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JOHN WAIHEE
GOVERNOR

'91 JAN 30 8:46 January 23, 1991

OFFICE OF ENVIRONMENTAL
QUALITY CONTROL

The Honorable William W. Paty
Chairperson
Board of Land and Natural Resources
P. O. Box 373
Honolulu, Hawaii 96809

Dear Mr. Paty:

I am pleased to accept the Final Environmental Impact Statement for KULA WATER SYSTEM RESERVOIRS as satisfactory fulfillment of the requirements of Chapter 343, Hawaii Revised Statutes. This environmental impact statement will be a useful tool in the process of deciding if the action described therein should be allowed to proceed. My acceptance of the statement is an affirmation of the adequacy of that statement under the applicable laws and does not constitute an endorsement of the proposed action.

When the decision is made regarding the proposed action itself, I expect the proposing agency to consider if the societal benefits justify the environmental impacts which will likely occur. These impacts are adequately described in the statement, and together with the comments made by reviewers, provide useful analysis of the proposed action.

With kindest regards,

Sincerely,

JOHN WAIHEE

cc: ✓ Bruce S. Anderson, Ph.D.

FINAL
ENVIRONMENTAL IMPACT STATEMENT

for the
KULA WATER SYSTEM RESERVOIRS
Kula, Maui

DECEMBER 1990



State of Hawaii
Department of Land and Natural Resources
Division of Water Resource Management

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DIVISION OF WATER RESOURCE MANAGEMENT
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE OF HAWAII

This Environmental Document is Submitted
Pursuant to Chapter 343, HRS

FINAL ENVIRONMENTAL IMPACT STATEMENT
KULA WATER SYSTEM RESERVOIRS
Kula, Maui, Hawaii

PROPOSING AGENCY:

Division of Water Resource Management
Department of Land and Natural Resources
P. O. Box 373
Honolulu, Hawaii 96809

ACCEPTING AGENCY:

Governor, State of Hawaii



William W. Paty
Chairperson
Board of Land and Natural Resources

Prepared By:

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SECTION 1

INTRODUCTION AND SUMMARY

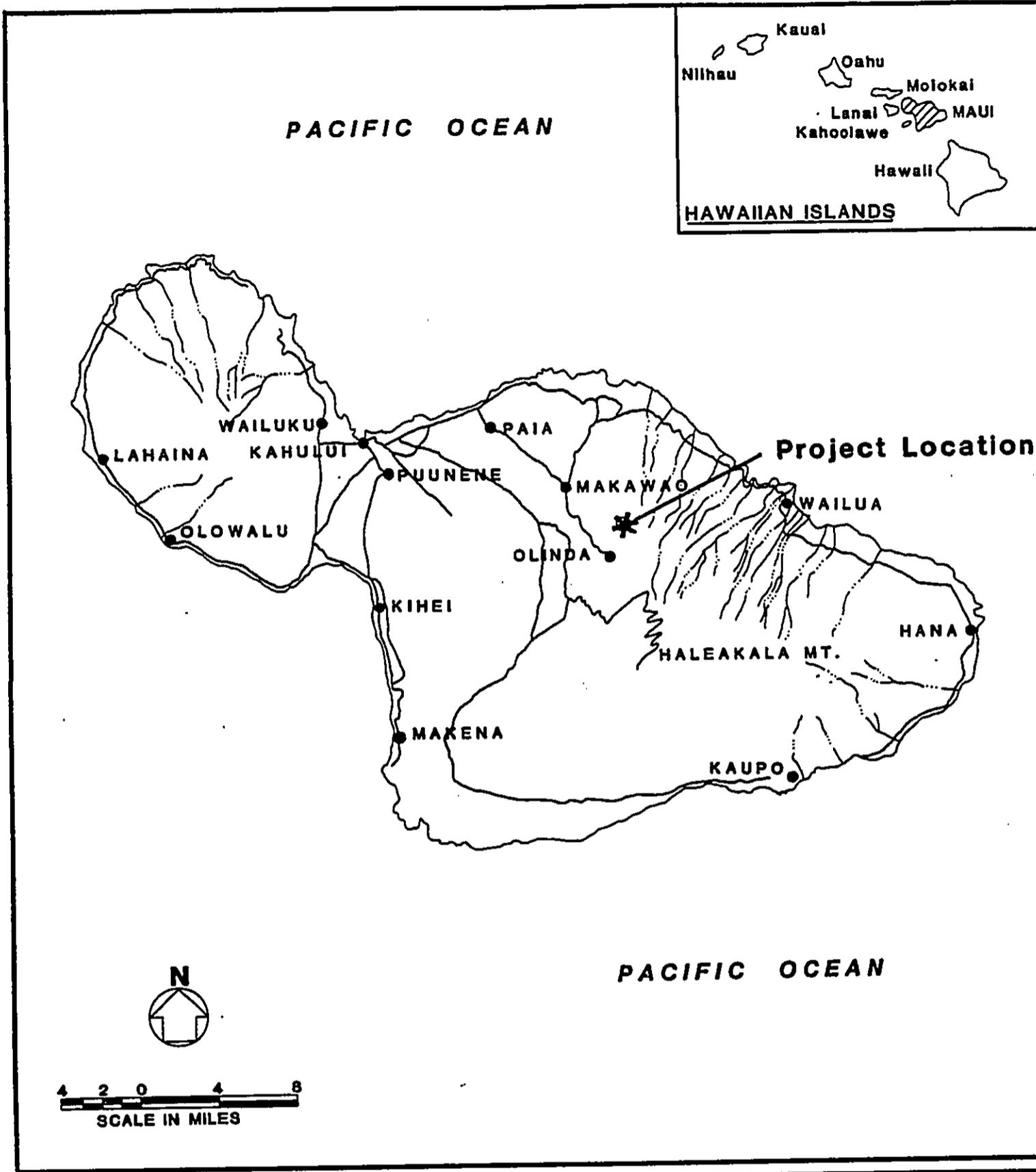
1.1 INTRODUCTION AND PURPOSE

The State Department of Land and Natural Resources, Division of Water Resource Management is proposing to construct two 50 million gallon (mg) reservoirs in the Upper Kula area of the island of Maui (see Figure 1). The purpose of constructing these new reservoirs is to provide additional water storage capacity to minimize the need to impose water use restrictions, which is a common occurrence in Kula, especially during the drought periods. The existing storage capacity is insufficient to provide adequate amounts of water during the drought periods and requires expensive pumping costs from the Wailoa Ditch, located 3,100 feet downslope of the Upper Kula Water System, to supplement the water supply. The addition of the new reservoirs will provide adequate water storage capacity to the year 2000 and minimize water use restrictions and expensive pumping costs.

The purpose of this Draft Environmental Impact Statement (DEIS) is to identify and evaluate significant environmental impacts that may result from the proposed project. Mitigative measures to reduce or eliminate adverse impacts on the environment were evaluated and are discussed in the following sections. This DEIS has been prepared in accordance with Chapter 343, Hawaii Revised Statutes and the Rules and Regulations of the Dept. of Health.

1.2 PROJECT LOCATION

The proposed reservoirs are located on the northern slopes of Haleakala, Island of Maui, between elevations 4100 and 4300 feet above mean sea level. The reservoirs and a disposal site for excess excavated material are planned on a portion of a 145-acre parcel owned by the State of Hawaii, Tax Map Key 2-4-16:1. A small portion of the reservoirs will be developed on an adjoining 9,900-acre parcel owned by the Haleakala Ranch Company Tax Map Key 2-4-16:4. The current State land use designation is "agriculture." The Makawao-Pukalani-Kula Community Plan designation is also "agriculture," however, the land has not been zoned "agriculture."



Kula Water System Reservoir
Makawao, Maui, Hawaii

STATE OF HAWAII
 DEPARTMENT OF LAND AND NATURAL RESOURCES
 DIVISION OF WATER AND LAND DEVELOPMENT

FIGURE 1
PROJECT LOCATION MAP

The reservoirs will be integrated with the existing upper Kula water system. The primary water source of the upper Kula water system is the Waikamoi Stream and is stored in two 15 mg reservoirs (see Figure 2). A newly constructed 36-inch transmission line will connect the two reservoirs to the Olinda Water Treatment Plant to the west, where the water is treated, and then distributed to the consumers. The new reservoirs are proposed to be located between the source and treatment facility, approximately 3,500 feet east of the Olinda water treatment plant.

1.3 PROPOSED ACTION

The new reservoirs will cover approximately 30 acres and consist of two 50 mg storage basins. The overall surface area of the two reservoirs together measures 1510 feet by 870 feet with a bottom depth of 30 feet. The reservoirs will be lined with an impervious layer of concrete and enclosed by a six-foot high chain link fence. The two basins will have a total storage capacity of 100 mg. The reservoirs will be fed by a newly installed 36-inch transmission main from the Waikamoi Arch Dam. The outlet will also be a 36-inch transmission main that leads to the Olinda water treatment plant. The designed spillway elevation is 4210 feet above mean sea level.

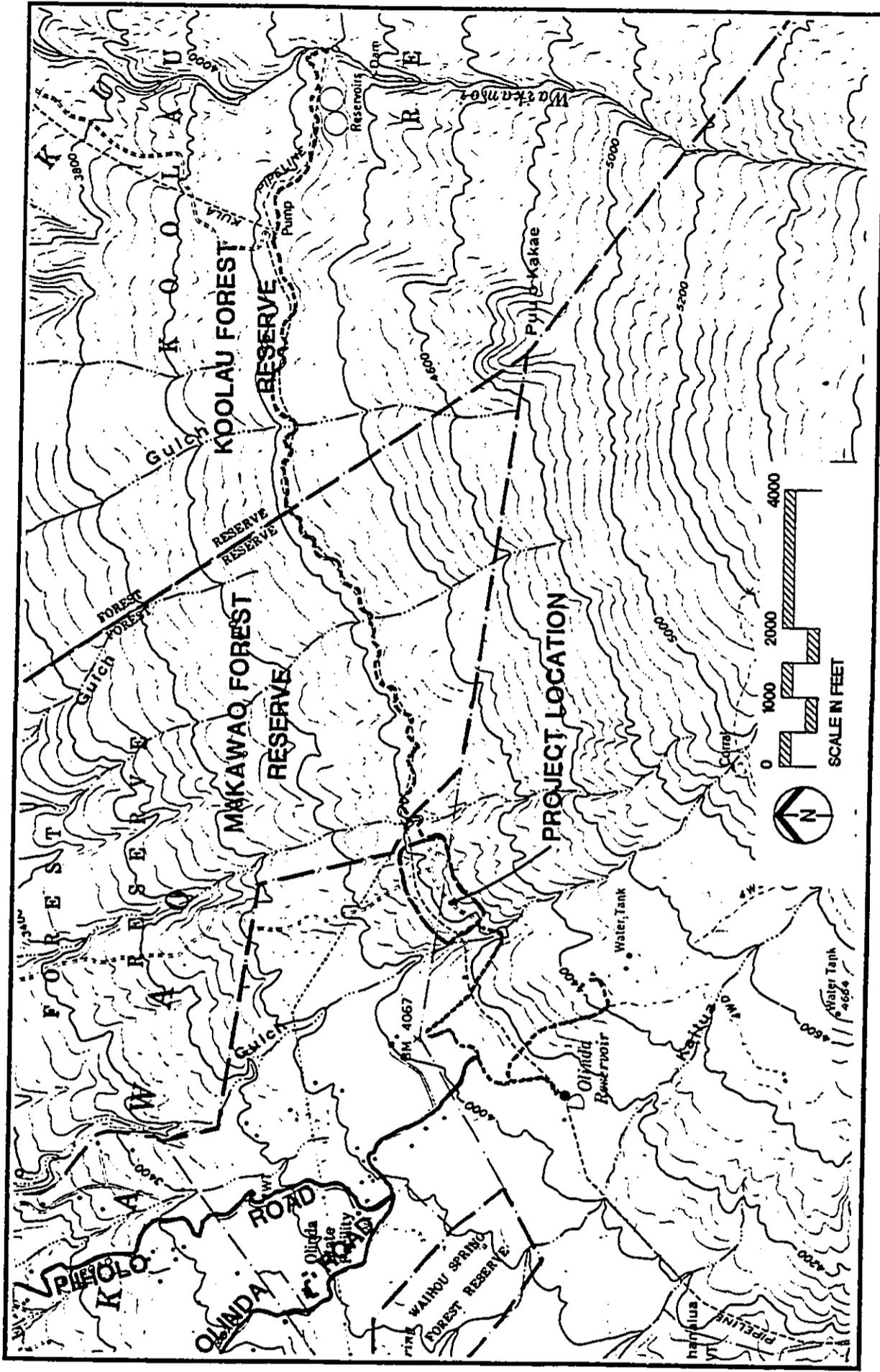
Two concrete lined diversion ditches are planned on the mauka side of the reservoirs to direct surface runoff to existing gulches on the east and west side of the reservoirs to prevent surface runoff from entering the new reservoirs.

The excavated material will be used to berm up the sides of the new reservoirs and the excess excavated material will be disposed of on the 145-acre parcel site at a designated disposal site. The bermed up area around the reservoirs and the disposal site will be grassed to minimize soil erosion.

1.4 SUMMARY OF IMPACTS AND MITIGATION

1.4.1 Land Use and Ownership

The 145-acre parcel is currently being leased by the State to the Haleakala Ranch Company for cattle grazing. The 9,900-acre parcel is owned by the Haleakala Ranch



Kula Water System Reservoir
MAKAWAO, MAUI, HAWAII
 STATE OF HAWAII
 DEPARTMENT OF LAND AND NATURAL RESOURCES
 DIVISION OF WATER AND LAND DEVELOPMENT

FIGURE 2

PROJECT LOCATION MAP

R.M. TOWILL CORPORATION

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100

Company and is also used for cattle grazing. Construction of the new reservoirs will remove approximately 30 acres of land from active cattle grazing.

The Haleakala Ranch Company owns approximately 32,500 acres of land on Maui and leases an additional 2,700 acres. In the Makawao-Pukalani-Kula area, the Haleakala Ranch Company owns or leases approximately 28,100 acres. The removal of only 30 acres of leased land will not significantly impact the available cattle grazing area. The new reservoirs will have a positive impact on ranching, because more water will be available during dry periods, reducing losses in livestock typical of the dry periods when water supply reaches critical levels.

The nearest resident is approximately 2000 feet away from the project site. Because of the great distance from construction activities to the nearest residence adverse noise and air impacts on existing residents are not expected.

1.4.2 State and County Land Use Classifications

The State land use classification is "agriculture." The Community Plan designation is "agriculture." The proposed reservoirs are a permitted use on State "agriculture" lands.

1.4.3 Soils and Topography

Soils consist mainly of Olinda loam, which are well drained soils found on smooth, intermediate to high mountain slopes and are suitable as good topsoil. The new reservoirs will be situated on the northern slopes of Haleakala Mountain between elevations 4100 to 4300 feet above mean sea level. The average slope in the vicinity of the proposed reservoirs is approximately 18 percent.

The excavated material will be contained on site and used to berm up the sides of the reservoirs. Excess excavated material will be placed on a designated disposal site on the 145-acre parcel. By keeping the excavated soil on the parcel, impacts on the existing roadway system from dirt hauling trucks will be minimized.

Dames and Moore performed a geotechnical engineering investigation to explore the subsurface conditions of the project area. Because there were layers of soft clayey silt and wet zones, special design considerations and construction procedures will be performed to minimize seepage and settlement problems.

An erosion control plan will be prepared prior to construction to protect downstream uses and reduce soil erosion during construction. The areas that are cleared and grubbed will be grassed to minimize soil erosion.

A grading plan will be prepared to show finished topographic conditions for the construction of the new reservoirs and the disposal site. Care will be taken to maintain the natural drainage pattern in the area.

1.4.4 Noise

Once completed, reservoirs will not generate noise and therefore will not have an adverse noise impact on the environment. During construction, significant adverse noise impacts are not anticipated, because there are no noise sensitive uses within 2000 feet of the project site. However, use of properly muffled construction equipment and the incorporation of State Department of Health regulations on construction noise limits and curfew hours will be observed to ensure that noise sensitive uses are not adversely impacted.

1.4.5 Air Quality

Impacts on air quality will occur during construction from dust generated from earth moving and emissions from construction equipment. Frequent watering of the soil will reduce the amount of fugitive dust generated during construction. Exhaust emissions from construction equipment will be mitigated by properly maintained and operated construction equipment. Dust control measures will be implemented in accordance with the Department of Health regulations and applicable County ordinances. After construction, the new reservoirs will not impact the air quality in the area.

Carbon monoxide emissions from maintenance vehicles traversing the site are not expected to cause any significant impact. Inspection of the system will be done periodically and is not expected to significantly impact the air quality.

1.4.6 Flora

The area of the proposed reservoirs consists primarily of a mixture of various introduced grasses. Sweet vernal grass, African dropseed and white clover were the most abundant of the grasses found on the site. A small gulch to the east contains a number of native species. The most numerous native species in the gulch are koa, pilo shrubs and two ferns, the 'ama'u and lau-kahi.

None of the plant species found are considered threatened or endangered by the U. S. Fish and Wildlife Service, 1989. All of these species can be found in the adjacent forest reserve lands and the Waikamoi preserve. Thus, there will not be significant negative impact on the botanical resources of the site.

1.4.7 Archaeology

An archaeological reconnaissance was performed to assess the archaeological resources on the project site. The survey indicated that there are no archaeological sites present on the property, therefore no impacts on the archaeological resources are expected. However, during construction, if archaeological deposits are uncovered, construction will be suspended and the State Historic Sites Section, DLNR, will be consulted.

1.4.8 Agriculture

The new reservoirs will remove 30 acres of land from active cattle grazing. However, the new reservoirs will have a positive impact on the agricultural industry, because livestock and crop losses incurred during dry periods will be minimized by the water availability. The gain in the agricultural economic benefits created by the new water storage capacity will far outweigh the loss of 30 acres of pastureland.

1.4.9 Visual Resources

Adverse visual impacts from the built reservoirs will not be significant. The area is not visible from public roadways or nearby residences.

1.4.10 Social and Economic Conditions

The new reservoirs will complement the growth of the Kula area. The water storage capacity will result in less water use restrictions during dry periods and will thus contribute to higher yields in crops and livestock.

1.4.11 Flooding and Drainage

There are no flooding and drainage problems in the vicinity of the new reservoirs. Drainage impacts during construction will be mitigated by following the erosion control measures prescribed by an Erosion Control Plan.

1.4.12 Circulation

Access to the project site is via Olinda Road, which terminates at an unpaved dirt road secured by locked gates. Impacts from construction traffic will be mitigated by notifying the public and posting signs along the roadway to apprise them of the upcoming construction activities. Most of the construction vehicles and equipment will be contained on site, such as the dirt hauling trucks, scrapers, cement trucks and bulldozers to minimize traffic impacts on existing public roadways.

1.4.13 Solid Waste

The new reservoirs will not be a source of solid waste. A trash receptacle may be used by the maintenance crew periodically and the trash will be disposed of at the Central Maui Sanitary Landfill.

1.4.14 Wastewater Treatment and Disposal

Cesspools are generally used for disposal of wastewater in the surrounding agricultural and residential developments, except for portions of Pukalani where sewage is routed to and treated at a privately-owned sewage treatment plant. The new reservoirs will not

generate any wastewater, therefore, no impacts on the existing wastewater treatment and disposal facilities are expected.

1.4.15 Power and Communications

Impacts on the existing electrical system are not expected, because the new reservoirs do not need electricity for their operation. Similarly, telephones are not planned. A telemetering system (radio) will be used for communication between the maintenance vehicles and the head office.

1.4.16 Fire, Police and Emergency Medical Services

Adverse impacts on the fire, police and emergency medical facilities are not anticipated. However, there will be a positive impact on the fire fighting service, because the additional water storage capacity will mean a reliable flow of water for fire fighting.

1.4.17 Schools

The new reservoirs will not have any adverse impacts on the schools in the vicinity. Existing schools in the Makawao District include: Makawao School, Haiku School, Pukalani Elementary School, Kula Elementary School, Kalama Intermediate School, St. Joseph School and Seabury Hall.

