DRAFT ENVIRONMENTAL ASSESSMENT

Hamoa Well 2

DWS Job No. 99-18

Hana, Maui, Hawai'i

TMK: (2) 1-4-009: 002 (por.)

August 2008

PREPARED FOR:
Department of Water Supply
County of Maui
200 South High Street
Wailuku, Hawai'i 96793

PREPARED BY:
R.M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawai'i 96819

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1-21315-OP

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SUMMARY OF PROPOSED ACTION

Project:	Hamoa Well 2, DWS Job No. 99-18
Landowner/Applicant:	Department of Water Supply, County of Maui
Accepting Agency:	Department of Water Supply, County of Maui
Agent:	R.M. Towill Corporation
Location:	Hana, Maui, Hawai'i
Tax Map Key (TMK):	(2) 1-4-009: Portion of Parcel 002
Proposed Action:	Construction of a new source well to supplement existing water service
Land Area:	5,615,755 s.f. (128.92 acres) - Project area is 43,643 s.f.
Present Use:	Existing Well (Hamoa 1) and Reservoir Facility
State Land Use District:	Agricultural
County Community Plan:	Agriculture
Present Zoning:	Agricultural
Special Management Area:	No
Permits Required:	Well Pump Installation Permit
Anticipated Determination:	Finding of No Significant Impact (FONSI)

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CHAPTER 1 - INTRODUCTION

1.1 PROJECT OVERVIEW

The Maui County Department of Water Supply (DWS) is proposing to develop Hamoa Well 2 to serve as a back-up source to support the Hana Water System in the Hana District on the Island of Maui (see **Figure 1, Project Location**). The proposed well development project will include installation of a well pump, discharge piping, motor control center within an existing building, and related appurtenances.

DWS proposes to commence construction in January 2009 with construction lasting approximately 9 months. The proposed project budget is $800,000.

Hamoa Well 2 was previously drilled as an exploratory well in 2006 and is situated within an existing facility consisting of Hamoa Well 1, Hamoa Well 2 (exploratory well) and a 190,000 gallon reservoir. The facility is located in Hamoa on a portion of TMK: (2) 1-4-009: Parcel 002 (see **Figure 1, Project Location** & **Figure 2, TMK Map**).

1.2 PURPOSE OF THE ENVIRONMENTAL ASSESSMENT

This Environmental Assessment has been prepared pursuant to Hawai'i Revised Statutes (HRS), Section 343-5, which states an environmental assessment shall be required for actions which "Propose the use of state or county lands or the use of state or county funds, other than funds to be used for feasibility or planning studies for possible future programs or projects that the agency has not approved, adopted, or funded, or funds to be used for the acquisition of unimproved real property; provided that the agency shall consider environmental factors and available alternatives in its feasibility or planning studies."

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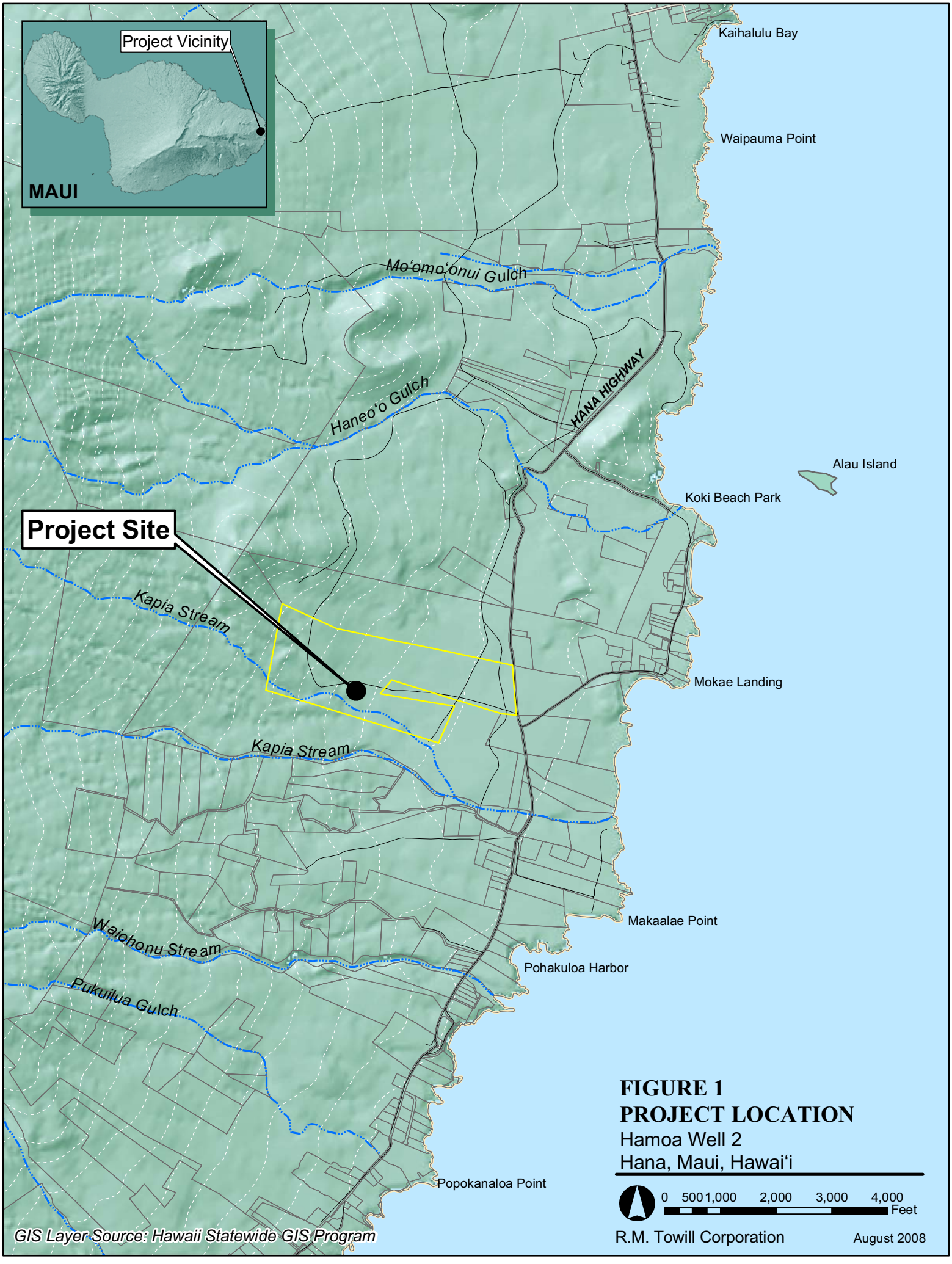

FIGURE 1
PROJECT LOCATION
Hamoa Well 2
Hana, Maui, Hawai'i

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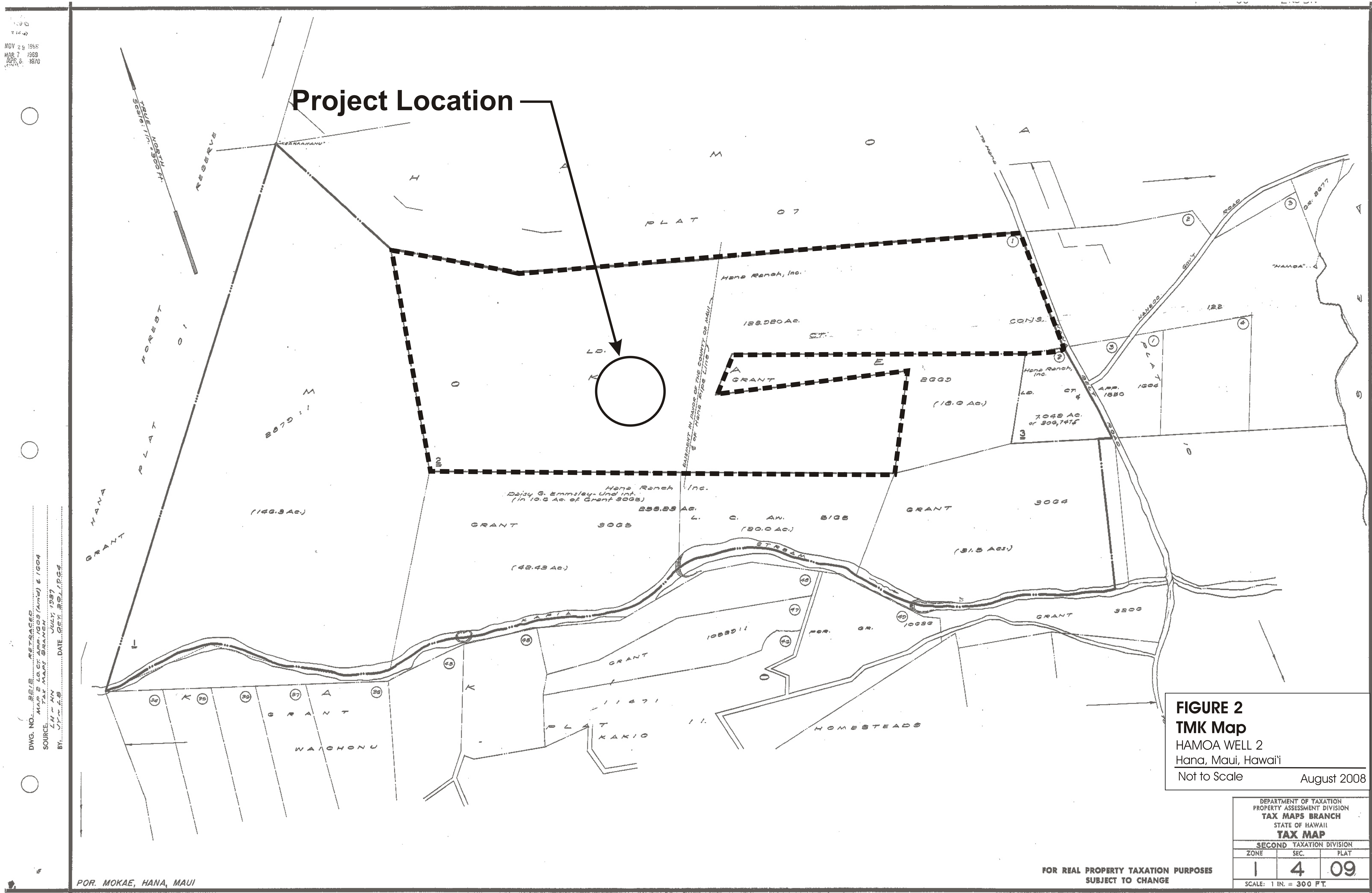


FIGURE 2
TMK Map
HAMOA WELL 2
Hana, Maui, Hawai'i
Not to Scale
August 2008

FIGURE 2 TMK MAP Back (11x17)

This Draft EA describes existing conditions and the limited environmental impacts anticipated from development of the proposed project as well as mitigation measures that will reduce, minimize or eliminate adverse impacts. A Finding of No Significant Impact (FONSI) is anticipated by the DWS.

1.3 PURPOSE AND NEED FOR THE PROJECT

The Hana Water System, which covers the area between Wainapanapa (to the North of project site) and Koali (to the South of project site), is currently being served potable water by Hamoa Well 1 and Wakiu Well B. The pumping capacity of Wakiu Well B and Hamoa Well 1 are 350 gallons per minute (gpm) and 200 gpm respectively.

The purpose of the proposed action is to provide a back-up source of water for the Hana Water System by installation of a well pump in the existing exploratory well, Hamoa Well 2. A back-up source will minimize disruption of service during a well pump failure and also allow for routine maintenance of the well pumps servicing the Hana Water system.

The Draft Maui County Water Use and Development Plan projects average daily water demand for the Hana – East Maui District in 2030 to be 215,000 gpd. The Hana – East Maui District comprises the Hana, Kaupo, Keanae and Nahiku sub-districts. Historical usage data from 1994 to 2007 shows that the Hana Water System accounts for the majority of demand ranging between 76 and 81 percent of the overall usage. Assuming that the Hana Water System continues to account for 81 percent of the water usage in the District, the projected average daily demand would to be 174,150 gpd (81% of 215,000) with a projected maximum daily demand of 261,225 gpd.

