BOARD OF WATER SUPPLY
COUNTY OF MAUI
P.O. BOX 1109
WAILUKU, MAUI, HAWAII 96793-7109
Telephone (808) 243-7816 • Fax (808) 243-7833

July 25, 1996

Mr. Gary Gill, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813

RECEIVED
'96 JUL 29 P4:25
OFC. OF ENVIL QUALITY CONTROL

Dear Mr. Gill:

Subject: **LOWER KULA PUMP STATION AND 2.0 MG WATER STORAGE TANK**
FINDING OF NO SIGNIFICANT IMPACT (NEGATIVE DECLARATION)

The County of Maui Department of Water Supply (DWS) has reviewed the relevant engineering and environmental data pertaining to construction of the subject Lower Kula Pump station and 2.0 MG Water Storage Tank on the Lower Kula transmission main on a 5.6 acre parcel in the Olinda area of upcountry (Kula) Maui. We distributed a Draft Environmental Assessment, published a Notice of anticipated Negative Declaration in the May 8th OEQC Bulletin, and reviewed the comments received in response to the Draft EA. We have addressed the comments received, and have received no comments from any reviewing agency or respondent which contests or objects to the findings of the draft EA. We have therefore concluded the construction of this project will have no significant adverse environmental impacts and therefore issue this Finding of No Significant Impact (FONSI) and submit the attached Final Environmental Assessment. We would appreciate publication of the attached Summary Notice in the August 8th, 1996 OEQC Bulletin.

This is an important public works project which will benefit the community by boosting water flow to the existing Lower Kula service area above the rate possible by gravity flow alone, which is currently inadequate to meet the peak demands of this system. This will reduce the possibility of water shortages and some drought effects due to transmission inadequacies (although periods of prolonged supply shortfalls will still require water to be pumped up from the Kamole Weir/Wailoa Ditch system). The 2.0 million gallon tank will increase system storage to meet Maui County standards, improve the reliability of this water system, and facilitate diversion of excess water to the Makawao system. This is a socially necessary project which will provide significant benefit to the social welfare and economic vitality of the community and county.

Sincerely,

David R. Craddick
Director

/HC:sc
Attachment

92

1996-08-08-HA-FEA- Lower Kula Pump Station and 2.0 MG Water Storage Tank

FINAL ENVIRONMENTAL ASSESSMENT

for the

LOWER KULA PUMP STATION
and 2 MG WATER STORAGE TANK

KULA, MAUI, HAWAII

prepared on behalf of the

County of Maui

Board of Water Supply

by

ECM, Inc.
485 Waiale Drive
Wailuku, Hawaii 96793

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EA Preparation Information: *This document is to satisfy the requirements of Chapter 343, Hawaii Revised Statues, and in accordance with Title 11; Chapter 200, Environmental Impact Statement Rules. Please direct comments / information requests to Charles Willson at ECM, Inc., 485 Waiale Drive, Wailuku, Maui, Hawaii 96793, 808-242-8070, Fax: 808-244-9539 (or 225 Queen St., Ste 7B, Honolulu, HI 96813, 808-533-0090), or email:* cwillson@lava.net. *Other documents on this water system, also produced for DWS by ECM, Inc. by the same author (Charles Willson) are also available:*

- *Hydraulics issues and flow calculations, system demographics and projected demands, and related information are extensively discussed in: **Hydraulics Report and Analysis of System Impacts for the Lower Kula Water Treatment Plant, January 12, 1995.***
- *The watershed area, collection system, and water quality issues are documented in: **Watershed Sanitary Survey and Engineering Report Update for the Lower Kula Water Treatment Plant, May 1995 (Volume 4 of the final Engineering Report).***
- *The need for the LK-WTP is documented in: **Environmental Assessment for the Lower Kula Water Treatment Plant, January 10, 1992.***
- *Additionally, a Preliminary Criteria Report was produced by ECM and Brown and Caldwell to establish design criteria (draft March 6, 1996, no final version released).*

Environmental Assessment for the
Lower Kula Pump Station and 2 MG Water Storage Tank

EXECUTIVE SUMMARY

The County of Maui Department of Water Supply (DWS) intends to construct an in-line pumping station and a 2 million gallon (mg) water storage tank on the Lower Kula (LK) transmission main on a 5.6 acre parcel in the Olinda area of upcountry (Kula) Maui. This will boost flows which are presently inadequate to meet the peak demands of the LK system, increase system storage to meet Maui County standards, and improve the reliability of this water system. This is a socially necessary project providing significant community benefits and no significant environmental impacts, and the Maui Department of Water supply has issued a **Finding Of No Significant Impact**.

OVERVIEW

The Department of Water Supply (DWS) owns and operates public water supply systems for the island of Maui. Water for residential and agricultural use in the upcountry areas of Maui is supplied by three interconnected water systems serving three elevation levels (illustrated roughly as concentric semi-circular lines in Figure 1b). Water for the Olinda and Kula areas between roughly 2200 and 2750 feet MSL is supplied by the Lower Kula system (Public Water System I.D. #247) by redirecting runoff collected from stream intakes in the Waikamoi watershed on the northwestern slope of Haleakala. This water is stored in the 50 million gallon (mg) Piiholo Reservoir in the Hamakua Poko district of Makawao and treated at the recently-completed Lower Kula Water Treatment Plant (LK-WTP). Due to the completion of the LK-WTP, LK water now conforms to standards specified by the U.S. Environmental Protection Agency in accordance with the Safe Drinking Water Act, the Surface Water Treatment Rule (SWTR), and State of Hawaii Public Health Regulations, Chapter 20. This direct filtration plant will normally treat up to six (6) million gallons per day (mgd) of collected surface water for domestic water supply in upcountry Maui, but has been rated by the Department of Health Safe Drinking Water Branch (DoH/SDWB) for sustained operation up to 7.5 mgd.

Both supply and demand on the Lower Kula system are highly variable, and -- due to the predominantly agricultural nature of the system -- generally poorly matched. Agricultural demand (about 82% of total demand) increases dramatically during dry periods when streamflow is lowest, and decreases sharply when rainfall, and therefore supply, is plentiful. Water receipts of 7.5 mgd[1] from the watershed intakes[2] are likely

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[1] Estimate based on a median streamflow of 8.2 mgd and the 7.5 mgd design transmission capacity of the line. 7.5 mgd is also the rated capacity of the LK-WTP by Department of Health, Safe Drinking Water Branch (DoH/SDWB) for sustained operation.

about 50% of the time and will fall below 2.7 mgd about 15% of the time. Daily demand ranges from well below 1 mgd to over 5 mgd, with the upper limitation imposed by the maximum flow rate of the transmission line. The completion of the WTP, however, lowers the hydraulic gradeline, significantly reducing the rate at which water will flow by gravity alone to a maximum of about 3.7 mgd.[3] This does not adequately allow the use of the water potentially available from this water source. To remedy this situation and provide better service to those served by the Lower Kula water system, DWS proposes to construct an in-line pumping station using two low-noise submersible pumps and a 2 million gallon (mg) water storage tank in the Olinda area, along with control telemetry upgrades at the Kula Kai tank. During periods when "excess" water is available (i.e.- water which is available for collection but for which there is inadequate system storage), the preferred configuration will also allow this excess water to be diverted to Makawao, although Makawao has it's own water source and *no water which would be needed by the LK system will be diverted.*

The preferred alternative involves construction of both the in-line pumping station and the 2 mg water storage tank to maximize the flexibility of the Lower Kula system, as detailed in this report. The No Action alternative, use of a different site, and two partial alternatives were also evaluated. The No Action alternative will result in inadequate water supply during periods of high water demand and excess water being unused during periods where supply exceeds demand. As water demand in the area increases, particularly with the ongoing development of Hawaiian Homelands, this water shortage will become chronic. Due to hydraulic concerns and the need to locate the pump station near the connection point for the 18" diameter line leading toward Makawao, alternative locations are less appropriate in meeting those needs. The partial alternatives of constructing a pump station with no tank and a tank with no pump station were also considered, but do not provide the service advantages of the preferred alternative and do not meet planning objectives.

continued

[2] No new or expanded diversions or other changes in this collection system are required for this project, nor are any alterations in the bed or banks of any stream channel anticipated or likely.

[3] The design parameters for the pump station and tank are based on the analysis presented in: ***Hydraulics Report and Analysis of System Impacts for the Lower Kula Water Treatment Plant, ECM, Inc., January 12, 1995.*** This report includes an extensive discussion of water supply (source) data, transmission, storage, treatment, distribution hydraulics and flow calculations, community growth demographic projections, forecasts of future system demand, and recommended system upgrades. Information of this nature should be drawn from this engineering report. Additional information on LK-WTP and the watershed area, collection system, water quality and treatment issues are documented in: ***Watershed Sanitary Survey and Engineering Report Update for the Lower Kula Water Treatment Plant, May 1995 (Volume 4 of the final Engineering Report).*** The discussion in this EA is focused on the environmental and related impacts of the system upgrades proposed, and includes only a brief summary of the key findings of the issues from the ***Hydraulics Report*** as necessary to justify the need for the project. Additional technical information should be drawn from the comprehensive documentation available in the original engineering reports.

The project will benefit the community by improving the flow of water to the existing service area above the rate possible by gravity flow alone. This will reduce the possibility of water shortages and some drought effects due to transmission inadequacies, but will not eliminate or reduce droughts (supply shortfalls); during drought periods, water will continue to be pumped up from the Kamole Weir/Wailoa Ditch system (at slightly above the 1100' MSL level).

The proposed action is not expected to result in significant environmental impacts. The project area was cleared more than 40 years ago and is presently in use as private pasture land. Small numbers of plants and soil inhabitants may be displaced or destroyed during project construction, but there will be little loss of habitat by this action, and effects on the terrestrial environment will be largely transitory. Effects on the community will also be largely transitory (such as minor traffic slowdowns due to slower-moving trucks) and can be minimized by performing most construction work during normal work hours and avoiding rush hour traffic flows. Implementation of the preferred alternative would not affect any endangered or threatened species, nor any historic sites.

On the basis of previous system-wide upgrades involving similar actions, the nature and scope of the recommended work, and the lack of significant environmental impacts, it is concluded that the proposed action is not a major action significantly affecting the quality of the environment. Therefore, an Environmental Impact Statement is not required, and the County of Maui Department of Water Supply has issued a **Finding Of No Significant Impact** (FONSI) for this project.

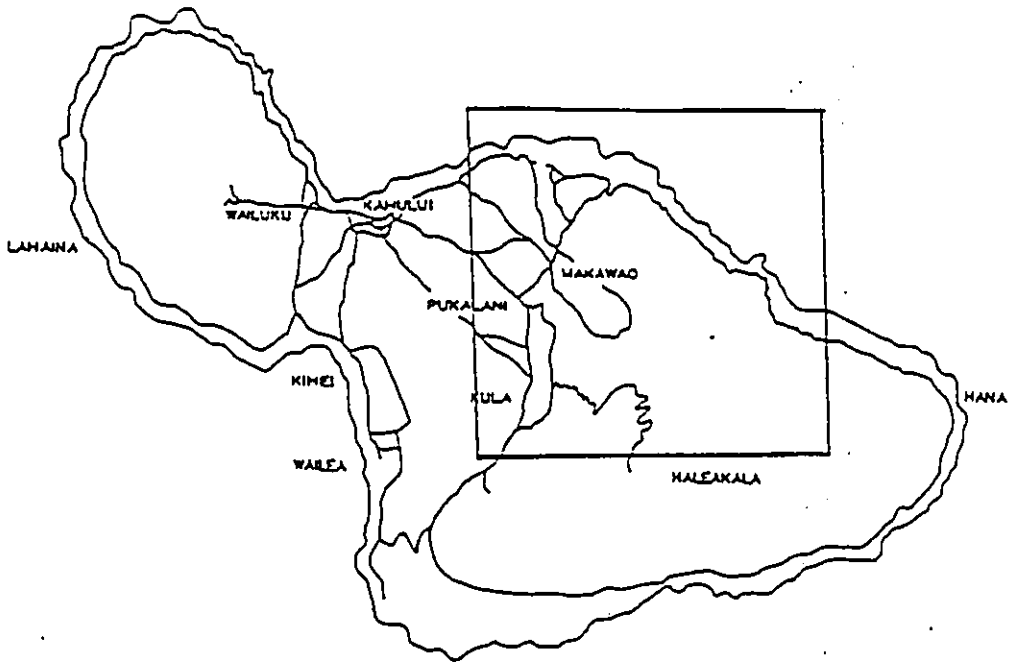
LOCATION, HISTORY, AUTHORITY, NEED AND OBJECTIVES OF ACTION

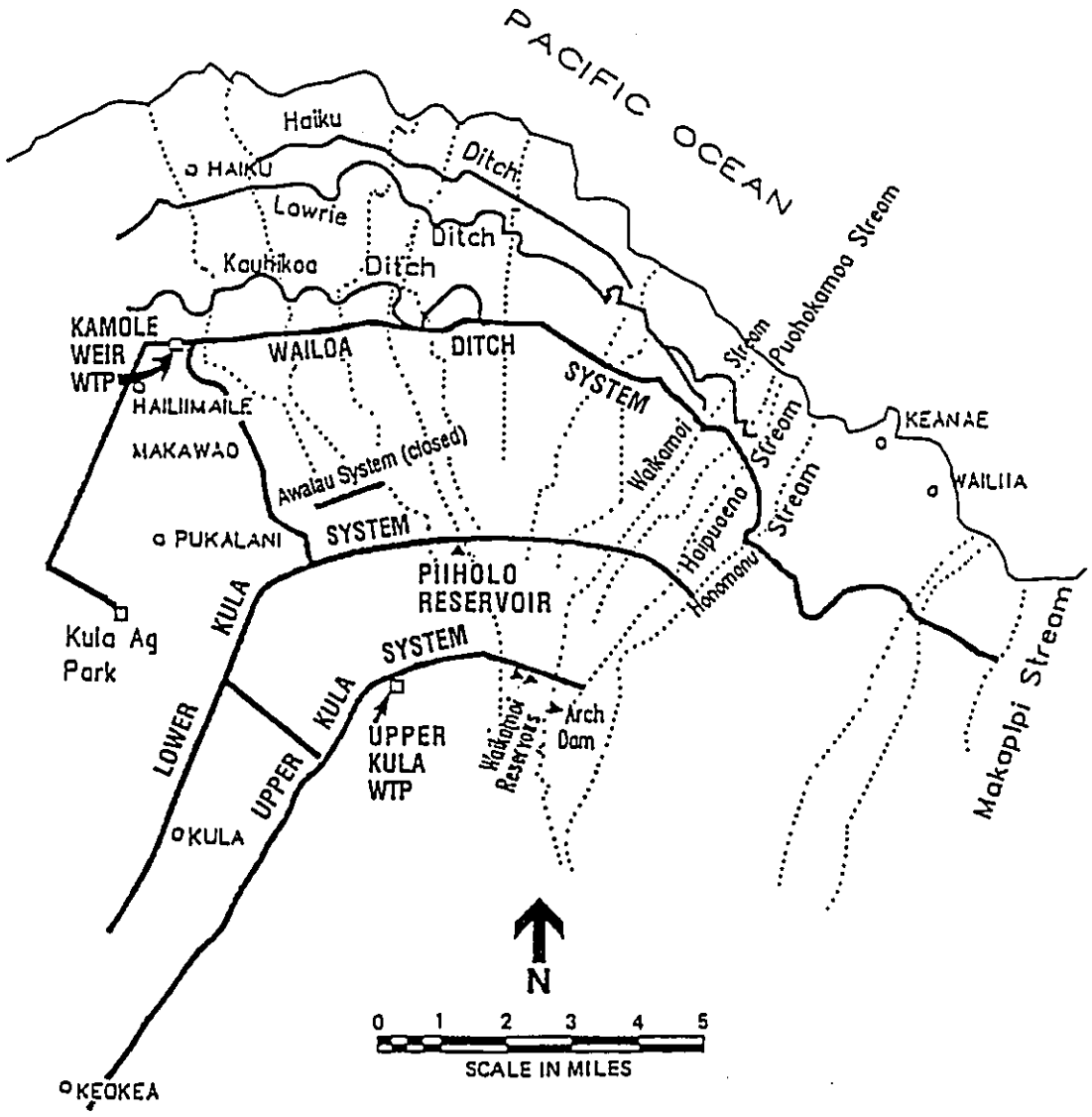
Location.

The project site is located in the Kula area of upcountry Maui about 2.6 miles up Olinda Road from the intersection with Makawao Avenue. The parcel is on the upslope (mauka) side of Olinda Road along the existing 18" diameter water transmission line between Piiholo Reservoir and Kula Kai tank (see location, USGS, and site maps; see also the construction topographic map and aerial photograph on p. 14a and Location Map on p. G-1 of the attached project plans). Construction will take place at elevations between 2760 and 2780 feet MSL.

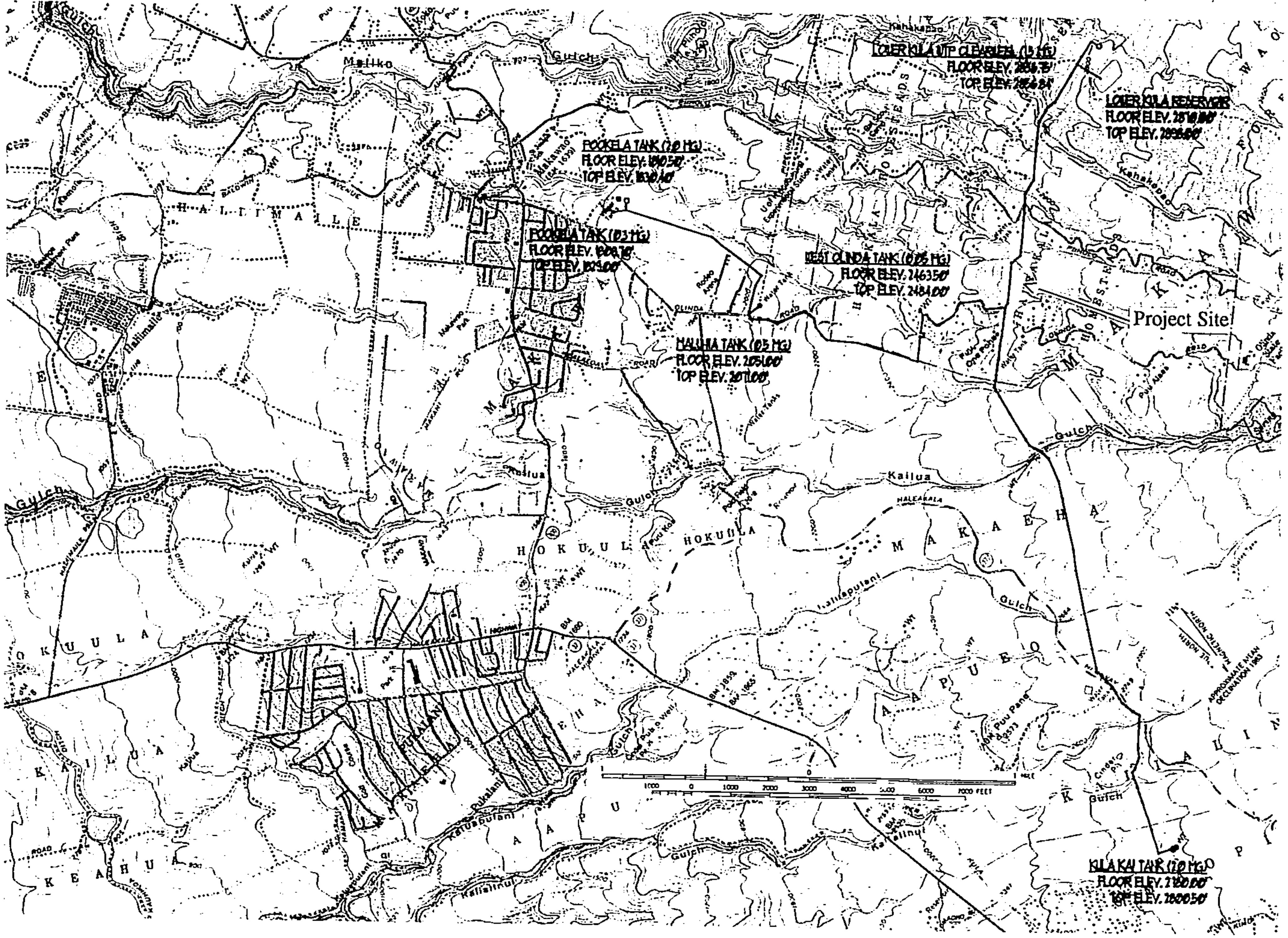
Legal Designation, Area, Ownership, and Existing Use of the Site.

The pump station and tank site is to be located on the northeastern corner of an 11.631 acre parcel presently owned by Glen & Karen Graf and Oran & Marilyn Spotts; it is designated as Tax Map Key (TMK): 2nd 2-4-13:179, also being a portion of Haleakala

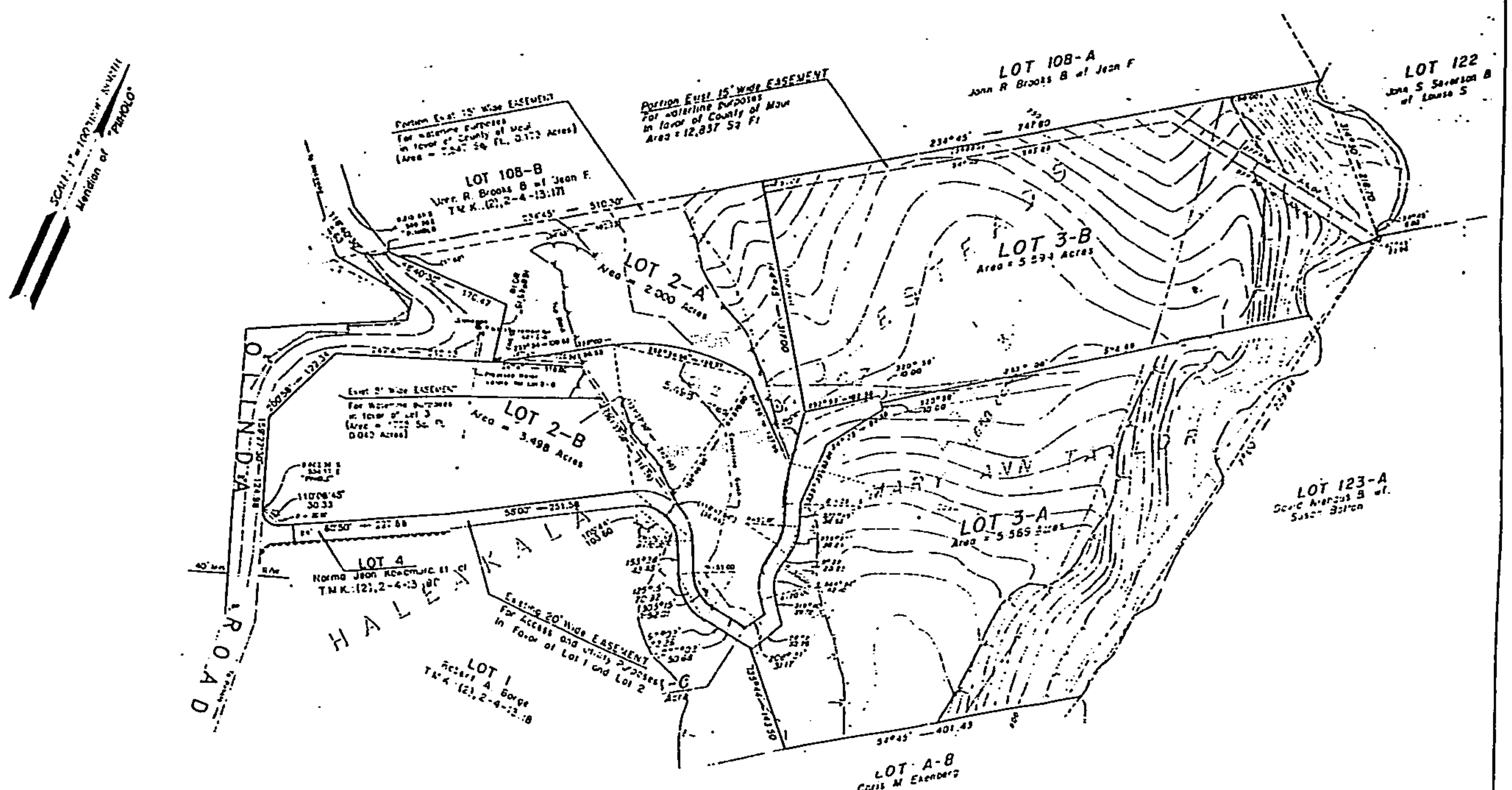




Source: Soil Conservation Service, "Water Resources for Up-County Maui," April 1982.



