFF PLAN

EXHIBIT

3



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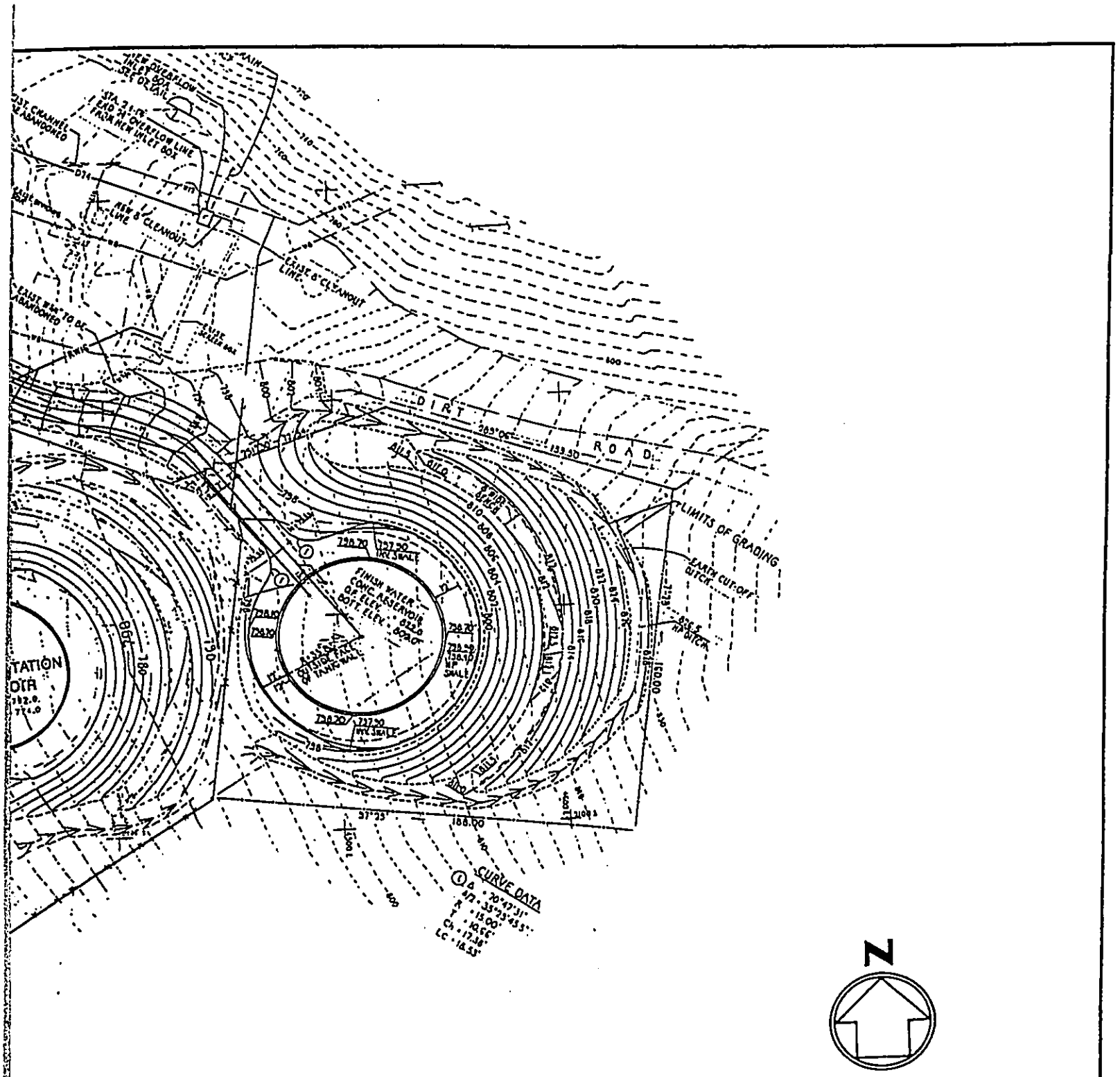


DEPARTMENT OF WATER SUPPLY COUNTY OF MAUI LAHAINA WATER TREATMENT PLANT PRELIMINARY GRADING AND DRAINAGE REPORT	AUSTIN, TSUTSUMI, & ASSOC., INC. ENGINEERS, SURVEYORS · HAWAII GRADING PLAN	EXHIBIT 4