1.4 ALTERNATIVES TO THE PROPOSED ACTION

This environmental assessment discusses the no action alternative, the delayed action alternative, and the preferred alternative.

1.4.1 NO ACTION ALTERNATIVE

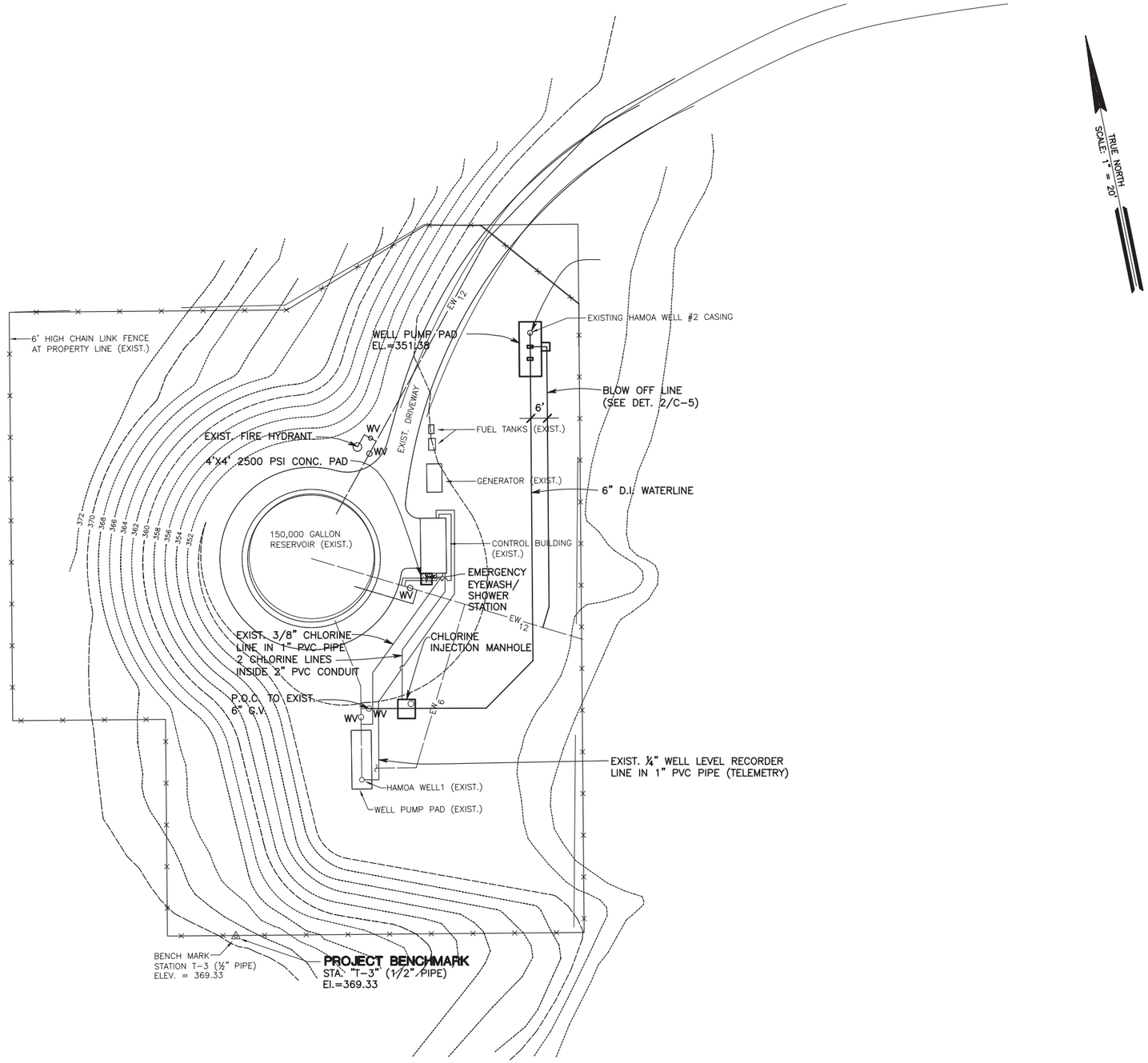
Under the No Action Alternative, no effort will be taken to develop the existing Hamoa exploratory well (Hamoa Well 2) into a potable production well and the potential for environmental, social, and economic impacts disclosed in this Assessment would be precluded. Taking no action does not accomplish the stated purpose of the proposed action which is to develop a new source well to provide back-up should any of the two existing source wells experience service disruption.

1.4.2 DELAYED ACTION ALTERNATIVE

The delayed action alternative was considered but not pursued because it does not address the existing need to develop a new source well to provide back-up service for the Hana Water System. Under this alternative, resource expenditures for well development would be averted in the short-term, however project activities would ultimately incur higher development costs due to inflation while generating environmental outcomes similar to immediate action.

1.4.3 PREFERRED ALTERNATIVE

This alternative involves development of the existing exploratory well, Hamoa Well 2 completed in 2006 (see **Figure 3, Site Plan**). This alternative meets the purpose of the proposed action to develop a new source well to serve as a back-up water source for the Hana Water System.



SITE PLAN
SCALE: 1" = 20'

GRAPHIC SCALE IN FEET
0 10 20 40 60

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Ph: 270-7835
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HAMOA WELL #2 WATER DEVELOPMENT PROJECT

DWS JOB NO. 99-17 & 99-18
TAX MAP KEY (2) 1-4-008:003
HAMOA, HANA, MAUI, HAWAII

SITE PLAN

THIS WORK WAS PREPARED BY ME OR UNDER MY SUPERVISION, AND CONSTRUCTION OF THIS PROJECT WILL BE UNDER MY OBSERVATION AS DEFINED IN HAR 16-115-2.

C:\a transfers 2005\RF Signature for Plans.tif

LICENSE EXPIRES: 04/30/2008

DESIGNED BY:	J.F.
DRAWN BY:	S.W.
CHECKED BY:	R.F.
DATE:	JUNE 2008
FILE NO:	

FIGURE 3
SITE PLAN

FIGURE 3 SITE PLAN back (11x17)

CHAPTER 2 - DESCRIPTION OF THE PROPOSED ACTION

2.1 PROJECT LOCATION AND SITE CHARACTERISTICS

The proposed project is located in Hamoa on the eastern slope of Haleakala. The project site is located approximately 5 miles south of Hana Town. The site, located at an elevation of 350 feet above mean sea level (AMSL), is in an agriculturally-zoned area with surrounding lands used primarily for pastureland. The proposed 44,000 s.f. project site is a portion of a larger property (TMK: (2) 1-4-009: Portion of Parcel 002) and contains an existing DWS source water facility that includes the Hamoa Well 1 and a 190,000 gallon reservoir (see **Figure 3, Site Plan** and **Site Photographs 1 thru 4**). The existing facility also contains an electrical building, standby generator, disinfection facility, fencing and other related appurtenances, as well as the existing exploratory well, Hamoa Well 2.

The existing exploratory well, dug back in 2006, underwent aquifer testing to determine the pumping capacity. The results of the step-drawdown and constant rate pumping tests indicated that the anticipated pumping capacity of 300 gpm will be sufficient to provide high quality groundwater with chloride levels less than 10 mg/L. The Aquifer Test report also indicated that the drawdown from the new well is very small and will not affect the existing Hamoa Well 1. Operation of both wells will also have little effect on the water level of a private well (4300-01) located approximately 2,000 feet to the south (see **Appendix A – Hamoa Well 2 (4300-03), Aquifer Test Results and Geologic Log**).

Photo 1: View of Existing Source Water Facility (Facing South)

Photo 2: View of Existing Hamoa 2 Exploratory Well Casing (Facing South)

Photo 3: Existing Hamoa Well 1 (Facing West)

Photo 4: Existing Hamoa Well 2 Casing (Facing West)

2.2 PROPOSED ACTIVITIES

The proposed well development project will involve construction of a well pump pad, installation of a well pump, discharge piping, a motor control center within the existing electrical building, and related appurtenances. The proposed well pump will be installed in the existing exploratory well, Hamoa Well 2, that was completed in 2006. Hamoa Well 2 is located approximately 172 feet north of the existing Hamoa Well 1 (see **Figure 3, Site Plan**). The proposed project will take place entirely within the existing DWS source water facility.

CHAPTER 3 - AFFECTED ENVIRONMENT: IMPACTS AND MITIGATION MEASURES

3.1 TOPOGRAPHY AND SOILS

The project is located approximately 350 feet AMSL. The landscape of the area ranges from relatively flat to moderate slopes. The project site was previously graded and is relatively flat.

The soil types at the project site are classified as Hana (very stony (HKLD) & extremely stony (HKMD)) Silty Clay Loam Series (see **Figure 4, Soil Map**). The Hana soil series consists of well-drained soils on uplands on the island of Maui. These soils developed in volcanic ash. They are gently sloping to moderately steep. Elevations range from nearly sea level to 1,200 feet. The annual rainfall amounts to 80 to 150 inches. The mean annual soil temperature is 73° F. Both HKLD and HKMD soil types are found on smooth, low mountain slopes with moderately rapid permeability, slow to medium runoff, and slight to moderate erosion hazard. In places, roots can penetrate to a depth of 3 to 4 feet. These soil types are typically used for pasture and home sites.

Potential Impacts and Mitigation Measures

The proposed source water development is limited in scope and therefore will not have a significant impact on the topography of the area. The site is already level therefore no grading is required. The project is not expected to impact existing soil conditions at the project site.

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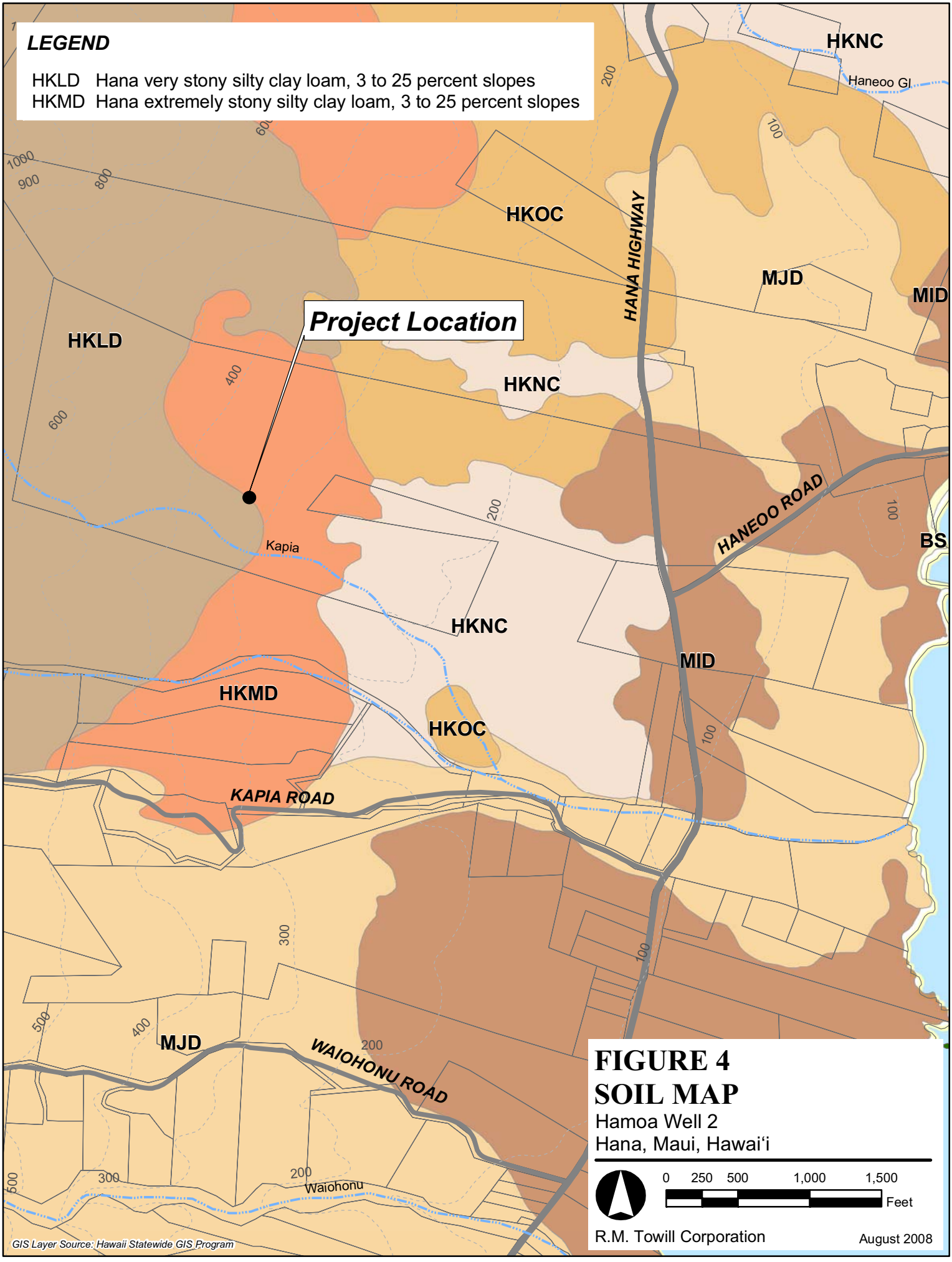
LEGEND
HKLD Hana very stony silty clay loam, 3 to 25 percent slopes
HKMD Hana extremely stony silty clay loam, 3 to 25 percent slopes
Project Location
HKLD
HKMD
HKOC
HKNC
MJD
MID
BS
HANA HIGHWAY
HANEOO ROAD
KAPIA ROAD
WAIOHONU ROAD
Kapia
Waiohonu
Haneoo Gl
1000
900
800
600
500
400
300
200
100
GIS Layer Source: Hawaii Statewide GIS Program
FIGURE 4
SOIL MAP
Hamoa Well 2
Hana, Maui, Hawai'i
0 250 500 1,000 1,500
Feet
R.M. Towill Corporation
August 2008