Project Site
LOWER KULA RESERVOIR
POOKELA TANK (1.0 MG)
POOKELA TANK (0.3 MG)
WEST OLINDA TANK (0.25 MG)
MALUHIA TANK (0.5 MG)
KULA KAI TANK (1.0 MG)
HALIIMAILE
Haliimaile
Maliko
Gulch
Kailua
HOKUULA
MAKAEHA
PUEO
Kalialinui


LOT 108-A
LOT 122
LOT 108-B
LOT 2-A
LOT 3-B
LOT 2-B
LOT 3-A
LOT 123-A
LOT 4
LOT 1
LOT A-8
Portion Esmt 15' Wide EASEMENT
For waterline purposes
In favor of County of Maui
Area = 12,837 Sq Ft
Existing 20' Wide EASEMENT
For Access and Utility Purposes
In Favor of Lot 1 and Lot 2
OLINDA ROAD
HALEAKALA

Homesteads Lot 107, Grant 7930. A subdivision application has been prepared to subdivide a 5.594 acre parcel (designated as Lot 3-B on the attached survey map) to be used as the site for the pump station and tank; this division follows a land division line previously agreed upon by the Graf and Spotts families and documented on a June 1984 map by Valera, Inc. Lot 3-A will remain the property of Glen & Karen Graf. The proposed Lot 3-B, which had been intended as the site for a retirement residence and farm for the Spotts family, is to be acquired by the County for the proposed project. The Spotts have expressed a willingness to accept an equivalent property in exchange, but have requested the County pursue acquisition and subdivision by condemnation until an acceptable replacement property has been located and acquired. Lot 3-B has been pasture land for at least 4 decades. The 18" diameter Lower Kula water transmission line passes through the site within an existing 15-foot wide easement along the north boundary. Access to the site is available by an existing (partially paved, partially dirt) 1200-foot long, 20-foot wide private road, which will be improved by DWS.

Zoning.

The Maui County Zoning and Community Plan designation is Agriculture. Land adjoining the subject parcel is also used for pasture land and rural dwellings consistent with the agricultural zoning of the land. No conservation land or publicly-held land is required for this project. Utility lines and accessory uses are permitted uses (per MCC 19.30.020.G and M) which will not require zoning changes or special permits other than the normal grading and building permits obtained by the contractor.

Water System History.

The Lower Kula system stream intakes were constructed beginning in late 1963 to collect water from seven streams in the 7.8 square mile Waikamoi watershed. These are located in the Koolau Forest Reserve near Kailiili along the Kaiku-Uka boundary at about the 2900' MSL level on: Honomanu Stream, Haipua`ena Stream, East Branch Puohokamoa Stream, Middle Branch Puohokamoa Stream, West Branch Puohokamoa Stream, East Branch Waikamoi Stream, and West Branch Waikamoi Stream.

Reservoir construction was completed and service to patrons began in FY 1971. Lower portions of the Lower Kula system, including the Kula Kai tank, were completed in FY 1977. The Lower Kula Water Treatment Plant (LK-WTP) was constructed between 1993 and 1995 and began service in 1995.

Authority and EA Requirement.

The County of Maui Department of Water Supply, as owner and operator of public water supply systems for the county and island of Maui, is charged with the construction, maintenance, and upgrades of these systems in the public interest. An

Environmental Assessment (EA) is triggered by the use of state and county funds. The County of Maui Department of Water Supply is therefore the appropriate agency to make this assessment and provide the anticipated Finding Of No Significant Impact.

Need.

The addition of the LK-WTP to the LK system reduces the hydraulic gradient of the LK transmission line, reducing the gravity flow rate along this line to an average 3.5 mgd. This is considerably lower than the historical water requirement during high demand periods (which have historically exceeded 5 mgd for a month at a time) and prevents adequate distribution of the water resource, limiting the use of the water potentially available from this source. To remedy this situation, DWS proposes to construct an in-line pumping station to raise the hydraulic gradient of the line by about 220 feet (a service pressure increase of about 95 psi).

The booster pump will increase water flow to the Kula Kai tank (the existing service area) to about 7.5 mgd, with the actual flow rate depending on tank water surface levels. This matches the design transmission capacity of the watershed collection system and the DoH/SDWB rated capacity of the plant. The improvements also include control systems to permit gravity flow at a rate sufficient to supply the average present needs of the Lower Kula system, diversion of excess water to the Makawao service area,[4] and simultaneous flow to both Kula Kai and Makawao service areas. In addition to facilitating simultaneous flow to both service areas, the 2 million gallon (mg) water storage tank also increases LK system storage and significantly improves the reliability and resilience of the system in the event the WTP is shut down or goes off-line. Available LK system storage is presently 3.35 million gallons (mg), presently slightly below the 3.45 mg considered adequate for 1995 and well below the estimated 4.7 mg required by year 2000; adding 2 mg brings total storage to 5.35 mg, which meets county criteria to beyond year 2000.[5]

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[4] Only excess water, which would otherwise be wasted because of the storage limitations of the LK system, will be diverted to Makawao. The tank will be used to buffer supply the LK system only. Makawao has it's own water source, and is supplied with water drawn from the Wailoa Ditch, treated by the Kamole Weir Water Treatment Plant, and subsequently pumped uphill to the Makawao service area. The use of excess Lower Kula water is preferable to Kamole Weir water due to its better raw water quality and lower energy cost, as well as meeting contractual conditions for the use of this water in preference to water pumped from the Kamole forebay. Kamole Weir water would be available, as before, to alleviate LK shortages during drought periods, but will not need not be pumped up to the higher elevation portion of the Makawao service areas when excess water from the new Lower Kula WTP is available to meet demand.

[5] Actual total, available, and working storage volumes are different. An extensive discussion of the water requirements of the LK system, projected demands, water storage requirements, supply and transmission calculations, and related issues can be found in the ECM, Inc. report: *Hydraulics Report and Analysis of System Impacts for the Lower Kula Water Treatment Plant* (HR), January 12, 1995. Storage requirement criteria are discussed on pages 60 - 62 of the HR, and are roughly equal to maximum day demand, which is estimated at 3.4, 4.7, 6.0, and 7.4 for the years 1995, 2000, 2005, and 2010 (see line 6 of the chart on p. 38 of the HR, copied in the Appendix). These numbers

Planning Objectives.

(1) Provide increased water transmission flow rates sufficient to supply the existing Lower Kula service area for most of the next decade, including Hawaiian Homes development. This provides economically viable protection against water shortages due to inadequate transmission by gravity flow.
(2) Provide additional protection against water shortages due to disruptions in the water supplied by the LK-WTP by increasing system storage by 2 mg.
(3) Reconfigure piping at Olinda Road to allow excess water to be diverted to Makawao without interrupting flow to Kula Kai tank or existing customers on the Lower Kula line.
(4) Minimize or mitigate environmental, cultural and social impacts to the maximum practical extent.

CONSISTENCY WITH COUNTY GENERAL PLAN AND COMMUNITY PLANS

The General Plan of the County of Maui, 1991 Update specifies its first water policy objective as: "To provide an adequate supply of potable and irrigation water to meet the needs of Maui County's residents." Construction of this project directly supports at least three specific policies, as specified on page 10 of the ***General Plan***:

(a.) "Support the improvement of water transmission systems to those areas which historically experience critical water supply problems...",

(g.) "Seek new sources of water..." (although technically not a new source, this project will allow DWS greater use of an underutilized source and a net increase in water actually available to the upcountry community),

(j.) "Support the planning, preservation, and development of water resources and systems which service Hawaiian Home Lands".

This facility also supports a major goal of the ***Makawao-Pukalani-Kula Community Plan*** by supporting the storage and delivery of an "adequate supply and quality of water", which will be directly enhanced by this project. Increasing the County's ability to effectively manage existing resources will improve water availability and the reliability of the Lower Kula water system. It may also indirectly support the goal of allowing planned housing to be completed, especially lands inappropriate for agriculture in the Makawao-Pukalani-Kula community and the planned development of Hawaiian Home Lands in the Kula area.

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continued

are rounded, and this is a general computational criteria used by the county which does not reflect the actual needs, conditions, and supply and demand variability of individual water systems, so this should not regarded as an accurate estimate of actual need for this system.

ALTERNATIVES ANALYSIS.

Alternative 1: No Action.

This alternative would not meet planning objectives. All flow on the Lower Kula line would be limited to gravity flow (about 3.3 to 3.7 mgd with the present hydraulic gradient), and water shortages would exist whenever demand exceeded 3.7 mgd. High demand periods will frequently exceed the flow capacity of the line. The higher capacity of the remainder of the system (watershed, intake/transmission, reservoir, and WTP should be capable of supplying 6 to 7.5 mgd at least half the time) will not be utilized, even when there is sufficient water available to meet demands at this level, and this water will be unused, as the LK system is unable to store water in excess of the capacity of the 50 mg Piiholo Reservoir and 3.35 mg tank storage. Flows in the range of 3.5 mgd would also require 24-hour gravity flow to Kula Kai tank, preventing diversion of excess water outside the existing service area. Thus the No Action alternative would result in (1) unacceptable water shortages which would threaten area farms and (2) substandard storage volumes which reduce the resilience of the LK system and threaten the health, safety, and well-being of the upcountry community.

Alternative 2: Pump Station and 2 MG Tank.

This is the preferred alternative. As indicated in the **Need** section, addition of the booster pumping station will increase the transmission capacity of the LK line flow to Kula Kai tank to about 7.5 mgd, matching the transmission capacity of the watershed collection system and the DoH/SDWB rated capacity of the plant. The improvements will also permit diversion of excess water to the Makawao service area to more fully exploit the water resource and allow simultaneous flow to both Kula Kai and Makawao service areas. The 2 mg water storage tank also increases LK system storage to meet county criteria to beyond year 2000 and significantly improve the resilience and reliability of the LK system in the event of WTP shut down or disruption.

Alternative 3: Construct the Pump Station and Tank at Another Location.

This has most of the advantages listed above, but would suffer from the use of a less appropriate location. The pump station needs to located along the existing LK transmission line near the connection to the 18" diameter force main which connects to Makawao; this permits a straightforward and cost-effective connection to the line and direct control of flow on each line segment. The tank should be located at an elevation sufficient to allow rapid filling by gravity flow from the LK-WTP treated water storage (TWS) tank at a rate similar to the rapid gravity flow possible when the line to Makawao is opened, and preferably on the same site for security, maintenance, and control benefits. These needs impose constraints on the site selected. No other site provides the same set of advantages as the selected site.

Alternative 4: Construct the Pump Station without the Tank.

This option would allow flow to Kula Kai tank to be boosted to about 7.5 mgd, but would not provide the additional storage need to meet minimum county storage requirements. Simultaneous flow to Makawao and Kula Kai tank would also be difficult, as the tank would be unavailable to maintain flow to Kula Kai during periods when flow is diverted to Makawao.

Alternative 5: Construct the 2 MG Tank without the Pump Station.

Construction of the 2 mg water storage tank alone would increases LK system storage to meet county criteria to beyond year 2000 and improves the resilience of the LK system in the event of WTP shut down or flow disruption. It would also allow the tank to be filled to allow continual flow to Kula Kai while diverting excess water to Makawao, improving the ability of the County to exploit the water resource. It would not meet planning objectives, however, as average flow to Kula Kai would be limited to gravity flow at about a 3.7 mgd maximum and shortages would occur any time demand exceeds the transmission limitations of the line.

AFFECTED ENVIRONMENT.

Environmental Setting.

Maui is the second largest island in the State of Hawaii, with a land area of 728 square miles (465,920 acres), and is about 48 miles long and 26 miles wide. The island was formed by two volcanoes, Haleakala and Puu Iki, connected by a central lowland plain (also called a saddle or isthmus) where the lava flows from each volcano overlap. The larger volcano, Haleakala, dormant since 1790, forms the eastern portion of Maui Island, is about 33 miles across, rises to 10,025 feet MSL and dips seaward at about twelve degrees.

The project area is located on the northwestern slope of Haleakala at an elevation of about the 2770 foot MSL. The LK water system exploits surface water runoff from the Waikamoi watershed immediately upslope on the northwestern slope of Haleakala[6] (illustrated on a reproduced portion of the DWS Water System Map in the Appendix). After treatment, this water is distributed via an existing transmission pipeline which passes through an existing 15' wide easement along the northern boundary of the project site.

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[6] The watershed area, collection system, and water quality issues are documented in: *Watershed Sanitary Survey and Engineering Report Update for the Lower Kula Water Treatment Plant*, May 1995 (Volume 4 of the final *Engineering Report for the Lower Kula Water Treatment Plant).*

Climate.

Maui has a pleasant climate notable for its mild and relatively stable temperatures, considerable rainfall differences by season and topography, and persistent surface trade winds from the east-northeast. "Mean annual temperatures in Hawaii vary between about 72° and 75° F. near sea level, decrease by about 3° for every 1000 feet of elevation, and tend to be higher in sunny dry areas."[7] The project area averages about 65°, with a seasonal range of around 7° between the warmest and coldest months. Rainfall is considerably higher at the higher elevations on Haleakala, with about 250 inches per year in the watershed area and 50 inches per year[8] in the project area, but is subject to considerable seasonal, topographic, and year-to-year variation. Rainfall drops to below 20 inches annually in many coastal areas with June being the driest month. Hurricanes with winds greater than 75 miles per hour rarely affect the project area, although tropical storms may pass through close enough to produce heavy rain and strong winds. Humidity averages about 70%, with wet season, higher elevation, and night humidities averaging somewhat higher.[9]

Trade wind conditions dominate the Hawaiian Islands weather pattern, resulting in a prevalence of partly cloudy skies with brief showers in the mountain areas. Storm conditions usually result from a breakdown of the normal circulation of the trade winds and are relatively infrequent. Storms typically occur during the autumn and winter months; however, intense local convection storms of short duration can occur at any time of the year.

Terrestrial Resources.

The project site is characterized by rolling pasture and uneven terrain punctuated by deep gulches and sharp changes in elevation. The site ranges in elevation from about 2750 to 2785 feet MSL, excluding the deep gulch on the east end of the property which is not a buildable area and is not included in this analysis. The site was previously cleared for agricultural use, and is presently covered with Kikuyu grass and Eucalyptus and available for use (although generally unused) as pasture land by relatives on adjacent properties. Surrounding uses are also pasture land. An existing private dirt road provides access to the property. Construction will be limited to the existing cleared areas and improvement of the existing dirt road.

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[7] United States Department of Agriculture Soil Conservation Service (USDA/SCS). *Soil Survey of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii*, August 1972, p. 224 - 229.

[8] USDA/SCS, Forest Service, *Water Resources for Upcountry Maui*, Honolulu, April 1989, p. C-45, and the isohyetal line map from W.J. Taliaferro, *Rainfall of the Hawaiian Islands*, Hawaii Water Authority, 1959. Recent annual rainfall at rain gauge stations in the watershed area is reported in the *Watershed Sanitary Survey* (WSS), op.cit., page 21. Streamflow and supply issues are discussed on the following pages of the WSS. Other climate information in this section from the above and USDA/SCS, *Soil Survey*, p. 224 - 229.

[9] USDA/SCS, *Soil Survey*, op. cit., p. 228.

Endangered and Threatened Species.

There are no known rare, threatened or endangered species on the proposed site. State captive breeding facilities for the endangered alala (Hawaiian crow) are lo©ated about two miles to the southeast at a higher elevation, but there are no free-roaming alala know to inhabit the area. The construction area was previously cleared of most vegetation (at least 4 decades ago) for agricultural use as pasture land. There appear to be few native species among the regrowth of Eucalyptus and Kikuyu grass (with some gorse and shrubs in the gulch areas). There is little likelihood of intact native vegetation or rare, threatened or endangered plant species on the site other than in the gulch area on the east end of the site. The gulch area has not been extensively disturbed (although prior disturbance occurred during installation of the 18" diameter water main), and was not investigated because it will not be affected by this action.

Water Quality.

The deep gulch on the east end of the property is indicated as an intermittent stream on 1:24,000 scale USGS maps, beginning just above the project site. There is a second, smaller gulch on the west end of the site which is not indicated as an intermittent stream but is crossed by an existing dirt road on the south end (see aerial photo). Both gulches are normally dry except during periods of heavy rainfall.

Air Quality.

The ambient air quality is relatively pristine because of the remote location, relatively low population, and lack of industrial pollution in the area. The passage of traffic on the adjoining Olinda Road contributes a slight amount of exhaust fumes and dust.

Noise.

The pump station project site is a quiet rural / agricultural area with a small amount of vehicular noise evident throughout the day from passing vehicles on Olinda Road, about 200 yards on the west (downslope) side of the property.

Archaeological / Historical Resources.

No sites listed or eligible for listing in the National or Hawaii Registers of Historic Places are located within the project area. No evidence for the presence of *in situ* cultural resources was noted on the site or during prior work on the property, although subsurface investigations were not conducted, as this property was cleared for use as pasture land over four decades ago.

Recreational Resources.

There are no nearby recreational resources which will be affected by the proposed project.

ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES.

General: The contractor will control potential adverse environmental effects and monitor air and water quality (site runoff), soil erosion (via best management practices and landscaping), noise, effects on plant, animal, and human life and welfare, resources of archaeological, historical, and/or cultural significance, solid waste disposal, and any other conditions which would affect ecological balance or visual aesthetics. The contractor will be responsible for compliance with all Federal, State, and County environmental quality standards.

Environmental Setting.

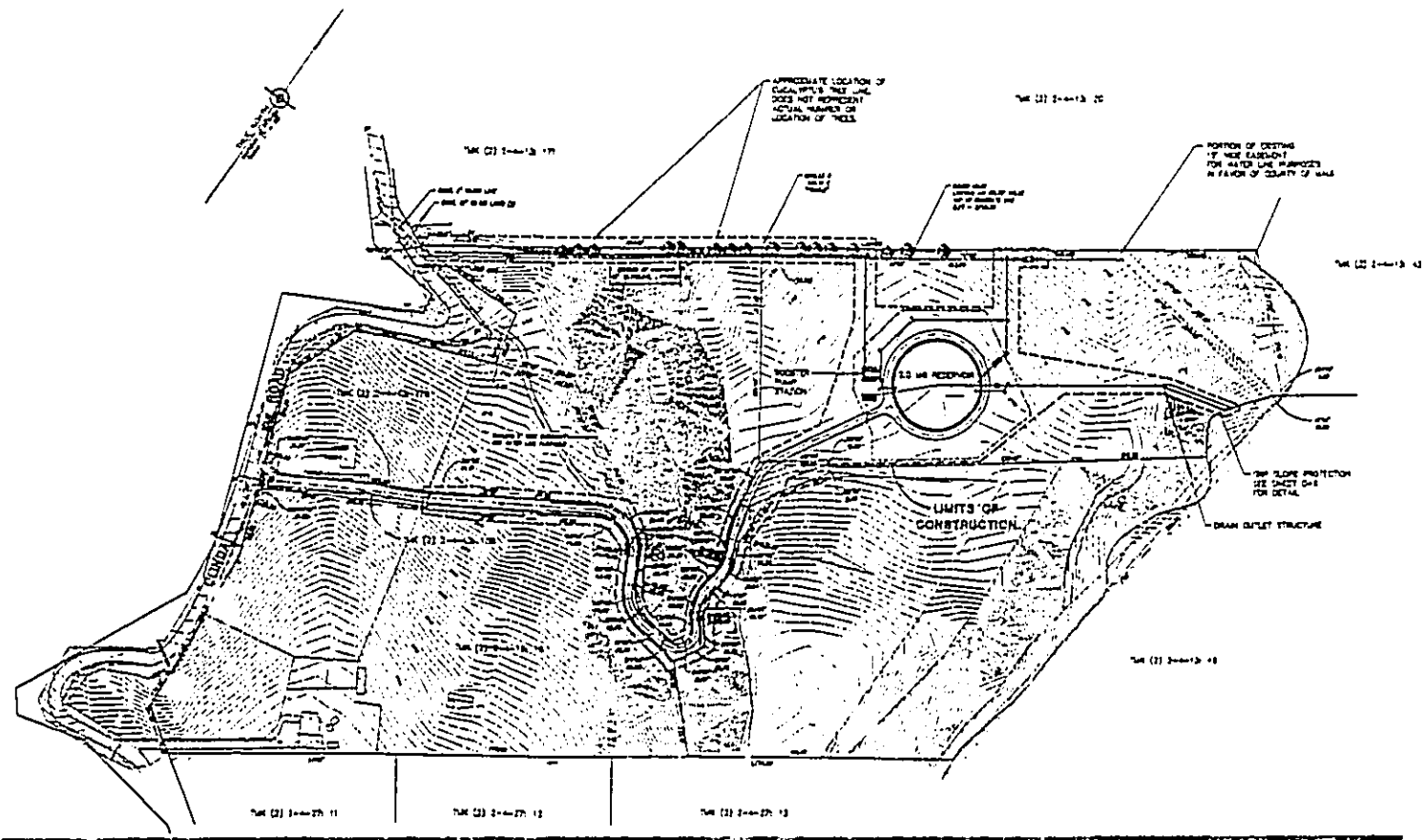
The proposed action will not significantly alter the environment other than in the immediate project vicinity. The pump station will not be obtrusive or disruptive to neighboring residents or environmental processes. The reinfored concrete water storage tank, although visible and of large size (about 136'in diameter and 21.5' high), is similar to other water tanks common in the upcountry area and important to residents and farmers alike. The tank will be painted an earth tone color (probably a shade of green) to blend in with the surrounding environment, minimize visual impacts, and insure compatibility with the character of the community. An antenna will also be erected for control telemetry between the proposed tank and the existing Kula Kai tank. Natural resources and human use of surrounding areas will be generally unaffected.

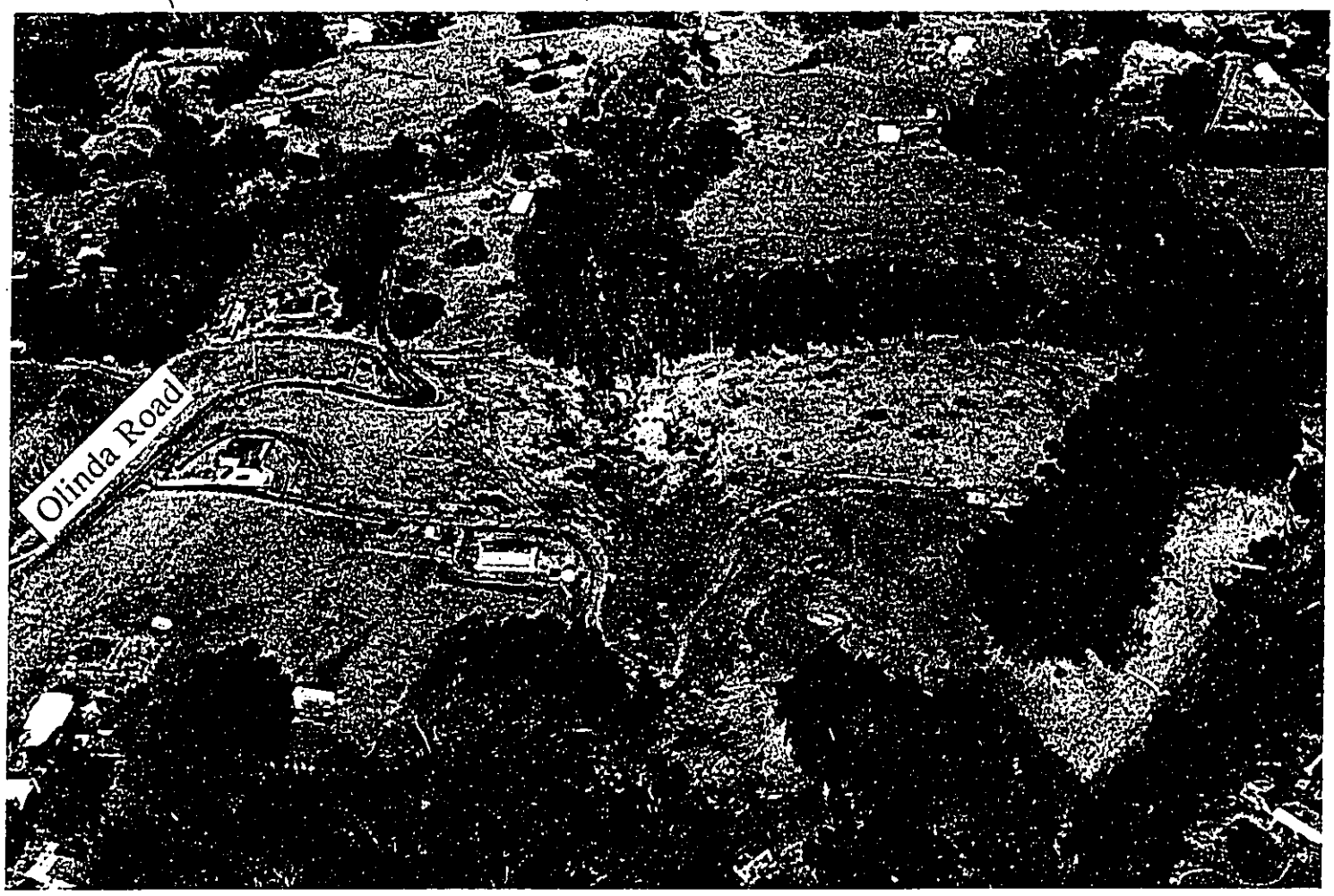
Terrestrial Resources.