1.5 RELATIONSHIP TO PLANS, POLICIES AND CONTROLS

The proposed reservoirs are consistent with the overall objectives and policies of the County and the State of Hawaii. The additional water storage capacity that will be available will greatly improve the water system in an area that suffers from water shortage during drought periods. Losses in crops and livestock will be minimized, resulting in a positive impact on the agricultural economy of Maui.

1.6 NECESSARY PERMITS AND APPROVALS

The following is a list of permits and approvals that will be required prior to construction:

County of Maui

Department of Water Supply

Department of Public Works

Building Department

Construction Plan Approval

Grading Permit
Erosion Control Plan

Building Permit

Access easements will be established through the County subdivision process.

1.7 ALTERNATIVES CONSIDERED

1.7.1 No Action Alternative

The no action alternative would mean that the existing water shortage in the area would still be a major problem. Existing uses in the area would continue to be burdened by water use restrictions, especially during dry periods, and losses in crops and livestock would continue.

1.7.2 Alternative Sites

In an effort to minimize additional cost to acquire land and minimize adverse impacts, alternative sites along the existing 36-inch water transmission line were evaluated. Other State land in the vicinity is in "conservation," which may be habitats for endangered flora or fauna. Other lands in the vicinity are privately owned and would require additional funds to acquire the land. The new reservoirs are also within the hydraulic gradient of the existing system for maximum efficiency.

1.7.3 Other Alternatives

A study was prepared by Belt, Collins Associates in January 1985, entitled "Study of Surface Water Development for Maui Up-Country Water Systems." The objective of this study was to develop recommendations to expand the supply capacity of the Upper and Lower Kula surface water sources, because the existing system is inadequate to meet the needs of the community. Recommendations in this study included construction of a new 100 mg reservoir to increase the water storage capacity of the upper Kula water system. This additional storage capacity would be sufficient to provide projected water requirements through the year 2000. This project is, therefore, being implemented as part

of the effort to improve the existing upper Kula water system to meet the growing demand for water.

Other alternatives, such as new sources and pumping stations were considered, however, these alternatives would not be economically feasible. New water sources are more available at the lower elevations and these sources would require expensive pumping to deliver the water to such high elevations to service the upper Kula water area. A new source may be required in the distant future, however, this alternative was not evaluated in detail at this time.

SECTION 2
PROJECT DESCRIPTION

2.1 OVERVIEW

Studies have been conducted and improvements made to solve the water resources problems in the Upcountry Maui area. However, Upcountry Maui still experiences a water shortage problem. One of the reasons the existing system cannot supply adequate amounts of water is because of the undersized facilities. The undersized facilities prevent storage of water during high rainfall periods for use during low rainfall periods.

The new reservoirs are expected to store water to service the upper Kula service area, since the present Upper Kula system does not have sufficient storage supply to service these communities during periods of drought. Thus, water is pumped from Wailoa Ditch near Haliimaile to supplement the Upper Kula water system. Indirectly, the entire Kula-Makawao service area will be affected because water is not expected to be pumped from Wailoa Ditch to the upper Kula water system during times of drought. Conversely, in the event the water system downstream of the Upper Kula water system requires additional water, the added storage capacity of the Upper Kula system can serve to supplement their water demands. The principal beneficiaries of the proposed improvements are those landowners currently on the upper Kula system.

Recent improvements to the system have been made to help mitigate the water shortage problem. These improvements include a new 36-inch water line from the Waikamoi Reservoir to the Olinda Water Treatment Plant and repair work on existing facilities to minimize leakages in the system. Restoration work involved the reconstruction of damaged portions of the existing 24-inch collector pipe and four existing intakes, replacement of five feeder pipes from the existing 12-inch transmission line to five existing intakes, and minor reconstructive work at these intakes. These restoration tasks and the installation of a new 36-inch water line project are currently in progress.

The two new 50 million gallon (mg) reservoirs are one of a number of improvements planned to improve the water supply system in Upcountry Maui. The addition of these new reservoirs will provide enough storage capacity to meet the needs of the community for a reliable supply of water. Additional storage capacity will probably be needed beyond the year 2000.

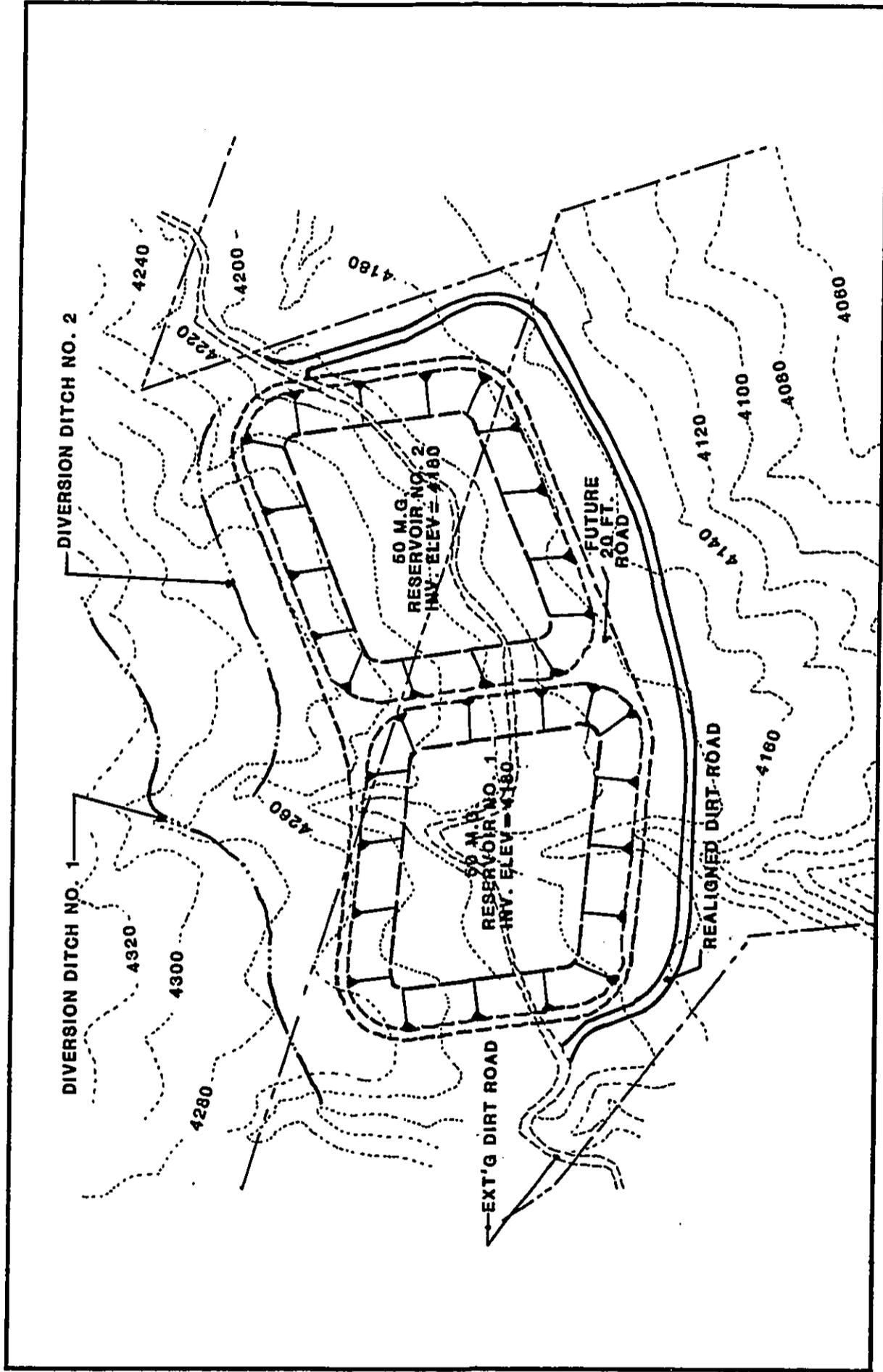
2.2 PROJECT DESCRIPTION

The proposed reservoirs will have a capacity of 100 million gallons (mg) and consist of two 50 mg storage basins. The reservoirs will be situated on portions of a 145-acre parcel owned by the State of Hawaii and a 9,900-acre parcel owned by Haleakala Ranch Company and will cover approximately 30 acres of land. The design of the reservoirs has been calculated to dimensions which would require minimal land area in order to keep the water surface area to a minimum. The current design plans require a surface length of 1,510 feet and a width of 870 feet (see Figure 3), with each basin measuring 755 feet by 870 feet. The reservoirs will have a bottom depth of 30 feet and will be lined with an impervious layer of concrete. Figures 4 through 6 provide a perspective view of the existing topographic conditions, Phase I conditions and finished conditions.

In order to obtain sufficient volume, current plans require the removal of 865,000 cubic yards (c.y.) of earth. Over half (470,000 c.y.) of this excavated earth will be used to form the sides of the reservoir. The embankment will be grassed to minimize soil erosion and a six-foot high chain link fence will be placed around the reservoir to prevent cattle from entering or falling into the reservoirs.

The remaining 395,000 c.y. will be contained on the 145-acre parcel at a designated disposal site. This disposal site is in a low area on the makai side of the parcel. Effort will be made to maintain the natural drainage pattern in the area.

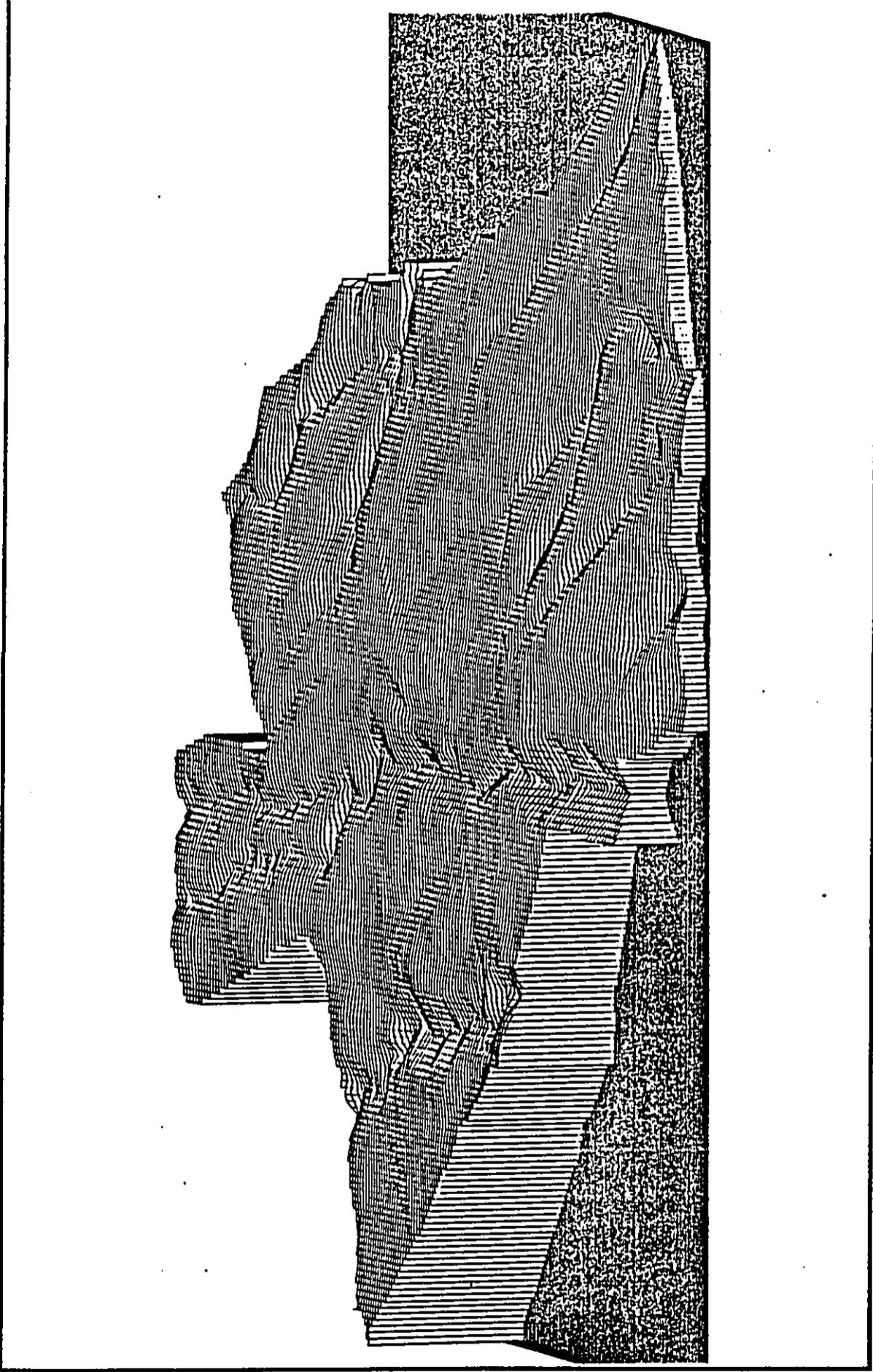
Two concrete lined diversion ditches (see Figure 7) are planned on the mauka side of the reservoirs to prevent surface runoff from entering the reservoirs. The ditches will divert the surface runoff to two existing drainageways on the east and west sides of the reservoirs.



Kula Water System Reservoir
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FIGURE 3
RESERVOIRS
SITE PLAN

R.M. TOWILL CORPORATION

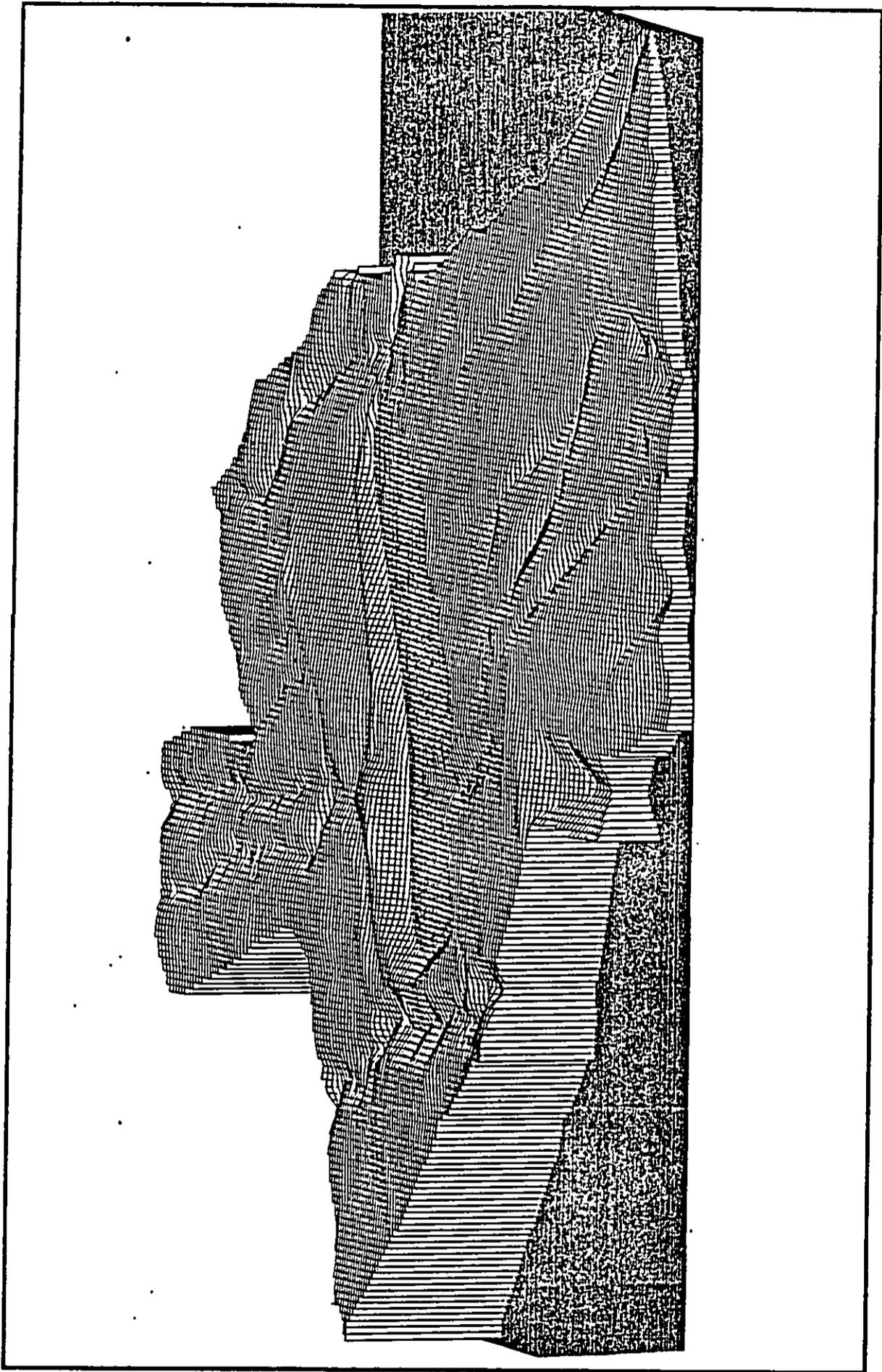


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DIVISION OF WATER AND LAND DEVELOPMENT

FIGURE 4
PERSPECTIVE OF
EXISTING TOPOGRAPHY

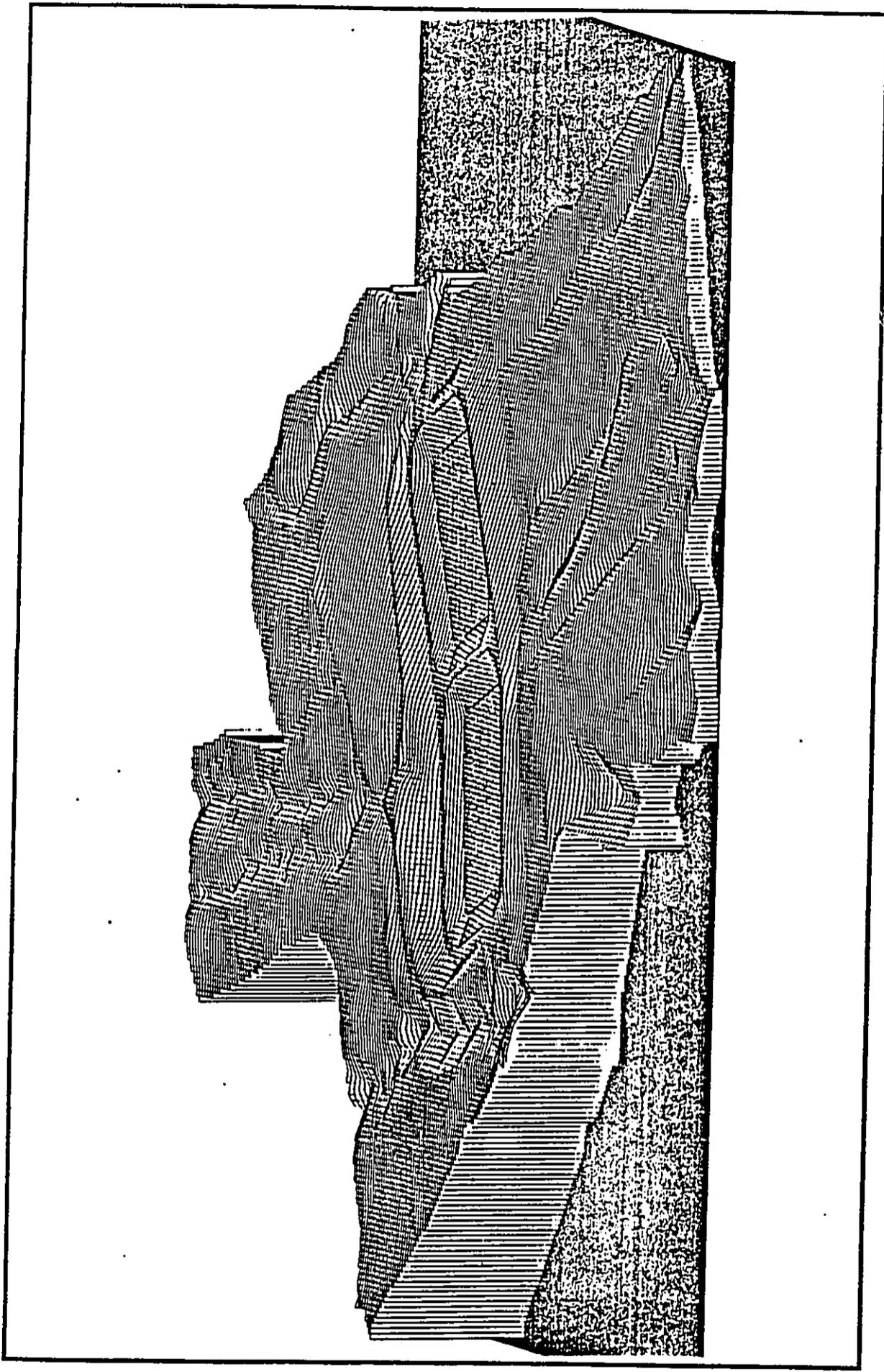
R.M. TOWILL CORPORATION

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Kula Water System Reservoir
MAKAWAO, MAUI, HAWAII
STATE OF HAWAII
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DIVISION OF WATER AND LAND DEVELOPMENT