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3.2 NATURAL HAZARDS

3.2.1 FLOOD ZONES

The entire project site is located in an area determined to be outside the 1% and 0.2% annual chance floodplains flood zone (Zone X). See **Figure 5, Flood Zone Map**.

Potential Impacts and Mitigation Measures

The proposed project is not expected to have significant impacts on flood conditions therefore no mitigation measures are proposed.

3.2.2 EARTHQUAKES

The Uniform Building Code (UBC) provides minimum design criteria to address potential for damage due to seismic disturbances. The UBC contains six seismic zones, ranging from 0 (no chance of severe ground shaking) to a 4 (ten percent chance of severe shaking in a fifty year period). Maui County's UBC seismic risk zone is currently 2b.

Potential Impacts and Mitigation Measures

A seismic event could affect the proposed improvements. DWS will ensure that structural designs are compliant with current seismic design parameters. All structures proposed for this project will be built, at a minimum, according to standards for UBC Seismic Zone 2B.

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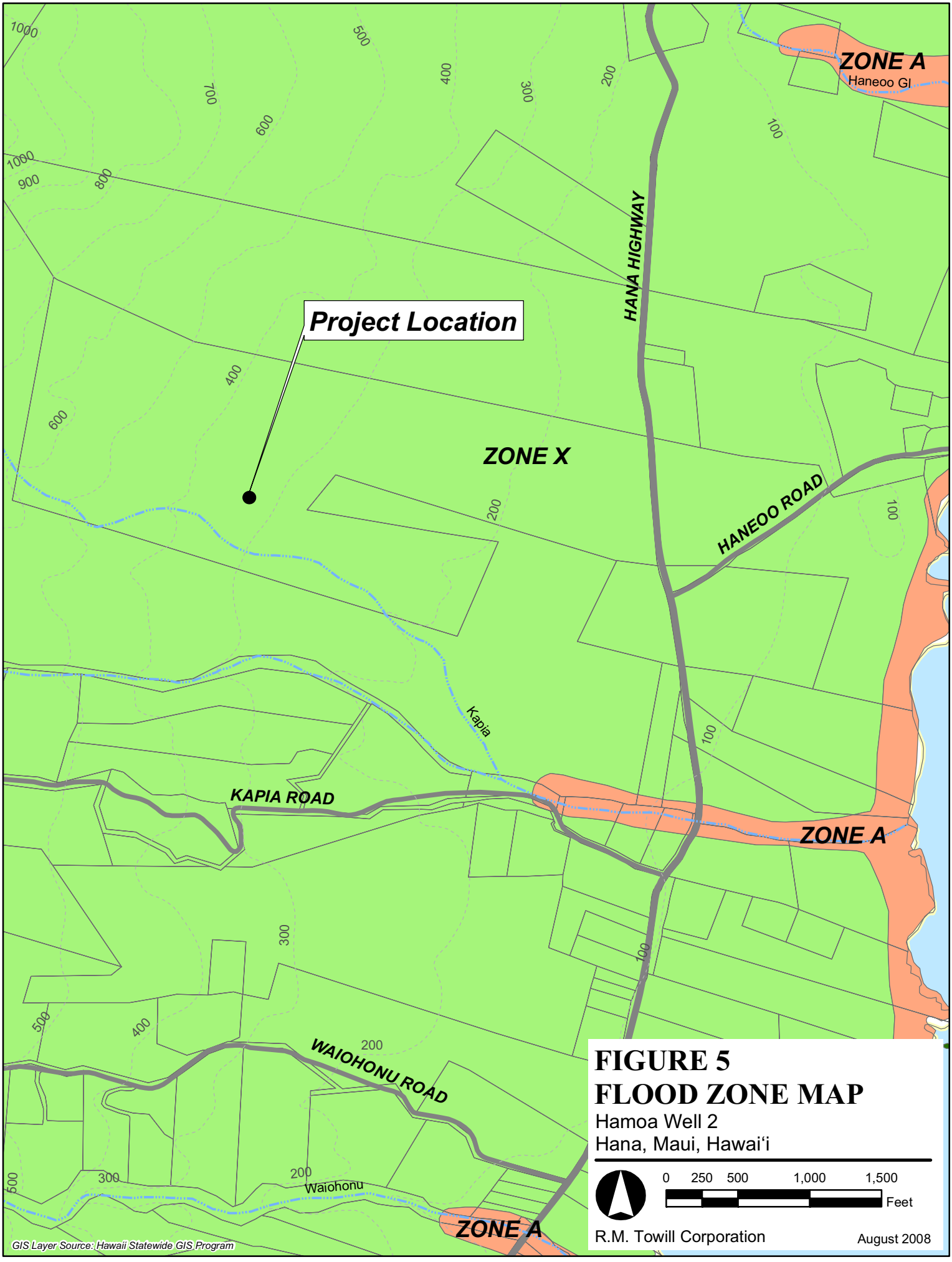

FIGURE 5
FLOOD ZONE MAP

Hamoa Well 2
Hana, Maui, Hawai'i

0 250 500 1,000 1,500
Feet

R.M. Towill Corporation

August 2008

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3.3 AIR QUALITY

Air quality in the project area is excellent. The combination of its rural location, prevailing trade winds from the northeast and absence of stationary pollutant sources contribute to the good air quality in the area.

Potential Impacts and Mitigation Measures

Air quality impacts attributed to the proposed action will be temporary and will include exhaust emissions of construction vehicles and dust generated by short-term, construction-related activities. Construction-related activities to construct the source well will generate airborne particulates. Dust control measures such as watering will be implemented as needed to minimize wind-blown emissions.

Construction-related exhaust emissions will be mitigated by ensuring the project contractor maintains internal combustion engines in proper working order and immediately repair or replace faulty equipment. The contractor, at his own expense, will keep the project area and surrounding area free from dust nuisance. The work will be in conformance with the air pollution control standards contained in Hawai'i Administrative Rules (HAR), Title 11, Chapters 59, "Ambient Air Quality Standards," and Chapter 60, "Air Pollution Control." Long-term air quality impacts resulting from operation of the water system and related vehicle traffic are not expected to cause significant increases in air pollution over existing levels. No long-term mitigation is needed.

3.4 WATER QUALITY

Kapia Stream flows along the southern boundary of the project area. Kapia Stream is designated as a Class 2 inland water body by the State Department of Health.

Potential Impacts and Mitigation Measures

The proposed water system improvement will not require work within the boundaries of Kapia Stream. All ground disturbing activities shall be performed in conformance with the applicable provisions of the water pollution control and water quality standards contained in HAR, Chapter 11-55, "Water Pollution Control" and Chapter 11-54, "Water Quality Standards." A Department of the Army permit will not be required for this project as waters of the U.S. are not affected.

3.5 NOISE

Existing noise levels at the subject property are very low given the surrounding open space and the agricultural land use of the surrounding area.

Potential Impacts and Mitigation Measures

Noise will be generated from short-term construction activity. Construction noise from machines and vehicles may impact nearby existing residences, but will be confined to daylight working hours only. Construction activities will comply with HAR, Chapter 11-46, "Community Noise Control." No construction work shall be done on Saturdays, Sundays and holidays at any time without prior notice to the County of Maui, Department of Public Works, Chief Engineer, provided that such grading work is also in conformance with HAR, Chapter 11-46. Once construction is completed, it is anticipated that the proposed water system improvement will not have an adverse impact upon existing noise characteristics. Long-term noise impacts resulting from the normal operation of the source well facility is not expected to cause significant increases in noise over existing levels. No long-term mitigation is needed.

3.6 BIOLOGICAL RESOURCES

There is no rare, threatened, or endangered plant or animal species or significant habitats on the subject property. The project site is an existing source water facility surrounded by pasture lands. Plant material on the fenced property consists of primarily introduced grasses (Bermuda grass – Manienie) and other non-native plant species (see **Site Photographs 1 thru 4**).

Based on general information about the area, it is expected that resident mammals are limited to cows, dogs, cats, mongooses and various rodents. Most of the birds in the area are introduced species such as chickens, doves, mynas, sparrows, cardinals and finches. Native birds that may inhabit or traverse the area include the endemic Hawaiian short-eared owl or pueo (*Asio flammeus*), the Hawaiian Hawk or 'Io (*Buteo solitarius*) and the Hawaiian "Nene" Goose (*Branta sandvicensis*). However, no threatened or endangered species are known to inhabit the site.

Potential Impacts and Mitigation Measures

No adverse impacts to terrestrial flora and fauna are anticipated or expected. No further mitigative measures are proposed.

3.7 HISTORICAL, ARCHAEOLOGICAL AND CULTURAL RESOURCES

The proposed site and surrounding areas have been used extensively as pasture lands decades prior to construction of Hamoa Well 1 and the reservoir. The proposed project site is within the existing source water facility that has undergone ground disturbance activities. Any historic or culturally significant resources that may have existed would have been uncovered during prior activities. The State Historic Preservation Division (SHPD) has been previously consulted regarding the construction of the exploratory well. SHPD determined that due to previous land alteration activities, no historic properties will be affected (see **Appendix B – State Historic Preservation Division Determination**).

The subject property is a County facility with restricted access to the public. The facility is fenced and gated to prevent unauthorized entry. Because access is restricted there are few to no opportunities to use the property for cultural practices involving the gathering of plant, animal or mineral resources, or for conducting ceremonial or religious activities. Vegetation on the property is dominated by introduced plants and grasses (see Section 3.6, above).

Potential Impacts and Mitigation Measures

No significant negative impacts to historic, archaeological or cultural resources or practices are anticipated to result from the proposed project activities due to extensive past disturbance and the present use of the land as a source water facility. However, in the unlikely event that archaeological or cultural remains are unearthed, work will be halted and SHPD notified to determine an appropriate course of action.

3.8 SCENIC RESOURCES

The project site is located at an elevation of 350 feet on the eastern slope of Haleakala and is approximately 3,000 feet mauka (west) of Hana Highway. Surrounding lands are zoned for agricultural uses. Existing topography and vegetation obstructs views of the site from Hana Highway below.

Potential Impacts and Mitigation Measures

The proposed project is not expected to be a visual intrusion into the existing landscape. No impacts are anticipated as the proposed well development is limited in scope and will be built in an area that is not visible from the major roadway down slope from the project site. The proposed project will not interfere with any existing mountain views. No further mitigative measures are proposed.