Project construction will require removal of all vegetation and site preparation under the tank site, concrete pump pad, and roadway. This will affect about 2 acres of the 5.6 acre parcel. The thick ground cover of Kikuyu grass will protect unused portions of the site from soil erosion, and ground cover will be restored as quickly as practicable in the areas of disturbance. The tank and road will result in the creation of about 20,000 square feet of impervious area. Wildlife in this limited area -- probably only soil-dwelling earthworm and insects -- may be displaced or destroyed. Landscape features will not be substantially altered, although the tank will visually dominate the site. Any landscape features damaged during construction will be restored in final site landscaping, which will focus on replanting with low maintenance species consistent with the surrounding area. Troublesome species, such as eucalyptus, may be reduced or cleared in the project area consistent with fire protection needs and the need to protect equipment from potential storm damage.

Endangered and Threatened Species.

There are no rare, threatened or endangered species known to inhabit the project site, and no impacts are anticipated on any candidate, proposed or listed species. State captive breeding facilities for the endangered alala (Hawaiian crow) are located


LIMITS OF CONSTRUCTION


Olinda Road

approximately two miles south-southeast at a higher elevation, but there are no free-roaming alala in the area.

Drainage and Water Quality.

No significant water quality impacts are expected or likely from this project. As indicated previously, there are gulches on either side of the site, with the deep gulch on the east end of the property indicated on some (but not all) USGS maps as an intermittent stream. Both gulches run together about 1.5 miles downslope, then join into Maliko Gulch about 2 miles further downslope, eventually running to the ocean. There will be no normal, expected discharge to either gulch other than rainwater runoff, which will be allowed to sheet flow into the gulches. Runoff quantities will increase by 10% (0.5 and 0.7 cfs for the 10 and 50 year storms, respectively) over pre-construction conditions. Rainwater runoff from the 20,000 square feet of impervious area will be collected by a perimeter drain consisting of 6" perforated pipe completely surrounding the tank on the inside of the perimeter road and leading to an outlet at the east gulch. Rainwater runoff on the south side of the site will be intercepted by an earthen perimeter swale to redirect water to the northeast around the structural areas and transition it to sheetflow across the pasture area. The **Preliminary Drainage Report** concludes: "There will be no adverse effects on any adjoining or downstream properties as a result of this project's increased drainage runoff." A final Drainage Report will be prepared before the grading permit is issued.

A tank overflow line also leads to the east gulch. (Note: The tank overflow line and perimeter drain are shown together on sheets C-3 and C-4 of the plans; the swale is shown on C-4 only.) This line runs from the tank overflow valve which is intended to relieve excess water pressure to prevent tank failure in the unlikely event that a valve failure overfills the tank, and allows the excess water to flow to an area where it will do no harm. It also allows water to drain in the event the tank needs to be cleaned, an event which is likely to occur at about 5 year intervals, depending on the condition of the tank and events within the water system. In the event any chlorinated water, including drinking water, is to be drained to the gulch, this is expected to require NPDES approval. In the event of an unplanned or emergency discharge, this is a reportable event. Either eventuality would require approval or review by the Department of Health Clean Water Branch (DoH/CWB), and possibly other agencies, including but not limited to the Army Corps of Engineers (Corps), the Department Land and Natural Resources (DLNR), and the Office of State Planning (OSP). The project will comply with all Federal, State, and County water quality standards, including, but not limited to, HAR Chapter 11-54 and applicable Department of Health Clean Water Branch requirements.

Air Quality.

Exhaust gases from construction equipment or dust from transport and handling of construction materials near the construction area may cause a temporary reduction of air quality at the project site during construction. Because of the limited amount of earthmoving work involved, this is expected to be minor. The contractor will use best management practices to monitor and implement control activities to minimize air quality impacts in compliance with all Federal, State, and County air quality standards.

Noise.

There will be temporary, localized increases in ambient noise for short periods of time due to the operation of heavy equipment during construction. Insofar as this is a remote agricultural area with a considerable distance between homes, and the amount of earthmoving work will be limited to two foundation pads and a driveway, this is unlikely to present a significant problem. There will also be a slight increase in noise along Olinda Road as trucks carrying heavy equipment and building supplies are driven to the site. Construction noise will be controlled in compliance with all applicable Federal, State, and County noise standards. Pump station noise will be minimized by the use of two low-noise submersible pumps, only one of which will operate at a time.

Traffic.

Construction activities along Olinda Road may cause temporary interference with traffic flow for short periods of time. This is most likely when heavy trucks are traveling up Olinda Road, and can be minimized by performing most construction work during normal work hours and avoiding the movement of construction equipment in the same direction as rush hour traffic flows.

Archaeological / Historical Resources.

As indicated above, no evidence for the presence of historic or cultural resources was noted on the site or during prior work on the property, and the property was cleared for use as pasture land over four decades ago. Although unlikely, it is possible that such resources could be uncovered during construction, so ongoing observation will take place during construction. Should historic remains such as artifacts, burials, concentrations of shell or charcoal be encountered during construction activities, work shall cease immediately in the immediate vicinity of the find, and the area of the find shall be protected from further damage or disturbance. The contractor shall immediately contact the State Historic Preservation Division, Maui Office (243-5169), which will assess the significance of the find and recommend an appropriate mitigation measure, if necessary.

Recreational Resources.

No recreational resources will be affected by the proposed project.

Community Effects.

This project will provide a number of beneficial effects to the upcountry community:

Desirable regional growth: small effect, possibly allowing the easing of water restrictions on area development (indirect effect) and providing a higher flow rate to support Hawaiian Home Land development in the LK service area. This project also reduces the probability of non-drought-related water supply disruptions in this area of upcountry Maui.

Employment/labor force: provide small community employment benefit during construction (by employing equipment operators, masons, carpenters, electricians, painters, laborers, materials suppliers, etc.).

Local governmental finance: estimated construction costs of $2.5 - 3 million, plus the cost of land, borne by the State and Maui County. Some long-term cost savings will also accrue due to the ability to divert lower cost excess LK water to Makawao.

Business and industrial activity: the project will reduce the probability of non-drought-related water supply disruptions (and possible crop reductions or failures) due to water shortages, benefiting upcountry Maui agricultural businesses.

Displacement of people or farms: displacement of 5.6 acres of agricultural pasture land, but improved water supply reliability is expected to significantly benefit the community and area farms by averting water shortfall problems.

Desirable community growth: slight positive effect (see Desirable regional growth, above).

Population: possible slight positive effect (see Desirable regional growth, above).

Public services: provide a significant public benefit by reducing the potential for non-drought-related water supply disruptions. (During drought periods, water will continue to be pumped up from Kamole Weir WTP to supplement the LK and Upper Kula systems, and this pump station can be used to pump this supplemental water to both the LK and UK systems.)

Public facilities: no impacts on other public services or facilities other than occasional minor traffic slowdowns during construction period is expected or likely. Cleared and grubbed material and rocks will be utilized other than by disposal at County landfills, so other services are unlikely to be burdened.

Aesthetic effects: the project will be visible from Olinda Road, but the tank will be painted an earth tone color (probably a shade of green) to blend in with the surrounding environment, minimizing visual impacts.

Community cohesion: no effect.

Infrastructure Impacts.

No adverse infrastructure impacts are expected or likely. Electric power will be provided by Maui Electric and telephone service by Hawaiian Telephone from existing service connections available on Olinda Road. (An antenna will be erected for control telemetry communications.) Water will be available at a standpipe and hose bib at the pump station. (Traffic impacts are discussed on p. 16 under **Traffic**.)

Land Disturbance Mitigation: Best Management Practices.

All land disturbance work will be conducted to the maximum practical extent in accordance with the following Best Management Practices ("BMPs") to minimize construction impacts on air and water quality, to assure the greatest possible protection of the environment, and to eliminate potential adverse environmental effects:

Construction Management Techniques

1. No excavation, fill activity, or other earth movement will be permitted except as authorized by the County under an approved Drainage and Soil Erosion Control Report.
2. Where appropriate, construction will be sequenced to minimize the exposure time of cleared surface area, and construction of large projects will be staged or phased so areas of one phase can be stabilized before another phase is initiated. Stabilization measures will be designed to protect the disturbed soil surface from stormwater runoff.
3. Where appropriate, erosion and sediment control measures will be installed prior to earth moving, and will be installed and maintained as needed throughout the construction period.
4. Control measures will be checked (and repaired as necessary) weekly in dry periods and within 24 hours after rainfall events exceeding 0.5 inches in 24 hours. Daily checking is required in periods of prolonged rainfall. Records of checks and repairs will be maintained.
5. All earthmoving work will cease during periods of significant rainfall, and contractors will be required to cease any earth-moving or other cover-disrupting activity during any period when significantly increased erosion potential exists due to high winds.
8. No site activity will be permitted which results in a significant discharge to any open body of water or which affects breeding or spawning areas.
9. Special care will be taken to assure that all activities are conducted in a manner which will not violate basic water quality criteria applicable to all waters, in accordance with State of Hawaii Department of Health Water Quality Standards.

10. A specific individual will be designated as responsible for erosion and sediment control measures on each project site.
11. Should historic remains be encountered during construction activities, all earthmoving work will cease in the immediate vicinity of the find, the area of the find shall be protected from further damage or disturbance, and the State Historic Preservation Division shall be contacted for further instructions as specified in the **Archaeological / Historical Resources** section above.

Vegetative Controls

1. Where practical, pre-construction vegetative ground cover will not be disturbed more than 20 days prior to site disturbance.
2. In areas where work has ceased, temporary soil stabilization shall be applied in areas to remain unfinished for more than 30 days.
3. As soon as practicable after final grading, exposed ground will be replanted with vegetation appropriate to the site environment to minimize potential erosion from stormflow.

Structural Controls

1. Where required, surface water flowing onto the construction area will be diverted using berms, channels, sediment traps, and other appropriate control measures, as practical.
2. Erosion control measures to detain runoff and trap sediment, if necessary, will be installed appropriate to the size of disturbance or drainage areas.
3. Where required, water will be discharged through a pipe or line channel to eliminate or minimize any erosion effects of the discharge.
4. Muddy water to be pumped from excavation and work areas will be held in settling basins or treated by filtration or other appropriate measures prior to any discharge into state waters. Water will be discharged through a pipe or lined channel to avoid erosion and sedimentation.

PROJECTED CONSTRUCTION TIMETABLE.

Design has been completed and this project has gone out to bid. A contract is likely to be awarded by third quarter 1996 with issuance of a Notice to Proceed and construction initiation by the end of 1996, pending final acceptance of the EA and FONSI and availability of State funds. (In the event that State funds are not released in a timely manner, the County may proceed with the pump station -- the most critical need -- as the first phase, with the tank completed as the second phase once funds have been released.) The contractor has a one-year construction period, so project completion is expected by the end of 1997.

ENVIRONMENTAL ASSESSMENT FINDINGS.

The following list responds to factors which could constitute significant adverse effects on the environment as indicated in Article II, Part II of the Rules and Regulations of the Planning Commission of the County of Maui.

1. Involves an Irrevocable Commitment to Loss or Destruction of any Natural or Cultural Resources:
   The project site is a previously-disturbed area with no natural or cultural resources at risk and minimal impacts.

2. Significantly Curtails the Range of Beneficial Use of the Environment:
   This use would not curtail or infringe upon the beneficial uses of the environment.

3. Conflicts with the County or State's Long-Term Environmental Policies or Goals:
   The proposed action is consistent with the water policy objectives of *The General Plan of the County of Maui, 1991 Update*, the *Water Use and Development Plan* for the County of Maui (1989), and with the *Makawao-Pukalani-Kula Community Plan*. No long-term environmental conflicts are likely to result from the project.

4. Substantially Affects the Economic or Social Welfare and Activities of the Community, County or State:
   The proposed pump station will produce improved community water supply conditions by increasing the flow rate of the system sufficient to meet peak system demands for the remainder of the century. The 2 mg storage tank will similarly meet county system storage criteria to beyond year 2000. This public use project thus increases the flexibility and reliability of the upcountry Maui water supply system, and thus directly improves the social welfare of the residents, the economic value of properties within the service area, and the economic vitality of the community and county.

5. Substantially Affects Public Health:
   The proposed development is an infrastructure upgrade which improves community water supply and provides significant public health and welfare benefits.

6. Involves Substantial Secondary Impacts, Such as Population Changes and Increased Effects on Public Facilities, Streets, Drainage, Sewerage, and Water Systems, and Pedestrian Walkways:
   Proposed usage is a beneficial improvement to existing water transmission infrastructure. Possible secondary impacts due to increased water availability could include political pressure to ease water restrictions on area development (Hawaiian Homelands development is already in progress). Thus some indirect secondary impacts (leading to increased demands on public facilities such as streets, drainage, wastewater, etc.) are possible, but **this project does not increase supply** (which is dependent on rainfall, system collection, and storage) and any additional development (other than HHL) will still require County approvals.

7. Involves a Substantial Degradation of the Environment:
No significant environmental degradation or other significant environmental impacts are likely to result from the proposed action.

8. In Itself has no Significant Adverse Effect but Cumulatively has Considerable Effect upon the Environment or Involves a Commitment for Larger Actions:
This project involves a commitment to future maintenance of the pump station and tank, but has little cumulative impact upon the environment and does not involve any commitments for larger actions.

9. Substantially Affects a Rare, Threatened, or Endangered Species of Animal or Plant, or Its Habitat:
This project involves improvement of a previously cleared site. There are no known rare, threatened or endangered plant species on the site, and no impacts are anticipated on any candidate, proposed or listed species.

10. Detrimentally Affects Air or Water Quality or Ambient Noise Level:
There will be minor short-term impacts on air quality and ambient noise level during construction. After completion, air and water quality will be unaffected and noise levels are unlikely to be noticeable beyond the immediate site area.

11. Substantially Affects an Environmentally Sensitive Area, such as Flood Plain, Shoreline, Tsunami Zone, Erosion-Prone Area, Geologically Hazardous Land, Estuary, Fresh Waters or Coastal Waters:
This project is located on cleared pasture land. No flood plains, shorelines, tsunami zones, erosion-prone areas, geologically hazardous lands, estuaries, or bodies of fresh or coastal water will be affected by the proposed project.

12. Substantially Alters Natural Land Forms and Existing Public Views to and Along the Shoreline:
Since the location is a remote agricultural area with no ocean views from any public area through the proposed project site, no ocean views are likely to be affected. The pump station will be visible from very few areas; the tank will be visible from the road and nearby residences but will be painted an earth tone color to blend in with the surrounding environment, minimizing visual impacts.

CONCLUSION AND FINDING OF NO SIGNIFICANT IMPACT

In conclusion, we find this is a socially necessary project which will provide significant benefit to the social welfare and economic vitality of the community, and no significant adverse environmental impacts are expected or likely. We have received no comments which contest or object to the findings presented in the Draft EA (comments attached). We have therefore concluded the construction of this project will have no significant adverse environmental impacts and therefore submit this **Finding Of No Significant Impact** (FONSI) and **Final Environmental Assessment.**

APPENDIX / ATTACHMENTS

Section 1 -- Review Comments / Responses:

EA Distribution List (Agencies Contacted with Draft EAs)

Summary of Responses to Draft EA (condensed comment list, with EA responses)

Comment Letters (received or sent) responding to Draft EA

Section 2 -- Supporting Documents:

Tax (TMK) Maps Zone 2, Sec. 4
Zone 2, Sec. 4, Plat 13

DWS Water System Map (a portion of the island-wide DWS distribution map illustrating transmission lines, storage tanks, and interconnections)

Lower Kula Water Transmission System (schematic of elements relevant to this project -- similar to overlay on Figure 2. USGS Vicinity / Topographic Map)

Hydraulic Profile (illustrating the hydraulic gradeline from the LK-WTP to Kula Kai tank, with pressure class limits illustrated on the profile at the top)

Population and Water Use Projections for Makawao-Pukalani-Kula (M-P-K) Community Plan Area, 1990 to 2010 (Hydraulics Report Summary Table)

LK Water Consumption Trend Extrapolation (graph of the water usage estimates on lines 3, 4, 5, and 6 in the M-P-K Community Plan projections table)

Preliminary Project Plans: (partial set)

- Cover Sheet
- Location plan / Vicinity Map & Index to Drawings (G-1)
- Notes (C-1)
- General Site Plan (C-2)
- Site Geometric Plan (C-3)
- Site Grading Plan (C-4)
- Access Road Plan and Profile (C-5)
- Booster Pump Plan and Section (C-8)

Lower Kula Pump Station and 2 MG Tank

Draft Environmental Assessment Distribution List

The following is the distribution list of those agencies / groups / individuals who were mailed or presented with a draft EA or otherwise contacted for comment.

FEDERAL AGENCIES

U. S. DEPARTMENT OF AGRICULTURE
Soil Conservation Service
P.O. Box 50004, Room 4316
Honolulu, Hawaii 96850
Att'n: State Conservationist
Phone: 541-2600

DEPARTMENT OF THE INTERIOR
U. S. Fish and Wildlife Service
Office of Environmental Services
300 Ala Moana Boulevard, Room 6307
Honolulu, Hawaii 96813
Attn: Robert Smith, Field Supervisor
Phone: 541-2749

U. S. Geological Survey
Water Resources Division
677 Ala Moana Blvd. #415
Honolulu, Hawaii 96813
Attn: William Meyer, District Chief
Phone: 541-2653

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Federal Activities
75 Hawthorne St.
San Francisco, CA 94105
Attn: Dr. Jacqueline Wyland (E-4)

Environmental Protection Agency
Pacific Islands Contact Office
300 Ala Moana Boulevard, Room 1302
Honolulu, HI 96850
Attn: Manager

DIRECTORATE OF FACILITIES ENGINEER
United States Army Support Command Hawaii
Attn: Environmental Management Office
Fort Shafter, HI 96858-5000

U. S. DEPARTMENT OF COMMERCE
National Marine Fisheries Service
Pacific Area Office - Southwest Region
2570 Dole Street
Honolulu, Hawaii 96822-2396
Attn: John Naughton, Pacific Islands Env. Coord.
Phone: 955-8831, fax 949-7400

HAWAII STATE AGENCIES

OFFICE OF STATE PLANNING
250 S. Hotel St., 4th Floor
Honolulu, Hawaii 96813
Gregory Pai, Director
Phone: 587-2846

DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT AND TOURISM
(Land Use Commission)
250 South Hotel, 5th Floor
Honolulu, Hawaii 96813
Dr. Seiji F. Naya, Director
Phone: 586-2355

DEPARTMENT OF HEALTH
Dr. Bruce Anderson, Director
P.O. Box 3378
Honolulu, Hawaii 96801
Phone: 586-4337

Environmental Management Division
Clean Water Branch
Five Waterfront Plaza
500 Ala Moana Blvd., Suite 250C
Honolulu, Hawaii 96813
Thomas Arizumi, Chief
Phone: **586-4304**,6

Office of Environmental Quality Control
220 South King Street, 4th Floor
Honolulu, Hawaii 96813
Gary Gill, Director
Phone: 586-4185

DEPARTMENT OF LAND AND NATURAL RESOURCES 18 Copies hand delivered
1151 Punchbowl Street, Room 131
Honolulu, Hawaii 96813
Michael D. Wilson, Chairperson
Phone: 587-0401

Chair's office distributes internally to DLNR divisions:

Land Division
Planning and Technical Services Branch (was OCEA)
Division of Forestry & Wildlife
Division of Forestry & Wildlife (Maui)
Natural Area Reserves System (DoF&W NARS)
Na Ala Hele Trail Program (Curt Cottrell)
Division of Conservation and Resources Enforcement (DOCRE)
Division of Aquatic Resources
Division of Water Resources Management
Land Division, Maui (Phil Ohta)
Division of State Parks
State Parks - Maui (DLNR)
Maui Land Board Member, BLNR (William Kennison)
State Historic Preservation Division (Don Hibbard)

OFFICE OF HAWAIIAN AFFAIRS
Land Use Division
711 Kapiolani Blvd., Ste #500
Honolulu, Hawaii 96813
Att'n: Linda Delaney
Phone: 586-3777

DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. Box 1879
Honolulu, Hawaii 96805
Attn: Kali Watson, Chairman
Phone: 586-3800 (Planning 586-3836)

DEPT OF TRANSPORTATION HIGHWAYS DIVISION
650 Palapala Drive
Kahului, Maui, HI 95732
Attn: Bob Siarot, District Engineer
Phone: 877-5061

UNIVERSITY OF HAWAII
Environmental Center
2550 Campus Road, Crawford 317
Honolulu, Hawaii 96822
Attn: Jacquelin Miller

Maui Community College Library
310 Ka'ahumanu Ave.
Kahului, Hawaii 96732

COUNTY OF MAUI AGENCIES

Office of the Mayor
200 South High St., 9th Floor
Wailuku, Hawaii 96793

County Council (Council Services office)
200 South High St., 7th Floor
Wailuku, Hawaii 96793
Attn: County Council Members & Staff

ECONOMIC DEVELOPMENT AGENCY
200 South High St.
Wailuku, Hawaii 96793
Phone: 243-7710

DEPARTMENT OF PLANNING
250 South High Street
Wailuku, Hawaii 96793
Phone: 243-7735

DEPARTMENT OF PARKS AND RECREATION
1580 Kaahumanu Avenue
Wailuku, Maui 96793
Att'n: Henry Oliva, Director
Phone: 243-7230

DEPARTMENT OF PUBLIC WORKS AND WASTE MANAGEMENT
200 South High Street
Wailuku, Hawaii 96793
Att'n: Charles Jencks, Director
Divisions include:
Land Use and Codes Administration (Ralph Nagamine, L.S., P.E., 243-7379)
Wastewater Reclamation Division (Eassie Miller, P.E.)
Engineering Division (Lloyd P.C.W. Lee, P.E.)
Highways Division (Att'n: Brian Hashiro, P.E., 243-7869)
Solid Waste Division

CIVIL DEFENSE AGENCY -- MAUI
200 South High Street
Wailuku, Hawaii 96793
Phone: 243-7285

MAUI DEPARTMENT OF FIRE CONTROL
200 Dairy Road
Kahului, Hawaii 96732
Attn: Ronald Davis, Chief
Phone: 243-7561

MAUI POLICE DEPARTMENT
55 Mahalani Street
Wailuku, Hawaii 96793
Attn: Chief Howard Tagomori
Phone: 244-6400

PRIVATE SECTOR (INTERESTED / AFFECTED) ENTERPRISES

MAUI ELECTRIC CO., LTD.
P.O. Box 398
Kahului, Hawaii 96732
Phone: 871-9777

HAWAIIAN TELEPHONE COMPANY
Planning Division (Maui)
P.O. Box 370
Wailuku, Hawaii 96793
Phone: 242-5108

PUBLIC / COMMUNITY ORGANIZATIONS

Kula Community Association
P.O. Box 417
Kula, Hawaii 96790
Fred Rohlfing, Pres. 878-6927

Makawao Community Association (unable to contact)

Olinda Community Association
c/o William Wachter
517 D Olinda Rd.
Makawao, HI 96768
Phone: 572-9765, 1135, 1840

The Nature Conservancy
P.O. Box 1716
Makawao, Hawaii 96790
Attn: Mark White, Director, Maui Preserves
Phone: 572-7849

Conservation Council for Hawaii
P.O. Box 2923
Honolulu, Hawaii 95802

Enviromental Legislative Network
1030 Aoloa Pl. #102B
Kailua, Hawaii 96734

Hawaii Audubon Society — hand delivered 5/3/96
1088 Bishop St., Ste 808
Honolulu, Hawaii 96813
Phone: 528-1432

Natural Resources Defense Council — no longer operating in Hawaii

Life of the Land — 5/3/96
1111 Bishop St., Ste 511 — (share office w/ Sierra Club - Oahu)
Honolulu, Hawaii 96813
Attn: Henry Curtis, Exec. Dir.
Phone: 533-3454

Sierra Club Hawaii Chapter (Maui)
P.O. Box 2000
Kahului, Hawaii 96732

INDIVIDUALS

Oran & Marilyn Spotts (co-owners of property to be acquired) — hand delivered

Dick Mayer
Economics Department
Maui Community College
Kahului, Hawaii 96732
Phone: 242-1274

Summary of Responses to Draft Environmental Assessment

Lower Kula Pump Station and 2 MG Tank

The following agencies, organizations, and individuals were contacted for comments (normally by a direct mailing of the Draft EA prior to the publication date). A the date, respondent, and a brief (paraphrased) summary of the comments is included below, as well as our response (as "**EA:**" in *italics*), where appropriate. A "**n/c**" indicates no comment was received from the agency within 45 days of the publication of the EA summary / preparation notice ("Negative Declaration Anticipated") published in the May 8th, 1996 *OEQC Bulletin*, beginning the 30-day public comment period.