Appendix D

Erosion Control Plan

EROSION CONTROL PLAN

FOR THE

LAHAINA WATER TREATMENT PLANT

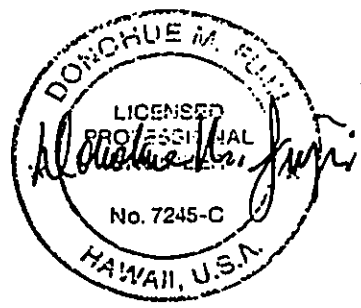
LAHAINA, MAUI, HAWAII

TAX MAP KEY: 4-6-18:12

PREPARED FOR

DEPARTMENT OF WATER SUPPLY

COUNTY OF MAUI



Prepared By

Austin, Tsutsumi & Associates, Inc.
Engineers • Surveyors
Honolulu • Wailuku • Hilo, Hawaii

November 1991

ATA AUSTIN, TSUTSUMI & ASSOCIATES, INC.
CIVIL ENGINEERS • SURVEYORS

EROSION CONTROL PLAN

NAME OF DEVELOPMENT: LAHAINA WATER TREATMENT PLANT

DEVELOPER: DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI

ENGINEER: AUSTIN, TSUTSUMI & ASSOCIATES, INC.

LOCATION: LAHAINA, MAUI, HAWAII

TAX MAP KEY: 4-6-18:12

AREA: 2.8 ACRES

DATE: November 22, 1991

SOILS: Lahaina silty clay, with slopes of 15 to 25 percent (LaD). This soil series includes small areas where most of the surface layer and, in places, part of the subsoil, has been removed by erosion.

EROSION HAZARD: Moderate. Rainfall Erosion Index is 185. Runoff is medium, as described by the USDA Soil Conservation Service "Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii".

The project site is presently overgrown with exotic grasses and weeds. The site is moderately sloping land with elevations ranging from 740 feet to 810 feet above mean sea level.

With the project site being highly overgrown, the majority of the off-site and on-site runoff percolates into the existing ground. The remaining runoff, if any, sheet flows into the Kanaha Stream Gulch or toward the Lahainaluna High School agricultural field.

CONSTRUCTION SCHEDULE:

1. Clear and grub project site - May 1-15, 1992.

2. Mass grade site. Construct storm runoff desilting basins. Grass all slopes, exposed areas and pads as soon as final grades have been established - May 18 - June 26, 1992.

3. Cut access road "B", water treatment plant clearwell and sludge lagoons - June 29 - July 24, 1992.

4. Cut access road "A" improvement and install off-site drain lines - July 27 - August 14, 1992.

5. Install permanent utilities. Provide base course for access roads and water treatment plant parking area - August 17 - October 9, 1992.

6. Complete construction of reservoirs, water treatment plant and all other improvements. Install permanent vegetative cover in open space areas - October 12, 1992 - May 1, 1993.

7. Clean up, treatment plant testing and inspection - May 1, - June 15, 1993.

TEMPORARY EROSION CONTROL MEASURES:

1. Grass all exposed areas and slopes.

PERMANENT EROSION CONTROL MEASURES:

1. Permanent drainage system.

2. Construction of A.C. paved roads, loading area and parking areas.

3. Permanent landscaping of slopes and exposed areas.

SEVERITY RATING CALCULATIONS:

1. Values of Equation Factors

F = 2
T = 12 months, 1.0 year
D = 2 Class A
A = 2.8 Acres
E = RK (LS) (CP)
R = 185

Soil Erodibility Factor:

K = 0.17; Soil Symbol: LaD

(LS): S = 21%; L = 400'
(LS) = 8.89

Cover and Management Factor, C and Erosion Control Practice Factor, P:

(CP): Grading in Summer Months: C = (0.4) (6 mo.) = 2.4
Grading in Winter Months: C = (0.75) (6 mo.) = 4.5

$$C = \frac{2.4 + 4.5}{12 \text{ mo.}}$$

C = 0.58

Erosion Control Measures:
Incremental Grading, P = 0.7

(CP) = 0.58 (0.7) = 0.41

2. CALCULATIONS

E = RK (LS) (CP)
= 185 (0.17) (8.89) (0.41)
E = 114.63

H = (2 FT + 3D) AE
= [2 (2) (1.0) + 3 (2)] [(2.8) (114.63)]
H = 3209.6 < 50,000 (Maximum Allowable Severity Rating)

REFERENCES: "Erosion and Sediment Control - Guide for Hawaii", USDA Soil Conservation Service, March 1981.