CHAPTER 4 - SOCIO-ECONOMIC CONDITIONS: IMPACTS AND MITIGATION MEASURES

4.1 DEMOGRAPHICS, POPULATION AND ECONOMIC CHARACTERISTICS

The 2000 Census recorded 1,855 persons in the Hana Area (by census tract) (DBEDT, 2008). The total population for Maui Island for the same year was 117,644. The total number of households in Hana is 593. The median age of Hana Town residents is 30.7 years old with approximately 68 percent of the population over the age of 18. The median household and per capita incomes (in 1999 dollars) were $38,385 and $16,439, respectively. A total of 321 Hana residents were living below the poverty level.

The project is being proposed to provide a back-up water source to supplement the existing water distribution system. The proposed improvement project was initiated to bring the system into compliance with the DWS Water System Standards.

Potential Impacts and Mitigation Measures

The proposed water system improvement will not materially change the character of the area. On a short-term basis, the proposed project will support construction and construction-related employment. In the long-term, the proposed project will not have an impact on employment opportunities. The project will not itself result in an increased population growth. No mitigation measures are proposed.

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CHAPTER 5 - PUBLIC SERVICES: IMPACTS AND MITIGATION MEASURES

5.1 TRAFFIC AND ROADWAYS

Primary access to the site is via an existing driveway off of Hana Highway.

Potential Impacts and Mitigation Measures

The proposed action is not expected to significantly alter the total volume of traffic on nearby roadways. On a short-term basis, construction-related work on the proposed project may impact traffic flow on the Highway. Short-term impacts are not considered significant since project-related delays experienced by motorists, if any, are anticipated to be minor. As required, flagmen will be used to direct traffic during delivery of materials and equipment to the project site.

In the long-term, the proposed improvements will not have a significant effect on traffic conditions in the area. No further mitigation is proposed.

5.2 WASTEWATER

Hana Town and the surrounding areas are not served by a municipal sewer system. Wastewater treatment is either by small private treatment systems or individual septic systems. The existing source water facility does not feature restroom facilities, therefore no treatment of wastewater will be required.

Potential Impacts and Mitigation Measures

The proposed project will not have long-term wastewater effects. During construction, portable toilet facilities will be provided for temporary use. The proposed project will not require wastewater treatment beyond the use of portable toilet facilities to serve construction work crews.

5.3 POTABLE WATER

DWS has two existing wells (Wakiu Well B and Hamoa Well 1) that provide water for the Hana Water System, which services the majority of the area between Wainapanapa and Koali. There is also a private water system in the vicinity of Kapia Stream (to the southeast of the project site) owned by Keaka Wai and services the Hotel Hana Maui and its other customers.

Wakiu Well B is located in TMK: (2) 1-3-04: portion of parcel 012, along with a 500,000-gallon reservoir. Wakiu Well B has a pumping capacity of 350 gpm, while Hamoa Well 1 has a 200 gpm pumping capacity. The proposed Hamoa Well 2 is anticipated to have a pumping capacity of 300 gpm.

Potential Impacts and Mitigation Measures

The existing (Hamoa Well 2) exploratory well underwent aquifer testing to determine the pumping capacity. Test results indicated that existing groundwater resources has chloride levels less than 10 mg/L and will be able to provide high quality water at the anticipated pumping capacity of 300 gpm without affecting the water levels of the two existing wells in the area (Hamoa Well 1 and Private Well 4300-01) (see **Appendix A – Hamoa Well 2 (4300-03), Aquifer Test Results and Geologic Log**).

The proposed project will provide a back-up source of water for the Hana Water System. No adverse impacts with regard to the potable water supply are anticipated therefore no mitigation measures are proposed.

5.4 SOLID WASTE

The Hana district is served by a County refuse system. Solid waste is disposed of at the Hana Landfill.

Potential Impacts and Mitigation Measures

The impact to solid waste collection services will occur only during the construction of the project. Any solid waste resulting from construction activities for the proposed project will be disposed of at the Hana Landfill. The long-term operation of the proposed source well will not result in the creation of on-site solid waste and therefore will not impact solid waste facilities. No mitigation measures are proposed.

5.5 POLICE AND EMERGENCY SERVICES

The proposed project site and surrounding areas is served by the Maui County Police Department. The Hana police substation is located in Hana Town at the intersection of Hana Highway and Uakea Road.

Potential Impacts and Mitigation Measures

No significant impacts on police or emergency services are anticipated as a result of the proposed project. No mitigation measures are proposed.

5.6 FIRE PROTECTION SERVICES

The property is under the jurisdiction of the Maui County Fire Department located in Hana Town.

Potential Impacts and Mitigation Measures

No significant adverse impacts on fire services are anticipated as a result of the proposed project. The proposed source well development will however increase the reliability of the water system for distribution and fire protection purposes. No mitigation measures are proposed.

5.7 ELECTRICAL AND COMMUNICATION FACILITIES

Electrical power for the Hana area is provided by Maui Electric Company, Ltd. (MECO) and telephone service is provided by Hawaiian Telcom.

Potential Impacts and Mitigation Measures

No adverse impacts are expected from the proposed project. The project will require electrical services for operation. The routine operation of the proposed project will not create negative impacts to existing facilities. No mitigation measures are proposed.

CHAPTER 6 - RELATIONSHIP TO LAND USE POLICIES AND CONTROLS OF THE AFFECTED AREA

6.1 OVERVIEW

State and County policy, land use plans and controls are established to guide development in a manner that enhances the overall living environment of Hawai'i, and ensures that the long-term social, economic, environmental, and land use needs of Hawai'i are met. The proposed water system improvements project is in accordance with State and County land use plans and policies, as discussed below.

6.2 HAWAI'I STATE PLAN

The Hawai'i State Plan, adopted in 1978, consist of three parts:

1. An overall theme with broad goals, objectives and policies
2. A system designed to coordinate public planning to implement the goals, objectives and policies of the State Plan; and
3. Priority guidelines which are statements of Statewide interrelated problems deserving immediate action.

The State objective for water systems is as follows:

> *Planning for the State's facility systems with regard to water shall be directed towards achievement of the objective of the provision of water to adequately accommodate domestic, agricultural, commercial, industrial, recreational, and other needs within resource capacities. (HRS, §226-16(a)).*

The proposed project supports the State water facility system policy to:

> *Assist in improving the quality, efficiency, service, and storage capabilities of water systems for domestic and agricultural use (HRS, §226-16(b) (4)).*

6.3 STATE LAND USE

The State Land Use Commission classifies all lands in the State of Hawai'i into one of four land use designations: Urban, Rural, Agricultural and Conservation. The proposed project is in the Agricultural District. See **Figure 6, State Land Use Map**.

The proposed land use is consistent with the Agricultural land use of the site under HRS, Chapter 205-4.5(7):

> *§205-4.5 Permissible uses within the agricultural districts. (a) Within the agricultural district, all lands with soil classified by the land study bureau's detailed land classification as overall (master) productivity rating class A or B shall be restricted to the following permitted uses:*
>
> > *(7) Public, private, and quasi-public utility lines and roadways, transformer stations, communications equipment buildings, solid waste transfer stations, major water storage tanks, and appurtenant small buildings such as booster pumping stations, but not including offices or yards for equipment, material, vehicle storage, repair or maintenance, or treatment plants, or corporation yards, or other like structures;*

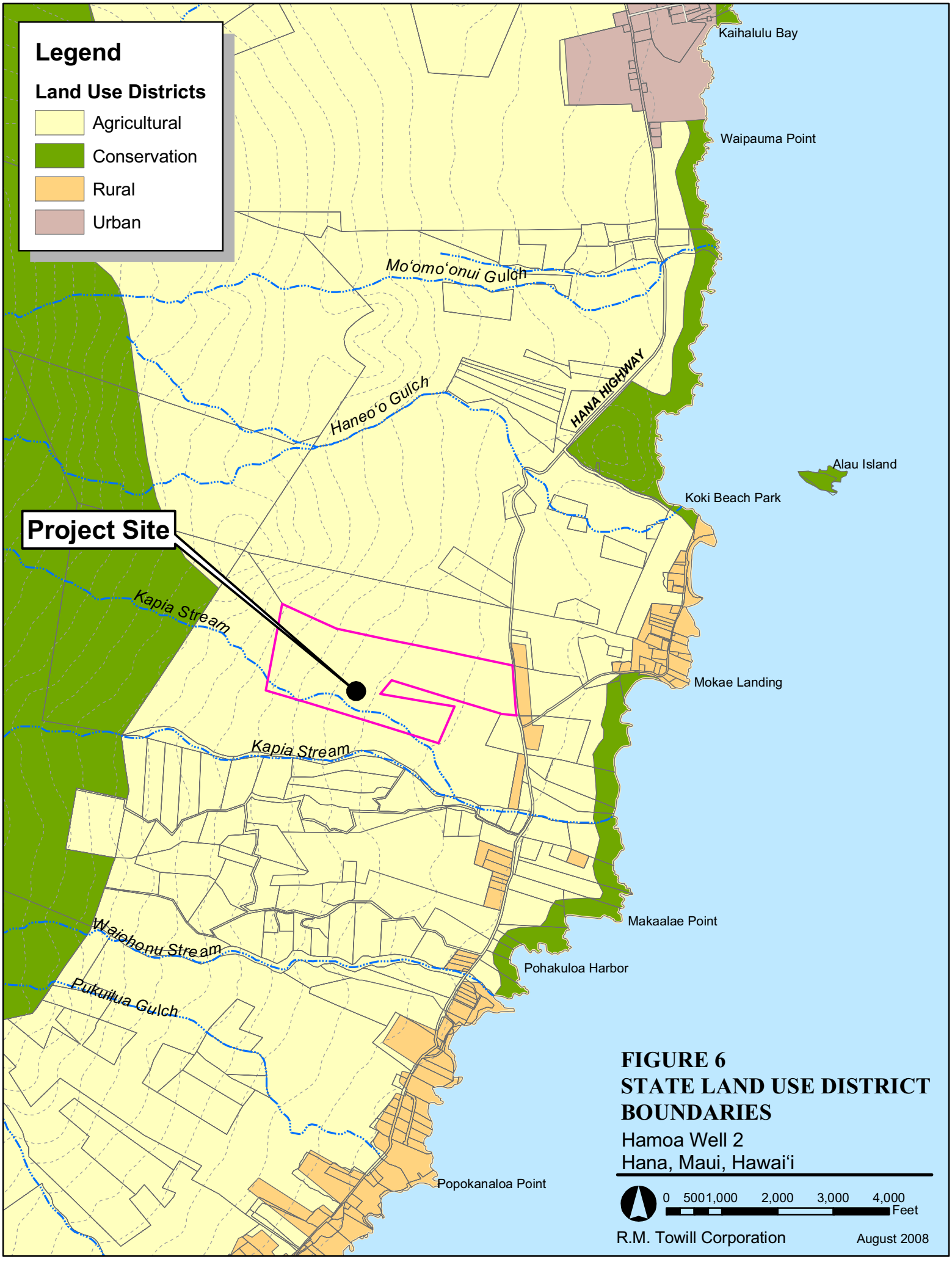

FIGURE 6
STATE LAND USE DISTRICT BOUNDARIES
Hamoa Well 2
Hana, Maui, Hawai'i

R.M. Towill Corporation August 2008

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6.4 1990 MAUI COUNTY GENERAL PLAN UPDATE

The Maui County General Plan was first adopted in 1980 and subsequently updated in 1990. The Plan was developed in accordance with the Maui County Charter as a tool to "recognize and state the major problems and opportunities concerning the needs and the development of the county and the social, economic and environmental effects of such development and shall set forth the desired sequence, patterns and characteristics of future development". The proposed project meets the following objective and policies in the Plan (Section IV.B.):

> *Objective 1*
>
> *To provide an adequate supply of potable and irrigation water to meet the needs of Maui County's residents.*

The proposed project is intended to develop a new source well that will result in a more reliable system to serve customers of the Hana Water System.