FEDERAL AGENCIES

U. S. Department of Agriculture, Natural Resources Conservation Division

Response: May 16, 1996 letter from Kenneth M. Kaneshiro, State Conservationist: "Structures for erosion control should be depicted and located on a map."

EA: *There is a perimeter drain consisting of a 6" perforated pipe surrounding the tank (just inside the paved perimeter road (illustrated by a dashed line on sheet C-3 and C-4 of the plans) and a swale immediately south of the paved perimeter road and continuing around to the north (illustrated by a serpentine arrow leading to a "V" up to just below the north arrow on sheet C-4). These elements will redirect rain water away from the tank pad and structural areas and toward the northeastern and northern side of the tank (respectively), where it will be allowed to sheet flow in a manner generally consistent with the preconstruction drainage patterns of the site. While these elements ("structures" may be a misleading term) were already depicted in the plans section of the Draft EA, the* **Water Quality** *section has been expanded as* **Drainage and Water Quality** *in the Final EA to include this information.*

Department of the Interior, U. S. Fish and Wildlife Service, Office of Environmental Services n/c

Department of the Interior, U. S. Geological Survey, Water Resources Division

Response: May 24, 1996 letter from William Meyer, District Chief: "... we have no comments to offer at this time."

U.S. Environmental Protection Agency, Office of Federal Activities n/c

U.S. Environmental Protection Agency, Pacific Islands Contact Office n/c

Directorate of Facilities Engineer, United States Army Support Command Hawaii, Environmental Management Office n/c

U. S. Department of Commerce, National Marine Fisheries Service, Pacific Area Office - Southwest Region n/c

HAWAII STATE AGENCIES

Office of State Planning

Response: May 8, 1996 letter (Ref. No. Z-0101) from Gregory G. Y. Pai, Director:
"We do not have any objections to the filing of a negative declaration for the project."

Department of Business, Economic Development and Tourism, Land Use Commission

Response: May 13, 1996 letter from Esther Ueda, Executive Officer:

1. "We confirm that the site ... is within State Land Use Agricultural District
2. Suggest project site be depicted on Figure 2
3. Suggest project parcel be highlighted on the tax map
4. In section in zoning, suggest discussion of any need for a change in zoning, consistency with land use law, CZM, etc., and any other needed approvals.

EA: *The Final EA now includes this information. Utility lines and accessory uses are permitted uses (per MCC 19.30.020.G and M) which will not require zoning changes or special permits other than the normal grading and building permits obtained by the contractor.*

Department of Health

Response: July 2, 1996 letter (Ref. No. 96-075) from Bruce S. Anderson, Dep. Dir.:
"We do not have any comments to offer at this time."

Department of Health, Environmental Management Div., Clean Water Branch n/c

Office of Environmental Quality Control

Response: June 6, 1996 letter from Gary Gill, Director (ref. Jeyan Thirugnanam):

1. Please study the alternative of installing a separate irrigation water system for agricultural activities in Lower Kula
2. Specify amount of water required for domestic and agricultural demand
3. Describe visual impacts (consider landscaping and painting to reduce impacts)
4. Show location on USGS map

EA: *See letter response addressing this issue, as a separate irrigation water system for agricultural activities is not an alternative. Items 2, 3, and 4 are addressed in the letter and the Final EA.*

Department of Land and Natural Resources

Internal distribution to DLNR divisions:

Land Division
Planning and Technical Services Branch (was OCEA)
Division of Forestry & Wildlife
Division of Forestry & Wildlife (Maui)
Natural Area Reserves System (DoF&W NARS)
Na Ala Hele Trail Program (Curt Cottrell)

Department of Land and Natural Resources (continued)

Division of Conservation and Resources Enforcement (DOCRE)
Division of Aquatic Resources
Division of Water Resources Management
Land Division, Maui (Phil Ohta)
Division of State Parks
State Parks - Maui (DLNR)
Maui Land Board Member, BLNR (William Kennison)

Combined DNLR Response: May 20, 1996 letter from Michael D. Wilson, Chairperson: [Distributed internally to DLNR divisions, but] "... did not receive any comments or objections from our divisions on the proposed project..."

State Historic Preservation Division (separate response)

Response: June 12, 1996 letter from Don Hibbard (ref. 243-5169 Teresa Donham): "We have no records of historic sites within or near the project area. Based on the present condition of the property, it appears unlikely that remains of such sites are present. We believe this project will have "no effect" on historic sites."

Office of Hawaiian Affairs, Land Use Division

Response: May 30, 1996 letter from Linda M. Colburn, Administrator: "... the Office of Hawaiian Affairs has no objections to the proposed water tank..."

Department of Hawaiian Home Lands

Response: June 17, 1996 letter from Kali Watson, Chairman: "[DHHL] supports the proposed project which will add to the storage capacity and improve water flow in the Lower Kula Water System."

Department of Transportation Highways Division

Response: May 15, 1996 letter from Robert Siarot, District Engineer, Maui: "The proposed project will not impact our facilities."

University of Hawaii, Environmental Center n/c

Maui Community College Library n/c

COUNTY OF MAUI AGENCIES

Office of the Mayor n/c

County Council (Council Services office) n/c

Economic Development Agency n/c

Planning Department

Response: June 18, 1996 letter from David W. Blane, Director:

"The proposed action is in keeping with the General Plan of the County of Maui, 1991 Update, which states: To provide an adequate supply of potable and irrigation water to meet the needs of Maui County's residents. The facility also supports a major goal of the Makawao-Pukalani-Kula Community Plan by supporting the storage and delivery of an adequate supply and quality of water."

"The review of the Draft Environmental Assessment for the proposed pump station and water storage tank has not identified any significant adverse impacts based on the significance criteria listed in §11-200-12, of the Environmental Impact Statement Rules. Therefore, the Planning Department has no further comments on this project."

Department of Parks and Recreation

Called by phone (5/6/96 to Patrick Matusui): support project, but do not wish to comment formally.

Department of Public Works and Waste Management (update entry as follows)

Divisions include:

Land Use and Codes Administration (Ralph Nagamine, L.S., P.E., 243-7379)
Wastewater Reclamation Division (Eassie Miller, P.E.)
Engineering Division (Lloyd P.C.W. Lee, P.E.)
Highways Division (Att'n: Brian Hashiro, P.E., 243-7869)
Solid Waste Division

Response: June 19, 1996 letter from Charles Jencks, Director

"The applicant shall submit a drainage and erosion plan verifying that there will be no adverse effects to adjacent and downstream properties as a result of the project."

EA: *The* **Preliminary Drainage Report** *concludes: "There will be no adverse effects on any adjoining or downstream properties as a result of this project's increased drainage runoff." A final Drainage Report will be prepared before the grading permit is issued. The* **Water Quality** *section of the Draft EA has been expanded as* **Drainage and Water Quality** *in the Final EA to include this information. The* **Construction Management Techniques** *section also states under (1.) "No excavation, fill activity, or other earth movement will be permitted except as authorized by the County under an approved Drainage and Soil Erosion Control Report." in both the Draft and Final EA.*

Civil Defense Agency -- Maui n/c

Maui Department of Fire Control

May 22, 1996 from Ronald Davis, Chief

"The Department of Fire Control is very pleased that the Department of Water Supply is increasing the storage capacity of the Lower Kula and Olinda areas. This will enhance the fire fighting capabilities of the Department of Fire Control in these areas."

Maui Police Department

June 6, 1996 memo from Charles Hall, Assistant Chief, for Howard H. Tagomori, Chief of Police, enclosing attached memo from Richie Nakashima, Captain, District I
"The project site would not have any adverse traffic considerations due to its remoteness and we do not anticipate any other negative police related concerns.

PRIVATE SECTOR (INTERESTED / AFFECTED) ENTERPRISES

Maui Electric Co., Ltd.
Response: May 20, 1996 letter from Edward Reinhardt, Engineering Manager:
"Maui Electric Company (MECO) at this time has no objections to the subject project."

Hawaiian Telephone Company, Planning Division (Maui) n/c

PUBLIC / COMMUNITY ORGANIZATIONS

Kula Community Association n/c

Olinda Community Association n/c

The Nature Conservancy n/c

Conservation Council for Hawaii n/c

Environmental Legislative Network n/c

Hawaii Audubon Society n/c

Natural Resources Defense Council no longer operating in Hawaii, deleted

Life of the Land n/c

Sierra Club Hawaii Chapter (Maui) n/c

INDIVIDUALS

Oran & Marilyn Spotts (co-owners of property to be acquired) n/c

Dick Mayer n/c

The actual response letters follow this section.

Comments Received

in response to

Draft Environmental Assessment

for the

Lower Kula Pump Station

and

2 MG Water Storage Tank

Kula, Maui TMK: 2nd 2-4-13:179

(Notice published in the May 8th, 1996 *OEQC Bulletin*)

United States Department of Agriculture
Natural Resources Conservation Service
P. O. Box 50004
Honolulu, HI
96850-0001

May 16, 1996

Mr. David Craddick, Director
Board of Water Supply
County of Maui
P.O. Box 1109
Wailuku, HI 96793-7109

Dear Mr. Craddick:

Subject: Draft Environmental Assessment (DRA) - Lower Kula Pump Station and 2 MG Water Storage Tank, Kula, Maui, Hawaii

We have reviewed the above-mentioned document and offer the following comment:

Structures for erosion control should be depicted and located on a a map.

We appreciated the opportunity to review this document.

Sincerely,

KENNETH M. KANESHIRO
State Conservationist

cc:
Mr. Gary Gill, Director, Office of Environmental Quality Control, Central Pacific Plaza, 200 S. King Street, 4th Floor, Honolulu, HI 96813
Mr. Herb Chang, Department of Water Supply, County of Maui, 200 South High Street, Wailuku, HI 96793

The Natural Resources Conservation Service formerly the Soil Conservation Service, works hand-in-hand with the American people to conserve natural resources on private lands.

AN EQUAL OPPORTUNITY EMPLOYER

TOTAL P.02

United States Department of the Interior
U.S. GEOLOGICAL SURVEY
WATER RESOURCES DIVISION
677 Ala Moana Boulevard, Suite 415
Honolulu, Hawaii 96813

May 24, 1996

Mr. David Craddick, Director
County of Maui Board of Water Supply
P.O. Box 1109
Wailuku, Maui, Hawaii 98793-7109

Dear Mr. Craddick:

Subject: Draft Environmental Assessment (DEA) for the Lower Kula Pump Station and 2 MG Water Storage Tank, Kula, Maui, Hawaii

The staff of the U.S. Geological Survey, Water Resources Division, Hawaii District, has reviewed the Draft Environmental Assessment, and we have no comments to offer at this time.

We are returning the report for your future use. Thank you for allowing us to review the DEA.

Sincerely,

William Meyer
District Chief

Enc.

cc: Mr. Gary Gill, Office of Environmental Quality Control
Mr. Herb Chang, County of Maui Department of Water Supply
Mr. Charles Willson, ECM Inc.

OFFICE OF STATE PLANNING
Office of the Governor
MAILING ADDRESS: P.O. BOX 3540, HONOLULU, HAWAII 96811-3540
STREET ADDRESS: 250 SOUTH HOTEL STREET, 4TH FLOOR
TELEPHONE: (808) 587-2846, 587-2898
BENJAMIN J. CAYETANO, Governor
FAX: Director's Office 587-2848
Planning Division 587-2824

Ref. No. Z-0101

May 8, 1996

Mr. David Craddick
Director
Board of Water Supply
County of Maui
P.O. Box 1109
Wailuku, Hawaii 98793-7109

Dear Mr. Craddick:

Subject: Draft Environmental Assessment and Notice of Anticipated Negative Declaration for the Lower Kula Pump Station and 2 MG Water Storage Tank, Kula, Maui, Hawaii

We have reviewed the draft environmental assessment and do not have any comments to offer at this time. We do not have any objections to the filing of a negative declaration for the project.

If any questions arise, please call Howard Fujimoto of our Coastal Zone Management Program at 587-2898.

Sincerely,

Gregory G.Y. Pai, Ph.D.
Director

cc: OEQC
✓ ECM Inc.
Maui Dept. of Water Supply

BENJAMIN J. CAYETANO
GOVERNOR

ESTHER UEDA
EXECUTIVE OFFICER

STATE OF HAWAII
DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT & TOURISM
LAND USE COMMISSION
P.O. Box 2359
Honolulu, HI 96804-2359
Telephone: 808-587-3822
Fax: 808-587-3827

May 13, 1996

Mr. David Craddick, Director
Board of Water Supply, County of Maui
P.O. Box 1109
Wailuku, HI 96793-7109

Dear Mr. Craddick:

SUBJECT: Lower Kula Pump Station and 2 MG Water Storage Tank Draft Environmental Assessment

The Department of Business, Economic Development & Tourism has forwarded the subject draft environmental assessment (Draft EA) to our office for review and comment.

We have reviewed the subject Draft EA and have the following comments to offer:

1) We confirm that the site for the proposed lower Kula pump station and 2 MG water storage tank, identified as TMK: 2-4-13: por. 179, is within the State Land Use Agricultural District.

2) We suggest that the project site be depicted on Figure 2 of the Draft EA. This would provide an easier way to show the project site in relation to the various towns and water facilities in the immediate area.

3) We also suggest that the project parcel be highlighted in the tax map for TMK: 2-14-13, which is in the appendix of the Draft EA.

4) The Draft EA should include a section that discusses whether the proposed project will require any approvals or permits (i.e., change in zoning, consistency with Chapter 205, HRS (Land Use Law), consistency with Chapter 205A, HRS (CZM Program), etc.)

We note that the Draft EA has a section on zoning. We suggest that this section be expanded to discuss other approvals that may be necessary for the proposed project.

We have no further comments to offer at this time.

Thank you for the opportunity to provide comments on the Draft EA.

If you have any questions in regards to this matter, please feel free to contact me or Leo Asuncion of my staff at 587-3822.

Sincerely,

ESTHER UEDA
Executive Officer

EU:dyk

cc: DBEDT (Dir. Ref. No. 96-235-A)
OEQC
Mr. Herb Chang
Mr. Charles Willson

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

LAWRENCE MIKE
DIRECTOR OF HEALTH

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

In reply, please refer to

July 2, 1996

96-075/epo

Mr. David Craddick
Director, County of Maui
Board of Water Supply
P. O. Box 1109
Wailuku, Maui, Hawaii 96793-7109

RECEIVED
JUL 10
ECM, INC.

Dear Mr. Craddick:

Subject: Draft Environmental Assessment
Lower Kula Pump Station and 2 Million Gallon Water Storage Tank
Olinda, Kula, Maui
TMK: 2-4-13

Thank you for allowing us to review and comment on the subject project. We do not have any comments to offer at this time.

Sincerely,

BRUCE S. ANDERSON, Ph.D.
Deputy Director for
Environmental Health

c: HDOH
OEQC
BWS - Maui County
ECM, Inc. ✓

BENJAMIN J. CAYETANO
GOVERNOR

GARY GILL
DIRECTOR

STATE OF HAWAII
OFFICE OF ENVIRONMENTAL QUALITY CONTROL
220 SOUTH KING STREET
FOURTH FLOOR
HONOLULU, HAWAII 96813
TELEPHONE (808) 586-4185
FACSIMILE (808) 586-4186

June 6, 1996

Mr. David Craddick
Department of Water Supply
200 South High Street
Wailuku, Hawaii 96793

Dear Mr. Craddick:

Subject: Draft Environmental Assessment for the Lower Kula Pump Station and 2 MG Water Storage Tank

Thank you for the opportunity to review the subject document. We have the following comments.

1. The recently completed Lower Kula Water Treatment Plant treats up to six million gallons per day of collected surface water for domestic water supply in Upcountry Maui. However, most of this treated water is used for agricultural activities which do not require treated water. Please study the alternative of installing a separate irrigation water system for agricultural activities in Lower Kula.

2. Please specify the amounts of water required for 1) domestic demand and 2) agricultural demand.

3. Please describe the visual impacts of the proposed storage tank. We recommend constructing and painting the reservoir with materials and colors that blend with the surroundings. We also recommend landscaping around the reservoir site to reduce the visual impacts.

4. Please show the project on the attached USGS map so that the relationship between the new water facilities and other water facilities in the vicinity can be seen.

If you have any questions please call Jeyan Thirugnanam at 5864185.

Sincerely,

Gary Gill
Director

HONOLULU OFFICE
225 Queen St., Ste 7B
Honolulu, Hawaii 96813
(808) 951-4105
fax: 599-5260

ECM, INC.
Electrical, Civil, and Mechanical Engineering Consultants

MAUI OFFICE
485 Waiale Drive
Wailuku, Hawaii 96793
(808) 242-8070
fax: 244-9539

Please note new † address and phone numbers

July 19, 1996

Mr. Gary Gill, Director
Office of Environmental Quality Control
465 South King Street, Room 104
Honolulu, Hawaii 96813
Att'n: Jeyan Thirugnanam

Re: Responses to comments on Draft Environmental Assessment for the Lower Kula Pump Station and 2 MG Tank (published May 8th, 1996)

Dear Mr. Gill,

This responds to your June 6, 1996 letter commenting on our Draft Environmental Assessment for the Lower Kula Pump Station and 2 MG Water Storage Tank. Insofar as some of these issues will not be separately discussed in the Final EA and this raises several complex issues, we felt a direct response was appropriate. Most of the information included below is drawn from the ***Lower Kula Water Treatment Plant: Hydraulics Report and Analysis of System Impacts***, January 1995, of which I am also the principal author. This is a complex report with a level of detail which was inappropriate to a discussion of the environmental impact issues resulting from this project, so only the major conclusions of that report were generally covered in the EA, thus reducing the reading load on reviewing agencies. We would be happy to reprint a 50-page excerpt from this report if additional detail is desired for your review.

A summary of your comments is included below with our responses:

1. Please study the alternative of installing a separate irrigation water system for agricultural activities in Lower Kula.

Installation of a dual water line is a good (although costly) idea, but it is not an alternative to the proposed pump station and water storage tank and will not be discussed as an alternative in the EA. This issue has been studied for the Upper Kula System (USDA/NRCS, Dec. 1995 Draft EIS Watershed Plan), and your office has this information on file. It is not an alternative because the proposed pump station and water storage tank is needed even if the County were to proceed with a dual line, as this project is: a.) needed immediately, b.) needed to allow excess water to be diverted to Makawao to avoid wasting this valuable resource, and c.) needed to meet County standards for water storage. The upgrades to improve flow on the Lower Kula line are needed immediately, not several years down the road while an additional line is constructed across difficult terrain. Such a dual system would be very costly, and for this reason we do not feel it is likely within this century. Currently, we have a new water treatment plant (WTP) rated at 7.5 million gallons per day (mgd) by DoH/SDWB. We expect source supply at or about that level about 50% of the time. However, completion of the WTP has lowered

the hydraulic gradient (or gradeline), which significantly reduces the gravity flow rate along this line to a maximum of about 3.7 mgd. So we have a 7.5 mgd plan feeding a line that will only flow at 3.7 mgd without pumping -- this presents a major problem.

While 3.7 mgd meets <u>average</u> demand, daily demand varies from below 1 mgd to over 5 mgd, with the upper limitation imposed by the maximum flow rate of the transmission line. So averages, far from being a reliable indicator of actual system demand at any given time, actually tend to disguise the realities of the system -- when there is water, this system has a LOT of water available, and when it is dry, there will be shortages. The key to effective utilization of the watershed and the WTP is to use available water in areas where it is needed. That is, because there is limited storage for upcountry water systems, water which cannot be diverted elsewhere will be uncollected, and therefore will flow out of the watershed to the sea. This does not adequately allow the use of the water potentially available from this water source. This project reconfigures this transmission and storage elements of the LK system to allow excess water to be easily diverted to Makawao, although Makawao has it's own water source and will not get any water which would otherwise be needed within the LK system. Excess water can also be pumped from the downslope end of the LK system to the Upper Kula system through existing connections at the Kula Kai tank, IF there is sufficient water to supply the Upper system.

2. Specify the amount of water required for domestic and agricultural demand.

According to the US Department of Agriculture, Soil Conservation Service, Forest Service (USDA/SCS) report, *Water Resources for Upcountry Maui* (Honolulu, April 1989, p. D-89), about 82% of system demand is attributed to agricultural use, with about 18% used for domestic use. The study states: "Eight two percent of total water consumed on the lower line is for agricultural purposes, mainly growing of truck crops." This figure is based on 1985 DWS sales data (cf. p. D-7). Other years are in the range of 78 - 83%, although the actual percentage may be higher due to small farming operations running off non-agricultural meters. Total demand, based on water *sales* for the 10 years between 1984 - 1993, ranged between about 1.75 mgd and 2 mgd.[1] However the use of averages hides much more information than it discloses, and is inappropriate in the analysis of actual need. Domestic use is relatively constant, while agricultural users do not need water when it is most plentiful (when it has been raining), and need lots of water during drought periods when it is least likely to be available. This mismatch between the supply and demand profiles of this system has been generally missed by other reports discussing upcountry water systems, and is almost completely obscured by discussions of average demands (the reason why the EA did not spend a lot of time discussing average demand). This problem will get worse with the ongoing development of Hawaiian Home Lands (see the table and graph in the EA Appendix for 1990 - 2010 demand projections).

[1] This does not include about 15% in system losses. Also, much of this stability is no doubt due to limits on supply, a recently-repaired valve at Piiholo Road [stuck in a constricted condition for over 5 years], and enforced restrictions. Please refer to the *Hydraulics Report* for more detailed statistical information.

Thus water tends not to be needed by agricultural users when abundant, and when droughts occur average demand can more than double. Monthly-to-month high:low flow variation sometimes exceeds 500%, and has been recorded at over 1000%. Demand variability is exacerbated by underutilization of the full buffering capacity of the 50 mg reservoir, and has resulted in chronic underutilization of the water resource, imposition of the (now withdrawn) "Kula Rule" and development moratorium, and exaggerated public perceptions of scarcity.

3. Describe visual impacts (consider landscaping and painting to reduce impacts).

Water tanks are essential infrastructure elements for upcountry residents, and are normally located at higher elevations to exploit the hydraulic advantages and insure adequate line pressure for distribution. The budget for landscaping is also more limited than for business sites, so this and other water tanks will normally be visible to some upcountry residents and travelers, although water tanks in the upcountry area are not normally considered to be community eyesores. While it is necessary for the project to be cost-effective, the tank will be painted an earth tone color (probably a shade of green) to blend in with the surrounding environment, minimize visual impacts, and insure compatibility with the character of the community.

4. Show location on USGS map.

This will be shown on the USGS map in the Final EA.

We hope this resolves the issues in your letter. We can supply additional information from the *Hydraulics Report* if you would like to get into the details of system hydraulics, area demographics, forecasting techniques, projections of future demand, and other issues best dealt with in a format of the technical documentation of this system. Please call me at 808-533-0090 if you require additional information or would like to discuss this matter further.

Sincerely,

Charles E. Wilson
Planner / Analyst

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

0596110

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

MICHAEL D. WILSON
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT S. COLOMA-AGARAN

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

May 20, 1996

LD-NAV
Ref.:EACOM242.RCO

Honorable. David Craddick, Director
County of Maui
Board of Water Supply
Post Office Box 1109
Wailuku, Maui 98793-7109

Dear Mr. Craddick:

SUBJECT: Draft Environmental Assessment for the Lower Kula Pump Station and 2MG Water Storage Tank. County of Maui, Maui Board of Water Supply.
Maui, Hawaii, Tax Map Key: (2)-4 and 2-4-13

Thank you for your transmittal received by us on May 8, 1996, wherein you have requested our review and comments on the Draft Environmental Assessment for the Lower Kula Pump Station and 2MG Water Storage Tank on the Lower Kula transmission main, located at Kula, Island of Maui, Hawaii.