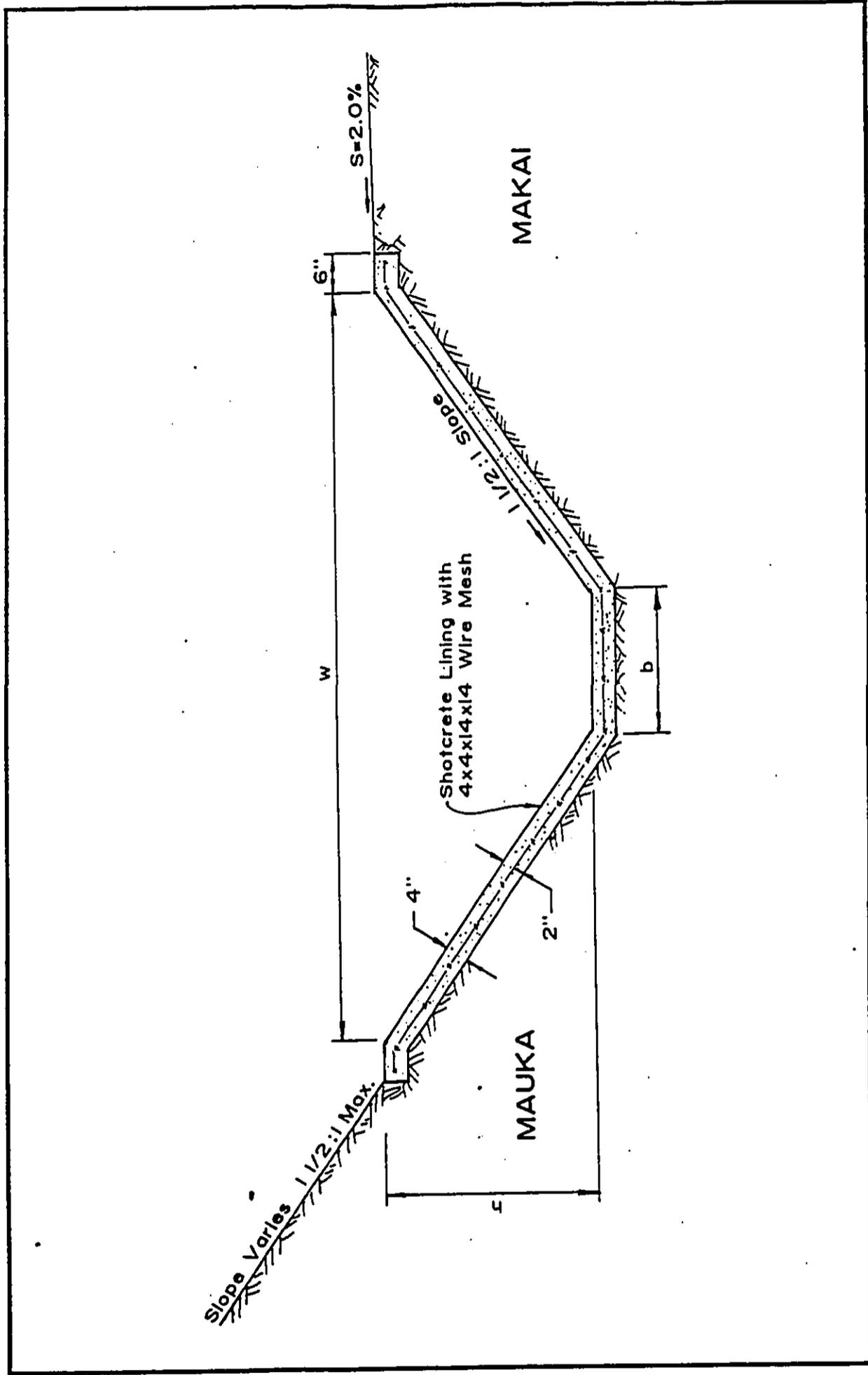
FIGURE 5
PERSPECTIVE OF
PHASE I TOPOGRAPHY
R.M. TOWILL CORPORATION



Kula Water System Reservoir
MAKAWAO, MAUI, HAWAII
STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
DIVISION OF WATER AND LAND DEVELOPMENT

FIGURE 6
PERSPECTIVE OF
FINISHED TOPOGRAPHY
R.M. TOWILL CORPORATION

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100



Kula Water System Reservoir
MAKAWAO, MAUI, HAWAII
 STATE OF HAWAII
 DEPARTMENT OF LAND AND NATURAL RESOURCES
 DIVISION OF WATER AND LAND DEVELOPMENT

FIGURE 7
TYPICAL DITCH
SECTION

SOURCE: Warren S. Unemori, Engineering, Inc.

R.M. TOWILL CORPORATION

The primary source of surface water is the Waikamoi Stream and the collection system that originates at the Waikamoi Arch Dam located to the extreme east of the upper Kula water system. The water is then routed to two nearby 15 mg reservoirs to the west via a 24-inch transmission line. The water then flows by gravity via 36-inch transmission main to the water treatment plant in Olinda, approximately 3 miles to the west. The new reservoirs are planned between the Waikamoi Arch Dam and the Olinda water treatment plant approximately 3500 feet from the water treatment facility. The reservoirs will be fed by the newly constructed 36-inch transmission line from the Waikamoi Arch Dam to the east. The outlet will also be a 36-inch transmission line, which will lead to the Olinda Water Treatment Plant where the stored water will be treated then distributed to the consumers. Connection of the 36-inch transmission line to the new reservoirs will be underground.

Because of the elevation of the reservoirs, between the source and treatment facilities, pumps will not be required to transport the water. The hydraulic gradient is such that water will flow by gravity into the proposed reservoirs and out by gravity to the water treatment plant. Therefore, an electrical source or generators will not be needed to operate the reservoirs.

The current storage capacity of the Kula-Makawao System is 102 mg. The upper Kula water system has a storage capacity of 52 mg and the lower Kula water system stores 50 mg of water. The addition of 100 mg of water storage will nearly double the system's storage capacity to 202 mg.

Access to the reservoirs is via Olinda Road which terminates at a private dirt road, secured by locked gates to control public access. This dirt road is currently being used to service the upper Kula water system and the forest reserves. This dirt road presently traverses the site of the new reservoirs and will therefore be realigned along the makai side of the reservoirs.

The cost to construct these reservoirs is estimated at \$20,000,000. Much of this cost is attributable to the earthwork required for excavation and embankment. State funds will be used to finance the construction of the reservoirs. After construction, the reservoirs will be maintained and operated by the County of Maui, Department of Water Supply.

The reservoirs are proposed to be developed in two phases. The first phase is scheduled for early 1991, with the second phase starting late 1991.

SECTION 3

EXISTING PHYSICAL ENVIRONMENT AND RELATED IMPACTS

3.1 GEOGRAPHY AND CLIMATE

Hawaii lies south of the Tropic of Cancer and has a mild semitropical climate, dominated by the northeast tradewinds, which blow approximately 80 percent of the time. The tradewinds are sometimes interrupted by cyclonic disturbances, usually during the winter months, commonly known as "Kona" storms.

The site of the proposed 50 mg reservoirs is located on the northern slopes of Mt. Haleakala, on the Island of Maui. Maui is the second largest of the Hawaiian island chain with a land area of approximately 729 square miles. The island was formed by the merging of two volcanos, Haleakala and West Maui volcano. Haleakala is the younger of the two volcanos and last erupted in 1790. The top of Haleakala, the third highest peak in the Hawaiian islands, has an elevation of about 10,000 feet. Near the summit, on the eastern and southwestern slopes, the terrain is rough and rocky. The northern and western slopes are relatively smooth.

Rainfall is high on the windward slope and exceeds 350 inches per year. The annual rainfall in the vicinity of the proposed reservoir is 30 to 60 inches. The mean temperature varies from 50 to 56 degrees.

A. IMPACTS

Adverse impacts on the geographical conditions and climate are not anticipated.

3.2 LAND USES AND OWNERSHIP

The new reservoirs will be situated on land owned by the State of Hawaii and Haleakala Ranch. The Tax Map Keys are 2-4-16:1 (145 acres) and 2-4-16:4 (9,900 acres) (see Figure 8). The existing land use on both parcels is pasture and is utilized by the Haleakala Ranch Company for cattle grazing.

Adjacent land uses in the area include the Makawao and Koolau Forest Reserves to the north and the Haleakala Homesteads and Olinda House lots to the west and south. An undeveloped parcel owned by Virginia C. Baldwin (TMK: 2-4-15:29) is also situated to the south and the 9,900-acre parcel owned by Haleakala Ranch Company (TMK: 2-3-05:4) is on the southeast.

A. IMPACTS

Because Haleakala Ranch Company utilizes 28,100 acres of land in the Makawao-Pukalani area, the removal of 30 acres from active cattle grazing is not expected to jeopardize the survival of their ranching business. The additional water storage capacity will enhance the ranching industry because fewer livestock losses will occur during dry periods from the lack of water.

Construction activities will be contained on site and are not expected to have long term adverse environmental effects on the existing and adjacent land uses. Short term impacts during construction will be mitigated by following the existing governmental regulations which control noise, air and soil erosion impacts.

3.3 SOILS AND TOPOGRAPHY

Information on the soil types was obtained from the "Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii," prepared by the U.S. Department of Agriculture, Soil Conservation Service, August 1972. Soil types in the vicinity of the proposed reservoir are summarized as follows.

The soil series within the project area consists of the Olinda series and are well-drained soils on the uplands of the Island of Maui (see Figure 9). Olinda soils are geographically associated with Kaipoi and Pane soils. The Olinda loam (OND) is the primary soil type with a few areas of rock land (rRK) and rough broken land (rRR). The Olinda loam is found on smooth, intermediate to high mountain slopes. Permeability is moderately rapid,

runoff is slow to medium and the erosion hazard is slight to moderate. This soil type is generally used for pasture, woodland, and water supply. The Olinda soil type is suitable as good topsoil.

The rock land is made up of areas where the exposed rock covers 25 to 90 percent of the surface. The main characteristics of this soil type are the rock outcrops and very shallow soils. The rock outcrops are mainly basalt and andesite. The soils associated with the rock outcrops are very sticky and very plastic and has a high shrink-swell potential.

Rough broken land consists of very steep land broken by numerous intermittent drainage channels. The soil is generally not stony and occurs in gulches and on mountainsides. The slope is 40 to 70 percent, thus, the runoff is rapid and erosion hazard is high. This soil type is primarily used for watershed, wildlife habitat, pasture and woodland.

The average slope in the vicinity of the new reservoirs is about 18 percent. The reservoirs will be situated between elevations 4100 to 4300 feet above mean sea level.

A geotechnical engineering investigation was performed to explore the subsurface conditions of the project area by drilling seven test borings. The surface layer is of reddish brown residual soil (weathered volcanic ash) about 5 to 10 feet thick, over interbedded weathered to unweathered volcanic rocks.

In the eastern sector of the site layers of very soft clayey silt were encountered. These soft deposits were found at depths of 15 to 75 feet below the existing ground surface. Other areas of the site contained wet zones at depths between 8 and 25 feet below the existing ground surface. Groundwater levels measured in the standpipes indicated the presence of groundwater at approximately 24 and 67 feet at two different locations. According to the Geotechnical Report, the presence of ground water in the two borings may be due to the use of water during the drilling operation.

A. IMPACTS

Approximately 865,000 cubic yards (c.y.) of earth will be excavated to create the impoundment to hold the water in the reservoirs. Over half of the excavated soil (470,000 c.y.) will be used for embankment to berm up the downslope portion and sides of the reservoir. The remaining excavated soil will be deposited (spread) at a disposal site located on the makai side of the property. Thus, the existing topographic conditions will be altered.

Without proper precautions, soil erosion may occur during construction, especially during times of rainfall. Soil erosion will increase the amount of silt entering the drainageways, which will impact the water quality downstream of the project site.

B. MITIGATION

A stockpile area for the excavated material will be designated on site. The excess excavated material will be placed in the disposal site and will be deposited incrementally to reduce the risk of soil erosion. The area will also be grassed to minimize soil erosion.

Because of the layers of soft clayey silt and wet zones, overexcavation may be necessary to prevent seepage in cut slopes and settlement. The cut slopes in soft soil should not exceed 3 horizontal to 1 vertical. If the slope is greater than 3 to 1, the soft materials should be overexcavated and replaced with properly compacted embankment fill. Similarly, to prevent settlement of the reservoir floors, overexcavation and replacement with properly compacted fill material should be performed.

To prevent soil erosion during construction, erosion control measures will be implemented according to the County regulations and as prescribed by an Erosion Control Plan. An Erosion Control Plan will be required for approval by the County of Maui prior to construction. The plan will describe

the measures required to minimize adverse impacts to downstream uses. Areas adjacent to the project area are heavily grassed or forested, which will reduce the velocity of the water and deposit silt and sediment. The Olinda soil type also has moderately rapid permeability, thus, much of the storm water runoff will infiltrate the soils. Care will be taken to minimize altering the natural drainage pattern in the area. A grading plan will be prepared to illustrate the finished topographic conditions.

3.4 NOISE

The nature of these facilities did not warrant a special study to assess the noise impacts from the built reservoirs. The new reservoirs will not create any adverse noise impacts while in operation. Noise generating equipment, such as pumps and generators, is not required for the reservoirs to function properly.

A. IMPACTS

Other than maintenance vehicles periodically traversing the site to monitor the operations and perform maintenance work on the water system, the reservoirs will not generate any adverse noise impacts.

Short term noise impacts will occur during construction. Construction related noise will be generated by the use of heavy equipment which will exceed allowable noise levels. However, there are no noise sensitive uses within 2,000 feet. Thus, it is not expected that the allowable noise levels will be exceeded beyond 2,000 feet of the site. Noise generated by construction traffic will not be significant because construction vehicles using public roads will satisfy the noise level requirements of the DOH regulations. In addition, heavy equipment such as bulldozers, scrapers and backhoes will be contained on site during construction.

B. MITIGATION

Short term construction noise impacts will be mitigated by the use of mufflers on construction equipment and vehicles. Specific start and curfew times in accordance with the State DOH regulations will be established for construction activities.

3.5 AIR QUALITY

After the new reservoirs are constructed, there will not be any air quality impacts resulting from their use. Emission producing devices or equipment are not needed to operate the reservoirs. Short term air quality impacts will be associated with construction activities.

A. IMPACTS

Short term impacts to the ambient air quality will occur during construction. Construction activities will increase concentrations of air pollutants in the vicinity of the project.

Other than the periodic maintenance vehicles, there will not be an increase in motor vehicles to cause significant carbon monoxide emissions. The existing access road is presently being used by the maintenance crew to service the upper Kula water system facilities. The addition of the new reservoirs is not expected to significantly increase the number of maintenance vehicles currently utilizing this access road. Thus, adverse long term impacts on the ambient air quality are not expected.

B. MITIGATION

During construction, dust control measures will be implemented in accordance with Department of Health regulations and applicable County ordinances. Frequent watering of the soil during construction will reduce the amount of fugitive dust emissions generated. EPA estimates that watering twice daily will reduce the amount of fugitive dust by 50 percent.

Exhaust emissions generated from construction equipment will be dispersed by the prevailing winds. The contractor will also be responsible for ensuring that construction equipment is maintained and operated properly to minimize exhaust emissions.

3.6 FLORA

A botanical survey was performed on May 17, 1990 to assess the botanical resources in the vicinity of the proposed reservoir. The survey covered approximately 50 acres of pastureland and gulch vegetation. The new reservoirs will be situated mostly in the pasturelands with a portion extending into a small gulch in the eastern sector of the site.

The pasturelands consisted mainly of a variety of introduced grasses. The most abundant grasses found were the sweet vernal grass (*Anthoxanthum odoratum*), African dropseed (*Sporobolus africanus*), and white clover (*Trifolium repens*). Other vegetation on the pasturelands included: carpet grass (*Axonopus fissifolius*; clumps of kilau (*Pteridium aquilinum* var. *decompositum*); hairy cat's-ear (*Hypochoeris radicata*); velvet grass (*Holcus lanatus*); kikuyu grass (*Pennisetum clandestinum*); orchardgrass (*Dactylis glomerata*); *Lotus subbiflorus*; Dallis grass (*Paspalum dilatatum*); *Kyllinga brevifolia*; *Juncus planifolius*; and *Juncus* af. *tenuis*.

Gulch vegetation consisted of numerous native species. The Koa (*Acacia koa*), pilo shrubs (*Coprosma ochracea*), and two ferns, the 'ama'u (*Sadleria cyatheoides*) and lau-kahi (*Dryopteris* af *wallichiana*) were the most abundant native species found. Other gulch vegetation included: 'akala (*Rubus hawaiiensis*); *Luzula hawaiiensis*; ho'i'o (*Diplazium sandwichianum*); palapalai (*Microlepia*); pukiawe (*Styphelia tameiameia*); 'ohelo (*Vaccinium calycinum*); epiphytic pakahakaha fern (*Pleopeltis thunbergiana*); hoi-kuahiwi (*Smilax melastomifolia*); 'ahu'awa (*Mariscus hypochlorus*); 'akolea (*Diplazium microphyllum*); mamane (*Sophora chrysophylla*); and Florida blackberry (*Rubus argutus*). In the sunnier portions of the gulch, pasture grasses, as found on the pasturelands, were identified. Few large peach trees were also found near concrete columns of an old pipeline.

Of the 47 species found, 28 are introduced, 1 possibly of early Polynesian introduction and 18 are native. Thirteen of the native species are endemic (found only in the Hawaiian islands) and five are indigenous (occur throughout the islands and the Pacific).

None of the species found are listed as threatened and endangered according to the U.S. Fish and Wildlife Service 1989, and not are proposed or candidate for such status (U.S. Fish and Wildlife Service 1990). All of the native species can be found within the wet forests of the adjacent forest reserve land and the Waikamoi preserve.

A. IMPACTS

Because none of the plant species found are considered threatened or endangered according to the U. S. Fish and Wildlife Service, significant adverse impacts on the botanical resources are not expected.

There is a potential of the introduction of noxious weeds from the use of construction machinery.

B. MITIGATION

If landscaping is used, the use of native species found in the gulch should be considered.

The lands that were chosen for the reservoirs have been previously altered and have been affected by the introduction of noxious plant pests such as blackberry and gorse. However, to mitigate introduction of other noxious plants, the areas that are disturbed will be monitored to ensure that other plant pests are not introduced in the area.

3.7 ARCHAEOLOGY

An archaeological reconnaissance survey was performed on June 8, 1990 by Cultural Surveys Hawaii, Inc., to assess the archaeological resources on the project site. A crew of two persons walked the site and explored the existing gullies. A few pylons were

found on the site, which was probably the location of older, above ground pipelines that serviced the upper Kula water system. However, these pylons are not considered historically significant. Other than the old pylons found on the site, the survey indicated that there was no evidence of sites of significance in the vicinity of the proposed reservoirs.

A. IMPACTS

Because there were no archaeological sites in the vicinity of the proposed reservoirs, impacts on the archaeological resources are not expected.

B. MITIGATION

Although there are no archaeological sites in the vicinity of the proposed reservoirs, during construction, if archaeological deposits are uncovered, construction will be suspended and the Department of Land and Natural Resources, Historic Sites Section, will be consulted.