The following are the policies set forth in Section IV.B of the General Plan:

a. *Support the improvement of water transmission systems to those areas which historically experience critical water supply problems provided the improvements are consistent with the water priorities and the County's Water Use Development Plan provisions for the applicable community plan area.*

b. *Meet or exceed Federal quality standards for the potable water supply.*

c. *Develop improved systems to provide better fire protection.*

d. *Monitor growth activities throughout Maui County in order that development of new water sources is concurrent with approval of new developments.*

e. *Support the Board of Water Supply in its determination of future water needs consistent with the General Plan, Community Plans and the growth management strategy.*

f. Support expeditious action on legislation providing replacement of inadequate water transmission systems.

g. Seek new sources of water by exploration in conjunction with other government agencies.

h. Maintain the right to manage the County's water sources and transmission systems at the County level.

i. Develop sufficient water supply during drought seasons so as to keep agricultural activities viable.

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

The proposed project is in accordance with policy items b. c, d, e, h and i.

6.5 MAUI ISLAND PLAN (GENERAL PLAN 2030) - DRAFT

The Maui Island Plan (Maui General Plan Update) provides a guide for the future growth of the island to the year 2030. The Plan establishes a vision and a set of long-range guiding principles, goals, objectives, policies and maps to guide the growth and development of the island. The proposed project meets the following water goal and policies in the Plan (Vol. II, Section 5.1.):

Goal 5.1:
All regions of Maui will be supplied with sustainable sources of water for a variety of uses.

The proposed project is intended to develop a new source well to provide a more reliable system to serve customers of the Hana Water System.

The following are the policies set forth in Volume II, Section 5.1 of the Maui Island Plan:

5.1.1 Pursue source development, improvements, and upgrades to Maui's existing water systems consistent with the County's capital improvement program, the Water Use and Development Plan, and the Maui Island Plan's policies and directed growth plan.

5.1.2 Support the allocation of water as prescribed in the Water Use Development Plan and applicable law.

5.1.3 Develop systems that allow for the distribution of potable and non-potable water throughout the island to support the implementation of the Maui Island Plan's land use policies and directed growth plan.

5.1.4 Support the provision of water delivery systems in new or expanded growth areas that can be sustainably and cost-effectively served with water.

5.1.5 Promote water conservation through education, effective incentives, and mandatory actions.

The proposed project is in accordance with policy items 5.1.1, 5.1.2, 5.1.3 and 5.1.4.

6.6 COUNTY ZONING

The subject parcel is zoned Agricultural use. The proposed project is consistent with the zoning regulation of the site under Chapter 19.30A of the Maui County Code:

19.30A.010 Purpose and intent.

A. Purpose. The purpose of the agricultural district is to:
- *1. Implement chapter 205, HRS, and the goals and policies of the Maui County general plan and community plans;*
- *2. Promote agricultural development;*
- *3. Preserve and protect agricultural resources; and*
- *4. Support the agricultural character and components of the County's economy and lifestyle.*

The proposed project is a permitted use under Section 19.30A.050. Permitted uses, which states:

"The following uses and structures shall be permitted in the agricultural district provided they also comply with all other applicable laws:

A. Principal Uses.
- *1. Agriculture;*
- *2. Agricultural land conservation;*
- *3. Agricultural parks, pursuant to chapter 171, HRS;*
- *4. Animal and livestock raising, including animal feed lots and sales*

yards;

5. *Private agricultural parks as defined herein;*
6. ***Minor utility facilities as defined in section 19.04.040, Maui County Code**; and*
7. *Retention, restoration, rehabilitation, or improvement of buildings, sites or cultural landscapes of historical or archaeological significance."…*

Where minor utility facilities are defined in Section 19.04.040 of the Maui County Code as:

"Minor utility facilities means transmission lines used directly in the distribution of utility services that have minor impact on adjacent land uses which include, but which are not limited to, twenty-three kilovolt transmission substations, vaults, water wells, tanks and distribution equipment, sewage pump stations, and other similar type uses".

6.7 SPECIAL MANAGEMENT AREA (SMA) PERMIT

The proposed project is not located within the boundaries of the SMA as defined by the County of Maui.

CHAPTER 7 - NECESSARY PERMITS AND APPROVALS

7.1 FEDERAL

No federal permits are required for this project.

7.2 STATE OF HAWAI'I

A Well Pump Installation Permit will be required from the Department of Land and Natural Resources, Commission on Water Resource Management.

7.3 COUNTY OF MAUI

No County permits are required for this project.

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CHAPTER 8 – ORGANIZATIONS, AGENCIES AND STAKEHOLDERS CONSULTED OR TO BE CONSULTED DURING THE PREPARATION OF THE DRAFT EA

8.1 STATE OF HAWAI'I

- Department of Health, Environmental Planning Office
- Department of Land and Natural Resources, Commission on Water Resource Management
- Department of Business, Economic Development & Tourism, Office of Planning

8.2 COUNTY OF MAUI

- Department of Environmental Management
- Department of Parks and Recreation
- Department of Planning
- Department of Public Works
- Fire Department
- Police Department

8.3 ELECTED OFFICIALS, ORGANIZATIONS AND INDIVIDUALS

- County Council Member Bill Medeiros, East Maui (Hana-Keanae-Kailua)
- Maui Electric Company, Ltd.

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CHAPTER 9 - DETERMINATION OF SIGNIFICANCE

9.1 SIGNIFICANCE DETERMINATION

Based on significance criteria set forth in HAR, Title 11, Department of Health, Chapter 200, "Environmental Impact Statement Rules," the proposed project is not expected to have a significant impact on the environment. As such, the recommended preliminary determination for the proposed project is a Finding of No Significant Impact (FONSI). The findings and reasons supporting this determination are discussed below.

1. *Involves an irrevocable commitment to loss or destruction of any natural or cultural resource.*

   The proposed project will not result in a significant loss of natural or cultural resources. The proposed project site is dominated by introduced vegetation with no occurrence of rare, threatened or endangered species in the area.

   The project site is within the existing Hamoa Well 1 source water facility. No archaeological resources are known to be present in the immediate vicinity of the project site. Past surface disturbances and the present use of the area makes it unlikely that archaeological sites remain. The SHPD has determined that the proposed project activities will have effect to historic properties (see **Appendix B**).

2. *Curtails the range of beneficial uses of the environment.*

   The proposed project site is an existing source water facility. The construction of the proposed source well will occur entirely within the site and therefore will not curtail beneficial uses of the environment.

3. *Conflicts with the State's long-term environmental policies or goals and guidelines as expressed in Chapter 343, HRS, and any revisions thereof and amendments thereto, court decisions, or executive orders.*

The proposed project has been planned and designed in conformance with the environmental policies and guidelines established in Chapter 343, HRS. The subject property is not under a Court Decision or Executive Order.

4. *Substantially affects the economic and social welfare of the community or state.*

The proposed project is a public utility improvement that will provide a back-up water source for the Hana Water System. The proposed project is not expected to adversely impact the economy or social welfare of the community or state.

5. *Substantially affects public health.*

Factors affecting public health, including air quality, water quality, and noise levels, are expected to be only minimally effected during construction. These temporary impacts will be mitigated in accordance with the State Department of Health and County of Maui regulations. The long-term operation of the source water facility is not expected to cause substantial negative effects on public health.

6. *Involves substantial secondary impact, such as population changes or effects on public facilities.*

The proposed activity is intended to increase the pumping capacity of the system to meet the requirements of the DWS Water System Standards. The proposed improvement is not anticipated to cause substantial secondary or indirect impacts such as population changes nor result in additional burden on other public facilities.

7. Involves a substantial degradation of environmental quality.

Impacts to air and water quality, noise levels, natural resources, and land use associated with the construction and operation of the proposed source well is anticipated to be minimal. Mitigation measures will be employed as practicable to further minimize potentially detrimental effects to the environment resulting from project activities.

Aquifer testing conducted on the proposed well indicate that the anticipated pumping capacity of 300 gpm will be sufficient to provide high quality groundwater with little to no effect the existing source water wells in the area (Hamoa Well 1 and private well (4300-01). The proposed project does not involve substantial degradation of environmental quality.

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

This project is being proposed to provide a back-up water source for the Hana Water System. Adverse cumulative impacts on the environment are not anticipated as a result of this project. The proposed project does not involve a commitment for larger actions.

9. Substantially affects a rare, threatened or endangered species.

There are no threatened or endangered plant or animal species on the subject site. The limited scale and duration of the project is expected to cause minimal negative impacts to threatened or threatened birds that may inhabit or traverse through the general area.

10. Detrimentally affects air or water quality or ambient noise levels.

On a short-term basis, ambient air and noise conditions will be affected by construction activities, however the potential for impacts will be controlled by mitigative measures described in this Environmental Assessment. During construction, best management practices (BMPs) will be employed to prevent untreated storm water runoff from entering any nearby water bodies. Once the project is completed, air and noise conditions in the project vicinity are expected to return to preconstruction levels.

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

The proposed project site is located outside areas prone to flooding. All structures proposed for this project will be built according to equivalent standards for Seismic Zone 2B, as established by the UBC. The project is not located in an environmentally sensitive area and is unlikely to affect or suffer damage from natural forces such as flooding, hurricanes, or earthquakes.

12. Substantially affects scenic vistas and view planes identified in county or state plans or studies.

The proposed residence will not impact scenic view planes or scenic vistas. The proposed source well will be built within the existing source water facility and will not be visible from Hana Highway.

13. Requires substantial energy consumption.

Construction and operation associated with the proposed project will not require substantial amounts of electrical energy.

9.2 FINDINGS

In accordance with the provisions set forth in Chapter 343(HRS), and the significance criteria in Section 11-200-12 of Title 11, Chapter 200 (HAR), it is anticipated that the project will have no significant adverse impact to water quality, air quality, existing utilities, noise levels, social welfare, archaeological sites, or wildlife habitat. All anticipated construction impacts will be temporary and will not adversely impact the environmental quality of the area. It is anticipated that an Environmental Impact Statement (EIS) will not be required, and that a Finding of No Significant Impact (FONSI) will be issued for this project.

REFERENCES

County of Maui, Department of Planning, 1990 General Plan, 2008, http://www.co.maui.hi.us/departments/Planning/generalPlan1990.htm.

County of Maui, Department of Planning, 2030 General Plan, 2008, http://www.co.maui.hi.us/departments/Planning/gp2030/.

County of Maui, Department of Water Supply, Annual Report for Fiscal Year 2007, 2007.

County of Maui, Department of Water Supply, Maui County Water Use and Development Plan - Water Use and Demand, May 2007 (Draft), http://mauiwater.org/WUDPdraftDemand.pdf.

Hawai'i Revised Statutes, Chapter 205.

Hawai'i Revised Statutes, Chapter 343.

Hawai'i Administrative Rules, Chapter 11-59.

Hawai'i Administrative Rules, Chapter 11-60.

Hawai'i Administrative Rules, Chapter 11-200.

Maui County Code, December 2007, http://municipalcodes.lexisnexis.com/codes/maui/index.htm

State of Hawai'i, Department of Business, Economic Development and Tourism, Hawaii Census 2000, 2008, http://hawaii.gov/dbedt/info/census/Folder.2005-10-13.2927/hsdc-tables-sf3.

State of Hawai'i, Hawai'i State Plan, 1978.

State of Hawai'i, Office of state Planning, Hawaii Statewide GIS Program, 2008

University of Hawai'i Press, Atlas of Hawai'i, 1983.

University of Hawai'i Press, Atlas of Hawai'i, Second Edition, 1998.

U.S. Department of Agriculture, Soil Survey of the Islands of Kauai, Oahu, Maui, Molokai and Lanai, State of Hawaii, United States Department of Agriculture, Soil Conservation Service, 1973.

U.S. Department of Agriculture, Soil Survey of Maui, United States Department of Agriculture, Natural Resources Conservation Service, 2008. http://www.ctahr.hawaii.edu/soilsurvey/5is/maui.htm.