The information that you have forwarded to us was distributed to our divisions for their review and comments.

We are pleased to inform you that the Department of Land and Natural Resources did not receive any comments or objections from our divisions on the proposed project, as submitted.

Should you or your staff have any questions, please feel free to contact Mr. Nicholas A. Vaccaro of the Land Division at 587-0438.

Aloha,

for MICHAEL D. WILSON

C: Michael H. Nekoba
Colbert M. Matsumoto
Maui District Land Office
William Kennison

BENJAMIN J. CAYETANO
GOVERNOR OF HAWAII

0696039

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
STATE HISTORIC PRESERVATION DIVISION
33 SOUTH KING STREET, 6TH FLOOR
HONOLULU, HAWAII 96813

MICHAEL D. WILSON, CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES

DEPUTY
GILBERT COLOMA-AGARAN

AQUACULTURE DEVELOPMENT PROGRAM
AQUATIC RESOURCES
CONSERVATION AND ENVIRONMENTAL AFFAIRS
CONSERVATION AND RESOURCES ENFORCEMENT
CONVEYANCES
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION DIVISION
LAND MANAGEMENT
STATE PARKS
WATER AND LAND DEVELOPMENT

June 12, 1996

Mr. David Craddick, Director
County of Maui Board of Water Supply
P.O. Box 1109
Wailuku, Hawaii 96793-7109

LOG NO: 17139
DOC NO: 9606KD03

Dear Mr. Craddick:

SUBJECT: Historic Preservation Review of a Draft Environmental Assessment - Lower Kula Pump Station and 2 MG Water Storage Tank in Olinda, Makawao District, Island of Maui 2-4-13: 179

Thank you for requesting comments regarding the proposed Lower Kula pump station and storage tank. The project area is located along the east side of Olinda Road, c. 2.5 miles above Makawao, at an elevation of 2760 to 2780 feet AMSL. The project will involve construction of a booster pumping station along the existing lower Kula water line, construction of a new 2.5 MG water storage tank, and improvement of an access road to the tank location. The total project area is c. 5.6 acres.

The proposed project is located in an open pasture setting that contains no drainage or gulch areas. The site has been impacted in the past by vegetation clearing, and has been in use as a pasture for over 40 years. The color aerial photograph of the property shown in the draft EA provides a clear indication that there are no surface structures on the property. Recent grubbing and grading in adjacent areas is also indicated on the photo.

We have no records of historic sites within or near the project area. Based on the present condition of the property, it appears unlikely that remains of such sites are present.
We believe that this project will have "no effect" on historic sites.

Please contact Ms. Theresa K. Donham at 243-5169 if you have any questions.

Aloha,

for DON HIBBARD, Administrator
State Historic Preservation Division

KD:jen

c: Dean Uchida (Ref EACOMLKPS2.424)

0696010

STATE OF HAWAI'I
OFFICE OF HAWAIIAN AFFAIRS
711 KAPIOLANI BOULEVARD, SUITE 500
HONOLULU, HAWAI'I 96813-5249
PHONE (808) 594-1888
FAX (808) 594-1865

May 30, 1996

Mr. David Craddick, Director
Board of Water Supply
P.O. Box 1109
Wailuku, HI 96793-7109

Dear Mr. Craddick:

Thank you for the opportunity to review the Draft Environmental Assessment (DEA) for the Lower Kula Pump Station and 2 MG Water Tank, Island of Maui. The County of Maui proposes to construct a pump station and 2 MG water tank to increase water storage capacity and improve water supply for upcountry Maui.

After a careful review of the DEA and supporting documentation, the Office of Hawaiian Affairs has no objections to the proposed water tank. Based on the information contained in the DEA, the proposed development apparently bears no significant long-term adverse impacts on adjacent lands nor upon existing rural settlements. No known archaeological remains exist and the proposed tank will not significantly alter the landscape and/or surrounding scenery. Please contact me, or Linda K. Delaney, the Land and Natural Resources Division Officer (594-1938), or Luis A. Manrique (594-1755), should you have any questions on this matter.

Sincerely yours,

Linda M. Colburn
Administrator

LM:lm

BENJAMIN J. CAYETANO
GOVERNOR
STATE OF HAWAII

STATE OF HAWAII
DEPARTMENT OF HAWAIIAN HOME LANDS
P.O. BOX 1879
HONOLULU, HAWAII 96805

KALI WATSON
CHAIRMAN
HAWAIIAN HOMES COMMISSION

JOBIE M. K. M. YAMAGUCHI
DEPUTY TO THE CHAIRMAN

June 17, 1996

Mr. David Craddick, Director
County of Maui Board of Water Supply
P.O. Box 1109
Wailuku, Maui, HI 96793-7109

Dear Mr. Craddick:

Subject: Draft EA and Anticipated Negative Declaration:
Lower Kula Pump Station and 2MG Water Tank

The Department of Hawaiian Home Lands supports the proposed project which will add to the storage capacity and improve water flow in the Lower Kula Water System.

As you know, coordination between this project and DHHL consultants is essential to ensure adequate water flow for homestead projects within the service area. We appreciate your assurances in this matter so that the proposed project does not result in negative impacts on Hawaiian home lands.

Thank you for the opportunity to review and comment.

Warmest aloha,

Kali Watson, Chairman
Hawaiian Homes Commission

cc: OEQC
Maui DWS
✓ECM Inc.

4005L22

BENJAMIN J. CAYETANO
GOVERNOR

-0596076

KAZU HAYASHIDA
DIRECTOR

DEPUTY DIRECTORS
JERRY M. MATSUDA
GLENN M. OKIMOTO

STATE OF HAWAII
DEPARTMENT OF TRANSPORTATION
HIGHWAYS DIVISION
MAUI DISTRICT
650 PALAPALA DRIVE
KAHULUI, HAWAII 96732

IN REPLY REFER TO:
HWY-M 2.143-96

May 15, 1996

Mr. David Craddick
Director, Department of Water Supply
County of Maui
P. O. Box 1109
Wailuku, Hawaii 96793

Dear Mr. Craddick:

SUBJECT: DRAFT EA FOR LOWER KULA PUMP STATION AND 2MG WATER STORAGE TANK

The proposed project will not impact our facilities. Thank you for the opportunity to comment.

Very truly yours,

ROBERT O. SIAROT
District Engineer, Maui

FC:mh

LINDA CROCKETT LINGLE
Mayor

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

DAVID W. BLANE
Director

GWEN OHASHI HIRAGA
Deputy Director

June 18, 1996

RECEIVED
JUN 25
F

Mr. David Craddick, Director
County of Maui Board of Water Supply
P. O. Box 1109
Wailuku, Maui, Hawaii 96793-7109

Dear Mr. Craddick:

RE: DRAFT ENVIRONMENTAL ASSESSMENT FOR THE LOWER KULA PUMP STATION

Thank you for the opportunity to comment on the Draft Environmental Assessment for the Lower Kula Pump Station and 2M Water Storage Tank.

The proposed action is in keeping with the General Plan of the County of Maui, 1991 Update, which states: To provide an adequate supply of potable and irrigation water to meet the needs of Maui County's residents. The facility also supports a major goal of the Makawao-Pukalani-Kula Community Plan by supporting the storage and delivery of an adequate supply and quality of water.

The review of the Draft Environmental Assessment for the proposed pump station and water storage tank has not identified any significantly adverse impacts based on the significance criteria listed in §11-200-12, of the Environmental Impact Statement Rules. Therefore, the Planning Department has no further comments on this project.

If additional clarification is required, please contact Mr. Don Schneider of this office at 243-7735.

Very truly yours,

for DAVID W. BLANE
Director of Planning

DWB:DAS:cmp
cc: Clayton Yoshida
Don Schneider
Office of Environmental Quality Control (OEQC)
Department of Water Supply
ECM Inc?
General File
Project File

JAN-20-0000 01:40 FROM ECM, INC. HONOLULU TO 18089552005 P.01

LINDA CROCKETT LINGLE
Mayor

CHARLES JENCKS
Director

DAVID C. GOODE
Deputy Director

AARON SHINMOTO, P.E.
Chief Staff Engineer

RALPH NAGAMINE, L.S., P.E.
Land Use and Codes Administration

EASSIE MILLER, P.E.
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

DAVID WISSMAR, P.E.
Solid Waste Division

BRIAN HASHIRO, P.E.
Highways Division

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

May 13, 1996

RECEIVED
MAY 16
ECM, INC.

Mr. Charles Willson
Planner/Analyst
ECM, Inc.
485 Waiale Drive
Wailuku, HI 96793

Dear Mr. Willson:

SUBJECT: SUBMISSION OF DRAFT EA AND NOTICE OF ANTICIPATED NEGATIVE DECLARATION - LOWER KULA PUMP STATION AND 2 MG WATER STORAGE TANK

We are in receipt of your letter dated May 3, 1996 along with the above subject document. In accordance with our Department of Public Works' policy, our comments will be forwarded to the Land Use and Codes Administration Division for consolidation. They in turn, will forward the Department's comments to you.

Thank you for considering us for review of the draft EA and notice of anticipated negative declaration.

Very truly yours,

Brian S. Hashiro

BRIAN S. HASHIRO
Highways Division Chief

BH:bh

cc: LUCA

LINDA CROCKETT LINGLE
Mayor

CHARLES JENCKS
Director

DAVID C. GOODE
Deputy Director

AARON SHINMOTO, P.E.
Chief Staff Engineer

RALPH NAGAMINE, L.S., P.E.
Land Use and Codes Administration

EASSIE MILLER, P.E.
Wastewater Reclamation Division

LLOYD P.C.W. LEE, P.E.
Engineering Division

BRIAN HASHIRO, P.E.
Highways Division

Solid Waste Division

COUNTY OF MAUI
DEPARTMENT OF PUBLIC WORKS
AND WASTE MANAGEMENT
200 SOUTH HIGH STREET
WAILUKU, MAUI, HAWAII 96793

June 19, 1996

Mr. Charles Willson
ECM Inc.
1357 Kapiolani Blvd., Ste. 1230
Honolulu, Hawaii 96814

Dear Mr. Willson:

SUBJECT: Draft Environmental Assessment
LOWER KULA PUMP STATION and 2MG WATER STORAGE TANK
TMK:(2) 2-4-013:179

We reviewed the subject application and have the following comment.

The applicant shall submit a drainage and erosion plan verifying that there will be no adverse effects to adjacent and downstream properties as a result of the project.

Sincerely,

For CHARLES JENCKS
Director of Public Works
and Waste Management

AS:da/mt
cc: Engineering Division
Land Use and Codes Administration
Solid Waste Division

g:\wastemgt\lowerku.ea

LINDA CROCKETT LINGLE
MAYOR

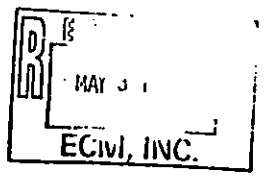
RONALD P. DAVIS
CHIEF

HENRY A. LINDO, SR.
DEPUTY CHIEF

COUNTY OF MAUI
DEPARTMENT OF FIRE CONTROL

200 DAIRY ROAD
KAHULUI, MAUI, HAWAII 96732
(808) 243-7561

May 22, 1996



Charles Willson, Planner/Analyst
ECM, Inc.
485 Waiale Drive
Wailuku, Maui, Hawaii 96793

RE: Lower Kula Pump Station and 2 MG Water Storage Tank
TMK: 2-4-13:179

Dear Mr. Willson,

This letter acknowledges receipt of your letter dated May 3, 1996 concerning the Submission of Draft EA and Notice of Anticipated Negative Declaration.

The Department of Fire Control is very pleased that the Department of Water Supply is increasing the storage capacity of the Lower Kula and Olinda areas. This will enhance the fire fighting capabilities of the Department of Fire Control in these areas.

You may use these comments in you environmental assessment for the project.

If you have any questions, direct them in writing to the Fire Prevention Bureau, 21 Kinipopo Street, Wailuku, Maui, Hawaii 97893.

Sincerely,

Ronald P. Davis
Fire Chief

LINDA CROCKETT LINGLE
MAYOR

OUR REFERENCE

YOUR REFERENCE

POLICE DEPARTMENT
COUNTY OF MAUI

55 MAHALANI STREET
WAILUKU, HAWAII 96793
AREA CODE (808) 244-6400
FAX NO. (808) 244-6411

HOWARD H. TAGOMORI
CHIEF OF POLICE

THOMAS H. PHILLIPS
DEPUTY CHIEF OF POLICE

MEMORANDUM

TO : DAVID CRADDICK, DIRECTOR
Board of Water Supply

FROM : HOWARD H. TAGOMORI, Chief of Police

SUBJECT : Submission of Draft EA and Notice of Anticipated Negative Declaration
Lower Kula Pump Station and 2 MG Water Storage Tank

_____ No recommendation or special condition is necessary or desired.

___/___ Refer to attachment(s).

_____ Recommend denial.

Assistant Chief Charles Hall
for: HOWARD H. TAGOMORI
Chief of Police

TO : CHARLES HALL, ASSISTANT CHIEF, UNIFORM SERVICES

FROM : RICHIE NAKASHIMA, CAPTAIN, DISTRICT I

SUBJECT : ENVIRONMENTAL ASSESSMENT FOR LOWER KULA PUMP STATION

Upon reviewing the Draft Environmental Assessment for the Lower Kula Pump Station and 2 MG Water Storage Tank, it was determined it would not have any significant impact on our police operations. The location of the water storage tank will be on a 5.6 acre parcel off of Olinda Road in the Kula area.

The project site would not have any adverse traffic considerations due to its remoteness and we do not anticipate any other negative police related concerns.

Submitted as directed.

RICHIE NAKASHIMA E-4403
CAPTAIN DISTRICT I
06-06-96 1057 HOURS

Maui Electric Company, Ltd. • 210 West Kamehameha Avenue • PO Box 398 • Kahului, Maui, HI 96732-0398 • (808) 871-8461

May 20, 1996

Mr. David Craddick
Director
County of Maui
Department of Water Supply
P. O. Box 1109
Wailuku, HI 96793-7109

Dear Mr. Craddick

Subject: Submission of Draft EA and Notice of Anticipated Negative Declaration
Lower Kula Pump Station and 2 MG Water Storage Tank
(TMK: 2-4-13:179 Lot 3-B)

Thank you for allowing us to comment on the subject project.

In reviewing the information transmitted and our records, Maui Electric Company (MECO) at this time has no objections to the subject project. MECO encourages that the project's consultant meet with us as soon as practical so that we may plan for the project's electrical requirements.

If you have any questions or concerns, please call Fred Oshiro at 872-3202.

Sincerely,

Edward Reinhardt
Manager, Engineering

FO:rt

cc: Herb Chang, COM Department of Water Supply
Charles Wilson, ECM Inc.

APPENDIX / ATTACHMENTS

Section 2 -- Supporting Documents

Tax (TMK) Maps Zone 2, Sec. 4
Zone 2, Sec. 4, Plat 13

DWS Water System Map (a portion of the island-wide DWS distribution map illustrating transmission lines, storage tanks, and interconnections)

Lower Kula Water Transmission System (schematic of elements relevant to this project -- similar to overlay on Figure 2. USGS Vicinity / Topographic Map)

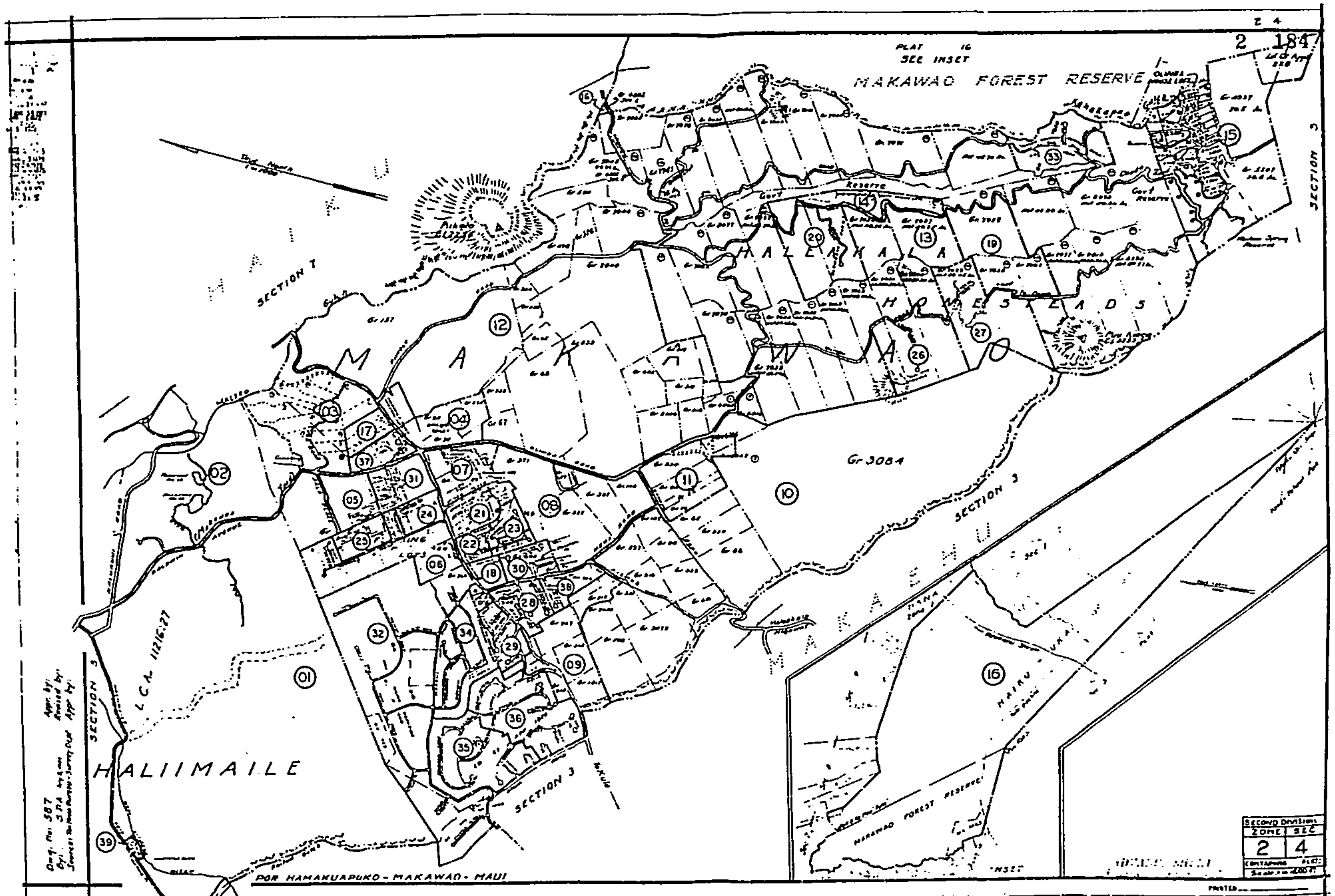
Hydraulic Profile (illustrating the hydraulic gradeline from the LK-WTP to Kula Kai tank, with pressure class limits illustrated on the profile at the top)

Population and Water Use Projections for Makawao-Pukalani-Kula (M-P-K) Community Plan Area, 1990 to 2010 (Hydraulics Report Summary Table)

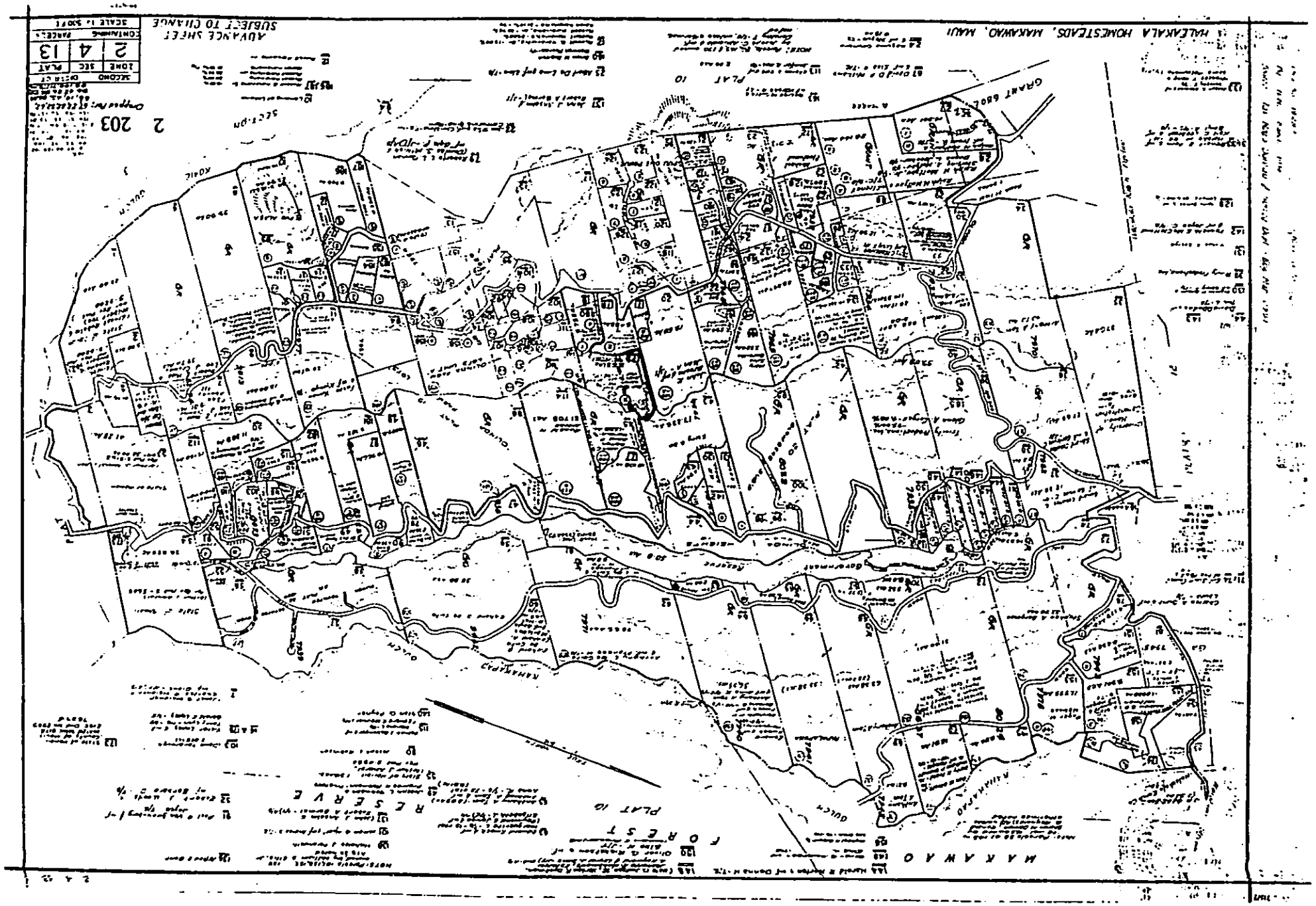
LK Water Consumption Trend Extrapolation (graph of the water usage estimates on lines 3, 4, 5, and 6 in the M-P-K Community Plan projections table)

Preliminary Project Plans: (partial set)