"Soil Erosion Standards and Guidelines", Department of Public Works, City and County of Honolulu, November 1975.

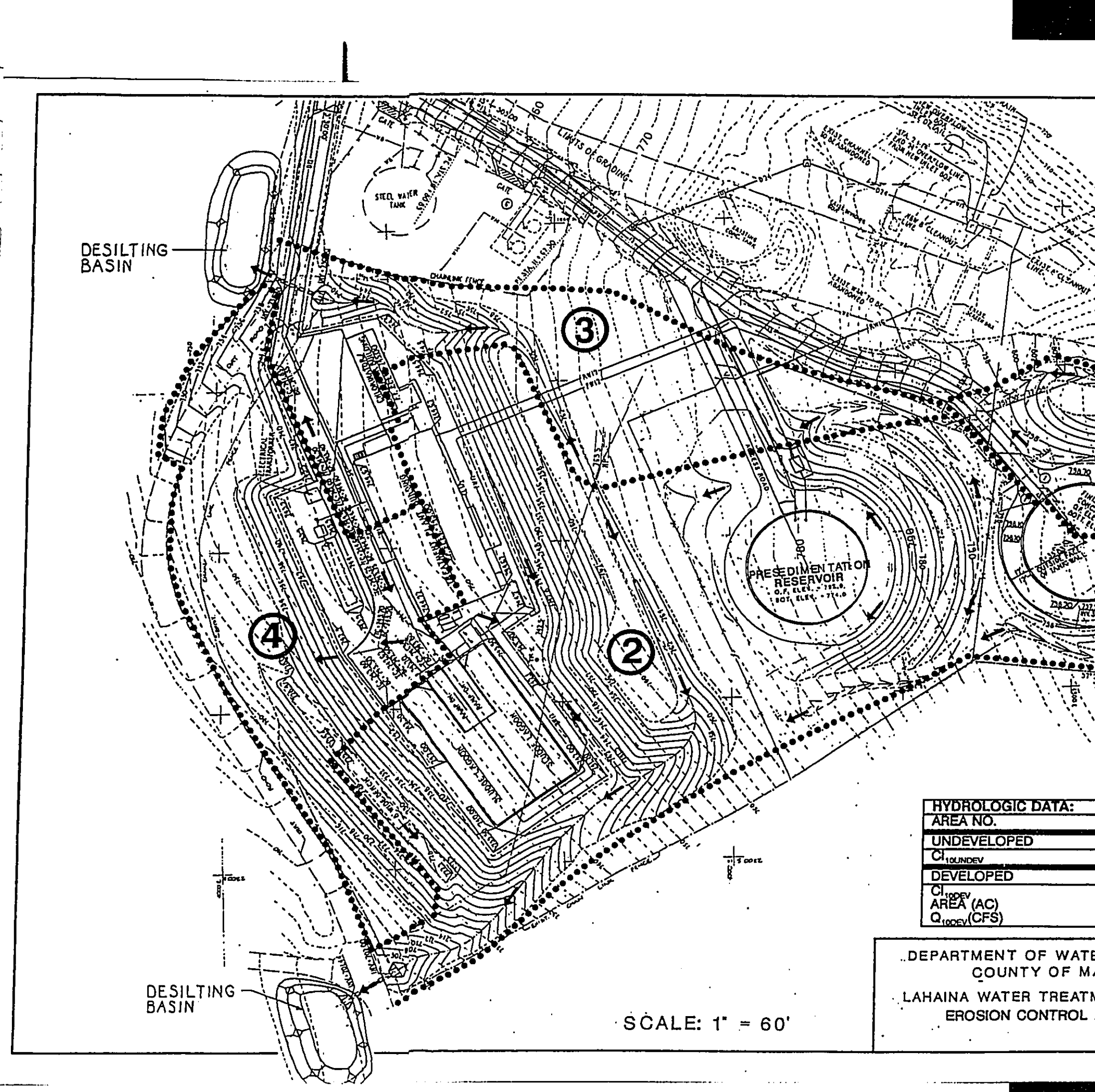
APPROVED:

Director and Chief Engineer
Department of Public Works

Date

Chief, Division of Engineering
Department of Public Works

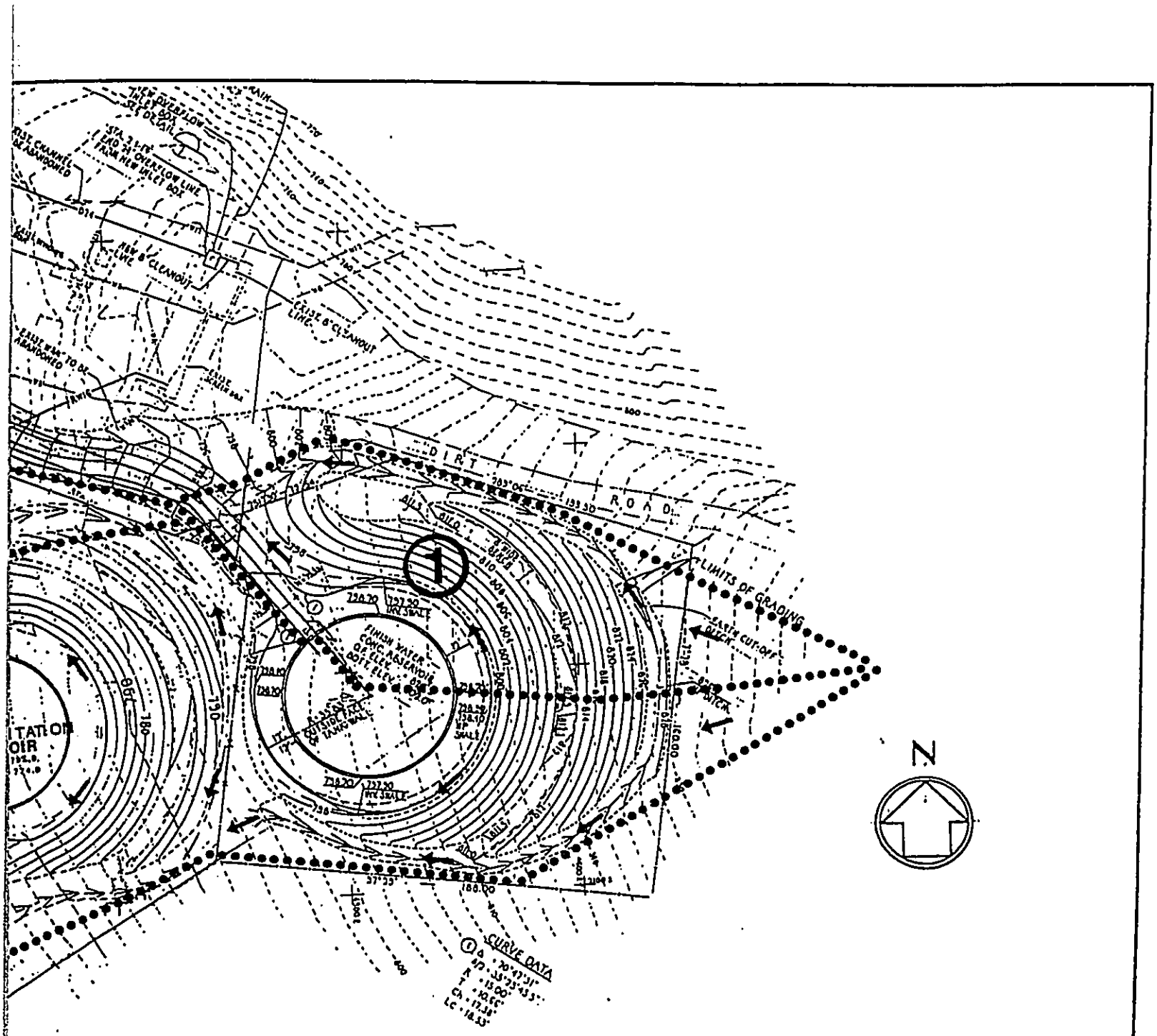
Date



HYDROLOGIC DATA:
AREA NO.
UNDEVELOPED
$CI_{10UNDEV}$
DEVELOPED
CI_{10DEV}
AREA (AC)
Q_{10DEV} (CFS)

DEPARTMENT OF WATE
COUNTY OF MA

LAHAINA WATER TREATM
EROSION CONTROL



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DEPARTMENT OF WATER SUPPLY COUNTY OF MAUI LAHAINA WATER TREATMENT PLANT EROSION CONTROL PLAN	AUSTIN, TSUTSUMI, & ASSOC., INC. ENGINEERS. SURVEYORS • HAWAII DRAINAGE RUNOFF PLAN	EXHIBIT 1