APPENDIX A

HAMOA WELL 2 (4300-03), AQUIFER TEST RESULTS AND GEOLOGIC LOG

Hamoa Well 2 (4300-03)

Aquifer Test Results and Geologic Log

Prepared for:

Ronald M. Fukumoto Engineering, Inc.
1721 Wili Pa Loop, Suite 203
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Prepared by:

Mink and Yuen, Inc.
1670 Kalakaua Avenue, Suite 605
Honolulu, Hawaii 96826

September 2006

Introduction

Drilling of Hamoa Well 2 was completed in July 2006 by Beylik Well and Pump Service, Inc. The well is owned by Maui Department of Water Supply (DWS), and is located about 172 feet north of the existing Hamoa Well 1 (4300-02) and adjacent to the Maui DWS tank. Figure 1 is a map showing the location of both wells. GPS NAD83 datum locations for the wells are:

Hamoa Well 1: 20° 43′ 09.8″
156° 00′ 08.9″

Hamoa Well 2: 20° 43′ 10.9″
156° 00′ 08.2″

We were unable to use Hamoa Well 1 as an observation well during the aquifer test because there was no access, either by airline or chase tube to measure water levels.

At the time of the pumping tests, no surveyed benchmark was established to measure an exact static water level. However, the approximate ground elevation is 352± feet above mean sea level (ft., msl). The static water level is estimated to be 9± ft., msl. The following elevations and measurements apply:

Ground Elevation:	352± ft., msl
Bottom of Solid Casing Elevation:	5 ft., msl
Bottom of Hole Elevation:	-51 ft., msl
Grout:	5 ft., msl to surface
Casing Diameter:	10 inches I.D.

Full-Flo louvered screen extends from 5 ft., msl to the bottom of the well.

The estimated static water level of 9± ft., msl is much higher than normal. Young islands that are not constrained by caprock sediments, are open to the ocean, and typically have a water level gradient of 1-foot per mile. Since the water level is much greater than normal, other geological and hydrological factors can account for this condition. The geological and hydrological factors could be 1) Hana Volcanics cones mapped in the vicinity of the wells are intruded by dikes and could be barriers to groundwater flow; 2) the Hana Volcanics could behave locally like a low permeability caprock retarding groundwater flow to the sea; 3) high rainfall and recharge to groundwater can cause water levels to increase significantly; and 4) regional hydraulic conductivities could retard groundwater flow in conjunction with the high recharge to the groundwater flow system.

Step-Drawdown Test

The step-drawdown test was performed on August 10, 2006. Four pumping rates were run. Each rate lasted for 30 minutes, and a total of 48,700 gallons of water was pumped. The step-drawdown test data are presented in Appendix A of this report.

The top of the chase tube protruded just above the top of the casing at the base of the right angle drive. A measuring point was established 1.05 ft. away from the top of the chase tube. This was done primarily for safety because of the proximity of the pump's drive shaft connecting the right angle drive to the engine. All subsequent drawdown measurements were relative to the pre-test depth-to-water (DTW) measurements from the measuring point. Four DTW measurements (using Beylik's Waterline sounder) were taken starting an hour prior to the test. These measurements did not fluctuate (see pump test data sheets). The following rates and drawdowns were recorded:

Q_{ave} (gpm)	Drawdown (ft.)
167	0.06
353	0.12
507	0.17
649	0.22

For each rate, the corresponding drawdown was established within the first minute. Slight changes in drawdown were noted and these changes were due to fluctuation in engine speed. During the last two pumping rates, the engine slowed down near the end of the rate. It was determined that the belt was slipping and the clutch also needed adjustment. These repairs were made prior to the constant rate test.

Figure 2 is plot of drawdown (s) versus pumping rate (Q). The slope of the line is less than 1, which means that the water entering the well bore did not encounter well loses due to turbulent flow. The drawdowns are due entirely to aquifer losses as a result of laminar flow.

The well recovered within five minutes of ending the test. The static water level in the aquifer was greater at the end of the test than in the beginning. The well recovered to the higher water level. Hamoa Well 1 was pumping 222 gpm at the time the test ended but probably had no effect on the water level measured in Hamoa Well 2 (according to Maui DWS SCADA data, the well turned on at 1327 and remained on until 1730). The water level change was probably due to tidal influences in a highly transmissive aquifer.

The temperature of the water started at 69° F and dropped to 68° F where it remained for the remainder of the test. Using the temperature of the groundwater, an estimate can be made for the elevation where recharge into the aquifer occurred. Groundwater temperature is taken as the ambient temperature

of elevation. Average temperature at sea level in Hawaii is 75° F. The lapse rate in temperature is 3.6° F per 1,000 ft. in elevation gain below an altitude of 3,900 ft., msl. In this case, the calculated approximate recharge elevation is 1,944± ft., msl.

Water samples were collected about 5 minutes before the end of each rate. Sample chloride concentrations are listed in the data sheets. Water samples were also collected periodically during each rate for specific conductivity measurements. Field measurements of specific conductance improved from 77 µS/cm to 66 µS/cm (see data sheet). A water sample collected from Hamoa Well 1 had conductance reading of 60 µS/cm and a temperature of 68° F.

Constant Rate Test

The constant rate test began August 11 at 0900 and ended on August 15 at 1045, a total of 97.5 hours of uninterrupted pumping. A total of 2,915,300 gallons were pumped giving an average discharge rate of 498 gpm. Appendix B presents the data collected during the duration of the test. Water samples were collected every six hours. Sample times and chloride results are noted in Appendix B constant rate test data sheets. Also included are the operational record of Hamoa Well 1 during the test.

Cooper and Jacob's analysis of drawdown during the first 250 minutes of the test shown in Figure 3 gives a transmissivity of 121,000 ft^2/d. The early drawdown data was used for analysis because tidal influences were minimal. Analysis of step-drawdown data for Hamoa Well 1 produced a similar transmissivity value of 128,495 ft^2/d. The thickness of the aquifer is taken as the active water producing zone below the bottom of the well, which is assumed to 1.6 times the well's depth below sea level plus the water table elevation. Given

the low drawdowns and well losses due to turbulent flow, the 1.6 factor is reasonable. For Hamoa Well 2, the assumed aquifer thickness is 89 ft. (1.6 x 51 + 9 ft.), which gives a hydraulic conductivity value of 1,370 ft/d. This value is typical of dike-free basaltic lava flows. Recovery occurred within minutes of ending the test.

Diurnal ocean tide fluctuations probably had an influence on the drawdown water levels during the Hamoa Well 2 constant rate test. A highly permeable aquifer that is not constrained by a caprock formation and open to the ocean will allow the tidal signal to be easily transmitted through the aquifer. Examination of the tide chart for Hana, Maui during the first 250 minutes of the test, which corresponds to the greatest drawdown of 0.58 ft., shows that changes in the well water level were lagging the ocean tide by 4.5± hours. The chart shows that the ebb tide dropped about 2 ft. from 0408 to 0944. Assuming the 4.5-hour lag, the 0900 start time of the test corresponds to 0430 on the tide gage. Barometric changes will also influence the water level during the test.

The following equation is used to calculate the effect of theoretical steady-state water level change that Hamoa Well 1 and Hamoa Well 2 will have on an infinite unconfined aquifer and existing well 4300-01:

$$s = Q/(2\pi T) \ln \{1.5/r\ (Tt/S)^{0.5}\}$$

Where:

s = drawdown in feet
Q = maximum draft in ft^3/d (2 wells pumping a total of 444 gpm = 85,476 ft^3/d)
T = transmissivity in ft^2/d (T_{ave} = 124,748 ft^2/d)
t = time in days (steady-state = 200,000 days)
r = distance, say 1,000 ft. from the well field
S = specific yield, taken at 0.10 (effective porosity)

The steady-state theoretical drawdown 1,000 ft. from the Hamoa well field is 0.72 ft. Pumping these wells will have little effect on existing well 4300-01, which is 2,000 ft. to the southeast of the well field (see Figure 1). The expected regional steady-state drawdown 2,000 ft. from the Hamoa wells is 0.64 ft.

Geologic Log

The attached geologic log presents a physical description of the cuttings. The well began in Hana Volcanics as mapped by Stearns and Macdonald (1942). Hana Volcanics (original formation names have been updated by Langenheim and Clague, 1987) originated from rejuvenated lava eruptions from the upper slopes of Haleakala and from cones near in and around Hana and Hamoa. It is possible that some cuttings described in the log are from the underlying Kula Basalt. Chemical analyses would be needed to discern the different rock units.

Conclusions

Based on the results of the step-drawdown and constant rate pumping tests, the Hamoa Well 2 the anticipated pumping capacity of 300 gpm will be sufficient to provide adequate supply of groundwater that is of excellent quality (<10 mg/L chloride). The drawdown at Hamoa Well 2 is very small and will not affect the existing Hamoa Well 1. Both of the Hamoa wells will have little affect on the water level at private well 4300-01.

References:

Langenheim, V. A. M. and D. A. Clague, 1987, The Hawaiian-Emperor Volcanic chain Part II. Stratigraphic framework of volcanic rocks of the Hawaiian Islands: USGS Prof. Paper 1350, pp. 55-84.

Stearns, H. T. and Macdonald, G. A., 1942, Geology and ground-water resources of the island of Maui, Hawaii: Hawaii Div. Hydrography Bull. 7, 344 p.