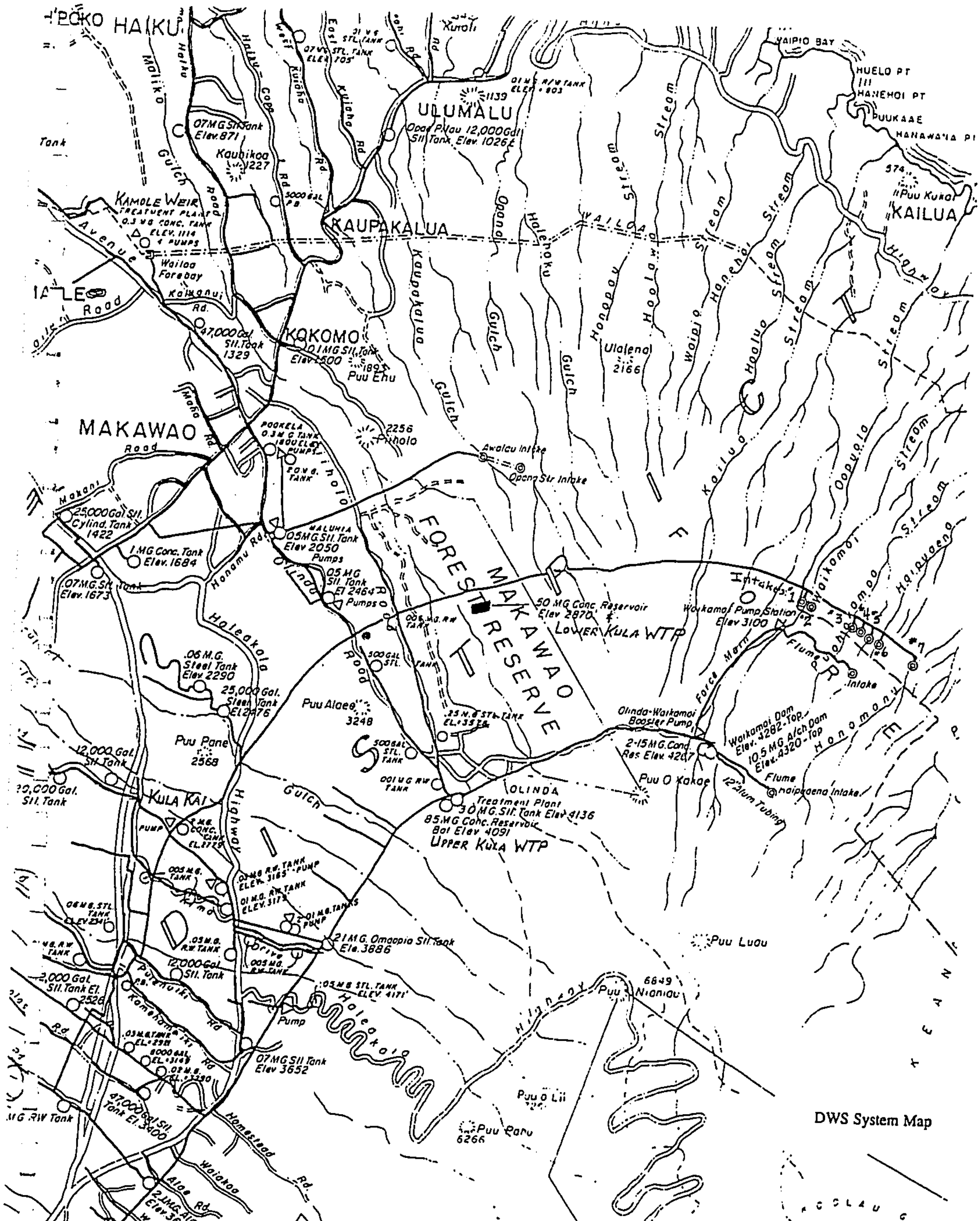
- Cover Sheet
- Location plan / Vicinity Map & Index to Drawings (G-1)
- Notes (C-1)
- General Site Plan (C-2)
- Site Geometric Plan (C-3)
- Site Grading Plan (C-4)
- Access Road Plan and Profile (C-5)
- Booster Pump Plan and Section (C-8)



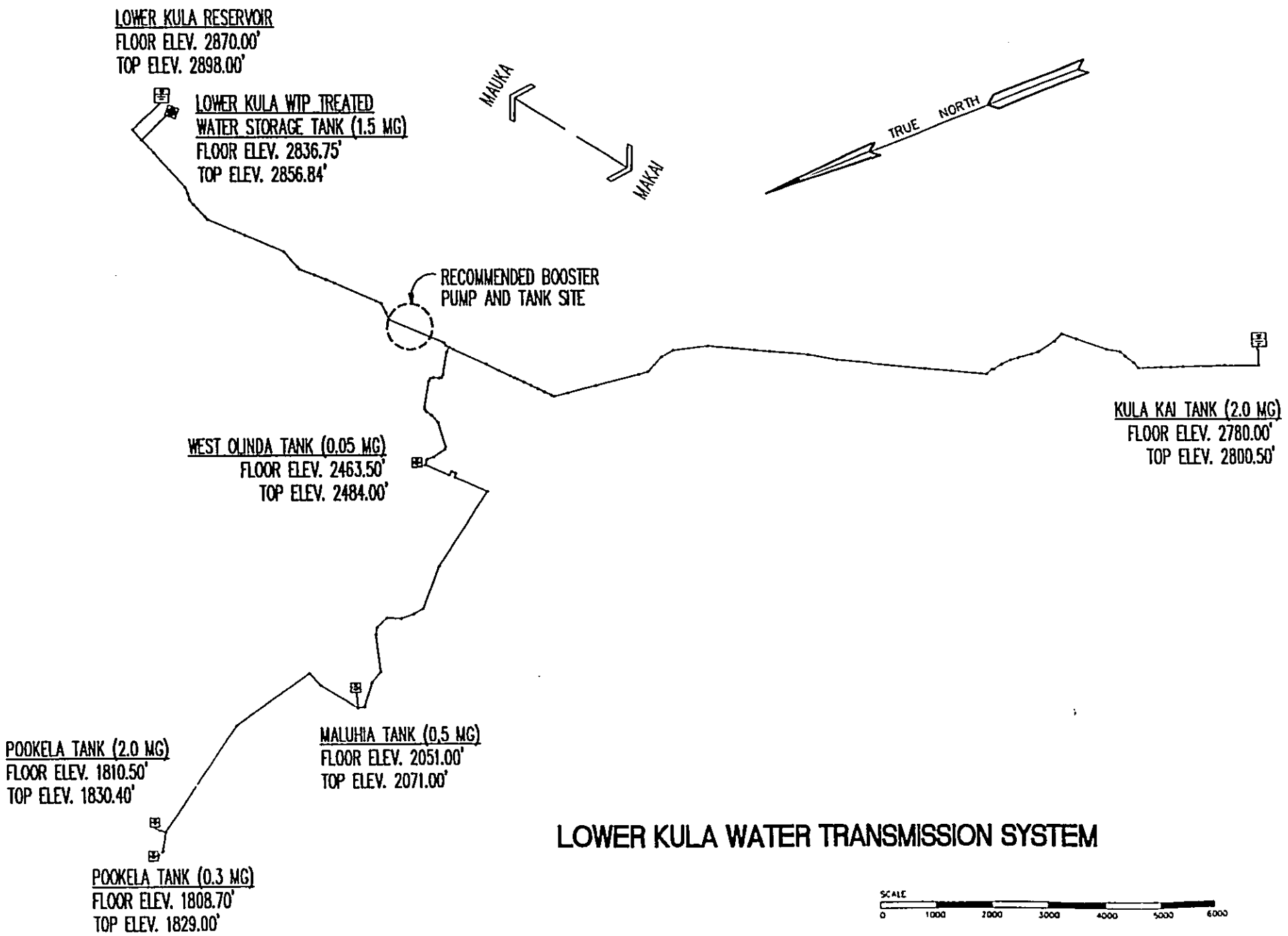
2 184
MAKAWAO FOREST RESERVE
PLAT 16 SEE INSET
HALEAKALA HOMESTEADS
MAKAWAO
HALIIMAILE
HAIKU
MAKAEHU
SECTION 3
SECTION 7
Gr. 3084
L.C.A. 11216:27
MAKAWAO FOREST RESERVE
INSET
POR HAMAKUAPOKO - MAKAWAO - MAUI
SECOND DIVISION
ZONE 2
SEC 4
Dwg. No. 587



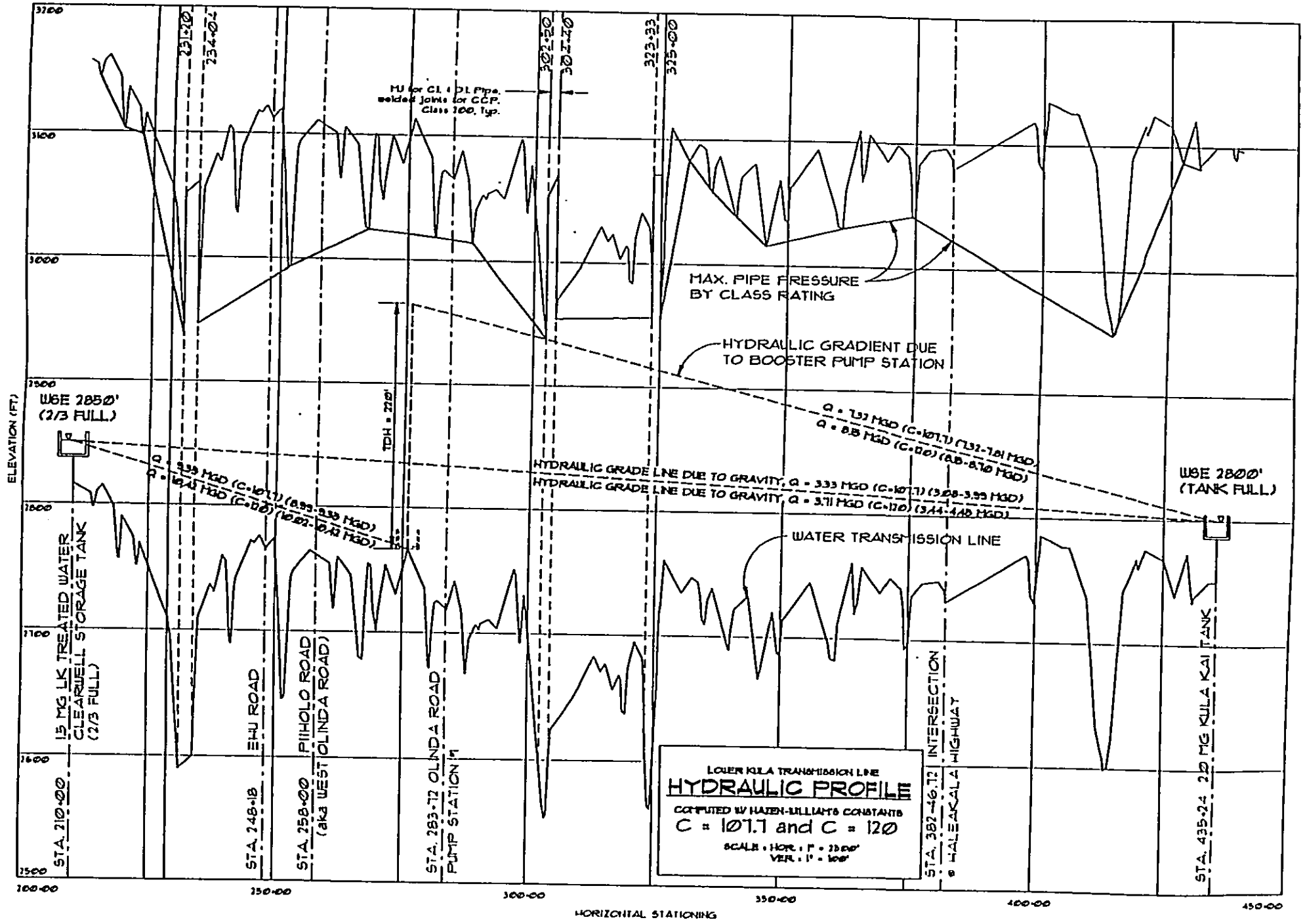
DOCUMENT CAPTURED AS RECEIVED



DWS System Map



LOWER KULA WATER TRANSMISSION SYSTEM

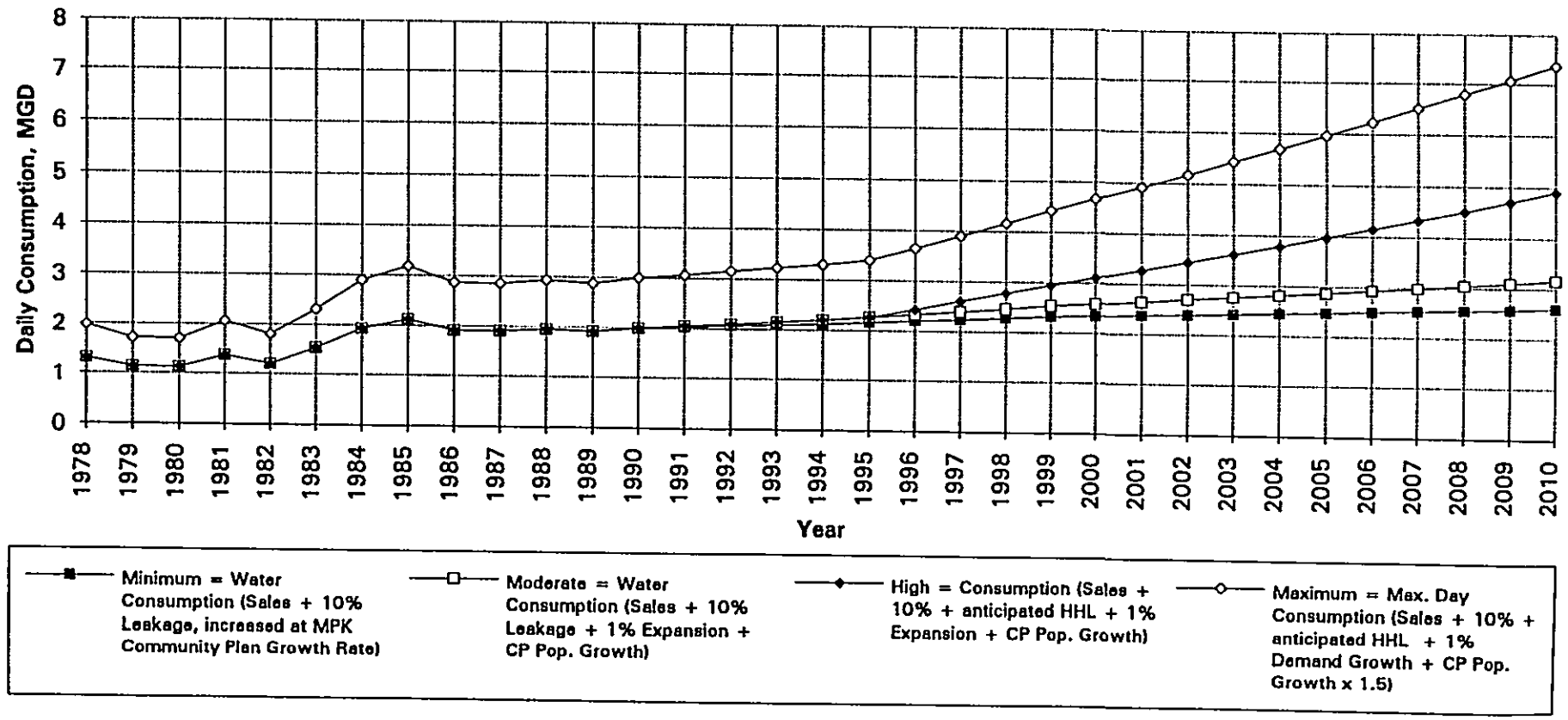

MJ for CI & DI Pipe, welded joints for CCP, Class 100, typ.
MAX. PIPE PRESSURE BY CLASS RATING
HYDRAULIC GRADIENT DUE TO BOOSTER PUMP STATION
Q = 7.37 MGD (C=107.1) (7.37-7.81 MGD)
Q = 8.8 MGD (C=120) (8.8-8.10 MGD)
WSE 2850' (2/3 FULL)
Q = 3.33 MGD (C=107.1) (8.33-8.33 MGD)
Q = 4.43 MGD (C=120) (10.82-10.83 MGD)
TDH = 220'
HYDRAULIC GRADE LINE DUE TO GRAVITY, Q = 3.33 MGD (C=107.1) (3.08-3.33 MGD)
HYDRAULIC GRADE LINE DUE TO GRAVITY, Q = 3.71 MGD (C=120) (3.44-4.10 MGD)
WATER TRANSMISSION LINE
WSE 2800' (TANK FULL)
1.5 MG LK TREATED WATER CLEARWELL STORAGE TANK (2/3 FULL)
STA. 210+00
STA. 248+18 EHU ROAD
STA. 258+00 PIIHOLO ROAD (aka WEST OLINDA ROAD)
STA. 283+72 OLINDA ROAD PUMP STATION
STA. 382+46.72 INTERSECTION @ HALEAKALA HIGHWAY
STA. 435+24 2.0 MG KULA KAI TANK
LOWER KULA TRANSMISSION LINE
HYDRAULIC PROFILE
COMPUTED W/ HAZEN-WILLIAMS CONSTANTS
C = 107.1 and C = 120
SCALE: HOR. 1" = 2000'
VER. 1" = 100'
ELEVATION (FT)
HORIZONTAL STATIONING
3100
3000
2900
2800
2700
2600
2500
200+00
250+00
300+00
350+00
400+00
450+00

M-P-K Comm. Plan Area	1990	1995	2000	2005	2010
1 Defacto Population	18,941	20,344	22,205	23,481	24,591
2 Annual Growth Rate	1.5%	1.81%	1.1%	1.0%	1.0%
3 **Avg.Day Demand :: Pop.**	**2.0**	**2.2**	**2.3**	**2.5**	**2.6**
4 **W. Demand :: Pop. +1%**	**2.0**	**2.3**	**2.6**	**2.9**	**3.2**
5 **Demand:: Pop.+1%+HHL**	**2.0**	**2.3**	**3.1**	**4.0**	**4.9**
6 Max. Day (Sales * 1.65)	3.0	3.4	4.7	6.0	7.4
7 Transmission Sizing	4.0	4.5	6.2	7.9	9.8
8 16% Probable Shortfall	0.3	0.7	1.9	3.2	4.6
9 **Avg. Makawao Demand**	**2.4**	**3.0**	**3.4**	**3.8**	**4.2**
10 Makawao Max. Day	3.6	4.5	5.1	5.7	6.3
11 Kamole Weir Drought Load	3.9	5.2	7.0	8.9	10.9

Community Plan Area Growth Assumptions -- notes by line: (figures in lines 3 - 11 in mgd)

1. **Defacto Population:** The higher of the two community plan population projections including all (resident and visitor) water users. Used to compute the growth rate.
2. **Annual community plan population growth rate:** Compound growth rate applied to compute the population for the following five years. This figure is used to project demand growth in both domestic and agricultural use at the same rate.
3. **Average Daily Water Demand :: Pop:** Demand (Sales +10%), projected proportional to population growth rate (between 1.0 and 1.81% annually); the same rate is used for agricultural growth. **Actual FY 1990 sales were 1.73 mgd;** this was adjusted upward to **2.0 mgd** as the 1990 starting point to compute future demand, and to match actual 10-year average meter flows, to adjust for system losses (≈9.5% for 1990), and to compensate for high 1992 - 1993 demand. (Note: 1.9 mgd is used in some places in this report (graphs, etc.) to represent actual LK draw.)
4. **Average Daily Water Demand :: Pop. +1%:** demand projected at population growth rate plus 1%/year add'l growth. Annual demand growth projected at 2.5, 2.81, 2.1, and 2.0% for combined domestic and agricultural during the periods shown. This is the highest ag. demand projection used in this report, and assumes major increases in ag. demand will not be permitted.
5. **Average Daily Water Demand :: Pop.+1% +HHL:** demand projected 1% higher than population growth, with Hawaiian Home Lands demand accommodated by 100,000 gpd yearly increases beginning in 1996. This is the highest probable projected demand unless agricultural demand is allowed to increase at rates greater than other growth, as explained in 3 and 4 above.
6. **Maximum Day Demand** is computed as Avg. Demand x 1.5 (or Sales x 1.65).
7. **Transmission Sizing** is the appropriate capacity for transmission elements to meet the extended periods of dry season demand, which can be double average daily demand levels. Due to the demand profile on this line, this figure should be considered a minimum and verified with accurate field data, as periods in the early 1980's exceeded this demand level for periods in excess of a month. Double the daily demand would be an appropriate Max. Day figure for LK.
8. **16% Probable Shortfall** is an estimate of the expected dry period supply shortages assuming Max. Day demand levels for the highest projected demand levels (including Hawaiian Homes). Streamflow above 2.73 mgd should be expected 84% of the time (1 standard deviation above mean streamflow volume). Actual shortfall may be greater, as this figure assumes 100% stream-flow capture by watershed intakes with no losses. This estimates the Lower Kula system draw from Piiholo Reservoir storage (or pumped up from Makawao) to meet Max. Day demand.
9. **Average Makawao Demand:** The average amount of excess Lower Kula water Makawao could absorb, given sufficient supply. Used to compute hydroelectric generation potential.
10. **Makawao Maximum Day:** Estimated high demand period requirement for Makawao system.
11. **Kamole Weir Drought Load:** The amount of water required from Kamole Weir to supply both the Lower Kula shortfall and Makawao Max. Day demand after the 50 mg Piiholo Reservoir is depleted, but assuming 2.73 mgd daily receipts by Piiholo Reservoir. Actual drought receipts could be 1 mgd lower. Note this scenario shows the 6.0 mgd rated capacity of Kamole Weir exceeded by about 1996, with no water available to pump to the Lower Kula system.

"Bracketing the Future" -- Lower Kula Water Consumption Trend Extrapolation (based on Community Plan Population Projections -- No Additional Agricultural Meters)



DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI, HAWAII

CONTRACT DOCUMENTS FOR CONSTRUCTION OF

LOWER KULA
BOOSTER PUMP STATION AND TANK

JOB NO. - DWS 94-13

APPROVED BY:

DIRECTOR, DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI

DATE

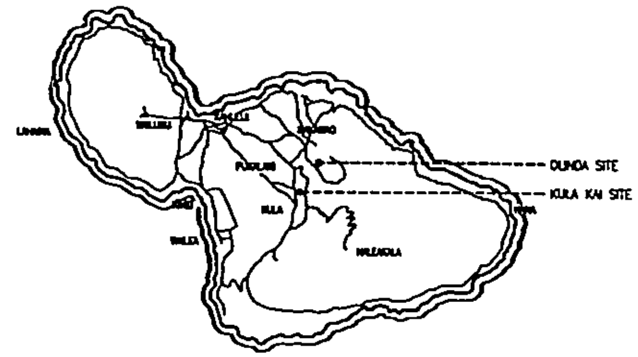
THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION AND COMBUSTION OF THIS PROJECT WILL BE UNDER MY SUPERVISION ECM INC.