3.8 AGRICULTURE

The State land use designation for the land on which the reservoirs will be built is "agriculture." The County zoning designation is "agriculture." The land is currently being utilized by the Haleakala Ranch Company for cattle grazing.

The State ALISH System (Agricultural Lands of Importance to the State of Hawaii) classifies agricultural lands into the following categories:

Prime Agricultural Land - Land which has the soil quality, growing season, and moisture supply needed to produce sustained yields of crops economically when treated and managed according to modern farming methods.

Unique Agricultural Land - Land that has the special combination of soil quality, location, growing season and moisture supply and is used to

produce sustained high quality and or high yields of a specific crop when treated and managed according to modern farming methods.

Other Important Agricultural Land - Land other than Prime or Unique Agricultural Land that is also of Statewide or local importance for agricultural use.

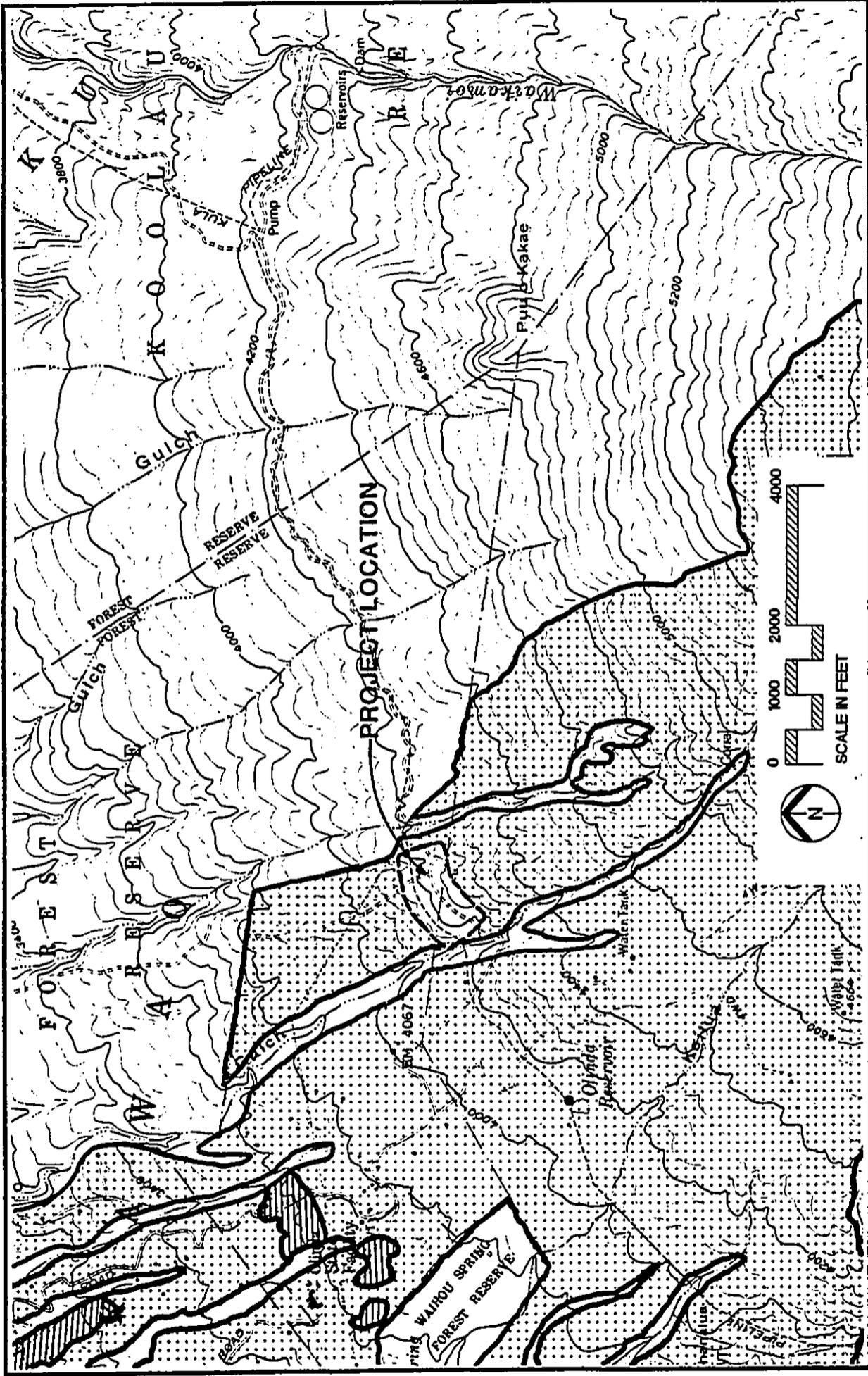
Lands not considered for classification as agricultural lands of importance to the State of Hawaii are designated "unclassified." This category of land includes land uses such as:

- Developed urban land over 10 acres.
- Natural or artificial enclosed bodies of water over 10 acres.
- Forest reserves.
- Public use lands (parks and historic sites).
- Lands with slopes in excess of 35 percent.
- Military installations, except undeveloped areas over 10 acres.

The ALISH system classifies most of the parcel as "other important agricultural lands" (see Figure 10). Two gulches which abut the property on the east and west are considered "unclassified" under the ALISH system.

A. IMPACTS

The new reservoirs will remove approximately 30 acres of pasture land for cattle grazing. The removal of agricultural lands will have a positive impact on the agricultural industry, because it will provide additional water storage capacity for agricultural use, especially during drought periods. Current losses in crop and livestock will be reduced by the water availability. These new reservoirs will improve the "upcountry" Maui water system and possibly reduce the occurrence of water use restrictions presently being experienced. Development of the new reservoirs is a permitted use on agricultural lands.



Kula Water System Reservoir
MAKAWAO, MAUI, HAWAII
 STATE OF HAWAII
 DEPARTMENT OF LAND AND NATURAL RESOURCES
 DIVISION OF WATER AND LAND DEVELOPMENT

LEGEND

| | |
|--|-----------------------------------|
| | Prime Agricultural Land |
| | Other Important Agricultural Land |
| | Unclassified |

FIGURE 10
ALISH MAP

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SECTION 4

THE SOCIO-ECONOMIC ENVIRONMENT AND RELATED IMPACTS

4.1 POPULATION CHARACTERISTICS

Of the four major islands in the Hawaiian island chain, Maui had the third largest resident population of 93,000 in 1988, (State of Hawaii Data Book, 1989). The Makawao District, which includes the Kula area, had a resident population of 25,400. Similar to the Lahaina District, Makawao nearly doubled its resident population during the period 1970 to 1980 from 9,979 to 19,005. Makawao had a 90.4 percent increase and Lahaina had an 86.2 percent increase in the resident population. Wailuku, the major district of Maui, had a 44.5 percent increase during this same period. In recent years, 1980 to 1988, the resident population of Makawao had increased by 33.7 percent, slightly more than the island-wide increase of 31.0 percent. Much of the increase during this period is a result of the growth in the visitor industry.

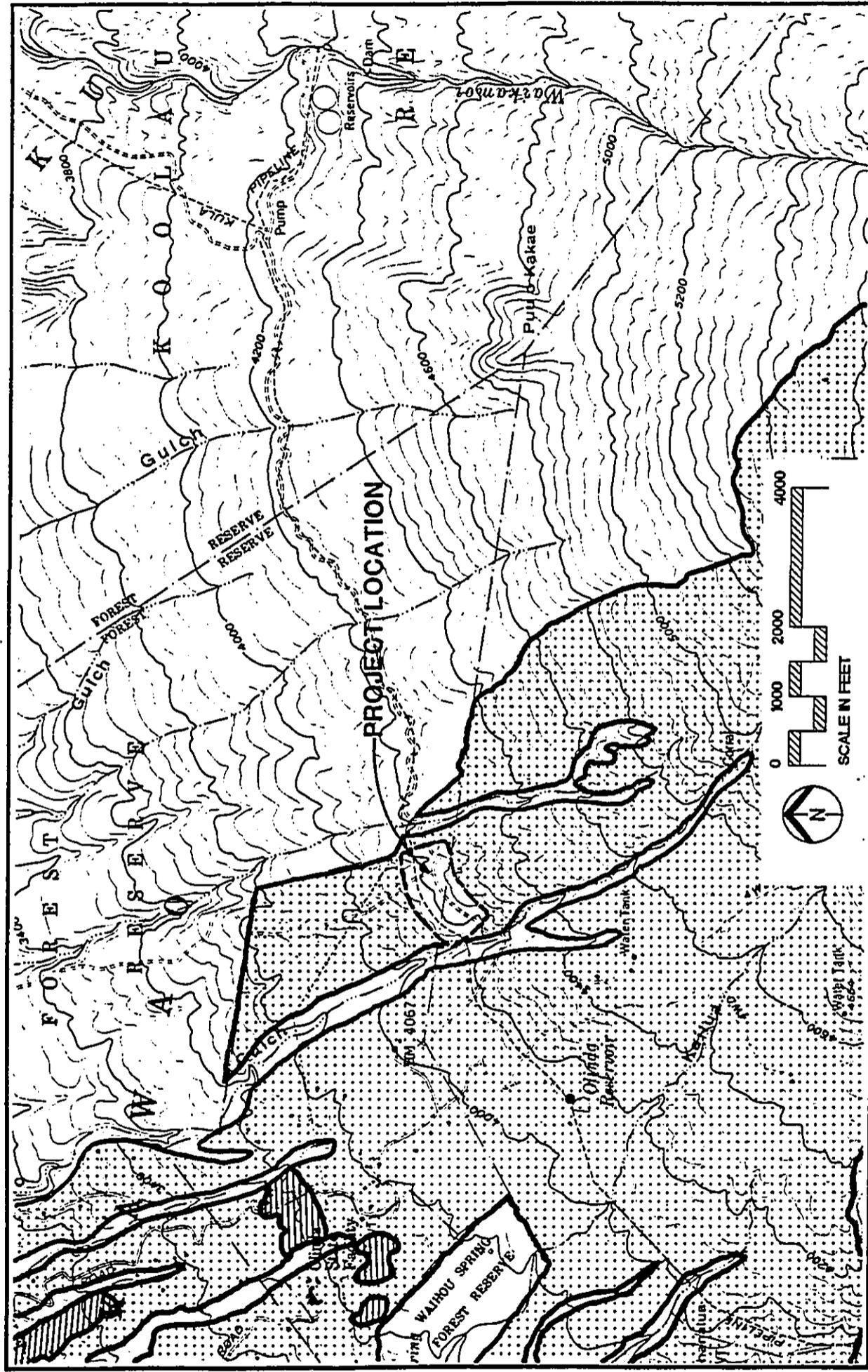
The dominant ethnic groups residing on Maui in 1980 was the Caucasians with 25,537, followed by the Japanese, Hawaiian and Filipinos with 15,441, 12,950 and 12,938 respectively. The remaining population consisted of: Race Not Classified (1635), Chinese (1419), Korean (236), Other Asian and Pacific Islander (214), Black (147), American Indian (106), Samoan (89), Guamanian (47), Asian Indian (46), Aleut (24), Vietnamese (13) and Eskimo (5).

A. IMPACTS

Because the new reservoirs will provide additional water storage and reduce the need to impose frequent water use restrictions on the current landowners of the upper Kula water system, people may be more encouraged to locate in Kula. Thus, the population of the area may indirectly increase. However, the proposed project will not increase the water supply of the upper Kula water system. New water supply sources are not planned, therefore, additional water will not be available for new landowners. The major purpose of the new reservoirs is to minimize the

CORRECTION

THE PRECEDING DOCUMENT(S) HAS
BEEN REPHOTOGRAPHED TO ASSURE
LEGIBILITY
SEE FRAME(S)
IMMEDIATELY FOLLOWING



Kula Water System Reservoir
MAKAWAO, MAUI, HAWAII
 STATE OF HAWAII
 DEPARTMENT OF LAND AND NATURAL RESOURCES
 DIVISION OF WATER AND LAND DEVELOPMENT

LEGEND

| | |
|--|-----------------------------------|
| | Prime Agricultural Land |
| | Other Important Agricultural Land |
| | Unclassified |

FIGURE 10
ALISH MAP
 R.M. TOWILL CORPORATION

3.9 VISUAL RESOURCES

The visual quality of the area is one of a typical rural setting with wide open pasturelands and scattered forested areas. Views from this project site are of the isthmus of Central Maui with the West Maui Mountains as a backdrop. Looking mauka, the views are of the rolling slopes looking up toward the summit of Haleakala Mountain.

A. IMPACTS

The visual quality of the terrain will not significantly be impacted. The reservoirs will have the appearance of a large lake within the open pasturelands. The reservoirs will be somewhat screened on the eastern side because the reservoir will be adjacent to a drainageway which is heavily forested and contains large trees. In addition, the reservoirs are not visible from public roadways or nearby residents. Access to the site is secured by locked gates to control public access.

SECTION 4

THE SOCIO-ECONOMIC ENVIRONMENT AND RELATED IMPACTS

4.1 POPULATION CHARACTERISTICS

Of the four major islands in the Hawaiian island chain, Maui had the third largest resident population of 93,000 in 1988, (State of Hawaii Data Book, 1989). The Makawao District, which includes the Kula area, had a resident population of 25,400. Similar to the Lahaina District, Makawao nearly doubled its resident population during the period 1970 to 1980 from 9,979 to 19,005. Makawao had a 90.4 percent increase and Lahaina had an 86.2 percent increase in the resident population. Wailuku, the major district of Maui, had a 44.5 percent increase during this same period. In recent years, 1980 to 1988, the resident population of Makawao had increased by 33.7 percent, slightly more than the island-wide increase of 31.0 percent. Much of the increase during this period is a result of the growth in the visitor industry.

The dominant ethnic groups residing on Maui in 1980 was the Caucasians with 25,537, followed by the Japanese, Hawaiian and Filipinos with 15,441, 12,950 and 12,938 respectively. The remaining population consisted of: Race Not Classified (1635), Chinese (1419), Korean (236), Other Asian and Pacific Islander (214), Black (147), American Indian (106), Samoan (89), Guamanian (47), Asian Indian (46), Aleut (24), Vietnamese (13) and Eskimo (5).

A. IMPACTS

Because the new reservoirs will provide additional water storage and reduce the need to impose frequent water use restrictions on the current landowners of the upper Kula water system, people may be more encouraged to locate in Kula. Thus, the population of the area may indirectly increase. However, the proposed project will not increase the water supply of the upper Kula water system. New water supply sources are not planned, therefore, additional water will not be available for new landowners. The major purpose of the new reservoirs is to minimize the

water storage problems during the drought period, therefore minimizing economic losses in crops and livestock. The new reservoirs will only store an additional 100 mg of water which can be collected during high rainfall periods for use during low rainfall periods. During dry periods, surface water collected through the streams and stream reaches is insufficient to meet the needs of the community, and the water storage supply is thus depleted to critical levels. The new reservoirs are proposed to minimize water use restrictions and provide existing consumers a continuous supply of water even during dry periods. During a severe drought, water use restrictions may still be needed to reduce the potential of critical water shortages. Thus, a significant increase in the population of the area is not expected.

The impact of this proposed action on other proposed system improvements planned in the "Water Use and Development Plan for the County of Maui," has not been assessed. Because this reservoir project does not contemplate the development of additional source, development in the Kula area will continue to be restricted for the present time, unless the County Water Department decides otherwise. The County Water Department will need to evaluate the timing and impact of this improvement as well as other planned improvements on the Kula water system.

B. MITIGATION

To mitigate and control a development surge in the area, incorporation of building restrictions within the County subdivision process could be implemented. As stated in the Makawao-Pukalani-Kula Community Plan, growth should be consistent with the rural and agricultural environment and the rate of growth should be monitored and phased with respect to the support facilities.

4.2 ECONOMIC CHARACTERISTICS

Maui's economy is relatively small compared to Oahu's economy. Agriculture is still an important part of Maui's economy. In recent years, however, tourism has grown considerably in economic importance. Current growth trends indicate that tourism will continue to grow and expand its role in the economy of Maui.

Maui had the second largest number of visitor arrivals in the State of Hawaii in 1987 of 1,884,050. During the period 1978 to 1988 the westbound visitor arrivals increased from 1,403,054 to 1,884,050, an increase of nearly 240,000 visitors.

The estimated direct visitor related expenditures in the State increased from \$2,094 million in 1977 to \$7,250 million in 1987. During this period, direct, indirect and induced visitor related expenditures in the State increased from \$3,643 million to \$12,028 million. Of the four major export industries (raw sugar and molasses, fresh and processed pineapples, defense expenditures, and visitor expenditures), the visitor expenditures accounted for about 73 percent of the direct export income for the State and 40 percent of the gross State product.

Agricultural lands consist of farms in crops, livestock, dairy products, poultry and aquaculture. In 1988, there were 4,650 farms in Hawaii totalling 1.72 million acres. Maui County accounted for 359,310 acres. The State total of all crop and livestock sales in 1988 amounted to approximately \$574 million. Crop sales for the State were \$485.4 million and livestock sales were \$88.6 million. Maui County accounted for \$138 million in all crop and livestock sales (\$128.8 million crop sales and \$9.1 million livestock sales).

Crop farms include sugar, pineapple, vegetables, fruits, coffee, macadamia nuts, taro, flowers and nursery products. Sugar and pineapple are two of Maui's major agricultural crops. Maui County had the highest value of unprocessed sugar in 1988 of \$66 million, followed by the County of Hawaii with \$60 million. Maui County and Oahu produce the bulk of the pineapple with a value of \$39 and \$68 million, respectively.

In 1988, livestock farms in the State produced cattle, milk and eggs, which totalled about \$88 million in sales. Total livestock sales for Maui County in 1988 was approximately \$9 million with cattle and hogs accounting for over \$5 million.

In 1988, Maui County had a labor force of 49,050 workers. Of this total, 47,600 persons were employed and 1,450 were seeking jobs. The per capita personal income for the County of Maui in 1988 was \$14,352, the second highest in the State. Oahu had the highest per capita income of \$16,412.

A. IMPACTS

The economy of the Upper Kula area may indirectly increase, because water will be available for agricultural use, especially during drought periods. During drought periods, crop and livestock losses are often high. With increased water storage capacity, losses during times of drought may be reduced, causing an increase in the island's economy.

The estimated construction cost for these new reservoirs is \$20 million. Short term jobs will be created and a construction contract will be awarded, further contributing to the economy of Maui.

SECTION 5

EXISTING PUBLIC FACILITIES AND SERVICES AND RELATED IMPACTS

5.1 FLOODING AND DRAINAGE

The streams or stream reaches in the vicinity of the project site are generally identified as intermittent. These intermittent stream reaches include Waiohiwi Gulch to the east and Kahakapao Gulch to the west. The Kahakapao Gulch abuts the western edge of the proposed reservoirs site.

Panel 150003 03300B of the Flood Insurance Rate Map (FIRM) was not printed, because there is minimal flooding in the vicinity of the proposed reservoirs because of the topography. The permeable soils are partly attributable to the relatively good drainage characteristics of the area.

A. IMPACTS

Short term impacts to the existing surface water runoff will occur during construction. Soil erosion from the removal of vegetation will increase the amount of silt and sediments entering the existing gulches during periods of rainfall, because there will be no vegetation to reduce the velocity of water and no vegetal root system to hold the soil in place.