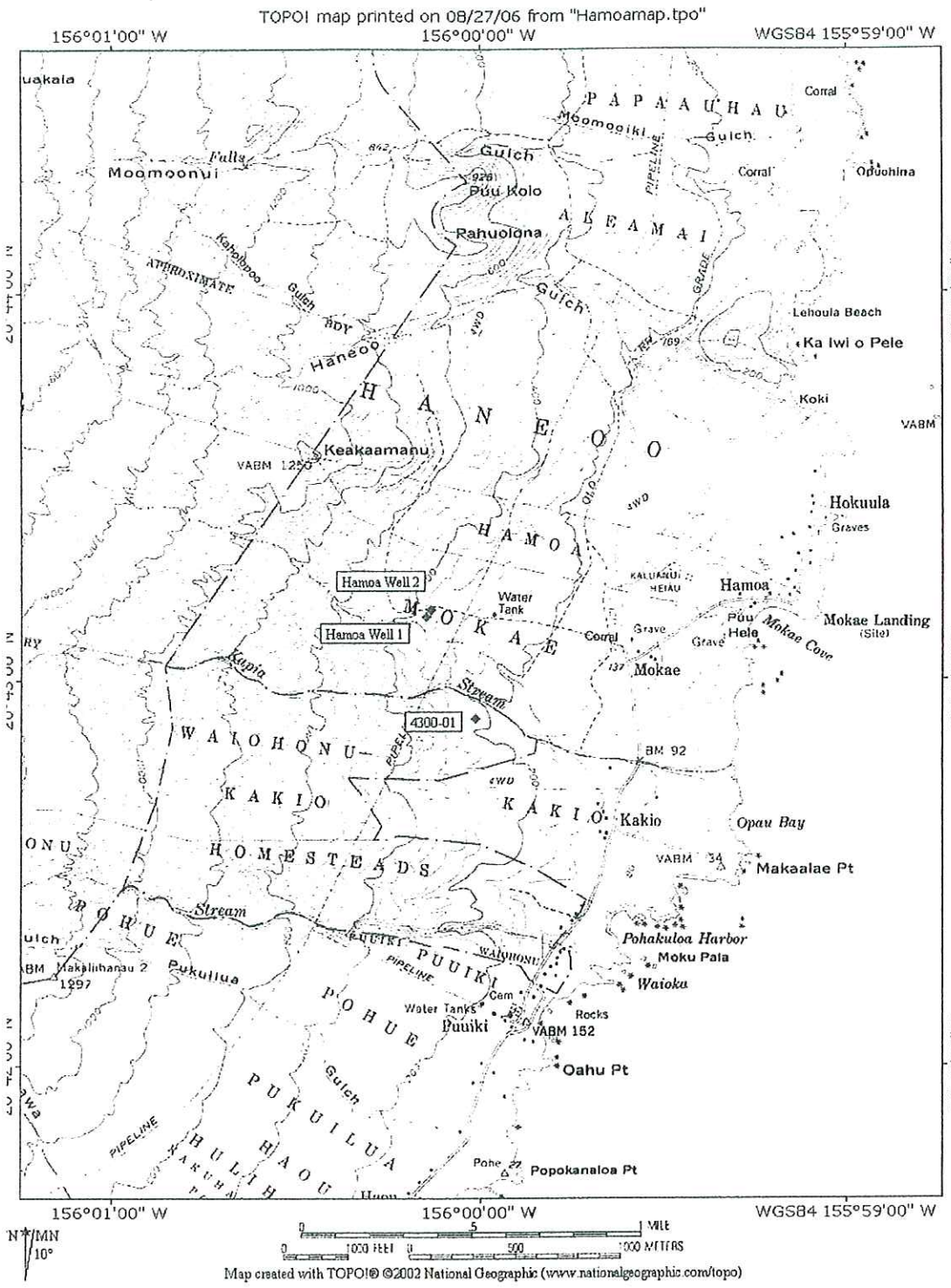

TOPO! map printed on 08/27/06 from "Hamoamap.tpo"
156°01'00" W
156°00'00" W
WGS84 155°59'00" W
20°44'00" N
20°43'00" N
20°42'00" N
Moomoonui
Falls
Gulch
Puu Kolo
Rahuolona
Kahalepoo
Gulch
Haneoo
Gulch
Keakaamanu
VABM 1250
Papaauhau
Moomooiki
Gulch
Corral
Opuohina
Akeamai
Lehoula Beach
Ka Iwi o Pele
Koki
VABM
Hokuula
Graves
Hamoa
Hamoa Well 2
Hamoa Well 1
Water Tank
Mokae
Kapia
Stream
4300-01
Mokae Landing
(Site)
Mokae Cove
Puu Hele
Grave
Corral
Mokae
BM 92
Waiohonu
Kakio
Homesteads
Kakio
Opau Bay
VABM 34
Makaalae Pt
Pohakuloa Harbor
Moku Pala
Waioka
Stream
Pohue
Puuiki
Pipeline
Waiohonu
Cem
Water Tanks
Puuiki
Rocks
VABM 152
Oahu Pt
Pukuilua
Gulch
Pipeline
Hulihaou
Pohe
Popokanaloa Pt
Makalihanau 2
1297
Pukuilua
156°01'00" W
156°00'00" W
WGS84 155°59'00" W
MN
10°
Mile
1000 FEET
500
1000 METERS
Map created with TOPO!® ©2002 National Geographic (www.nationalgeographic.com/topo)

Figure 1

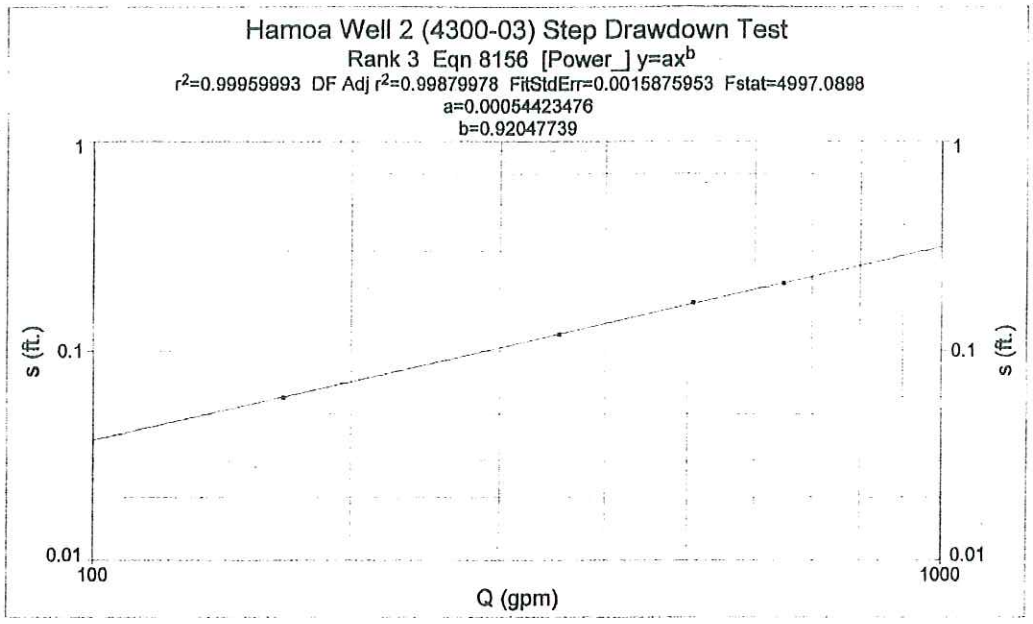
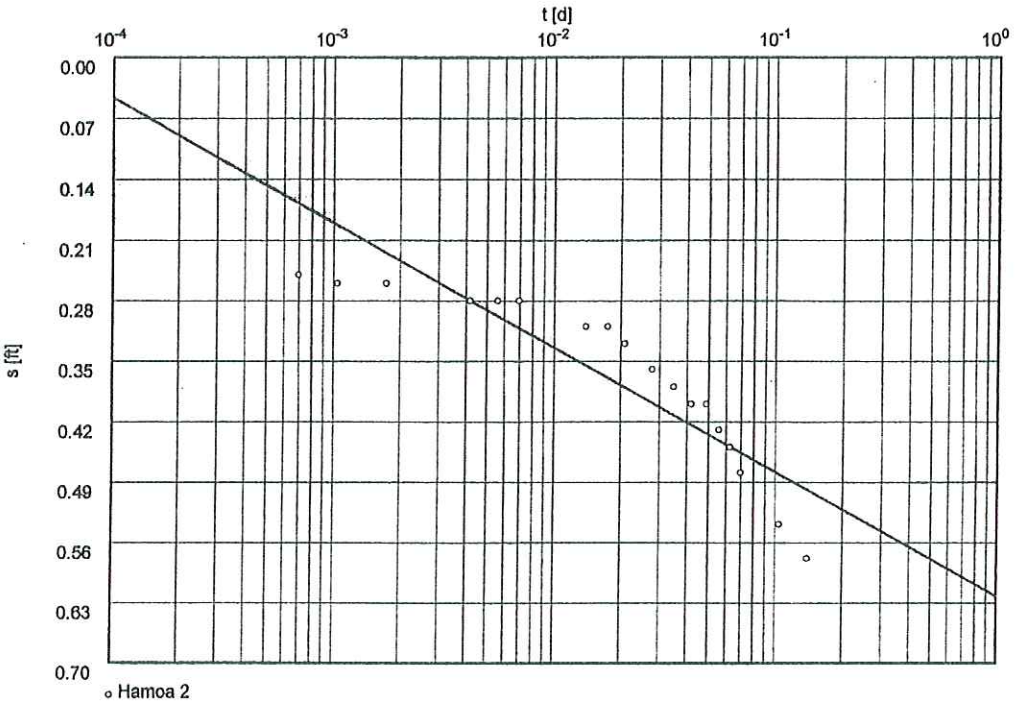

Hamoa Well 2 (4300-03) Step Drawdown Test
Rank 3 Eqn 8156 [Power_] y=ax^b
r²=0.99959993 DF Adj r²=0.99879978 FitStdErr=0.0015875953 Fstat=4997.0898
a=0.00054423476
b=0.92047739
1
0.1
0.01
s (ft.)
100
1000
Q (gpm)

Figure 2

Waterloo Hydrogeologic 180 Columbia St. W. Waterloo,Ontario,Canada ph.(519)746-1798	Pumping test analysis Time-Drawdown-method after COOPER & JACOB Unconfined aquifer	Date: 16.08.2006	Page 1
		Project: Hamoa Well 2 (4300-03)	
		Evaluated by: Glenn Bauer	
Pumping Test No. Constant Rate		Test conducted on: August 11-15, 2006	
Discharge 95865.00 ft³/d			



Transmissivity [ft²/d]: 1.21×10^5

Hydraulic conductivity [ft/d]: 1.37×10^3

Aquifer thickness [ft]: 89.00

Figure 3

APPENDIX A

Step-Drawdown Test Results

STEP-DRAWDOWN PUMP TEST DATA

Pumped Well No.: 4300-03 Observation Well No.: N/A

Pumped Well Name: **Hamoa Well 2** Distance between Obs. & Pumped Well: N/A ft.

Target Q: 600 gpm Ref. Pt. for DTW: N/A ft., msl

Static Water Level @ start of test: 10.3 ft., msl

Water level measurement by: X Sounder ___Transducer _____Airline

START TEST date: 8/10/06 Time of Day: 12:30 pm

Flow Meter Reading Start: 05040700 gal. Flow Meter Reading End: 05089400 gal.

Total gallons pumped: 48,700

Time	Elapsed Time (min.)	Depth to Water (ft.)	Drawdown (ft.)	Rate Q (gpm)	EC* (µS/cm)	Cl* (mg/L)	Temp	Remarks
1105	-85	343.79						
1120	-70	343.79						
1140	-50	343.79						
1215	-15	343.79						
1230								Start
1231	1	343.84	0.05	167			69	
1232	2	343.85	0.06					
1233	3	343.85	0.06					
1238	8	343.85	0.06		77			Field meas.
1240	10	343.85	0.06					
1244	14	343.85	0.06				68	
1250	20	343.83	0.04	152				Adjust rate
1255	25	343.82	0.03	162	83	7.3		Sample 1
1300	30							Change rate
1301	31	343.91	0.09	353				
1305	35	343.91	0.09				68	

Time	Elapsed Time (min.)	Depth to Water (ft.)	Drawdown (ft.)	Rate Q (gpm)	EC* (µmhos)	Cl-* (mg/L)	Temp	Remarks
1307	37	343.91	0.09	353				
1309	39				68			Field meas.
1310	40	343.91	0.09					
1314	44	343.91	0.09					
1316	46						68	
1320	50	343.91	0.09	364				Engine speed up
1325	55	343.89	0.07	353	80	7.4		Sample 2
1327								Hamoa 1 on
1330	60							Change rate
1331	61	343.96	0.17	507				
1333	63	343.96	0.17					
1335	65	343.96	0.17				68	
1338	68	343.96	0.17					
1340	70	343.96	0.17		67			Field meas.
1344	74			507				
1345	75	343.96	0.17				68	
1350	80	343.93	0.14	500				
1355	85	343.91	0.12	489	79	7.6		Sample 3
1400	90							Change rate
1401	91	343.99	0.20	676				
1403	93	344.00	0.21					
1404	94	343.99	0.20	623				
1406	96						68	
1407	97	343.99	0.20	645				Rate fluctuates
1410	100	343.98	0.19					

Time	Elapsed Time (min.)	Depth to Water (ft.)	Drawdown (ft.)	Rate Q (gpm)	EC* (µmhos)	Cl-* (mg/L)	Temp	Remarks
1414	104				66			Field meas.
1420	110	343.96	0.17	649				Drawdown fluctuating
1425	115				78	7.9		Sample 4
1430	120							End test
								Recovery**
1431	121	343.70	-0.09					
1432	122	343.68	-0.11					
1433	123	343.67	-0.12					
1434	124	343.66	-0.13					
1435	125	343.62	-0.17					
1436	126	343.62	-0.17					
1438	128	343.62	-0.17					
1440	130	343.62	-0.17					
1445	135	343.62	-0.17					End recovery

* EC and chloride determined by Maui Dept. of Water Supply laboratory.

**The static water level in the aquifer was greater at the end of the test than in the beginning. The well recovered to the higher water level. Hamoa Well 1 was pumping 222 gpm at the time the test ended but would have no effect on the water level measured in Hamoa Well 2. Water level change was probably due to tidal influences.

APPENDIX B

Constant Rate Test Results

CONSTANT RATE PUMP TEST DATA

Pumped Well No.: 4300-03 Observation Well No.:

Pumped Well Name: **Hamoa Well 2** Distance between Obs. & Pumped Well: N/A ft.

Target Q: 500 gpm Ref. Pt. for DTW: N/A ft., msl

Static Water Level @ start of test: 9.22 ft., msl

Water level measurement by: X Sounder ___Transducer _____Airline

START TEST date: 8/11/06 Time of Day: 0900

Flow Meter Reading Start: 5089400 gal. Flow Meter Reading End: 8004700 gal.