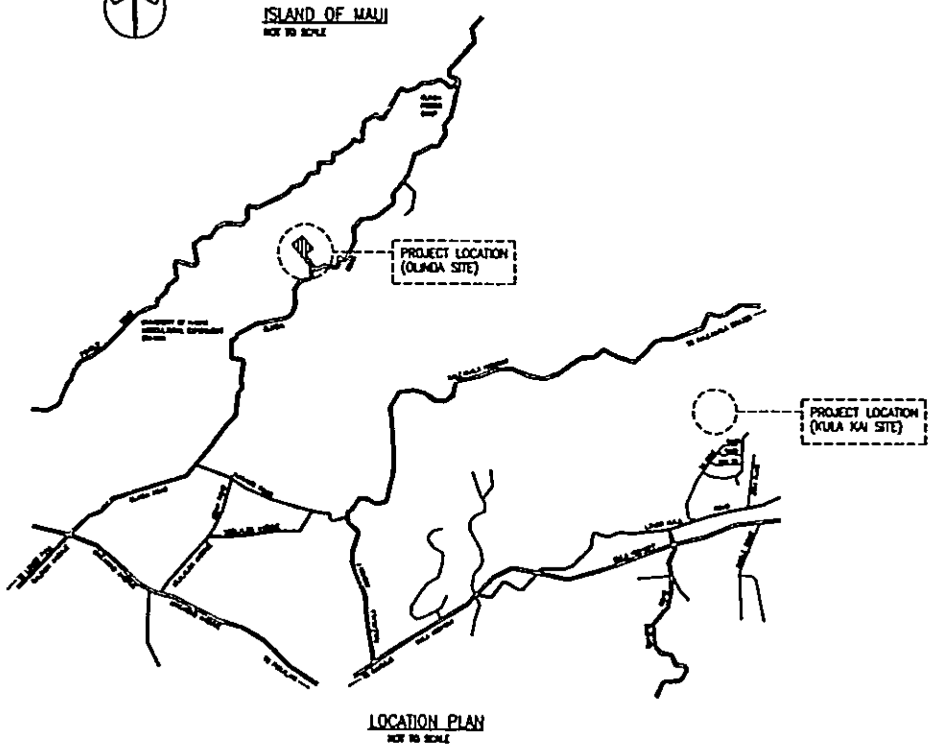
HILTON M. UNEBORI
REGISTERED PROFESSIONAL ENGINEER
STATE OF HAWAII CERTIFICATE NO. 6574-E

ECM INC.
Engineering Consultants
485 Waiale Drive
Wailuku, Maui, Hi. 96793
Phone: (808)242-8070
Fax: (808)244-9539

BROWN AND CALDWELL

MARCH 1996





INDEX TO DRAWINGS

GENERAL:

1. T1 TITLE SHEET
2. G-1 LOCATION PLAN/VICINITY MAP AND INDEX TO DRAWINGS
3. G-2 STANDARD ABBREVIATIONS
4. G-3 STANDARD SYMBOLS

CIVIL:

5. C-1 NOTES
6. C-2 GENERAL SITE PLAN
7. C-3 SITE GEOMETRIC PLAN
8. C-4 SITE GRADING PLAN
9. C-5 ACCESS ROAD PLAN & PROFILE
10. C-6 18 INCH FORCE MAIN
11. C-7 16" WASHOUT/OVERFLOW LINE BOOSTER PUMP SUCTION LINE
12. C-8 BOOSTER PUMP PLAN & SECTION
13. C-9 ALTITUDE VALVE DETAILS
14. C-10 RATE FLOW VALVE DETAILS
15. C-11 MISCELLANEOUS DETAILS
16. C-12 MISCELLANEOUS DETAILS
17. C-13 MISCELLANEOUS DETAILS
18. C-14 MCC BUILDING FLOOR PLAN/SECTION

STRUCTURAL:

19. S1 GENERAL STRUCTURAL NOTES
20. S2 TYPICAL CONCRETE DETAILS
21. S3 TYPICAL METALWORK DETAILS
22. S4 TYPICAL HANDRAIL & LADDER DETAILS
23. S101 FLOOR AND ROOF PLANS
24. S102 ROOF STEEL LAYOUT
25. S103 FLOOR PLAN STEEL & COLUMN SECTION
26. S104 SECTIONS AND DETAILS 1
27. S105 SECTIONS AND DETAILS 2
28. S106 SECTIONS AND DETAILS 3
29. S107 SECTIONS AND DETAILS 4

ELECTRICAL:

30. E001 STANDARD SYMBOLS
31. E002 LUMINAIRE SCHEDULE AND ELECTRICAL DETAILS
32. E003 INSTRUMENTATION AND IDENTIFICATION SYMBOLS
33. E101 ELECTRICAL SITE PLAN (BOOSTER PUMP SITE) DUCT SECTIONS
34. E102 ONE LINE DIAGRAM AND SWITCHBOARD ELEVATION (BOOSTER PUMP SITE)
35. E103 ELEMENTARY DIAGRAMS PUMPS 1, 2, 3
36. E201 PROCESS DIAGRAMS BOOSTER PUMPS
37. E301 PARTIAL KULA SITE PLAN/ONE LINE DIAGRAM

ECM Engineering Consultants — BROWN AND CALDWELL

FILE G1.DWG — DRAWN MAA — DESIGNED ---- — CHECKED DLC — CHECKED ----

REVISIONS

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI, HAWAII

LOWER KULA
BOOSTER PUMP STATION and TANK

GENERAL

LOCATION PLAN/VICINITY MAP
INDEX TO DRAWINGS

SCALE AS NOTED — DRAWING NUMBER G-1 — SHEET NUMBER _ OF _

NOTE REGARDING DISCOVERIES OF ARCHAEOLOGICAL INTEREST:

SHOULD HISTORIC SITES SUCH AS WALLS, PLATFORMS, PAVEMENTS AND MOUNDS, OR REMAINS SUCH AS ARTIFACTS, BURIALS, CONCENTRATION OF CHARCOAL OR SHELLS ARE ENCOUNTERED DURING CONSTRUCTION WORK, WORK SHALL CEASE IN THE IMMEDIATE VICINITY OF THE FIND AND THE FIND SHALL BE PROTECTED FROM FURTHER DAMAGE. THE CONTRACTOR SHALL IMMEDIATELY CONTACT THE STATE HISTORIC PRESERVATION DIVISION (243-5169), WHICH WILL ASSESS THE SIGNIFICANCE OF THE FIND AND RECOMMEND AN APPROPRIATE MITIGATION MEASURE, IF NECESSARY.

PURSUANT TO CHAPTER 6E OF THE HAWAII REVISED STATUTES, ALL CONTRACTORS SHALL ENSURE THAT IN THE EVENT THAT ANY HUMAN SKELETAL REMAINS ARE INADVERTENTLY DISCOVERED DURING CONSTRUCTION, THE REMAINS SHALL NOT BE MOVED AND ANY ACTIVITY IN THE IMMEDIATE AREA THAT COULD DAMAGE THE REMAINS OR THE POTENTIAL HISTORIC SITE SHALL CEASE AND THE DEPARTMENT OF LAND AND NATURAL RESOURCES' HISTORIC PRESERVATION DIVISION, THE APPROPRIATE MEDICAL EXAMINER OR CORONER, AND THE POLICE DEPARTMENT SHALL BE CONTACTED.

GRADING NOTES:

1. CONTRACTOR SHALL OBTAIN A GRADING PERMIT FROM THE DEPARTMENT OF PUBLIC WORKS (DPW) TWO (2) WEEKS PRIOR TO COMMENCEMENT OF ANY GRADING OR GRUBBING.
2. CONTRACTOR SHALL SUBMIT A SATISFACTORY GRADING WORK METHOD TO MINIMIZE DUST POLLUTION BEFORE A GRADING PERMIT IS ISSUED.
3. GRADING OPERATIONS SHALL CONFORM WITH APPLICABLE PROVISIONS OF THE "WATER POLLUTION CONTROL AND WATER QUALITY STANDARDS" CONTAINED IN THE STATE OF HAWAII PUBLIC HEALTH REGULATIONS, AND THE COUNTY GRADING ORDINANCE.
4. CONTRACTOR, AT HIS OWN EXPENSE, SHALL KEEP THE PROJECT AREA AND THE SURROUNDING AREA FREE FROM DUST NUISANCE. WORK SHALL CONFORM WITH THE AIR POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE DEPARTMENT OF HEALTH AND THE COUNTY GRADING ORDINANCE.
5. CONTRACTOR SHALL REMOVE ALL SILT AND DEBRIS RESULTING FROM HIS WORK AND DEPOSITED IN DRAINAGE FACILITIES, ROADWAYS AND OTHER AREAS. COST INCURRED FOR ANY REMEDIAL ACTION ORDERED BY THE DIRECTOR OF PUBLIC WORKS SHALL BE PAYABLE BY THE CONTRACTOR.
6. CONSTRUCTION DEBRIS AND WASTE SHALL BE DEPOSITED AT AN APPROPRIATE SITE MEETING REQUIREMENTS OF THE GRADING ORDINANCE. CONTRACTOR SHALL INFORM THE DPW OF THE LOCATION OF THE DISPOSAL SITE PRIOR TO ANY DISPOSAL.
7. FOR GRADING PERMIT PURPOSES ONLY, THE ENGINEER HAS ESTIMATED QUANTITIES AS FOLLOWS:
   EXCAVATION = 11,500 CUBIC YARDS
   EMBANKMENT = 0 CUBIC YARDS
   AREA = 4 ACRES
   CONTRACTOR SHALL DETERMINE HIS OWN QUANTITIES FOR TAKEOFF AND BIDDING PURPOSES, PER THE CONTRACT DOCUMENTS.
8. ALL GRADING AND/OR PLACEMENT OF BACKFILL SHALL BE DONE IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS AND BE APPROVED BY A LICENSED ENGINEER. CERTIFICATION OF COMPLIANCE SHALL BE SUBMITTED TO THE LAND USE AND CODES ADMINISTRATION PRIOR TO FINAL APPROVAL.
9. CONTRACTOR SHALL VERIFY EXISTING GRADES BEFORE PROCEEDING WITH GRADING WORK. SHOULD SIGNIFICANT DISCREPANCIES BE DISCOVERED IN EXISTING GRADES OR DIMENSIONS GIVEN ON THE PLANS, CONTRACTOR SHALL IMMEDIATELY NOTIFY THE ENGINEER BEFORE PROCEEDING FURTHER WITH ANY WORK. ABSENT SUCH NOTIFICATION, THE CONTRACTOR SHALL BE RESPONSIBLE FOR ANY COSTS INVOLVED IN CORRECTION OF CONSTRUCTION PLACED DUE TO SUCH DISCREPANCIES.

COMPACTION REQUIREMENTS:

1. TESTING OF MATERIALS SHALL BE CONDUCTED BY AN APPROVED INDEPENDENT TESTING AGENCY IN ACCORDANCE WITH ASTM STANDARD METHODS OR AS SPECIFIED BY THE DEPARTMENT OF PUBLIC WORKS, ENGINEERING DIVISION, AS FOLLOWS:
   A. EMBANKMENT/SELECT BORROW AND SUBGRADE MATERIALS: ONE (1) COMPACTION TEST PER 600 SQUARE FEET.
   B. AGGREGATE SUBBASE COURSE: ONE(1) COMPACTION TEST PER 400 SQUARE YARDS, ONE (1) GRADATION AND SAND EQUIVALENT TEST PER PROJECT.
   C. AGGREGATE BASE COURSE: ONE(1) COMPACTION TEST PER 300 SQUARE YARDS, ONE(1) GRADATION AND SAND EQUIVALENT TEST PER PROJECT.
   D. ASPHALT CONCRETE PAVEMENT OR ASPHALT TREATED BASE COURSE: THREE (3) A.C. CORES FOR THICKNESS AND DENSITY TEST PER PROJECT.
   E. TRENCH BACKFILL MATERIAL: ONE (1) TEST FOR EACH 300 LINEAL FEET OF TRENCH PER LIFT OF MATERIAL.
2. CONTRACTOR SHALL SUBMIT ALL TESTING REPORTS INCLUDING RESULTS TO THE COUNTY'S INSPECTION AGENCY FOR REVIEW AND APPROVAL PRIOR TO COUNTY'S ACCEPTANCE OF WORK.
3. THE CONTRACTOR SHALL BE REQUIRED TO NOTIFY THE COUNTY OF ANY TESTING FAILURES AND CORRECT EACH FAILURE PRIOR TO PROCEEDING TO THE NEXT PHASE OF CONSTRUCTION.

NOTES REGARDING PUBLIC HEALTH, SAFETY AND CONVENIENCE:

1. CONTRACTOR SHALL OBSERVE AND COMPLY WITH ALL FEDERAL, STATE, AND LOCAL LAWS REQUIRED FOR THE PROTECTION OF PUBLIC HEALTH AND SAFETY AND ENVIRONMENTAL QUALITY.
2. AS REQUIRED BY THE COUNTY, CONTRACTOR SHALL HIRE SPECIAL DUTY POLICE OFFICERS TO CONTROL THE FLOW OF TRAFFIC.
3. DURING NON-WORKING HOURS, ALL LANES SHALL BE OPEN AND ALL EXCAVATIONS ON THE ROADWAY SHALL BE COVERED WITH A SAFE NON-SKID BRIDGING MATERIAL. DRIVEWAYS SHALL BE KEPT OPEN UNLESS OWNERS OF THE PROPERTY USING THESE RIGHTS-OF-WAY ARE OTHERWISE PROVIDED SATISFACTORY ACCESS.
4. DURING WORKING HOURS, CONTRACTOR SHALL MAINTAIN A ROADWAY SUITABLE FOR ONE LANE OF TRAFFIC WITH FLAG MEN AT BOTH ENDS, ALTERNATING DIRECTION OF TRAFFIC FLOW.
5. CONTRACTOR SHALL PROVIDE, INSTALL AND MAINTAIN ALL NECESSARY SIGNS, LIGHTS, FLARES, BARRICADES, MARKERS, CONES, AND OTHER PROTECTIVE FACILITIES AND SHALL TAKE ALL NECESSARY PRECAUTIONS FOR THE PROTECTION, CONVENIENCE, AND SAFETY OF THE PUBLIC.

ENVIRONMENTAL HEALTH NOTES:

1. THE CONTRACTOR SHALL REMOVE ALL SILT AND DEBRIS RESULTING FROM HIS WORK AND DEPOSITED IN DRAINAGE FACILITIES, ROADWAYS AND OTHER AREAS. THE COSTS INCURRED FOR ANY NECESSARY REMEDIAL ACTION BY THE CHIEF ENVIRONMENTALIST SHALL BE BORNE BY THE CONTRACTOR.
2. THE CONTRACTOR SHALL KEEP THE PROJECT AREA AND SURROUNDING AREAS FREE FROM DUST NUISANCE, ALL IN ACCORDANCE WITH THE AIR POLLUTION CONTROL STANDARDS AND REGULATIONS OF THE STATE DEPARTMENT OF HEALTH. ALL COSTS SHALL BE BORNE BY THE CONTRACTOR.
3. ALL GRADING OPERATIONS SHALL BE PERFORMED IN CONFORMANCE WITH THE APPLICABLE PROVISIONS OF WATER POLLUTION CONTROL AND WATER QUALITY STANDARDS OF THE PUBLIC HEALTH REGULATIONS OF THE STATE DEPARTMENT OF HEALTH AND THE COUNTY'S GRADING ORDINANCE.
4. ALL CUT AND FILL SLOPES SHALL BE SODDED OR PLANTED IMMEDIATELY AFTER GRADING WORK HAS BEEN COMPLETED.
5. CONSTRUCTION DEBRIS AND WASTES SHALL BE DEPOSITED AT APPROPRIATE SITES. THE CONTRACTOR SHALL INFORM THE ENGINEER OF THE LOCATION OF DISPOSAL SITES. THE DISPOSAL SITES SHALL ALSO FULFILL THE REQUIREMENTS OF THE GRADING ORDINANCE.
6. THE CONTRACTOR SHALL NOT DEMOLISH OR CLEAR ANY STRUCTURE, SITE OR VACANT LOT WITHOUT FIRST ASCERTAINING THE PRESENCE OR ABSENCE OF RODENTS WHICH MAY ENDANGER THE PUBLIC HEALTH BY DISPERSAL FROM SUCH PREMISES. SHOULD SUCH INSPECTION REVEAL THE PRESENCE OF SUCH RODENTS, THE CONTRACTOR SHALL ERADICATE SUCH RODENTS BEFORE DEMOLISHING OR CLEARING SAID STRUCTURE, SITE OR VACANT LOT.

NOTES TO CONTROL DRAINAGE & EROSION:

1. CONTROL DUST BY MEANS OF WATER WAGONS DURING CONSTRUCTION.
2. CONSTRUCT SHORT TEMPORARY DIVERSION DITCHES AWAY FROM THE ROADWAY SECTION TO NATURAL LOW AREAS DURING CONSTRUCTION. THE NUMBER AND LOCATION OF THE DIVERSION DITCHES TO BE DETERMINED BY THE ENGINEER.
3. ALL EXPOSED AREAS SHALL BE PAVED, GRASSED, OR PERMANENTLY LANDSCAPED AS SOON AS FINISHED GRADING IS COMPLETED.
4. GRADED AREAS SHALL BE THOROUGHLY WATERED AFTER CONSTRUCTION ACTIVITY HAS CEASED FOR THE DAY AND FOR THE WEEKENDS.
5. MAINTAIN THE FOLLOWING MINIMUM DISTANCES FROM TOP OF CUT OR BOTTOM OF FILL TO PROPERTY LINES:

HEIGHT OF CUT OR FILL		DISTANCE FROM PROPERTY LINE
0' TO 2'	=	1'
2' TO 4'	=	2'
4' TO 6'	=	3'
6' TO 10'	=	4'
10' TO 15'	=	5'
MORE THAN 15'	=	6'

WATER SYSTEM

1. CONTRACTOR SHALL NOTIFY THE DEPARTMENT OF WATER SUPPLY (DWS), IN WRITING, ONE (1) WEEK PRIOR TO COMMENCEMENT OF WORK.
2. ALL MATERIALS USED AND METHODS OF CONSTRUCTION OF WATER SYSTEM FACILITIES SHALL BE IN ACCORDANCE WITH THE LATEST REVISIONS OF DWS STANDARDS. CONTRACTOR SHALL OBTAIN THE LATEST REVISIONS OF THE DWS STANDARD DETAILS BEFORE COMMENCING CONSTRUCTION.
3. THE EXACT DEPTH AND LOCATION OF EXISTING WATERLINES, SERVICE LATERALS AND OTHER UTILITIES ARE NOT KNOWN. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO LOCATE SAME PRIOR TO TRENCHING FOR THE NEW WATER LINE. THE COST OF LOWERING, RELOCATING OR ADJUSTING EXISTING WATER LINES, SEWER LATERALS AND OTHER UTILITIES SHALL BE CONSIDERED INCIDENTAL TO THE COST OF THE NEW WATER LINE, UNLESS NOTED OTHERWISE, AND WILL NOT BE PAID FOR SEPARATELY.
4. CONCRETE FOR REACTION BLOCKS AND ANCHOR BLOCKS SHALL BE DWS CLASS 2500.
5. THE MAXIMUM DISTANCE BETWEEN VALVE NUT AND TOP OF MANHOLE SHALL BE THREE (3) FEET.
6. CONTRACTOR SHALL SUBMIT A MATERIALS LIST TO DWS FOR APPROVAL PRIOR TO CONSTRUCTION.
7. CONNECTION TO DWS SYSTEM:
   A. THE CONTRACTOR SHALL VERIFY THE EXACT LOCATION, DEPTH, TYPE AND CONDITION OF THE EXISTING LINE BEFORE ORDERING MATERIALS FOR THE HOOK-UP. HE SHALL, HOWEVER, CHECK WITH DWS BEFORE EXCAVATING FOR VERIFICATION PURPOSES. HE SHALL BE RESPONSIBLE FOR FURNISHING ALL NECESSARY FITTINGS AND OTHER MATERIALS REQUIRED FOR THE HOOK-UP.
   B. WHENEVER FEASIBLE, MECHANICAL JOINT FITTINGS SHALL BE USED.
   C. AUTHORIZED DWS PERSONNEL WILL MAKE THE FINAL CONNECTION TO THE EXISTING LINE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS INCURRED BY DWS FOR SAID WORK, INCLUDING THE COST OF PRESSURE TESTING.
   D. THE CONTRACTOR SHALL BE RESPONSIBLE FOR FURNISHING ALL MATERIAL, EQUIPMENT AND LABOR FOR CHLORINATION, TRENCH EXCAVATION, BACKFILLING, PAVING, AND OTHER WORK NECESSARY TO COMPLETE THE HOOK-UP, AS DIRECTED BY AND TO THE SATISFACTION OF DWS.
8. THE DEVELOPER SHALL SUBMIT A COST LIST ALONG WITH AN AFFIDAVIT FOR THE WATER SYSTEM PRIOR TO ACCEPTANCE.
9. THE CONTRACTOR SHALL SUBMIT TWO (2) SETS OF RECORD DRAWINGS VIA A CONSULTANT PRIOR TO ACCEPTANCE OF THE WATER SYSTEM.
10. MINIMUM COVER OVER WATER MAIN, 8" DIAMETER OR LARGER, SHALL BE 3'-0". MINIMUM COVER FOR 6" DIAMETER SHALL BE 2'-6". MINIMUM COVER FOR DIAMETER LESS THAN 6" SHALL BE 1'-6".
11. THE CONTRACTOR SHALL PAINT AND NUMBER THE FIRE HYDRANT. NUMBERING TO BE FURNISHED BY DWS.
12. ALL BURIED METALS SHALL BE WRAPPED WITH POLY-WRAP. FOR DUCTILE IRON PIPE INSTALLATION, POLY-WRAP SHALL BE REQUIRED.
13. ALL NUTS AND BOLTS SHALL BE PAINTED WITH ASPHALTIC PAINT.
14. LUBRICATE HYDRANT NOZZLE THREADS WITH NON-TOXIC GREASE.

CHLORINATION OF WATER SYSTEMS:

1. LIQUID CHLORINE OR CALCIUM HYPOCHLORITE, CONFORMING TO AWWA STANDARDS SHALL BE USED FOR THE CHLORINATION OF THE PROJECT.
2. PRIOR TO CHLORINATION, THE PROJECT SHALL BE THOROUGHLY FLUSHED.
3. THE INTERIOR SURFACES OF THE PROJECT SHALL BE EXPOSED TO THE CHLORINATING SOLUTION FOR A MINIMUM OF 24 HOURS AND THE CHLORINE RESIDUAL SHALL NOT BE LESS THAN 10 PPM AFTER SUCH TIME.
4. SHOULD CALCIUM HYPOCHLORITE BE USED, NO SOLID AND/OR UNDISSOLVED PORTION OF THE COMPOUND SHALL BE INTRODUCED INTO ANY SECTION OF THE PROJECT TO BE CHLORINATED.
5. AT THE END OF THE 24-HOUR DISINFECTION PERIOD, REPRESENTATIVE SAMPLES SHALL BE TAKEN AND ANALYZED TO ASSURE A CHLORINE RESIDUAL OF AT LEAST 10 PPM.
6. SHOULD THE RESULTS INDICATE ADEQUATE CHLORINATION, THE PROJECT SHALL BE THOROUGHLY FLUSHED AND FILLED WITH WATER FROM THE EXISTING SYSTEM AND AGAIN TESTED FOR CHLORINE RESIDUAL. THE FLUSHING SHALL BE CONSIDERED ADEQUATE IF THE TEST RESULTS INDICATE THAT THE WATER IN THE PROJECT HAS A COMPARABLE CHLORINE RESIDUAL AS THE WATER IN THE EXISTING SYSTEM.
7. FOLLOWING THE ACCEPTABLE FLUSHING OF THE PROJECT, TWO CONSECUTIVE SETS OF ACCEPTABLE SAMPLES, TAKEN AT LEAST 24 HOURS APART, FROM REPRESENTATIVE POINTS IN THE PROJECT SHALL BE TAKEN AND SUBJECTED TO MICROBIOLOGICAL TESTS. AT LEAST ONE SET OF SAMPLES SHALL BE COLLECTED FROM EVERY 1,200 FEET OF THE NEW WATER MAIN, PLUS ONE FROM THE END OF THE LINE AND AT LEAST ONE SET FROM EACH BRANCH. POSITIVE RESULTS WILL NOT BE ACCEPTABLE AND THE PROCESS WILL BE REPEATED.
8. ANALYSIS FOR RESIDUAL CHLORINE SHALL BE MADE IN ACCORDANCE WITH "STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER," AMERICAN PUBLIC HEALTH ASSOCIATION, 18th EDITION.
9. MICROBIOLOGICAL TESTS SHALL BE MADE IN ACCORDANCE WITH "STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER," AMERICAN PUBLIC HEALTH ASSOCIATION, 18th EDITION.
10. ALL MEASUREMENTS FOR CHLORINE RESIDUAL AND MICROBIOLOGICAL TESTS SHALL BE PERFORMED BY A LABORATORY APPROVED BY THE DIRECTOR.
11. THE DEVELOPER/CONTRACTOR SHALL BE RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH ALL OF THE FOREGOING.

CHLORINATION OF REINFORCED CONCRETE TANKS:

1. PRIOR TO ACTUAL CHLORINATION WORK, THE CONTRACTOR SHALL SUBMIT TO THE ENGINEER FOR APPROVAL, A PLAN AND SCHEDULE DELINEATING THE METHOD OR STEPS BY WHICH HE PROPOSES TO ACCOMPLISH THE WORK.
2. ALTERNATE 1
   A SOLUTION OF 200 MG/L AVAILABLE CHLORINE SHALL BE APPLIED DIRECTLY TO THE SURFACES OF ALL PARTS OF THE STORAGE FACILITY THAT SHOULD BE IN CONTACT WITH WATER WHEN THE STORAGE FACILITY IS FULL TO THE OVERFLOW ELEVATION. THE CHLORINE SOLUTION MAY BE APPLIED WITH SUITABLE BRUSHES OR SPRAY EQUIPMENT. THE SOLUTION SHALL THOROUGHLY COAT ALL SURFACES TO BE TREATED, INCLUDING INLET AND OUTLET PIPING, AND SHALL BE APPLIED INTO ANY SEPARATE DRAIN PIPING SUCH THAT IT WILL HAVE AVAILABLE CHLORINE OF NOT LESS THAN 10 MG/L WHEN FILLED WITH WATER. OVERFLOW PIPING NEED NOT BE DISINFECTED.
3. ALTERNATE 2
   WATER AND CHLORINE SHALL BE ADDED TO THE STORAGE FACILITY IN AMOUNTS SUCH THAT INITIALLY THE SOLUTION WILL CONTAIN 50 MG/L AVAILABLE CHLORINE AND WILL FILL APPROXIMATELY 6 PERCENT OF THE TOTAL STORAGE FACILITY FOR A PERIOD OF NOT LESS THAN 6 HOURS. THE STORAGE FACILITY SHALL THEN BE FILLED TO THE OVERFLOW LEVEL BY FLOWING POTABLE WATER INTO THE HIGHLY CHLORINATED WATER. IT SHALL BE HELD FULL FOR A PERIOD OF NOT LESS THAN 24 HOURS. ALL HIGHLY CHLORINATED WATER SHALL THEN BE PURGED FROM THE DRAIN PIPING. FOLLOWING THIS PROCEDURE, AND SUBJECT TO SATISFACTORY BACTERIOLOGICAL TESTING AND ACCEPTABLE AESTHETIC QUALITY, THE REMAINING WATER MAY BE DELIVERED TO THE DISTRIBUTION SYSTEM. THE ACTUAL VOLUME OF THE 50 MG/L CHLORINE SOLUTION SHALL BE SUCH THAT, AFTER THE SOLUTION IS MIXED WITH FILLING WATER AND THE STORAGE FACILITY IS HELD FULL FOR 24 HOURS, THERE WILL BE A FREE CHLORINE RESIDUAL OF NOT LESS THAN 2 MG/L.
4. BACTERIOLOGICAL TESTING
   ALL MEASUREMENTS FOR CHLORINE RESIDUAL AND MICROBIOLOGICAL TESTS SHALL BE PERFORMED BY AN INDEPENDENT LABORATORY APPROVED BY THE DIRECTOR. A CERTIFICATION OF THE TEST RESULTS SHALL BE SUBMITTED TO THE DEPARTMENT OF WATER SUPPLY FOR ACCEPTANCE.
5. THE ENVIRONMENT INTO WHICH THE CHLORINATED WATER IS TO BE DISCHARGED SHALL BE INSPECTED, AND IF THERE IS ANY LIKELIHOOD THAT THE CHLORINATED DISCHARGE WILL CAUSE DAMAGE, THEN A REDUCING AGENT SHALL BE APPLIED TO THE WATER TO BE WASTED TO THOROUGHLY NEUTRALIZE THE CHLORINE RESIDUAL IN THE WATER. FEDERAL, STATE OR LOCAL ENVIRONMENTAL REGULATIONS MAY REQUIRE SPECIAL PROVISIONS OR PERMITS PRIOR TO DISPOSAL OF HIGHLY CHLORINATED WATER.