B. MITIGATION

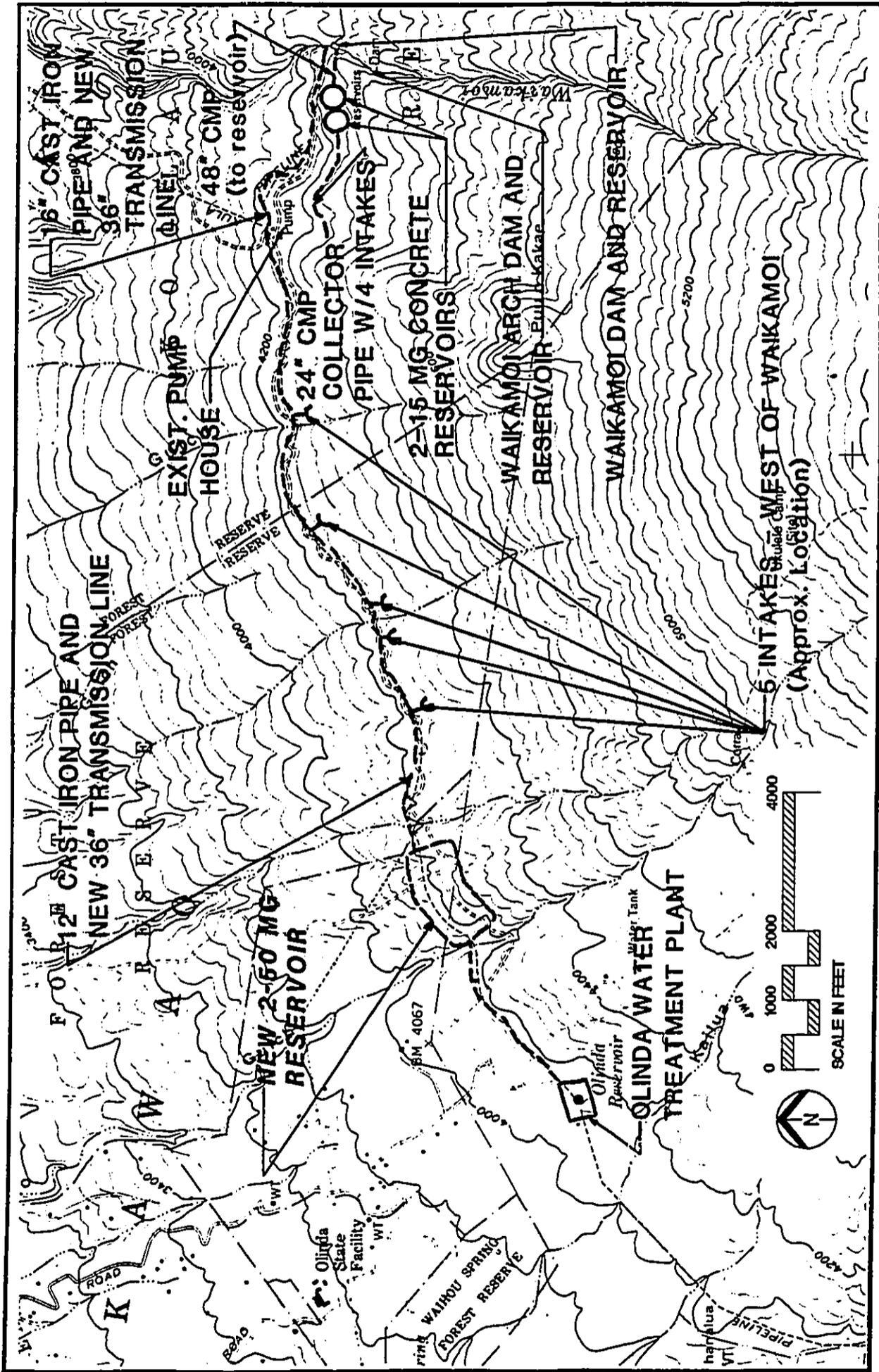
Drainage impacts because of construction will be mitigated by following the erosion control measures prescribed by an Erosion Control Plan required for approval by the County of Maui prior to construction. The Erosion Control Plan will delineate the sequence of construction and erosion control measures as required by the County of Maui and the State of Hawaii. The Erosion Control Plan may also include the construction of temporary silting basins to minimize the amount of eroded soil and reduce the volume of water that will leave the construction site. Earth moving during drier periods will be considered to ensure that runoff is controlled and effectively mitigated.

A grading plan will also be prepared to show the finished topographic conditions. The natural drainage pattern will be maintained, except for the area above the reservoirs where diversion ditches will be constructed to route the flows to existing drainageways to the east and west of the reservoir. These diversion ditches are needed to prevent surface runoff from entering the reservoirs. A grading permit will be obtained from the County Department of Public Works.

5.2 POTABLE WATER

The water system for the upper Kula area depends entirely on the collection of surface water. The primary water source for the upper Kula system originates at the Waikamoi Stream where an arch dam has been built. The water then flows into a boulder concrete dam and intake 400 feet downstream (see Figure 11). The Arch Dam has an impoundment capacity of 10 million gallons (mg). The Arch Dam is also connected via a 48-inch corrugated metal pipe (CMP) to two 15 mg concrete reservoirs. Two thousand linear feet of 24-inch CMP extends from the two reservoirs to the west and consists of 4 intakes. Existing 12-inch and 16-inch cast iron pipes from the 15 mg reservoirs connect to the Olinda Water Treatment Plant approximately 17,000 lineal feet to the west. Five small intakes along the 12-inch transmission line intercept the flow from intermittent streams to the Olinda Water Treatment Plant. An 8.5 mg reinforced concrete reservoir was constructed in Olinda to provide storage during periods of low rainfall.

The Waikamoi arch dam presently captures all the normal water flows from the Waikamoi Stream above the 4,320-foot elevation. Water impounded behind the Arch Dam is released through a sluice gate. Water flows down the Lower Waikamoi Dam (elevation of 4,280 feet) and then is diverted into the Waikamoi reservoirs. Thus, none of the stream flows continue beyond the dam. The additional water that will fill the two new reservoirs will probably occur during the high rainfall periods or during storm conditions.



Kula Water System Reservoir
MAKAWAO, MAUI, HAWAII
 STATE OF HAWAII
 DEPARTMENT OF LAND AND NATURAL RESOURCES
 DIVISION OF WATER AND LAND DEVELOPMENT

FIGURE 11
UPPER KULA
WATER SYSTEM
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Currently, a new 36-inch transmission main is being installed from the Waikamoi Reservoirs to the Olinda Water Treatment Plant. This new line will replace the existing 12-inch and 16-inch pipeline as the main transmission line from the primary raw water sources east of Waikamoi to the Olinda water treatment facility. This new 36-inch transmission line generally follows the alignment of the existing 12-inch and 16-inch pipelines. The existing 12-inch and 16-inch pipelines will remain as back-up transmission lines and as a supplementary source to collect flows from the five existing intakes west of Waikamoi.

The new reservoirs will be constructed approximately 3,500 feet east of the Olinda Water Treatment facility. The reservoirs will connect to the system by the newly constructed 36-inch transmission main.

At present, a dual water system for the Up-County area for agricultural and domestic use is in the planning stages. The development of the reservoirs will be part of that system.

A. IMPACTS

The new reservoirs will have a positive impact on the existing water system by providing additional water storage for the upper Kula water system. Current water use restrictions may become less frequent, especially during times of drought. The reservoirs will be able to store an additional 100 million gallons, which will increase the supply capacity from 1.7 million gallons per day (mgd) to 2.1 mgd which is the projected demand up to year 2000. The demand and design assumptions have been documented in the "Study of Surface Water Development for Maui Up-County Water Systems," prepared for the County Department of Water Supply, January 1985. Losses in crops and livestock during drought periods are expected to be minimized with the additional water storage capacity.

The existing water service will not be interrupted during the tie-in of the new reservoirs, because the Olinda reservoir has enough storage to ensure continuous service even if the transmission lines are closed off. In addition,

the 12-inch and 16-inch pipelines will serve as backup transmission lines should the tie-in take longer than anticipated. Thus, no impacts on existing water users are expected.

5.3 CIRCULATION

Access to the upper Kula water system facilities is via Olinda Road. The paved Olinda Road past Piiholo Street intersection narrows and terminates at an unpaved, private dirt road approximately 1 mile past the Olinda Prison Camp. This dirt road is presently being used to service existing facilities and will continue to be used to access the new reservoirs. The reservoirs are located in the vicinity of the this existing dirt road which currently services the upper Kula Water System. This access road will be realigned on the makai side of the reservoirs. The access road is secured by several locked gates to control public vehicular access.

A. IMPACTS

Short term impacts on the existing circulation system in the area will occur during the course of construction. Construction vehicles will access the site to transport construction materials and the construction crew via Olinda Road. Other construction equipment such as concrete trucks, bulldozers, backhoes, etc., will be contained on site. Because of the narrow pavement width of Olinda Road, large trucks may pose a hazard to the traffic circulation in the area and cause inconveniences for all who use this road.

B. MITIGATION

To minimize impacts during construction, construction signs should be posted prior to actual construction to notify the public of the upcoming construction activities. The existing residents in the area could also be notified prior to the construction start date, to inform them of the potential traffic congestion.

Because the excavated material will be contained on the site, dirt hauling trucks will also be contained on site. Additionally, construction equipment and vehicles, such as cement trucks, bulldozers, backhoes, etc. will also be contained on the site, further minimizing impacts on the public roadway system.

A traffic control plan will be prepared prior to the start of construction. Measures such as the posting of operational hours and the timely notification of residents along the road are a few of the means that can be employed to ensure safety on the roadway.

5.4 SOLID WASTE

Solid waste is presently being disposed of at the County-operated Central Maui Sanitary Landfill in Puunene. A solid waste disposal facility is also located at Makawao, however its use is restricted to non-commercial users only.

A. IMPACTS

The new reservoirs are not a source of solid waste therefore there will not be a significant adverse impact on the Central Maui Sanitary Landfill. A trash receptacle may be used by the maintenance crew periodically, however, the volume of solid waste which is produced is not expected to significantly affect the life of the existing landfill.

5.5 WASTEWATER TREATMENT AND DISPOSAL

Presently there is no sewage collection and disposal system serving the Kula area and no facilities are planned. The surrounding agricultural and residential developments, including Makawao town, use cesspools for domestic wastewater disposal. Portions of Pukalani are serviced by County-owned sewer lines, however the sewage is treated at a privately-owned sewage treatment plant.

A. IMPACTS

Because the new reservoir will not generate any wastewater, there will be no impacts on the existing wastewater treatment and disposal system.

5.6 POWER AND COMMUNICATION

Electrical power and telephone services are available at the Olinda Water Treatment Plant to the west of the project site. An overhead electrical power line also provides power to the existing booster pump station located to the east of the new reservoirs site.

The communication system presently being utilized is a telemetering system (radio). This communication system will continue to be used when the new reservoirs are constructed.

A. IMPACTS

Because the new reservoirs do not require any electrical power for their operation, the existing electrical system will not be impacted. The present system of communication via radio will continue to be used and will not have an impact on the existing telephone system.

5.7 FIRE, POLICE AND EMERGENCY MEDICAL SERVICES

The nearest County fire station is the Makawao Fire Station located in Makawao town. This fire station is located approximately 5 miles from the project site.

The Wailuku Police Station, headquarters of the Police Department, is the nearest police station. Police protection is provided in the area around the project site by patrolling police forces of the County Police Department. Other lands adjacent to the project site are in secured private lands or State controlled Forest Reserve areas.

Emergency medical services are coordinated through Maui Memorial Hospital located in Wailuku. A paramedic unit is stationed at the Makawao Fire Station and is in constant communication with the Hospital.

A. IMPACTS

The new reservoirs are not expected to adversely impact the existing fire, police and emergency medical facilities and services. Indirectly, because there will be additional water storage capacity, the new reservoirs will have a positive impact on the existing fire protection service. The new reservoirs will have the capacity to supply more water to fire fighting crews should a fire break out in the area.

5.8 SCHOOLS

Educational institutions in the vicinity of the project site include Makawao School, Haiku School, Pukalani Elementary School, Kula Elementary School, Kalama Intermediate School, St. Joseph School and Seabury Hall.

A. IMPACTS

Impacts on the schools in the vicinity are not anticipated.

SECTION 6

RELATIONSHIP TO PLANS, POLICIES AND CONTROLS

6.1 HAWAII STATE PLAN

The Hawaii State Plan was developed to serve as a guide for future development of the State of Hawaii in areas of population growth, economic benefits, enhancement and preservation of the physical environment, facility systems maintenance and development, and socio-cultural advancement. The Plan identifies, in general, the goals, objectives, policies and priorities for the development and growth of the State. Guidelines have been provided in the Plan to give direction to the overall development of the State.

The proposed project is consistent with the objectives and policies of the Hawaii State Plan. The following describes the relationship and compatibility of the proposed project with the overall plans for the State of Hawaii, as set forth in the Hawaii State Plan.

6.1.1 Population (HRS Section 226-5)

The new reservoirs are consistent with the population objective, because they will encourage an increase in economic activities in the Kula area by storing water for use during the dry periods. Losses of crop and livestock presently occur during the drought period, because of water shortages. With the increase in water storage capacity, crop and livestock losses during the dry period should decrease, thus increasing the economic activity in the area.

6.1.2 Economy (HRS Sections 226-6 and 7)

The economic objective, to improve the standard of living, is fulfilled by the construction of the new reservoirs, because people in the area will experience less water use restrictions during dry periods. Water shortages during drought periods has been a problem and a concern of the residents in the area for many years. The additional water storage capacity will reduce the concerns of the people and enhance their mental well being and improve their quality of life.

The new reservoirs will also support the agricultural industry by storing an adequate supply of water to accommodate the present needs. Economic productivity should increase, because crop and livestock losses from the lack of sufficient amounts of water supply during dry periods will be reduced.

Short term employment will be available during the course of construction, which will also contribute to the economy of Maui.

6.1.3 Physical Environment (HRS Sections 226-11, 12, and 13)

The new reservoirs satisfy the objectives of the physical environment, because they make prudent use of Hawaii's water resources. Presently, during high rainfall periods, much of the surface water empties into the ocean. The new reservoirs will store an additional 100 mg of water to meet the needs of the consumers.

Views will not be significantly impacted, because high structures are not planned which would obstruct views. The visual quality of the area may be enhanced, because the reservoirs will have the appearance of a large lake within an open field with scattered tree cover. In addition, because the project area is not accessible to the public and is not visible from public roadways or nearby residents, adverse visual impacts are not expected.

6.1.4 Facility Systems (HRS Sections 226-14 and 16)

This project complies with the facility systems objectives by improving the water service and storage capabilities of the water system and makes productive use of surface runoff for domestic and agricultural use. The area currently experiences critical water shortage problems during drought periods. The addition of the new reservoirs will help to alleviate this problem. The development objective of the new reservoirs is to adequately accommodate the water needs for domestic and agricultural use.

6.1.5 Socio-Cultural Advancement (HRS Sections 226-20, 22, 24, 25, 26 and 27)

The socio-cultural advancement objectives are satisfied by providing the community with a reserve of water resources which is necessary for basic individual health needs. The

new reservoirs will improve the public water supply service, thereby improving the social and economic well-being of the community.

Because more water will be in reserve for times of need, should a fire occur in the vicinity, water will be more available to extinguish the fire, thereby providing the people a safer community.

The socio-cultural advancement objectives and policies in relation to government are fulfilled by providing the necessary water resources for the community's needs and concerns. In addition, this DEIS is a public document, which provides for public information and response.

6.2 STATE FUNCTIONAL PLANS

The twelve State Functional Plans were adopted by the State Legislature in April 1984. These plans were formulated to specify in greater detail the policies, guidelines and priorities set forth in the Hawaii State Plan. The twelve functional plans include: Energy, Transportation, Water Resources Development, Historic Preservation, Recreational, Health, Education, Housing, Agriculture, Tourism, Higher Education and Conservation Lands. The following is a description of the proposed project as it relates to certain State Functional Plans.

6.2.1 State Energy Functional Plan

The State Energy Functional Plan will be satisfied by conserving fuel energy used by construction equipment because cement and dirt hauling trucks will not be using the public roadways during construction. These vehicles will be contained and operated on site.

The location of the reservoirs will allow the water to flow by gravity from the source into the reservoirs and then to the water treatment plant. Therefore, no electrical or fuel consuming equipment or devices will be needed for their operation.

6.2.2 State Transportation Functional Plan

Similar to the Energy Functional Plan the objective of the Transportation Functional Plan to promote energy conservation and transportation efficiency, will be fulfilled by containing and operating most of the construction equipment on site.

6.2.3 State Water Resources Development Functional Plan

The new reservoirs are in compliance with Water Resources Development Functional Plan, because they will provide additional water storage capacity in an area which experiences water storage during times of drought. Surface runoff will be stored in the reservoirs during the rainy season for use during the dry season.

6.2.4 State Health Functional Plan

The development of the new reservoirs will satisfy the objective of the State Health Functional Plan, because they will enhance the quality of the water resources in the area by providing for adequate storage capacity for use during low rainfall periods. People will not suffer from water dependent agricultural losses, which are presently being experienced.

6.2.5 State Agriculture Functional Plan

The nature of the existing uses in the vicinity of the new reservoir is largely agricultural (crops or livestock). The project will support the objectives of the Agricultural Functional Plan, because it will store sufficient water supply for agricultural activities serviced by the Upper Kula water system. Losses in crops and livestock, presently being experienced, will be minimized.

6.3 STATE LAND USE

The State Land Use Commission classifies the land on which the new reservoirs will be built "agriculture" (see Figure 12). The proposed project is compatible with the "agriculture" designation, thus, no change will be made to the State Land Use designation.

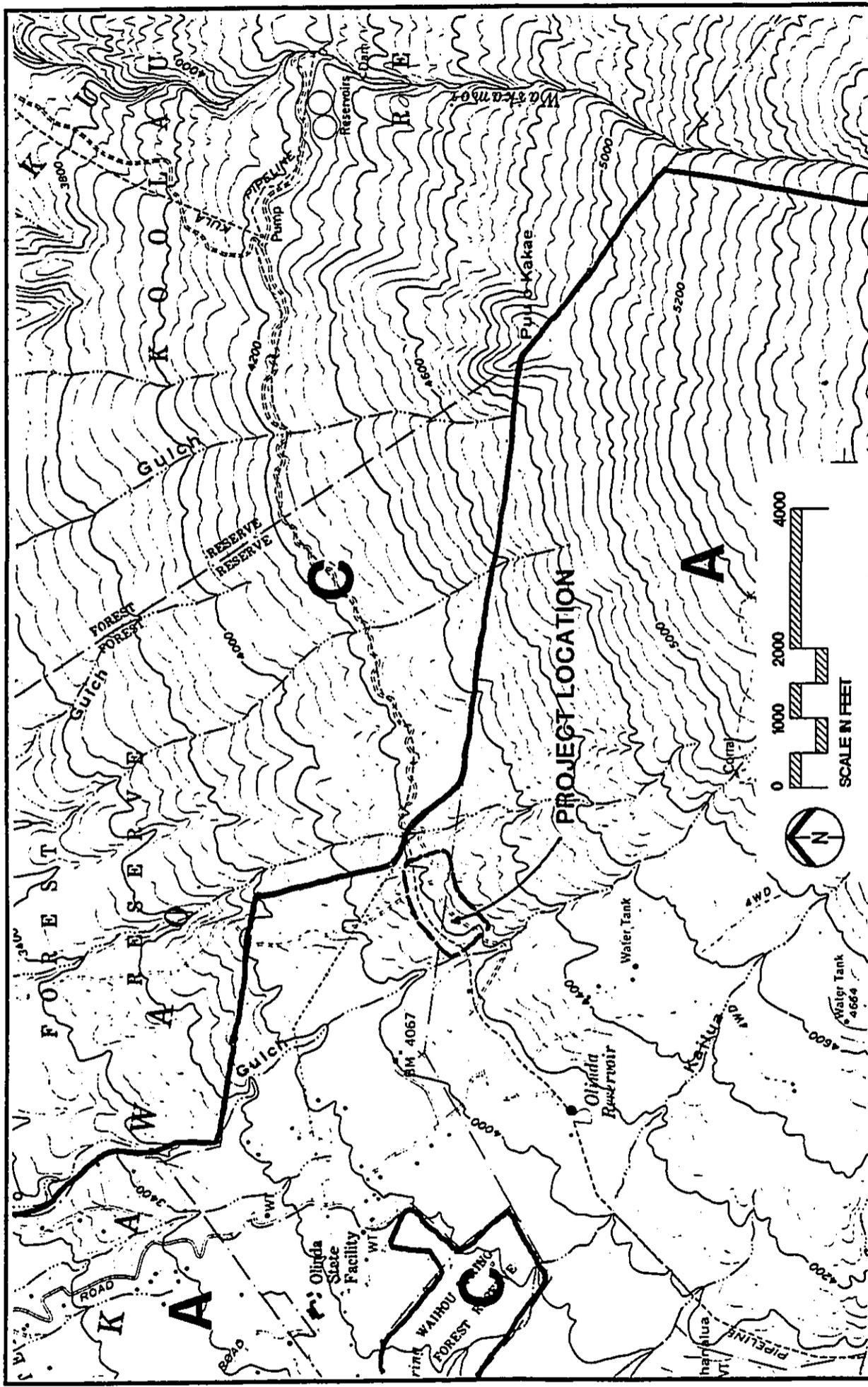


FIGURE 12

STATE LAND USE

Kula Water System Reservoir
MAKAWAO, MAUI, HAWAII
 STATE OF HAWAII
 DEPARTMENT OF LAND AND NATURAL RESOURCES
 DIVISION OF WATER AND LAND DEVELOPMENT

LEGEND

A Agricultural
 C Conservation

R.M. TOWILL CORPORATION

6.4 STATE WATER PLAN

The State Water Plan is being formulated as a major element of the State Water Code (HRS Chapter 174C) to accomplish several goals as follows:

1. The attainment of maximum reasonable-beneficial use of water;
2. The proper conservation and development of waters of the State;
3. The control of the waters of the State for such public purposes as navigation, drainage, sanitation, and flood control;
4. The attainment of adequate water quality as expressed in the state water protection and quality plans;
5. Implementation of the policies of the State Water Code.