Total gallons pumped: 2,915,300

Time	Elapsed Time (min.)	Depth to Water (ft.)	Drawdown (ft.)	Rate Q (gpm)	EC* (µS/cm)	Cl-* (mg/L)	Temp	Remarks
0815	-45	343.46						Hamoa 1 on
0830	-30	343.47						
0845	-15	343.46						
0900	0	343.46		504				Start test
0901	1	343.71	0.25		78	7.7		Sample
0902	2	343.71	0.25					
0903	3	343.72	0.26					
0904	4	343.72	0.26					
0905	5	343.72	0.26					
0906	6	343.74	0.28				68	
0907	7	343.74	0.28		66			Field meas.
0908	8	343.74	0.28					
0910	10	343.74	0.28	537				
0915	15	343.74	0.28					
0920	20	343.77	0.31					
0930	30	343.79	0.33					

Time	Elapsed Time (min.)	Depth to Water (ft.)	Drawdown (ft.)	Rate Q (gpm)	EC* (µmhos)	Cl-* (mg/L)	Temp	Remarks
0940	40	343.82	0.36					
0950	50	343.84	0.38					
1000	60	343.86	0.40					
1010	70	343.86	0.40					
1020	80	343.89	0.43					
1030	90	343.91	0.45					
1040	100	343.94	0.48					
1049	109							Hamoa 1 off
1130	150	344.00	0.54					
1220	200	344.04	0.58					
1310	250	344.04	0.58					
1400	300	343.97	0.51					
1500	360				75	7.9		Sample
1501	361							Hamoa 1 on
1540	400	343.81	0.35					Tidal?
1720	500	343.56	0.10					Tidal?
1914	614							Hamoa 1 off
2100	720				74	7.7		Sample
2220	800	343.58	0.12					
8/12/06								
0000	900	343.75	0.29					
0036	936							Hamoa 1 on
0140	1000	343.80	0.34					
0300	1080				74	7.9		Sample
0324	1104							Hamoa 1 off

Time	Elapsed Time (min.)	Depth to Water (ft.)	Drawdown (ft.)	Rate Q (gpm)	EC (µmhos)	Cl- (mg/L)	Temp	Remarks
0900	1440				74	7.7		Sample
0915	1455							Hamoa 1 on
1000	1500	343.75	0.29					
1323	1703							Hamoa 1 off
1500	1800				74	7.9		Sample
1820	2000	343.47	0.01					Tidal
1708	1928							Hamoa 1 on
2100	2160				73	7.8		Sample; Hamoa 1 off
8/13/06								
0240	2500	343.90	0.44					
0300	2520				74	7.8		Sample
0312	2532							Hamoa 1 on
0605	2705							Hamoa 1 off
0900	2880				73	8.1		Sample
1100	3000	343.64	0.18					
1105	3005							Hamoa 1 on
1457	3237							Hamoa 1 off
1500	3240				73	7.7		Sample
1815	3435							Hamoa 1 on
2100	3600				72	8.4		Sample
2121	3621							Hamoa 1 off
8/14/06								
0300	3960				73	7.9		Sample
0340	4000	343.80	0.34					

Time	Elapsed Time (min.)	Depth to Water (ft.)	Drawdown (ft.)	Rate Q (gpm)	EC (µmhos)	Cl- (mg/L)	Temp	Remarks
0523	4103							Hamoa 1 on
0900	4320				73	8.0		Sample
1003	4383							Hamoa 1 off
1500	4680				73	7.9		Sample
1523	4703							Hamoa 1 on
1904	4924							Hamoa 1 off
2020	5000	343.60	0.14					
2100	5040				73	8.2		Sample
8/15/06								
0030	5250							Hamoa 1 on
0300	5400				73	8.0		Sample
0318	5418							Hamoa 1 off
0854	5754							Hamoa 1 on
0900	5760	343.64	0.17		73	7.9		Sample
1030	5850	343.63	0.16					
1045	5905							End test

*EC and Chloride determined by Maui Dept. of Water Supply laboratory.

Later note: benchmark established on well pad at 351.05 ft., msl. The 9.22 ft., msl water level was determined later from the benchmark.

APPENDIX C

Geologic Log

Geologic Log
For Hamoa Well 2 (4300-03)
Glenn Bauer, Mink & Yuen, Inc.

Depth Interval (ft.)	Elevation (ft., msl)*	Description
0-10	352-342	Dark gray basalt with olivine phenocrysts
10-20	342-332	Mixture of red and dark gray scoriaceous lava
20-40	332-312	Dark gray aa with small olivine phenocrysts
40-50	312-302	Dark gray-brown pahoehoe (round vesicles)
50-70	302-282	Dark gray aa
70-80	282-272	Lithic tuff (?), light matrix and dark fragments
80-90	272-262	Mix of dark gray and dense gray aphyric aa
90-100	262-252	Dense red aa (block lava ?)
100-110	252-242	Dark gray aa
110-120	242-232	Mix of white secondary mineral(?) & dark gray aa
120-130	232-222	Dark gray-brown aa some red fragments
130-160	222-192	Dense gray block (?) lava
160-170	192-182	Dense dark gray-brown block (?) lava
170-180	182-172	Mix of dark and light gray aa
180-190	172-162	Gray aa
190-210	162-142	Massive dark and light gray block (?) lava
210-220	142-132	Brown-gray lithic tuff (?)
220-230	132-122	Massive, dense gray aphyric block (?) lava
230-240	122-112	Lithic tuff (?)
240-250	112-102	Dense red aa

Depth Interval (ft.)	Elevation (ft., msl)*	Description
250-260	102-92	Massive gray block lava small gabbro inclusions
260-270	92-82	Mix of dark gray and red block lava
270-280	82-72	Dense gray aphyric aa
280-290	72-62	Gray fragmental rock with matrix of white clay
290-300	62-52	Mix of dark gray, red, and tan aa (?)
300-320	52-32	Mix of tan, brown, and red aa
320-330	32-22	Mix of brown and red aa
330-360	22- -12	No sample present
360-365	-12- -17	Mix of red and dark gray aa
365-370	-17- -22	No sample present
370-380	-22- -32	Scoriaceous red-brown lava
380-390	-32- -42	Dark gray aphyric aa
390-400	-42- -52	Mix of dark gray, tan, and red aa
400-405	-52- -57	Dark brown scoriaceous lava

*Assumed ground elevation of 352 ft., msl

APPENDIX B

STATE HISTORIC PRESERVATION DIVISION DETERMINATION

1-4-9:2

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

ROBERT K. MASUDA
DEPUTY DIRECTOR - LAND

DEAN NAKANO
ACTING DEPUTY DIRECTOR - WATER

AQUATIC RESOURCES
BOATING AND OCEAN RECREATION
BUREAU OF CONVEYANCES
COMMISSION ON WATER RESOURCE MANAGEMENT
CONSERVATION AND COASTAL LANDS
CONSERVATION AND RESOURCES ENFORCEMENT
ENGINEERING
FORESTRY AND WILDLIFE
HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

HAWAI`I HISTORIC PRESERVATION DIVISION REVIEW

Log No.: 2005.1067
Doc No.: 0505CD38
Received: April 18, 2005

Applicant/Agency:	Carl K. Takumi
Address:	C. Takumi Engineering 18 Central Avenue Wailuku, Hawaii 96793
SUBJECT:	Chapter 6E-8 Historic Preservation Review – Request for Determination for the Proposed Hamoa Well 2
Ahupua`a:	Mokae
District, Island:	Hana, Maui
TMK:	(2) 1-4-009:002

1. We believe there are no historic properties present, because:

____ a) intensive cultivation has altered the land
_✓_ b) residential development/urbanization has altered the land
_✓_ c) previous grubbing/grading has altered the land
____ d) an acceptable archaeological assessment or inventory survey found no historic properties
____ e) other:

2. This project has already gone through the historic preservation review process, and mitigation has been completed ___.

✓ Thus, we believe that "no historic properties will be affected" by this undertaking

In the event that historic sites (human skeletal remains, etc.) are identified during the construction activities, all work needs to cease in the immediate vicinity of the find, the find needs to be protected from additional disturbance, and the State Historic Preservation Office needs to be contacted immediately at 243-5169, on Maui, or at (808) 692-8023, on O`ahu.

Staff: Cathleen A. Dagher Date: May 25 2005
Cathleen A. Dagher, Assistant Maui/Lana`i Island Archaeologist, (808) 692-8023

JUN - 3 2005

1-4-9: 2
1-4-2: 3, 7, 9

STATE OF HAWAII

DEPARTMENT OF LAND AND NATURAL RESOURCES

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

HAWAI`I HISTORIC PRESERVATION DIVISION REVIEW

Log #: 2003.0147
Doc #: 0303CD63

Applicant/Agency: Fiona K. van Ammers
Address: C. Takumi Engineering, Inc.
18 Central Avenue
Wailuku, Hawaii 96793

SUBJECT: Chapter 6E-42 Historic Preservation Review – Draft Environmental Assessment Hamoa to Hana Waterline & Hamoa Well 2 (JOB NO. CWS – 007EA)
Ahupua`a: Various
District, Island: Hana, Maui
TMK: (2) 1-4-009:002 & 1-4-002, 003, 007, 009

1. We believe there are no historic properties present, because:

____ a) intensive cultivation has altered the land
____ b) residential development/urbanization has altered the land
✓ c) previous grubbing/grading has altered the land
✓ d) an acceptable archaeological assessment or inventory survey found no historic properties (See SHPD DOC NO.: 0209MK09/LOG NO.: 30827)
____ e) other:

2. This project has already gone through the historic preservation review process, and mitigation has been completed ___.

✓ Thus, we believe that "no historic properties will be affected" by this undertaking

Staff: Cathleen A. Dagher Date: 31 March 2003
Cathleen A. Dagher
Assistant Maui/Lana`i Island Archaeologist
(808) 692-8023

APR - 3 2003

1-4-009:002

LINDA LINGLE
GOVERNOR OF HAWAII

PETER T. YOUNG
CHAIRPERSON
BOARD OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

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AQUATIC RESOURCES
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CONSERVATION AND RESOURCES ENFORCEMENT
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HISTORIC PRESERVATION
KAHOOLAWE ISLAND RESERVE COMMISSION
LAND
STATE PARKS

STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES

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

April 11, 2006

Mr. Dean Nakano
Commission on Water Resource Management
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawai'i, 96809

LOG NO: 2006.0615
DOC NO: 0603JP12
Archaeology

Dear Mr. Nakano:

SUBJECT: **Chapter 6E-8 Historic Preservation Review -**
Well Construction Permit Application (Well No. 4300-03) for the
Proposed Hamoa 2 Exploratory Well
Mokae Ahupua'a, Hana District, Island of Maui
TMK: (2) 1-4-009:002

The subject application consists of proposed plans to construct an exploratory well.

We believe that **no historic properties will be affected** by this undertaking because:

- ☐ a) intensive cultivation has altered the land
- ☐ b) residential development/urbanization has altered the land
- ☒ c) previous grubbing/grading has altered the land
- ☐ d) an acceptable archaeological assessment or inventory survey found no historic properties
- ☐ e) this project has gone through the historic review process, and mitigation has been completed
- ☒ f) other: *We have previously commented on the Draft Environmental Assessment for Hamoa to Hana Waterline and Hamoa Well 2 (LOG NO: 2003.0147, DOC NO: 0303CD63) and Request for Determination for the Proposed Hamoa Well 2 (LOG NO: 2005.1067, DOC NO: 0505CD38). Both documents regarding the proposed undertaking indicated that "no historic properties will be affected".*

In the event that historic resources, including human skeletal remains, are identified during routine construction activities, all work needs to cease in the immediate vicinity of the find, the find needs to be protected from additional disturbance, and the State Historic Preservation Division, Maui Section, needs to be contacted immediately at (808) 243-5169.

Aloha,

Melanie Chinen, Administrator
State Historic Preservation Division

JP:kf:dlb

cc: Bert Ratte, Engineering, DSA, County of Maui, Fax: (808) 270-7972
Maui Cultural Resources Commission, Dept. of Planning, 205 S. High Street, Wailuku HI 96793