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LINE IS 2 INCHES AT FULL SIZE

FILE NOTES.DWG
DRAWN ADD
DESIGNED ----
CHECKED DLC
CHECKED ----

REVISIONS

APPROVED:
APPROVED:
APPROVED:

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI, HAWAII

LOWER KULA
BOOSTER PUMP STATION and TANK

CIVIL

NOTES

SCALE AS NOTED
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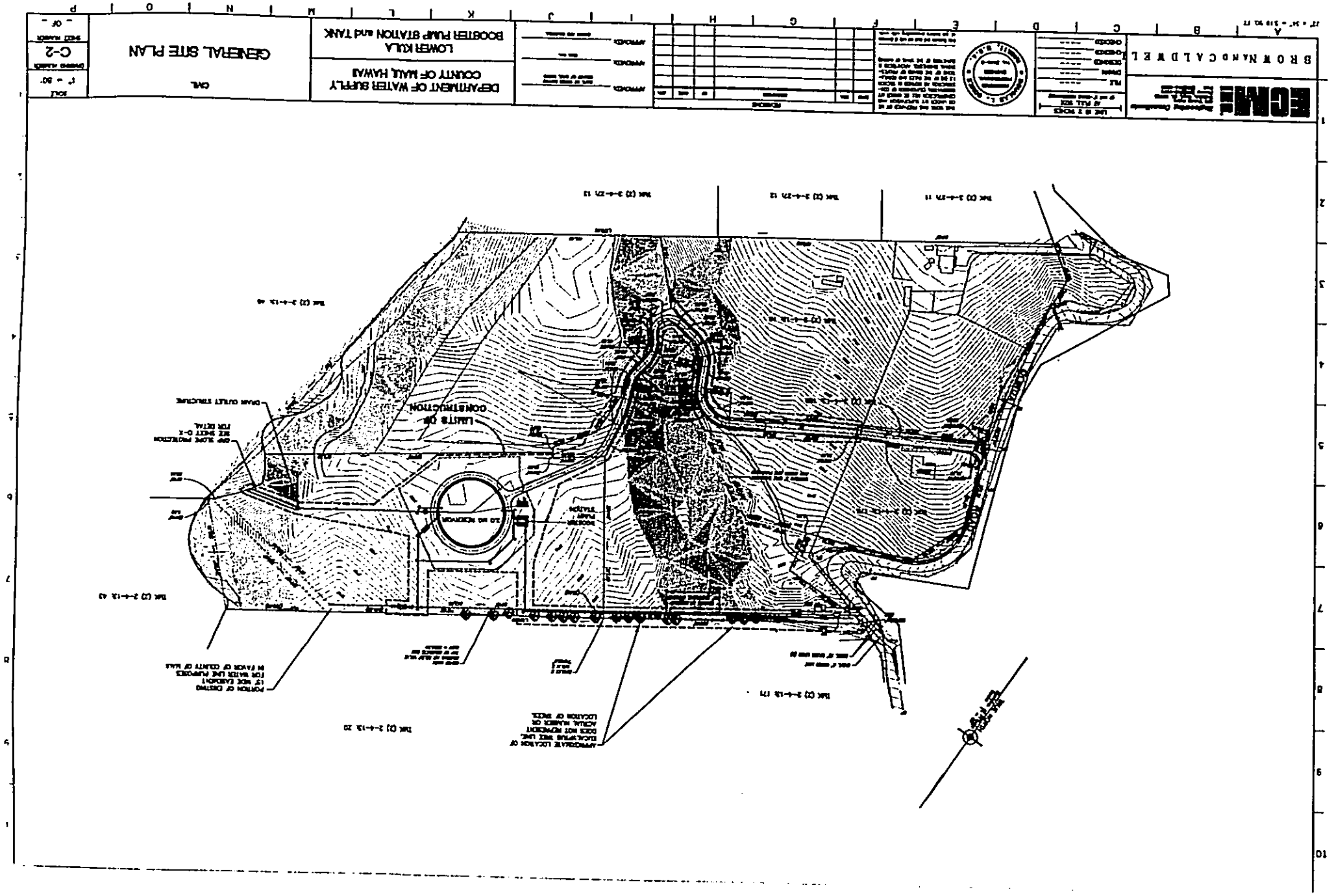
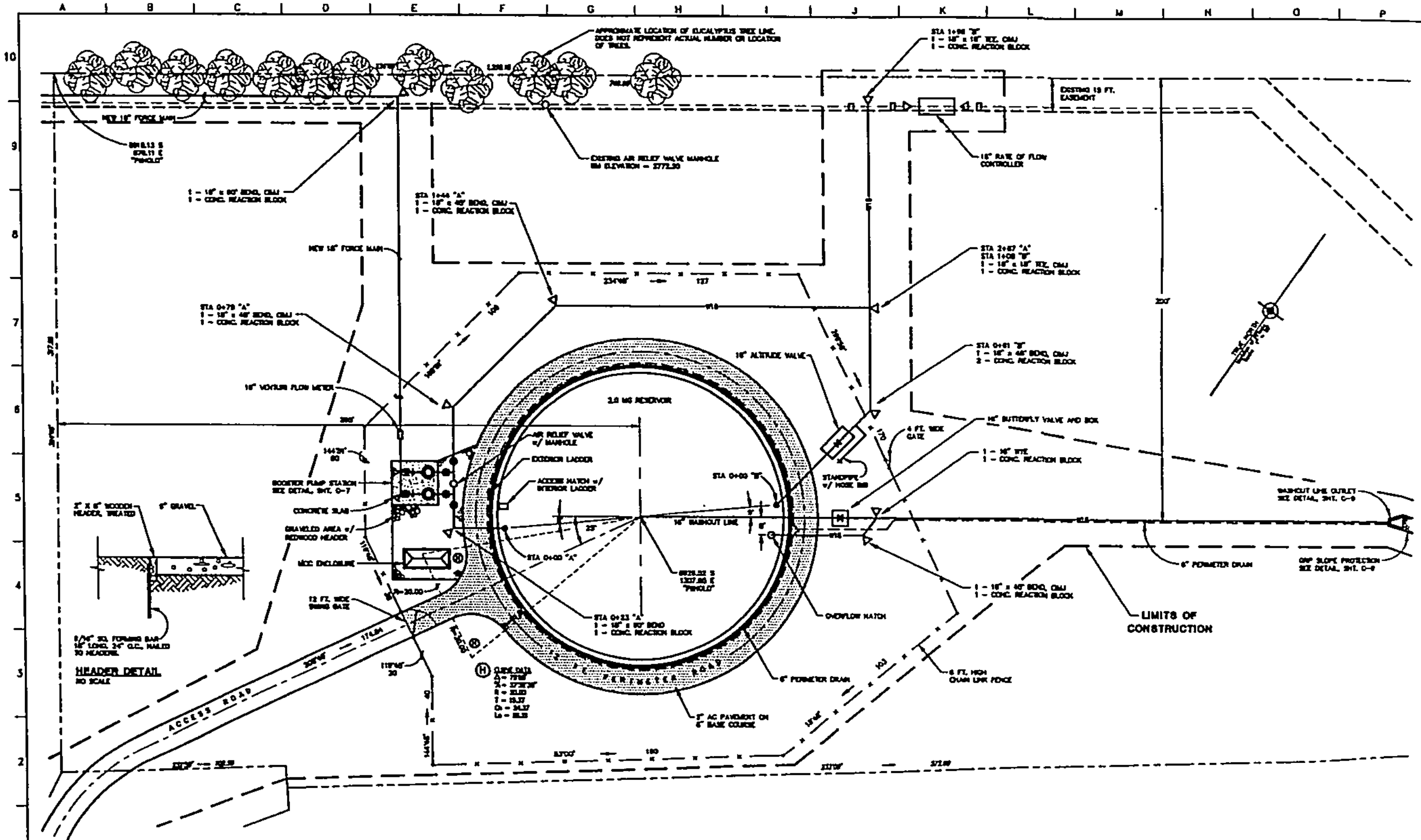
SHEET NUMBER _ OF _





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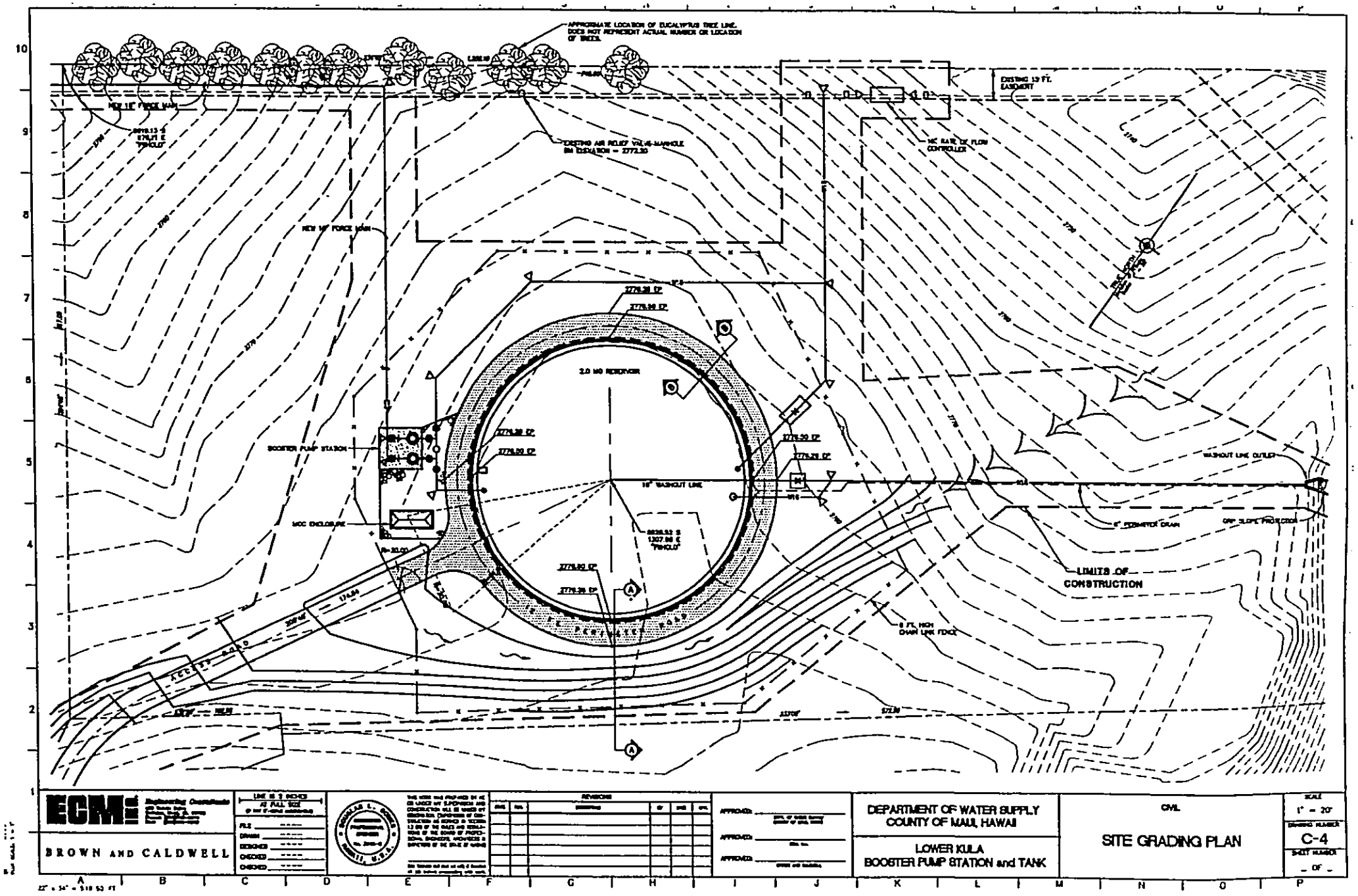
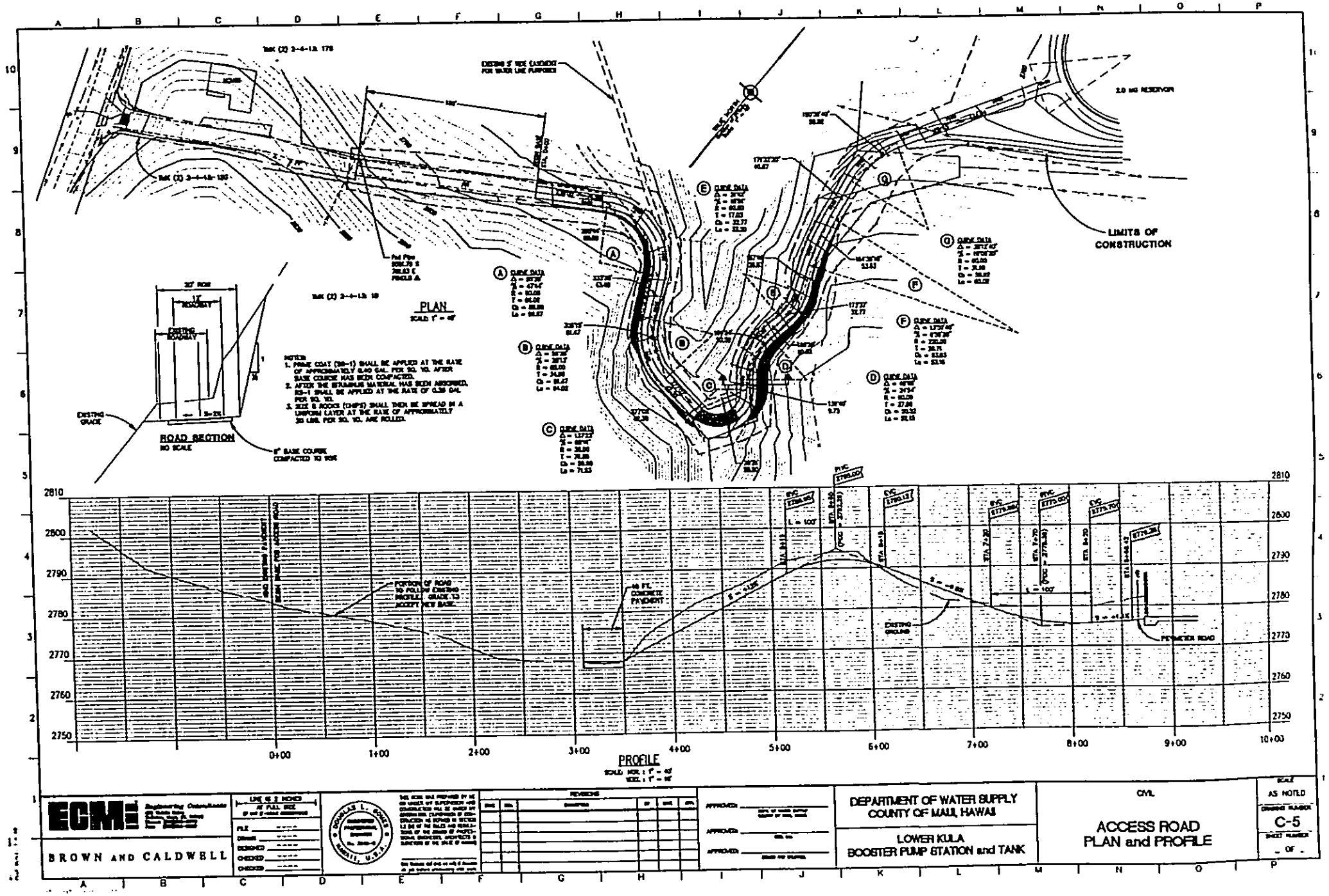
DEPARTMENT OF WATER SUPPLY COUNTY OF MAUI, HAWAII	CIVIL
LOWER KULA BOOSTER PUMP STATION and TANK	SITE GEOMETRIC PLAN

SCALE 1" = 20'

DRAWING NUMBER C-3

SHEET NUMBER _ OF _


APPROXIMATE LOCATION OF EUCALYPTUS TREE LINE. DOES NOT REPRESENT ACTUAL NUMBER OR LOCATION OF TREES.
EXISTING 15 FT. EASEMENT
EXISTING AIR RELIEF VALVE-MANHOLE
2.0 MG RESERVOIR
BOOSTER PUMP STATION
10" WASHOUT LINE
WASHOUT LINE OUTLET
LIMITS OF CONSTRUCTION
6 FT. HIGH CHAIN LINK FENCE
6" PERIMETER DRAIN
RIP RAP SLOPE PROTECTION
BROWN AND CALDWELL
DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI, HAWAII
LOWER KULA
BOOSTER PUMP STATION and TANK
CIVIL
SITE GRADING PLAN
SCALE
1" = 20'
DRAWING NUMBER
C-4
SHEET NUMBER
_ OF _



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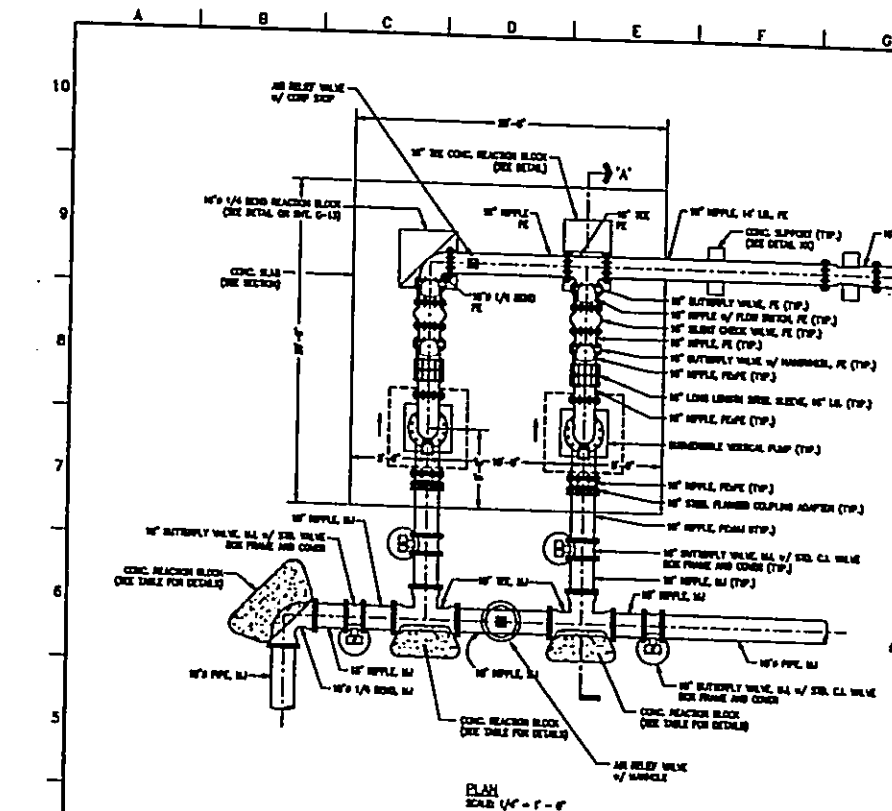
DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI, HAWAII

LOWER KULA
BOOSTER PUMP STATION and TANK

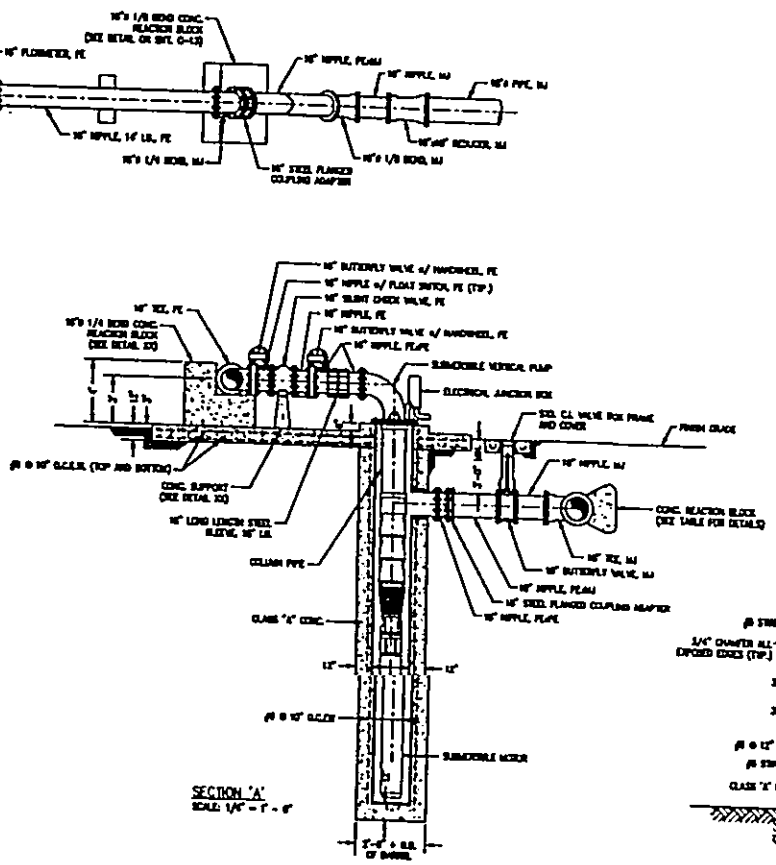
CIVIL

ACCESS ROAD
PLAN and PROFILE

SCALE: AS NOTED
DRAWING NUMBER: C-5
SHEET NUMBER: _ OF _



PLAN
SCALE: 1/4" = 1' - 0"



SECTION 'A'
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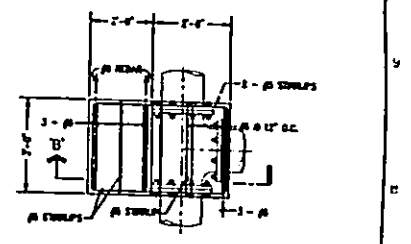

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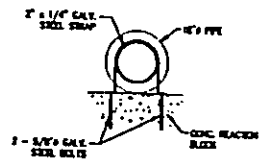

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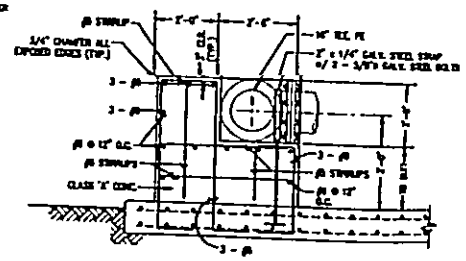

SCALE: 1/2" = 1' - 0"

BOOSTER PUMP STATION DETAILS

SCALE AS NOTED

BROWN AND CALDWELL

DEPARTMENT OF WATER SUPPLY
COUNTY OF MAUI, HAWAII

LOWER KULA
BOOSTER PUMP STATION and TANK

CIVIL DETAILS

BOOSTER PUMP
PLAN and SECTION

SCALE: AS NOTED

DRAWING NUMBER: C-8

SHEET NUMBER: - OF -