The State Water Code's main objective is to "protect, control and regulate the use of Hawaii's water resources for the benefit of its people."

The Hawaii Water Plan will consist of four major plan elements: 1) Water Resources Protection Plan; 2) Water Use and Development Plans; 3) State Water Projects Plan; and 4) Water Quality Plan. Responsibility for the preparation of these plans will be shared by various State and County departments. These plan elements will be prepared and integrated into a master plan which will provide a comprehensive approach and list of actions to protect the State's water resources. The State Department of Land and Natural Resources is tasked to prepare, maintain and update the Water Resources Protection Plan and the State Water Projects Plan. Each county is responsible for the preparation of the Water Use and Development Plans for their county. These plans will be adopted by ordinance and updated and maintained by the counties. The State Department of Health will formulate the Water Quality Plan to cover all existing and potential sources of drinking water. The Department of Health will be responsible for maintenance and updating of the Water Quality Plan. These plan elements are currently being prepared by the various governmental agencies.

A draft report of the Maui County's Water Use and Development Plan was prepared in December 1989. The final report is planned for completion by June 30, 1990. The draft report indicated the need to improve the upper Kula water system, because of water shortages during drought periods. The plan projects growth in the water demand to the year 2010 at a yearly increase of 4.1 percent, based on the increase during the period 1980 to 1987. The upper and lower Kula water system used 2.98 mg per average day. In addition, 0.25 mg was pumped up from the Makawao system to supplement the water supply. By year 2010, the expected growth in water usage is projected to total 8.1 mgd. This estimate includes water losses of 18 percent to provide total required production to meet the requirements of real system operations.

To meet the growth rate of the Kula water system the plan recommends improvements of the intakes and increasing storage capacity with the addition of several new reservoirs. If needed, the Kamole Weir, located at elevation 1,100 in Halliimaile, can be used to supplement the system.

These improvements to the Kula system are intended to: 1) provide a 90-day drought security; 2) assist family type subdivisions; 3) provide for agricultural opportunities; 4) assist the Department of Hawaiian Home Lands with the subdivision of Keokea; and 5) assist existing users. The proposed improvements will not have direct benefits to the Hawaiian Home Lands in Keokea because additional improvements to the Upper Kula system need to be made. These improvements have yet to be programmed by the Department of Water Supply. The projects list of facilities includes the new 36-inch transmission line and repairs of existing intakes, which are presently being constructed, and the proposed 100 mg reservoir, which is the subject of this DEIS. Improvements recommended in the Maui County Water Development Plan for upper Kula are listed in Table 1. Construction of this new reservoir will implement the recommendations of the Water Use and Development Plan.

6.5 KULA RULE

In 1977, the County of Maui enacted the "Kula Rule" to regulate water distribution to the Upper and Lower Kula water system. This rule regulates the issuance of water meters and the approval of subdivision applications in the Upper and Lower Kula water area. The rule was put into effect because of the inadequate water system capacity, which often led to water use restrictions or expensive pumping costs from the water system below. This rule has been an effective means of controlling water demands in the area enabling the County to keep up with the improvements to meet the demands.

6.6 MAKAWAO-PUKALANI-KULA COMMUNITY PLAN

The Makawao-Pukalani-Kula Community Plan was adopted in 1987 to establish a program for implementing the County General Plan. The Community Plan contains objectives and policies specifically for the Makawao-Pukalani-Kula area. The Plan is comprised of recommendations for development in the socio-economic aspects, physical aspects, support systems and government. The "Water Distribution" subsection of the Community Plan recommends that reservoirs be developed at higher elevations. The project is directly related to this recommendation by constructing a 100 mg reservoir in the Upper Kula water system. Thus, the new reservoirs are being planned to support the Makawao-Pukalani-Kula Community Plan.

6.7 COUNTY ZONING

The proposed reservoirs are on land which has not been zoned by the County of Maui.

TABLE 1
UPPER KULA IMPROVEMENTS
(In Millions)

| PROJECT | EST. COST |
|-------------------------------|-----------|
| 36-Inch Transmission Pipeline | \$ 7.500 |
| 100 MG Kahakapao Reservoir | 13.000 |
| Intakes West of Waikamoi | .080 |
| Intake and Pipeline Repair | .420 |
| Expand Olinda Plan to 2.5 MGD | .315 |
| 50 MG Mahanalua Reservoir | 5.400 |
| 75 MG Waihou Reservoir | 12.000 |

Source: Draft "Executive Summary, Maui County Water Use and Development Plan," December 1989.

SECTION 7

RELATIONSHIP BETWEEN LOCAL SHORT TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG TERM PRODUCTIVITY

Approximately 30 acres of agricultural land currently used for cattle grazing will be utilized for the proposed reservoirs. This reduction in pasturelands will provide long term productivity in terms of the reduction in livestock and crop losses currently being experienced because of the water shortage. The agricultural economy will be enhanced by the increased yield in livestock and crop production.

Short term adverse impacts will occur during construction. However, by following the mitigative measures which will control the noise, air and water quality impacts of the construction activities, no long term environmental effects are anticipated. In addition, there are no residents within 2000 feet of the proposed reservoirs site, therefore, adverse impacts from construction activities on existing residents would be minimal. Traffic inconveniences may occur during the course of construction, because of construction traffic and the narrow pavement width of Olinda Road. To reduce impacts on the traffic circulation, signs will be posted and residents notified of the proposed construction traffic prior to the start of construction. Long term adverse effects are not expected after the reservoirs are constructed.

Because the existing water storage capacity is inadequate, water shortage often occurs during the dry periods. Therefore, water use restrictions have been enforced for many years to regulate the consumption of water. In addition, population in the area has gradually increased, however, the water system has had minimal upgrades to meet the growing demand, causing the water supply problems to become more critical. The new reservoirs will reduce the water supply problems by storing an additional 100 mg of water for use during dry periods and the concerns of the consumers will be minimized.

SECTION 8

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Construction of the proposed project will commit the necessary construction materials, energy, human and fiscal resources. Commitment of these resources will provide benefits to the residents of the region as discussed in previous sections. Additionally, the economy will be augmented through direct employment and its multiplier effects during construction and the increase in livestock and crop production.

Existing vegetation will be removed by the development of the reservoirs and the existing visual character of the area will be altered. However, the area is not visible from existing public roadways or existing residents, thus, adverse visual impacts are not expected.

Commitment of land for a long term period will foreclose the use of this land for other purposes as long as the reservoir remains in operation. Although the land will be committed for a long period of time, the proposed use could be changed in the future.

SECTION 9

LIST OF INDIVIDUALS, ORGANIZATIONS AND AGENCIES CONSULTED

9.1 STATE

Department of Land and Natural Resources
Office of Environmental Quality Control

9.2 COUNTY

Department of Water
Planning Department

9.3 INDIVIDUALS AND ORGANIZATIONS

Haleakala Ranch Company
Ms. Elaine S. Wender

SECTION 10
LIST OF PREPARERS

10.1 LIST OF PREPARERS

R. M. Towill Corporation

Chester Koga, Project Planner
Joanne Hiramatsu, Staff Planner

Warren Unemori Engineering, Inc.
(Engineering)

Warren Unemori, President

Char & Associates, Inc.
(Flora and Fauna)

Winona Char, Principal

Cultural Surveys Hawaii
(Archaeology)

Hallett H. Hammatt, Ph. D

Dames and Moore
(Soils Engineer)

S. K. Djou, P.E.

SECTION 11

PREPARATION NOTICE COMMENTS RECEIVED

420 WAIKAMULO RD. - SUITE 411
HONOLULU, HAWAII 96817-4941
(808) 842-1133
FAX (808) 842-1937

R. M. TOWILL CORPORATION

Engineering • Planning • Photogrammetry • Surveying • Construction Management • Energy Systems

May 22, 1990

Ms. Elaine S. Wender
SR. 93
Haiku, Hawaii 96708

Dear Ms. Wender:

SUBJECT: Kula Water System Reservoir EIS

Please find enclosed a copy of the preparation notice regarding the Kula Water System Reservoir. The Draft EIS is currently in preparation and will be available shortly.

Should you have any particular concerns regarding the project please do not hesitate to call on me.

Very truly yours,

Chester Koga

Chester Koga, AICP
Project Planner

Enclosure

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SR 93
Ha'iku, Hawaii 96708
March 18, 1990

Chester Koga
R.M. Towill Corp.
420 Waiakamilo Rd. #411
Honolulu, Hawaii 96817-4941

RE: EIS Preparation Notice; Kula Water System Reservoir

Dear Mr. Koga,

I wish to be a consulted party in the subject proposal. Please send me a copy of the EIS Preparation Notice and Environmental Assessment immediately. Please also send any other relevant materials, as well as the Draft and Final EIS when they are available.

Thank you.

Sincerely,

Blaine S. Wender

Blaine S. Wender

JOHN BLAINE
DIRECTOR



STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
445 SOUTH KING STREET, ROOM 1414
HONOLULU, HAWAII 96813

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TELEPHONE NO.
544-8815

OK

March 22, 1990

Chester Koga
R.M. Towill Corporation
420 Waiakamilo Rd #411
Honolulu, Hawaii 96817-4941

SUBJECT: ENVIRONMENTAL IMPACT STATEMENT PREPARATION NOTICE (EISPN)
for the proposed Kula Water System Reservoir

Dear Mr. Koga:

Thank you for the opportunity to review and comment on the above referenced EISPN. Please respond in the draft to the following comments:

1. Project Location:

How was the project site selected for the proposed development? Are any alternative sites available?

2. Soils:

Additional information on land spreading should be provided. Further exploration into alternative solutions for excess soil is requested.

3. Drainage:

A map of existing drainage patterns and of a proposed drainage plan should be provided. Describe how existing drainage patterns will be altered. Discuss adverse impacts and mitigative measures.

4. Biological Characteristics:

Flora and Fauna: Mitigative measures for any adverse impacts that are determined from conducted studies must be provided.

5. Traffic:

Discuss present road conditions of those intended to be used during the construction phase. Address the construction traffic impacts on the surrounding area. Are access roads capable of providing thorough-fare for large construction trucks and bulldozers? Will roads to the site be affected by truck traffic? Watering of unimproved roads may be necessary as mitigative measure for dust control. Provide mitigative measures for adverse impacts.

6. Noise:

Mitigative measures should be provided if adverse impacts to wildlife are determined from study.

7. Air Quality:

We suggest that as a mitigative measure to the anticipated air pollution, all equipment be maintained in proper working order to avoid extra emissions.

8. Water Quality:

Expand on the type of erosion control measures proposed.

9. Archeological Resources:

The study should provide an analysis of the long term and short term impacts if any resources are determined to be on site. Also, mitigative measures must be provided.

10. Additional Information Required: Provide a detailed vicinity map of the subject area.

If you have any questions, please phone Tracy Elliot-Yawn at 548-6915.

Sincerely,

Marvin Miura

Marvin F. Miura, Director
Office of Environmental Quality Control

15 12 11 10 9 8 7 6 5 4 3 2 1

SECTION 12
DRAFT EIS COMMENTS RECEIVED



**DEPARTMENT OF BUSINESS,
ECONOMIC DEVELOPMENT & TOURISM**

ENERGY DIVISION, 333 MERCHANT ST., 2ND FLOOR, HONOLULU, HAWAII 96813 PHONE: (808) 541-4088 FAX: (808) 531-3242

JOHN WATHEE
GOVERNOR
ROGER A. ULVELING
DEPUTY GOVERNOR
BARBARA LEM STANTON
DEPUTY DIRECTOR
LISLE S. MATSUOKA
DEPUTY DIRECTOR

R. M. TOWILL CORPORATION

420 WAIKAKAULO RD. - SUITE 411
HONOLULU, HAWAII 96817-4941
(808) 842-1133
FAX (808) 842-1937

Engineering • Planning • Photogrammetry • Surveying • Construction Management • Energy Systems

September 10, 1990

December 14, 1990

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The Honorable John Waihee
Governor, State of Hawaii
c/o Office of Environmental
Quality Control
465 South King Street
Honolulu, Hawaii 96813

Dear Governor Waihee:

Subject: DEIS Kula Water Systems Reservoirs
Hakawao, Maui THK: 2-4-16; Por, 1 and 2-16 por 2

We wish to inform you that we have no comments to offer on the subject environmental impact statement.

Thank you for the opportunity to review the document.

Sincerely,

Roger A. Ulveling
for Roger A. Ulveling

RAU:HHK/hk

cc: Division of Water Resource Management, DLNR
R. M. Towill Corporation

Mr. Roger Ulveling
Department of Business & Economic
Development
State of Hawaii
335 Merchant Street, Room 110
Honolulu, Hawaii 96813

Dear Mr. Ulveling:

SUBJECT: Draft EIS for Kula Water System Reservoirs
Kula, Maui, Hawaii

Thank you for your comments of September 10, 1990 relating to the proposed Kula Water System Reservoirs project. We appreciate your review of this document.

If you should have any additional comments or suggestions, please contact us.

Very truly yours,

Chester Koga
Chester Koga, AICP
Project Planner

cc: Division of Water Resource Management
Department of Land & Natural Resources

420 WAIKAKAEO RD. • SUITE 411
HONOLULU, HAWAII 96817-4941
(808) 842-1133
FAX (808) 842-1937

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December 14, 1990

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The Honorable John Waihee
Governor
c/o Office of Environmental
Quality Control
465 South King Street, Suite 104
Honolulu, Hawaii 96813

Attention: Dr. Bruce Anderson

Dear Governor Waihee:

Subject: Kula Water Systems Reservoirs

Thank you for the opportunity to review the subject document. We have no comments to offer.

Should there be any questions, please contact Mr. Ralph Yukumoto of the Public Works Division at 548-7192.

Respectfully,

Russel S. Nagata
RUSSEL S. NAGATA
State Comptroller

CT:jk
cc: DLNR Division of Water Resource Management
R. M. Towill Corporation

Mr. Russel Nagata
State Comptroller
Department of Accounting &
General Services
State of Hawaii
1151 Punchbowl Street
Honolulu, Hawaii 96813

Dear Mr. Nagata:

SUBJECT: Draft EIS for Kula Water System Reservoirs
Kula, Maui, Hawaii

Thank you for your comments of September 12, 1990 relating to the proposed Kula Water System Reservoirs project. We appreciate your review of this document.

If you should have any additional comments or suggestions, please contact us.

Very truly yours,

Chester Koga

Chester Koga, AICP
Project Planner

cc: Division of Water Resource Management
Department of Land & Natural Resources

JOHN WALKER
SECRETARY



RECEIVED

30 OCT 1 10:52

STATE OF HAWAII
DEPARTMENT OF EDUCATION
P. O. BOX 2388
HONOLULU, HAWAII 96804
DIV. OF WATER &
LAND DEVELOPMENT

OFFICE OF THE SUPERINTENDENT

September 13, 1990

CHARLES T. TOGUCHI
Superintendent

420 WAIKAMALO RD., SUITE 411
HONOLULU, HAWAII 96817-4941
(808) 842-1133
FAX: (808) 842-1937

R. M. TOWILL CORPORATION

Engineering • Planning • Photogrammetry • Surveying • Construction Management • Energy Systems

December 14, 1990

Mr. Charles T. Toguchi
Superintendent
Department of Education
State of Hawaii
P.O. Box 2380
Honolulu, Hawaii 96804

MEMO TO: Dr. Bruce Anderson, Acting Interim Director
Office of Environmental Quality Control

FR O My Charles T. Toguchi, Superintendent
Department of Education

SUBJECT: Kula Water System Reservoirs

The Department of Education supports the development of the subject reservoirs in Kula, Maui. We concur with section 5.8 that the public schools including Makawao Elementary, Haiku Elementary, Fukalani Elementary, Kula Elementary, and Kelema Intermediate will not be impacted.

The Department of Education plans to construct a new high school in the Upcountry area by September, 1994, and is concerned that the development of the school will be delayed if there is an insufficient supply of water. We estimate the need for the high school at 105,000 gallons per day plus fire flow requirements. The reservoirs would assure that the school will receive an adequate water supply.

Should there be any questions, please call the Facilities Branch at 737-4743.

CTT:LC:j1

cc: E. Imai
L. Lindsey
DLNR, Div. of Water Resource Management
R.M. Towill Corporation
ORQCS

Dear Mr. Toguchi:

SUBJECT: Draft EIS for Kula Water System Reservoirs
Kula, Maui, Hawaii

Thank you for your comments of September 13, 1990 relating to the proposed Kula Water System Reservoirs project. We appreciate your review of this document.

If you should have any additional comments or suggestions, please contact us.

Very truly yours,

Cherita Koga
Cherita Koga, AICP
Project Planner

cc: Division of Water Resource Management
Department of Land & Natural Resources

AN AFFIRMATIVE ACTION AND EQUAL OPPORTUNITY EMPLOYER



OFFICE OF STATE PLANNING

Office of the Governor

STATE CAPITAL, HONOLULU, HAWAII 96813 TELEPHONE (808) 548-1000

R. M. TOWILL CORPORATION

Engineering • Planning • Photography • Surveying • Construction Management • Energy Systems

420 WAIKUKUI RD • SUITE 411
HONOLULU, HAWAII 96817-4941
(808) 842-1123
FAX (808) 842-1837

September 20, 1990

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DIV. OF WATER & LAND DEVELOPMENT

OFFICE OF ENVIRONMENTAL QUALITY CONTROL

Dr. Bruce Anderson
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Dr. Anderson:

Subject: Draft Environmental Impact Statement
Kula Water System Reservoirs
Kula, Maui.

We have reviewed the Draft Environmental Impact Statement (EIS) for the construction of two 50 million gallon reservoirs in the Upper Kula area of Maui. The reservoirs and a disposal site for excess excavated material are planned on a portion of a 145-acre parcel owned by the State of Hawaii, Tax Map Key: 2-4-16: 1. A small portion of the reservoirs will be developed on an adjoining parcel owned by the Haleakala Ranch Co., Tax Map Key: 2-4-16: 4.

According to the EIS, the purpose of constructing these new reservoirs is to provide additional water storage capacity to minimize the need to impose water use restrictions, which is a common occurrence in Kula, especially during the drought periods.

We have reviewed the subject application and have no comments to offer at this time.

Thank you for the opportunity to comment.

Sincerely,

Harold S. Masumoto
Harold S. Masumoto
Director

December 14, 1990

Mr. Harold S. Masumoto
Director
Office of the Governor
Office of State Planning
State Capitol
State of Hawaii
Honolulu, Hawaii 96813

Dear Mr. Masumoto:

SUBJECT: Draft EIS for Kula Water System Reservoirs
Kula, Maui, Hawaii

Thank you for your comments of September 20, 1990 relating to the proposed Kula Water System Reservoirs project. We appreciate your review of this document.

If you should have any additional comments or suggestions, please contact us.

Very truly yours,

Chester Koga
Chester Koga, AICP
Project Planner

cc: Division of Water Resource Management
Department of Land & Natural Resources

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University of Hawaii at Manoa

Environmental Center
Crawford 317 • 2550 Campus Road
Honolulu, Hawaii 96822
Telephone (808) 948-7801

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October 11, 1990
RE:0562

Governor, State of Hawaii
c/o Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

Dear Governor:

Draft Environmental Impact Statement (EIS)
Kula Water System Reservoir
Makawao, Maui

The above referenced document addresses proposed construction of two 50-million gallon reservoirs in the Upper Kula area of the island of Maui to provide increased water storage capacity to meet demands for water during drought periods. The reservoirs will be fed by a newly installed 36 inch transmission main from the Waikamoi Arch Dam.

The Environmental Center has reviewed this Draft EIS with the assistance of Doak Cox, Hydrology/Geology; and William Grannis, Environmental Center.

We have identified the following area which we feel was inadequately addressed in the Kula Water System Reservoir Draft EIS.

Stream Flow

There is no discussion of the impacts of proposed additional water diversion and storage on the Waikamoi Stream below the intake at the Waikamoi Arch Dam. Waikamoi Stream is rated by the Hawaii Stream Assessment as a continuous flow stream of medium flow size (6 mgd). The proposed reservoirs 100 million gallon storage capacity represents almost 17 days of average flow for the Stream. Given the significant total volume of water to be removed from stream flow, particularly if it occurs during a dry period, we recommend that the final EIS include consideration and discussion of potential impacts of reduced stream flow to stream and wetland ecology.

10/15/90

AN EQUAL OPPORTUNITY EMPLOYER

Governor, State of Hawaii

- 2 -

October 11, 1990

Thank you for the opportunity to comment on this document. We look forward to your consideration and response to our comments.

Yours truly,

John T. Harrison, Ph.D.
Environmental Coordinator

cc: R.M. Tovill Corporation ✓
DLNR Division of Water Resource Management
Roger Fujioka
Doak Cox
William Grannis

HARRIBAL TAVARES
Mayor



COUNTY OF MAUI
PLANNING DEPARTMENT
250 S. HIGH STREET
WAILUKU, MAUI, HAWAII 96793
October 23, 1990

Governor John Waihee
c/o OEQC
465 South King St., Suite 104
Honolulu, HI 96813

contact: Dr. Bruce Anderson

Dear Governor Waihee:

Re: Draft Environmental Impact Statement (DEIS) for the Kula
Water System Reservoirs

We offer the following comments regarding the above referenced

DEIS:

1. The Environmental Impact Statement (EIS) Rules, Chapter 200 of Title 11, are rules of the Department of Health not the Office of Environmental Quality Control (see Section 1.1, page 1).
2. Section 11-200-17(e) of the EIS Rules state that a DEIS shall contain information regarding use of public funds and the phasing and timing of the action. Information regarding the phasing and timing of the proposed project is needed in order to assess short term or construction related impacts as well as potential secondary or long term impacts.
3. References are made throughout the document indicating compliance with County "Agriculture" zoning (Sections 1.2, 1.4.2, 3.8, 6.6). Maui County has not zoned the area in question.
4. Section 3.6 and the Botanical survey prepared for the proposed project (Appendix A) fail to give adequate attention to native ecosystems in the area. Section 11-200-17(g) of the EIS Rules state in part that "Special emphasis shall be placed on environmental resources that are rare or unique to the region and the project site..." (emphasis added). Nearby native forests, including the Nature Conservancy's Waikamoi Preserve, are some of the most pristine in the State. Conditions or mitigation measures should be addressed which would limit potential threats to these resources. One potential threat is the introduction of noxious weeds, such as the Banana Poka, from construction machinery.

CHRISTOPHER L. HART
Planning Director
JOHN E. MIN
Deputy Planning Director

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Governor John Waihee
October 10, 1990
Page 2

5. We have some concerns regarding the impact of construction related traffic on Olinda Road. Section 5.3 indicates that most of the construction related machinery would remain on-site, including concrete trucks. Given the rather large size of the two reservoirs (755 feet by 870 feet), each of which would be lined with an impervious layer of concrete, it would appear that a significant amount of concrete or concrete aggregate would need to be transported to the site. Further information regarding material transport activity and the time frame in which this would occur is necessary in order to assess potential impacts to Olinda Road residents and traffic.
 6. Consideration should be given to scheduling major excavation work during dry months of the year in order to reduce the possibility of erosion problems. The amount of material which would be excavated and disposed of is rather large and all mitigation measures which would reduce potential erosion problems should be addressed and implemented.
 7. On page 39, reference is made to the Department of Hawaiian Home Lands subdivision in "Keohea", the correct spelling is "Keokea".
 8. The Makawao-Pukalani-Kula Community Plan was adopted in 1987 not 1981 as mentioned on page 39.
 9. Perhaps the most significant concern we have with regards to this DEIS is the lack of full disclosure of cumulative effects of improvements to the Kula Water System. Section 4.1.A states that the proposed storage reservoirs are designed to meet the needs of existing system users and is not meant to accommodate demands of new development. This notion is used throughout the DEIS in order to dismiss potential land use or growth related impacts. The improved storage system, however, is only one component of system improvements for the Upper Kula system.
- Section 11-200-17(g) of the EIS rules provides in part that
- "specific reference to related projects, public and private, existent or planned in the region shall be included for purposes of examining the possible overall cumulative impacts of such actions." (emphasis added)
- Additionally, section 11-200-17(i) provides in part that
- "The interrelationships and cumulative environmental impacts of the proposed action and other related projects shall be discussed in the draft EIS. It should be

Governor John Waihee
October 10, 1990
Page 3

realized that several actions, in particular those that involve the construction of public facilities or structures (e.g., highways, airports, sewer systems, water resource projects, etc.) may well stimulate or induce secondary effects." (emphasis added)

This section further provides that

"The population and growth impacts of an action shall be estimated if expected to be significant, and an evaluation made of the effects of any possible change in population patterns or growth upon the resource base, including land use, water, and public services..."

While section 6.4 of the DEIS discusses proposed improvements to the Kula water system it fails to place the subject improvements into the context of an overall development program. In particular, elaboration is needed on how overall system capacity is affected by the previous addition of the 36 inch transmission main together with the proposed increase in storage. Furthermore, the discussion should address how this project in conjunction with future projects will affect system capacity. Estimates of the time frame for completion of this project as well as projected dates for future projects should be given. This information is essential in order to comply with the Makawao-Pukalani-Kula Community Plan which calls for the sequencing of future growth in up-country communities with the expansion of water supply and distribution systems.

10. No mention is made of the Maui County Board of Water Supply's "Kula Rule" which essentially is a moratorium on subdivision of lands and issuance of water meters in the area served by the Upper and Lower Kula water systems. The rule was put into effect based on the inadequate system capacity, most notably storage capacity, which often led to water use restrictions.

11. It is stated in Section 4.1.A, page 24, that "additional water will not be available for new developments." There is need for clarification of the terms "existing users" and "new development" as used in this section. Also, specific reference should be made regarding how these terms relate to the land use patterns of the Makawao-Pukalani-Kula Community Plan.

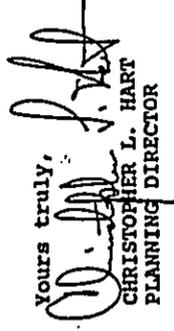
12. The design criteria assumptions which were used in determining the amount of storage needed should be made clear. Specific reference should be made to the Community Plan and the build-out assumptions which were used. Relatedly, the assumptions regarding the allocation of water to agriculture and non-agriculture (i.e. residential) uses should be made clear.

Governor John Waihee
October 10, 1990
Page 4

13. There should be discussion of the relation of the proposed improvements to the Department of Hawaiian Home Lands Keokea Subdivision. It appears from the wording of Section 4.1 that this subdivision would not be accommodated by the proposed improvements.

Thank you for the opportunity to provide comments on this DEIS.

Yours truly,



CHRISTOPHER L. HART
PLANNING DIRECTOR

cc: Andy Mondan, DLNR
Chester Koga, R.M. Towill Corp.
Rae Shikuma, DWS
Ann Takabuki
Rory Frampton

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R. M. TOWILL CORPORATION

Engineering • Planning • Photogrammetry • Surveying • Construction Management • Energy Systems

December 14, 1990

Mr. Chris Hart, Director
Planning Department
County of Maui
250 S. High Street
Wailuku, Hawaii 96793

Dear Mr. Hart:

SUBJECT: Draft EIS for Kula Water System Reservoirs
Kula, Maui, Hawaii

Thank you for your comments of October 23, 1990 relating to the proposed Kula Water System Reservoirs project. Your review and comments are appreciated. We would like to offer the following responses to your specific comments:

1. We will change the specific reference to the rules and regulations of the OEQC to those of the Department of Health.
2. The reservoirs are proposed to be developed in two phases. The first phase is scheduled for early 1991, with the second phase starting late 1991.
3. We will note in the EIS that the lands being proposed for the reservoirs are not zoned.
4. The site of the reservoirs are currently being used for pasture and we do not anticipate a change to the land use in the near future. The lands that were chosen for the reservoirs have been previously altered and have been affected by the introduction of non-native grasses and noxious plant pests such as blackberry and gorse. We share your concern for the introduction of banana poka into this area. The areas that are disturbed will be monitored to ensure that other plant pests are not introduced into the area.

Mr. Chris Hart, Director

-2-

December 14, 1990

5. The use of Olinda Road for the transport of construction supplies will cause inconveniences for all who use this road. In order to lessen the impact and to ensure safe movement of people and goods, a traffic control plan will be developed prior to the start of construction. Measures such as the posting of operational hours and the timely notification of residents along the road are a few of the means that can be employed to ensure safety on the roadway.
6. The scheduling of earth movement during "drier" periods have been considered. We appreciate your concern and every means available will be utilized to ensure that runoff is controlled and effectively mitigated.
7. We have noted the mis-spelling of Keokea from Keohea.
8. We will correct our reference to the date when the Makawao-Pukalani-Kula Community Plan was adopted.
9. The Kula Reservoirs are part of an overall system improvements plan for the Kula area. The planned improvements have been cited by reference in the "Water Use and Development Plan for the County of Maui". The impact of this proposed action on other proposed improvements has not been assessed. Because this reservoir project does not contemplate the development of additional source, development in the Kula area will continue to be restricted for the present time unless the County Water Department decides otherwise. The County Water Department will need to evaluate the timing and impact of this improvement as well as other planned improvements on the Kula water system.
10. We will include a section on the "Kula Rule" in the final EIS.
11. The proposed water improvements are being planned in support of the Makawao-Pukalani-Kula Community Plan. The principal beneficiaries of the proposed improvements are those landowners currently on the upper Kula system. The proposed improvements will not benefit people in Pukalani or Makawao. Indirectly, the entire Kula-Makawao service area will be affected because water is not expected to be pumped from Waioa Ditch to the Upper Kula water system during times of drought.
12. The design criteria for the development of the proposed reservoirs have assumed a desired demand level of 2.1 million gallons per day by the year 2000. The demand and design assumptions have been documented in the "Study of Surface Water Development for Maui Up-County Water Systems", prepared for the County Department of Water Supply, January 1985.

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December 14, 1990

Mr. Joseph K. Conant
Executive Director
Housing Finance & Development Corporation
Seven Waterfront Plaza, Suite 300
500 Ala Moana Boulevard
Honolulu, Hawaii 96813

Dear Mr. Conant:

SUBJECT: Draft EIS for Kula Water System Reservoirs
Kula, Maui, Hawaii

Thank you for your comments of October 23, 1990 relating to the proposed Kula Water System Reservoirs project. We appreciate your review of this document.

If you should have any additional comments or suggestions, please contact us.

Very truly yours,

Chester Koga

Chester Koga, AICP
Project Planner

cc: Division of Water Resource Management
Department of Land & Natural Resources

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JOSEPH K. CONANT
EXECUTIVE DIRECTOR

IN REPLY REFER TO:

STATE OF HAWAII
DEPARTMENT OF BUDGET AND FINANCE
HOUSING FINANCE AND DEVELOPMENT CORPORATION
SEVEN WATERFRONT PLAZA, SUITE 300
500 ALA MOANA BOULEVARD
HONOLULU, HAWAII 96813
FILE (808) 842-4941

90:PLNG/5061jt

October 23, 1990

To: Governor, State of Hawaii
c/o Office of Environmental Quality Control
From: *Joseph K. Conant*
Executive Director

Subject: DRAFT ENVIRONMENTAL IMPACT STATEMENT (EIS) FOR THE
KULA WATER SYSTEMS RESERVOIRS

Thank you for the opportunity to comment.

We have reviewed the draft EIS for the subject Kula Water Systems Reservoirs project and have no substantive comments to offer.

JT:eks

c: Mr. Andy Monden, DLNR
Mr. Chester Koga, R.M. Towill Corp.

APPENDIX A
BOTANICAL SURVEY.

**BOTANICAL SURVEY
KAHAKAPAO RESERVOIRS
OLINDA, MAKAWAO DISTRICT, MAUI**

**BOTANICAL SURVEY
KAHAKAPAO RESERVOIRS
OLINDA, MAKAWAO DISTRICT, MAUI**

INTRODUCTION

The two proposed reservoirs, holding 50 million gallons each, will help to increase the reliability of the water supply to upcountry Maui. The Kahakapao reservoirs as well as the proposed access roads and diversion ditches, will cover approximately 50 acres. The project site is located between the 4,100-foot and 4,350-foot elevation contours in open pasture lands on the slopes of Haleakala in the Makawao District.

by

Winona P. Char

**CHAR & ASSOCIATES
Botanical/Environmental Consultants
Honolulu, Hawaii**

Field studies to assess the botanical resources found on the project site were conducted on 17 May 1990. The primary objectives of the survey were to (1) describe the plant communities or vegetation types; (2) inventory the vascular flora; and (3) search for threatened and endangered plant species protected by federal and/or state laws.

SURVEY METHODS

Prior to undertaking the field studies, a search was made of the pertinent literature to familiarize the principal investigator with other botanical studies conducted in the general area. Topographic maps as well as orthophotoquads were examined to determine vegetation patterns, terrain characteristics, access, boundaries, and reference points.

Access to the site is along an existing dirt road which services

**Prepared for: R. M. TOWILL CORPORATION
May 1990**

the Upper Kula water system and the State forest reserves.

A walk-through survey method was used. The small gulch located on the eastern portion of the site was surveyed more intensively as it harbors a number of native plant species. Notes were made on plant associations and distribution, substrate types, topography, exposure, etc. Plants were identified in the field; plants which could not be positively determined were collected for identification in the herbarium and for comparison with the most recent taxonomic literature.

DESCRIPTION OF THE VEGETATION

The ±50-acre project site is found on Olinda loam soil, 12 to 20 percent slopes (Foote et al. 1972). This soil type occurs on smooth, intermediate to high mountain slopes. The surface layer consists of dark, reddish-brown loam, about 6 inches thick; subsoil, about 5 inches thick, is dark reddish-brown and yellowish-red silty clay. Below this is yellowish-red and reddish-brown silty clay loam and gravelly silty clay loam. All these overlay slightly weathered basic igneous rock. A representative profile of this soil type can be seen on some of the steep slopes of the small gulch located on the property. In many places, the gulch floor has been eroded down to the weathered rock.

Portions of the site were surveyed by the State's Division of Forestry and Wildlife in preparation of an Environmental Impact Statement for the Kula water system improvements (State of Hawaii 1988). No listed threatened and endangered plants were located during that survey.

On the ±50-acre site, vegetation consists of pasture land and gulch vegetation; these are discussed in detail below. A check-list of species found during the field studies is presented at

the end of this report.

Pasture Land

Pasture land is found on the somewhat gently rolling slopes of the project site and consists primarily of sweet vernal grass (Anthoxanthum odoratum), African dropseed (Sporobolus africanus), and white clover (Trifolium repens). Locally common, in places, is carpet grass (Axonopus fissifolius). Scattered throughout the pasture land are clumps of kilau (Pteridium aquilinum var. decompositum), a native fern; hairy cat's-ear (Hypochoeris radicata), velvet grass (Holcus lanatus), kikuyu grass (Pennisetum clandestinum), and orchardgrass (Dactylis glomerata).

Where the grass-legume cover has been disturbed, as along the roadsides and recently bulldozed areas, Lotus subbiflorus, Dallis grass (Paspalum dilatatum), Kyllinga brevifolia, and two species of rush, Juncus planifolius and Juncus af. lenuis, are usually found.

Gulch Vegetation

A small gulch is found on the eastern portion of the site. The gulch provides habitat for a number of native species, some of which are quite abundant here. Among the most numerous natives are koa (Acacia koa), pilo shrubs (Coprosma ochracea), and two ferns, the 'ama'u (Sadleria cyatheoides) and lau-kahi (Dryopteris af. vallichiana). Other natives found occasionally in the gulch area are the native raspberry or 'akala (Rubus hawaiiensis), Luzula hawaiiensis (especially on steep, open gulch slopes), ho'i'o (Diplazium sandwichiannum), and palapalai (Microlepia strigosa). Less frequently seen are puhiawe (Styphelia tameiameia), 'ohelo (Vaccinium calycinum), the epiphytic pakahakaha fern (Pleopeltis thunbergiana), hoi-kuahivi (Smilax melastomifolia), 'ahu'ava (Mariscus hypochlorus), and 'akolea (Diplazium microphyllum). One tree of mamane (Sophora chrysophylla) can be

found on the edge of the gulch.

The introduced Florida blackberry (Rubus argutus) forms a dense tangle on the bottom and sides of the gulch where it is less steep. Also common in the sunnier portions of the gulch are the pasture grasses previously mentioned. A few large peach trees are found near the concrete columns for the old pipeline.

DISCUSSION AND RECOMMENDATIONS

Pasture land vegetation, composed primarily of a mixture of various introduced range grasses and legumes such as sweet vernal grass, orchardgrass, African dropseed, and white clover, covers the majority of the site proposed for the reservoirs. A small gulch which supports a mixture of native and introduced species is found on the eastern portion of the project site. Among the natives, shrubs of pilo, koa trees, and two ferns, lau-kahi and 'ama'u, are common. Florida blackberry, an introduced species, forms a dense, prickly thicket among the other plants.

A total of 47 species were inventoried during the field studies. Of these, 28 (60%) are introduced or alien; 1 (2%) is possibly of early Polynesian introduction; and 18 (38%) are native. Of the natives, 13 are endemic, that is, they are found only in the Hawaiian Islands, and 5 are indigenous, that is, they occur throughout the islands and the Pacific in similar habitats. Almost all the natives are restricted to the small gulch on the project site.

None of the native plants are officially listed threatened and endangered species (U. S. Fish and Wildlife Service 1989); nor are any proposed or candidate for such status (U. S. Fish and Wildlife Service 1990). All can be found within the wet forests of the adjacent forest reserve lands and the Maikamoi preserve.

As the majority of the project site consists of pasture land and the native species found in the small gulch on the property also occur commonly throughout the wet forests of Haleakala, there is not expected to be a significant negative impact on the botanical resources of the site. There are no botanical reasons to impose any restrictions, conditions, or impediments to the development of the site. If landscaping is to be undertaken, then use of native species, as represented in the small gulch area, should be considered. Native plants of ornamental value include koa, pilo, mawane, 'akala, 'ama'u, and lau-kahi.

LITERATURE CITED

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| SCIENTIFIC NAME | COMMON NAME | STATUS | COMMUNITY | |
|---|----------------------------|--------|-----------|---|
| | | | P | R |
| FERNS AND FERN ALLIES | | | | |
| ASPIDIACEAE (Shieldfern Family) | | | | |
| Dryopteris aff. wallichiana (Spreng.) Hyl. | lau-kahi | I | - | + |
| ATHYRIACEAE (Athyrium Family) | | | | |
| Athyriopsis japonica (Thunb.) Ching | athyriopsis | X | - | + |
| Diplazium microphyllum (J. Sm.) Alston | 'akolea | E | - | + |
| Diplazium sandwichianum (Presl) Diels | ho'i'o | E | - | + |
| BLECHNACEAE (Blechnum Family) | | | | |
| Sadleria cyatheoides Kaulf. | 'ama'u | E | - | + |
| DENNSTAEDTIACEAE (Dennstaedtia Family) | | | | |
| Microlepia strigosa (Thunb.) Presl | palapalai | I | - | + |
| GLEICHENIACEAE (Vine Fern Family) | | | | |
| Dicranopteris linearis (Burm.) Underw. | uluhe | I | - | + |
| HEMIONITIDACEAE (Gold Fern Family) | | | | |
| Pityrogramma calomelanos (L.) Link | gold fern | X | + | + |
| HYPOLEPIDACEAE (Bracken Fern Family) | | | | |
| Pteridium aquilinum var. decompositum (Gaud.) Tryon | kilau, kilau-pueo | E | + | + |
| POLYPODIACEAE (Common Fern Family) | | | | |
| Pleopeltis thunbergiana Kaulf. | pakahakaha, 'ekaha-'akolea | I | - | + |

PLANT SPECIES LIST -- Kahakapao Reservoirs, Makawao, Maui

Following is a checklist of all those vascular plant species inventoried during the field studies. Plant families are arranged alphabetically within each of three groups: Ferns and Fern Allies, Monocots, and Dicots. Taxonomy and nomenclature of the Ferns and Fern Allies follow Lamoureaux (1984); the flowering plants (Monocots and Dicots) follow Wagner *et al.* (1990). In most cases, common English and/or Hawaiian names given follow St. John (1973) or Porter (1972).

For each species, the following information is provided:

1. Scientific name with author citation.
2. Common English and/or Hawaiian name, when known.
3. Biogeographic status. The following symbols are used:
E = endemic = native only to the Hawaiian Islands
I = indigenous = native to the islands and also to one or more other geographic area(s)
P = Polynesian = plants of Polynesian introduction prior to Western contact (1778); not native
X = introduced or alien = all those plants brought to the islands intentionally or accidentally after Western contact; not native.
4. Presence (+) or absence (-) of a particular species within each of two plant communities recognized on the project site (see text for discussion):
P = pasture land
R = gulch

| <u>SCIENTIFIC NAME</u> | <u>COMMON NAME</u> | <u>STATUS</u> | <u>COMMUNITY</u> | |
|--|----------------------|---------------|------------------|----------|
| | | | <u>P</u> | <u>R</u> |
| THELYPTERIDACEAE (Wood Fern Family) | | | | |
| Christella parasitica (L.) Levl. | wood fern | X | - | + |
| MONOCOTS | | | | |
| CYPERACEAE (Sedge Family) | | | | |
| Kyllinga brevifolia Rottb. | kyllinga, kili'o'opu | X | + | - |
| Mariscus hypochlorus (Hillebr.) C. B. Clarke | 'ahu'awa | E | - | + |
| JUNCACEAE (Rush Family) | | | | |
| Juncus planifolius R. Br. | rush | X | + | - |
| Juncus af. tenuis Willd. | rush | X | + | - |
| Luzula hawaiiensis var. glabrata (Hillebr.) Degener & I. Degener | | E | - | + |
| POACEAE (Grass Family) | | | | |
| Anthoxanthum odoratum L. | sweet vernal grass | X | + | + |
| Axonopus fissifolius (Raddi) Kuhl. | carpet grass | X | + | - |
| Dactylis glomerata L. | orchardgrass | X | + | + |
| Eragrostis brownii (Kunth) Nees ex Steud. | | X | + | - |
| Holcus lanatus L. | velvet grass | X | + | + |
| Paspalum dilatatum Poir | Dallis grass | X | + | - |
| Pennisetum clandestinum Chiov. | kikuyu grass | X | + | - |
| Sacciolepis indica (L.) Chase | Glenwoodgrass | X | + | + |
| Sporobolus africanus (Poir.) Robyns & Tournay | African dropseed | X | + | + |
| SMILACACEAE (Smilax Family) | | | | |
| Smilax melastomifolia Sm. | hoi-kuahivi | E | - | + |

| <u>SCIENTIFIC NAME</u> | <u>COMMON NAME</u> | <u>STATUS</u> | <u>COMMUNITY</u> | |
|--|-----------------------------|---------------|------------------|----------|
| | | | <u>P</u> | <u>R</u> |
| DICOTS | | | | |
| ASTERACEAE (Daisy Family) | | | | |
| Ageratina adenophora (Spreng.) R. King & H. Robinson | Hamakua pamakani | X | - | + |
| Hypochoeris radicata L. | hairy cat's-ear, gosmore | X | + | + |
| EPACRIDACEAE (Epacris Family) | | | | |
| Styphelia tameiameia (Cham.) F. Muell. | pukiawe | I | + | + |
| ERICACEAE (Heath Family) | | | | |
| Vaccinium calycinum Sm. | 'ohelo | E | - | + |
| FABACEAE (Pea Family) | | | | |
| Acacia koa A. Gray | koa | E | - | + |
| Lotus subbiflorus Lag. | | X | + | + |
| Melilotus sp. | | X | + | - |
| Sophora chrysophylla (Salisb.) Seem. | mamane | E | - | + |
| Trifolium repens L. | white clover | X | + | + |
| Ulex europaeus L. | gorse, furze | X | + | - |
| LAMIACEAE (Mint Family) | | | | |
| Prunella vulgaris L. | self-heal | X | - | + |
| ONAGRACEAE (Evening Primrose Family) | | | | |
| Epilobium billardierianum ssp. cinereum (A. Rich.) Raven & Engelhorn | willow herb | X | - | + |
| OXALIDACEAE (Wood Sorrel Family) | | | | |
| Oxalis corniculata L. | yellow wood sorrel | P? | - | + |

| <u>SCIENTIFIC NAME</u> | <u>COMMON NAME</u> | <u>STATUS</u> | <u>COMMUNITY</u> | |
|---|---|---------------|------------------|----------|
| | | | <u>P</u> | <u>R</u> |
| PIPERACEAE (Pepper Family) Peperomia cookiana C. DC. | 'ala'alawainui | E | - | + |
| PLANTAGINACEAE (Plantain Family) Plantago lanceolata L. | narrow-leaved plantain | X | + | - |
| POLYGONACEAE (Buckwheat Family) Rumex acetosella L. | sheep sorrel | X | - | + |
| ROSACEAE (Rose Family) Prunus persica (L.) Batsch. Rubus argutus Link | peach | X | - | + |
| Rubus hawaiiensis A. Gray | prickly Florida black- berry 'akala | X E | + | + |
| RUBIACEAE (Coffee Family) Coprosma ochracea W. Oliver | pilo | E | - | + |
| SCROPHULARIACEAE (Snapdragon Family) Verbascum thapsus L. | mullein | X | + | - |

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APPENDIX B

ARCHAEOLOGICAL RECONNAISSANCE

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ARCHAEOLOGICAL RECONNAISSANCE
SURVEY FOR THE PROPOSED KAHAKAPAO RESERVOIRS
KULA, MAUI, HAWAII
TMK 2-4-16:01 AND TMK 2-3-05:4

By
DOUGLAS F. BORTHWICK, B.A.

Prepared For
R. M. TOWILL CORPORATION

By
DR. HALLETT H. HAMMATT, PH.D.
CULTURAL SURVEYS HAWAII

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Typing was performed by Charlotte Cordes. A special mahalo to Dr. Hallett H. Hammatt for his continued guidance and support.

I. INTRODUCTION

At the request of R. M. Towill Corporation an archaeological reconnaissance survey was conducted for the proposed Kahakapao Reservoirs, Kula, Maui. The reservoirs are to be part of the Kula Water System improvements which also includes installation of a new 36 inch pipeline.

The reconnaissance survey covered some 60+ acres which included the reservoir and spoils (excess excavated material) areas. The project area is situated at an elevation range of 3,600 to 4,300 feet just west of the Makawao Forest Reserve and east of the former Olinda Prison Camp (Figs. 1-4).

The project area is characterized by gently sloping ridges and shallow gullies.

Vegetation is almost exclusively low pasture grasses except in the bottom of the gullies. The gullies contain some tree ferns, blackberry and in one, a few small trees of native Koa (Acacia Koa). Because of the low grasses, ground visibility was excellent (Figs. 5-8).

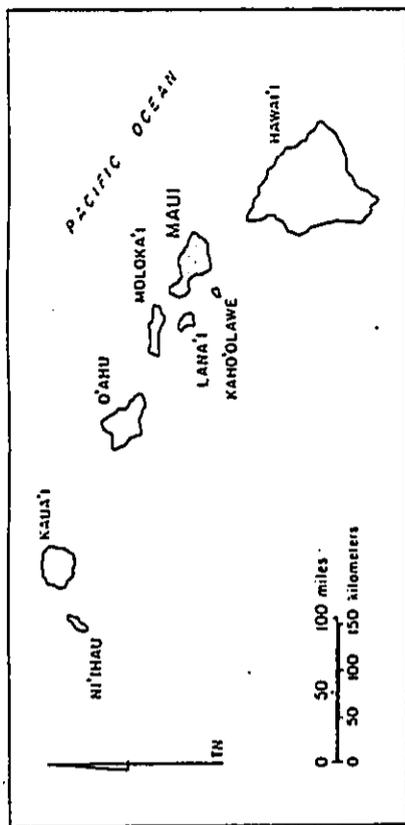


FIGURE 1
Map of the State of Hawaii

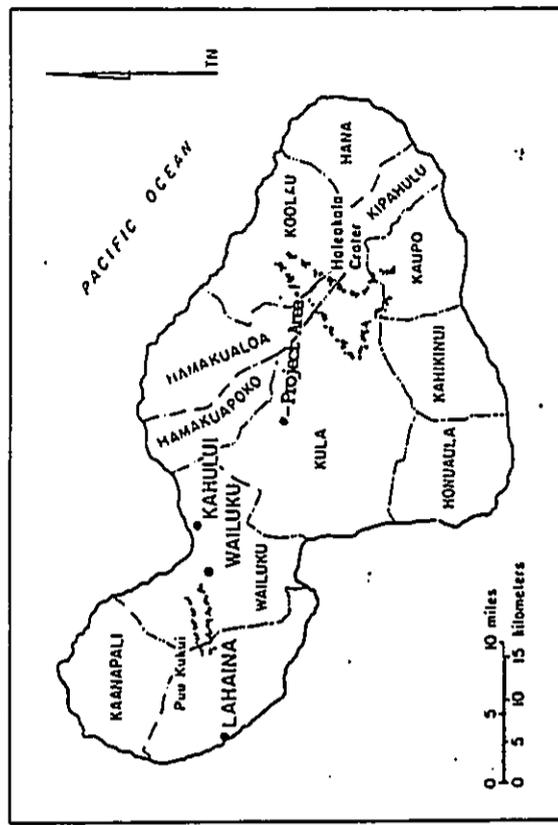


FIGURE 2
General Location Map, Maui Island



Figure 5 General View Project Area, Existing
Dirt Road (View to South)



Figure 6 General View, Shallow Gully with Ferns
and Koa (View to South)

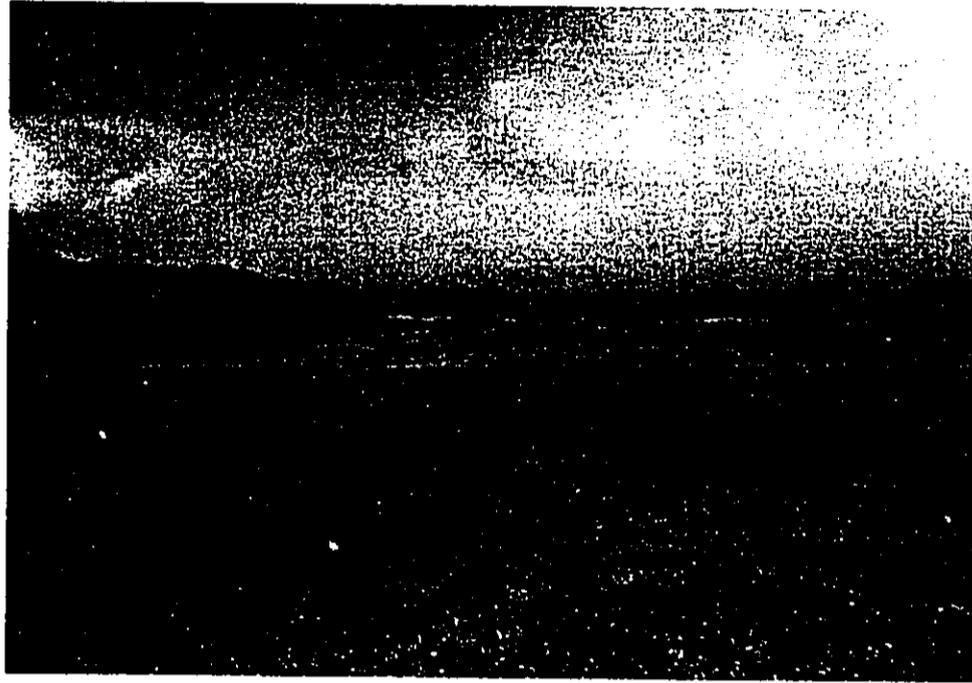


Figure 7 General View, Looking Makai (North)



Figure 8 General View, Looking Mauka (East)

II. PREVIOUS ARCHAEOLOGICAL RESEARCH

To the author's knowledge the only known archaeological work specific to the project area was done in conjunction with the new 36 inch waterline (A. Griffin 1988). The survey of the approximately 17,000 linear feet for the pipeline found "no evidence of Historic sites" (Ibid.:3). This report further states: "In general, historic sites in this type of environment are scarce and localized" (Ibid.).

III. HISTORIC LAND USE

This project area, like the adjacent Makawao Forest Reserve, was undoubtedly native Hawaiian forest prior to its clearing. During traditional Hawaiian times (Pre-1778) this area was probably sparingly utilized for forest resources. Procurement of forest resources such as timber (Koa, etc.), bird feathers, medicinal plants, and possibly alternate food sources during times of famine would leave little or no evidence of such activities. However, clearing of the forest for pasture or other uses is quite evident as the fence line separating the forest reserve from the project area delineates a very abrupt change in vegetation (Fig. 4).

During the 1850's a portion of the project area was awarded to one Kamaikaaloo as LCA (Land Commission Award) 7124. LCA 7124 was for some 19 acres of Kaliaianui (Kaliaianui), Kula, Maui (Indices 1829). No specific information on the use of this LCA could be found, however, perusal of other documents relating to Kamaikaaloo indicates interests in livestock on Maui and Hawaii (Waimea area). This suggests early ranching activities in the general area.

Ranching was to eventually dominate all land use within this area and the upland slopes of Haleakala (Makawao, Kula, Ulupalakua) in general. Deforestation for pasturage, water tanks and lines, fencing and even "camps" (i.e. Ukulele Camp; Fig. 3) are evidence of the extensive nature of ranching in "up country" Maui. Specific to the project area is Haleakala Ranch which

leased government lands in which (at least in part) the project area lies.

Within the project area are two sets of cut basalt and cement pylons which served as pipeline supports. This pipeline predates the existing 12 inch line which is being replaced by a 36 inch pipe. The exact dates of construction and abandonment of the earliest pipe is unknown. However, water resource records suggest a late 1800's (CA, 1890's) construction and early 1900's (CA, 1920's) abandonment. Abandonment coincided with the construction of the 12 inch line. The early pipeline extended westward from Waikamoi Stream (El. 4,250') on the northeast slope of Haleakala to Olinda Reservoir, on to Kula and finally to Waiopai Ranch (El. 1,740') on the southern slope of Haleakala, and serviced numerous associated water lines and tanks along its route. (Martin and Pierce 1912).

Pasturage still dominates land use within the project vicinity. However, with the in progress water line construction and proposed reservoirs specific use of the project area will be solely one of water management.

IV. SURVEY RESULTS AND RECOMMENDATIONS

The survey was conducted with the use of a one inch equals 200 foot map with 20 foot contour lines which showed the entire project area including the spoils area. A map showing just the reservoir(s) area was also utilized and it was a one inch equals 100 ft. map with 10 foot contours. As mentioned earlier vegetation, which was predominately low grasses, allowed for excellent ground visibility.

No historically significant sites were observed within the entire project area. The only features of any kind observed were pipeline supporting pylons mentioned in the land use section of this report. The pylons or columns are of cut basalt block and cement construction with metal straps on top which would have held the pipe in place (Figs 9, 10). Though these historic features indicated past land use they are not significant (NS) in and of themselves. Other similar examples are probably numerous along the aforementioned pipe line route. At least one set of (possibly both) pylons will be destroyed for construction of the reservoirs.

With 100 percent ground coverage of the project area and the absence of archaeologically significant sites, no further archaeological work is deemed necessary for the proposed Kahakapao Reservoirs and spoils area.

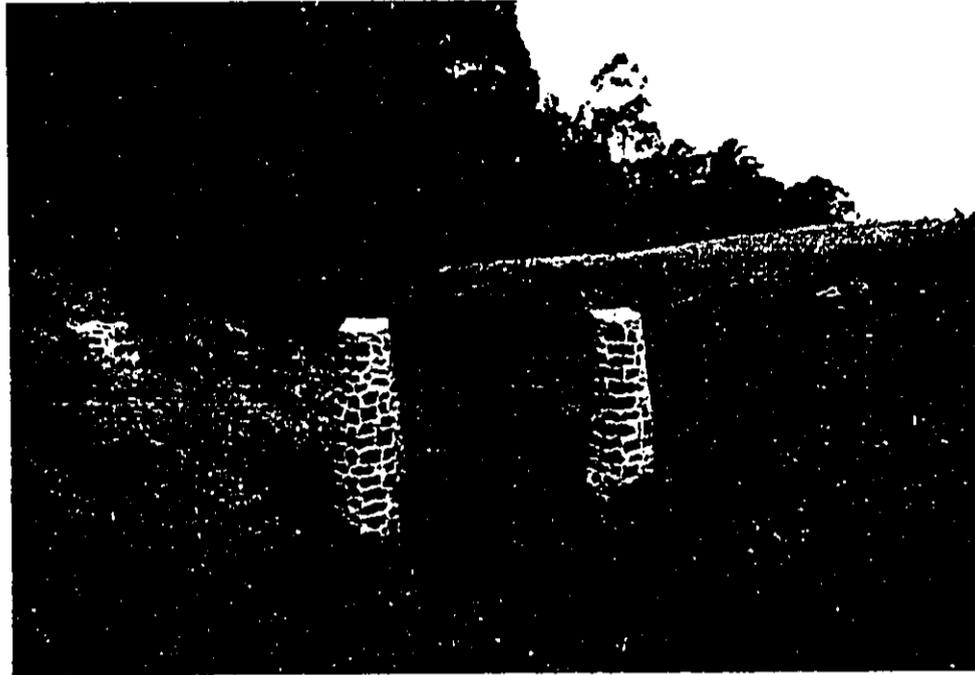


Figure 9 Pylons/Columns, Old Pipeline Supports

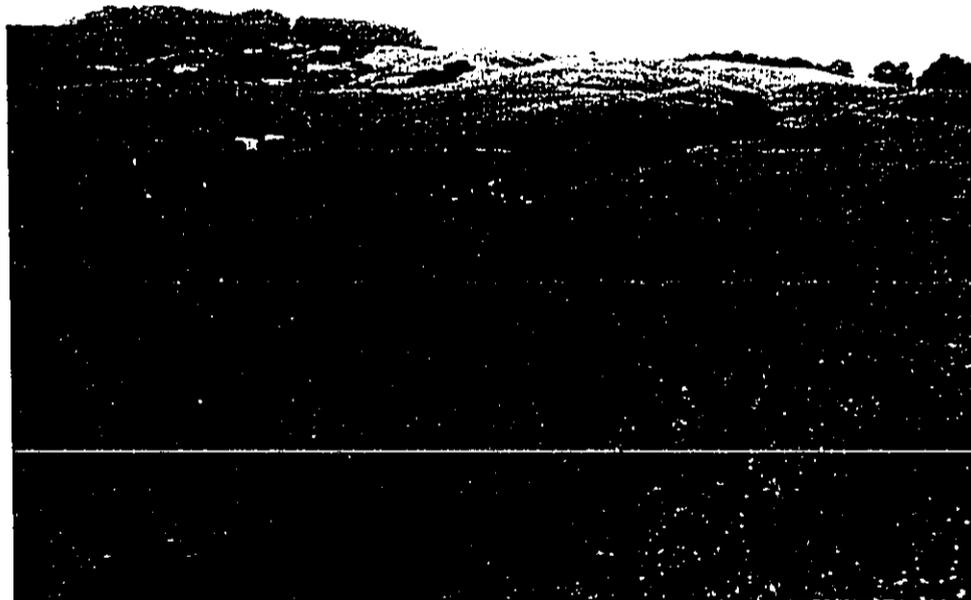


Figure 10 Pylons/Columns, Old Pipeline Supports

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