Draft Environmental Assessment
Prepared in Accordance with Chapter 343, Hawai‘i Revised Statutes and Title 11, Chapter 200, Hawai‘i Administrative Rules

Intersection Improvements Dillingham Ranch Agricultural Subdivision

Waialua, Island of O‘ahu, Hawai‘i
Tax Map Key: (1) 6-8-003: 015

July 2008

Dillingham Ranch ‘Āina, LLC
9601 Wilshire Boulevard, Suite 220
Beverly Hills, California 90210

R. M. TOWILL CORPORATION
Planning • Engineering • Environmental Services • Photogrammetry • Surveying • Construction Management
2024 North King Street Suite 200
Honolulu Hawaii 96819

1-21195-00

Draft Environmental Assessment

Intersection Improvements Dillingham Ranch Agricultural Subdivision

Waialua, Island of O‘ahu, Hawai‘i
Tax Map Key: (1) 6-8-003: 015

July 2008

Prepared Pursuant to
Chapter 343, Hawaii Revised Statutes, and
Title 11, Chapter 200, Hawaii Administrative Rules

Prepared for:
Dillingham Ranch ‘Āina, LLC
9601 Wilshire Boulevard, Suite 220
Beverly Hills, California 90210

Prepared by:
R. M. Towill Corporation
2024 North King Street, Suite 200
Honolulu, Hawaii 96819

Table of Contents

Page

Project Summary iv

Section 1 Project Description

1.1 Project Purpose 1
1.2 Purpose for Preparation of an Environmental Assessment 1
1.3 Project Description 2
1.3.1 Project Location and Site Characteristics 2
1.3.2 Proposed Construction Activities 4
1.3.3 Project Schedule and Cost 7

Section 2 Environmental Setting, Potential Impacts and Mitigation Measures

2.1 Physical Environment 8
2.1.1 Climate 8
2.1.2 Topography and Soils 8
2.1.3 Surface Water 11
2.1.4 Flora/Fauna 11
2.1.5 Scenic and Visual Resources 15
2.1.6 Historic and Arcaheological Resources 16
2.1.7 Beach Erosion and Sand Transport 21
2.1.8 Noise 21
2.1.9 Air Quality 23
2.1.10 Flood Hazard 25
2.2 Public Facilities 25
2.2.1 Access 25
2.2.2 Traffic and Roadways 25
2.2.3 Police, Fire and Ambulance Service 31
2.3 Additional Information Concerning the Potential for Secondary Impacts Associated with the Dillingham Ranch Subdivision 32
2.3.1 Agricultural Feasibility Report 32
2.3.2 Rockfall Potential Evaluation 40
2.3.3 Wastewater Systems 58
2.3.4 Water System 60

Section 3 Project Alternatives

3.1 Alternatives to the Proposed Action 68
3.2 No Action and Delayed Action 68
3.3 Alternative Location for theT-Intersection 68
3.4 Preferred Alternative 69

Section 4 Relationship to State and City & County Land Use Plans and Policies

4.1 Hawai'i State Plan and Functional Plans 70
4.1.1 Hawai'i State Plan 70
4.1.2 State Functional Plans 71
4.2 State Land Use District 71
4.3 General Plan 73

4.4 North Shore Development Plan/Sustainable Communities Plan 74
4.5 City & County of Honolulu Zoning 74
4.6 Special Management Area 76
4.7 Coastal Zone Management, HRS 205(A) 76

Section 5 Permits and Approvals That May be Required

5.1 City & County of Honolulu 84
5.2 State 84

Section 6 Cultural Impact Assessment Evaluation

6.1 Impacts to Traditional/Cultural Resources 85

Section 7 Agencies, Organizations and Individuals Consulted

7.1 City & County of Honolulu 86
7.2 State of Hawaii 86
7.3 Federal Government 86
7.4 Organizations and Individuals 86

Section 8 Summary of Impacts and Significance Determination

8.1 Short Term Impacts 87
8.2 Long Term Impacts 88
8.3 Significance Criteria 88

Section 9 Findings 92

References 93

List of Figures

Figure 1 – Project Location 3
Figure 2 – Proposed T-Intersection 5
Figure 3 – Dillingham Ranch Subdivision 6
Figure 4 – Soils 9
Figure 5 – Archaeological Study Area 17
Figure 6 – Drolet and Shilz Archaeological Site Locations (1991) 22
Figure 7 – Proximity of Residences/Structures 24
Figure 8 – FEMA FIRM Map 26
Figure 9 – State Land Use District 72
Figure 10 – Zoning 75
Figure 11 – Project Site in Relation to SMA 77

Other Figures Referenced From Reports

Traffic Assessment of Proposed Subdivision, Julian Ng, Inc.

Figure T-2 – Figure T-2, Traffic Assignments (2030) 29

Rockfall Potential and Hillside Slope Evaluation, Geolabs, Inc.
Plate 2 – Site Plan 42
Plate 5 – Schematic Detail for Typical Rockfall Impact Barrier Fence 49
Plate 4.1 – Conceptual Rockfall Mitigation Plan 1 51
Plate 6 – Typical Section, Rockfall Imapct Barrier and Access Trail 52
Plate 4.2 – Conceptual Rockfall Mitigation Plan 2 54

Preliminary Water System Report, RMTC
Figure 2 – Project Vicinity Map 61
Figure 3 – Schematic of the Proposed Water System 65

Appendices

Appendix A – Documentation Regarding Application for Subdivision, Dillingham Ranch Agricultural Subdivision, Mokūleʻia, O'ahu, Hawai'i

Appendix B – Botanical survey in support of an environmental assessment document for intersection improvements, Dillingham Ranch Agricultural Subdivision, Mokuleʻia, O'ahu, Hawai'i, AECOS Consultants, Inc., January 2008.

Appendix C – Avifaunal and Feral Mammal Field Survey of the Proposed Dillingham Ranch Subdivision, Mokūleʻia, Oʻahu, Phil Bruner, Ph.D., January 2008.

Appendix D – Archaeological Inventory Survey of an Approximately 75-Acre Portion of the Proposed 861-Acre Dillingham Ranch Development Project, Waialua District, Island of Oʻahu, Cultural Surveys Hawaiʻi,
Subdivision, Mokūleʻia, Oʻahu, Phil Bruner, Ph.D., January 2008.

Appendix E – Traffic Assessment of Proposed Subdivision of Dillingham Ranch Property, Mokuleia, Oʻahu, Hawaiʻi. Julian Ng, Incorporated, January 4, 2007.

Appendix F – Agriculture Feasibility Report, (Expanded Supplement on the Working Ranch) Dillingham Ranch, Development Strategies, LLC, November 2007

Appendix G – Rockfall Potential and Hillside Slope Evaluation, Dillingham Ranch Mokūleʻia Development, Mokūleʻia, Oʻahu, Hawaiʻi, Geolabs, Inc., February 15, 2008.

Appendix H – Application for Individual Wastewater System (IWS), Dillingham Ranch ʻĀina, LLC Mokūleʻia, Oʻahu, Hawaiʻi, Best Industries USA, March 9, 2007.

Appendix I – Preliminary Water System Report, Dillingham Ranch Agricultural Subdivision, Mokūleʻia, Oʻahu, Hawaiʻi, R. M. Towill Corporation, January 17, 2008.

Project Summary

Project:	Intersection Improvements Dillingham Ranch Agricultural Subdivision
Proposing Agency/Applicant:	Dillingham Ranch ʻĀina, LLC 9601 Wilshire Boulevard, Suite 200 Los Angeles, California 90210 Contact: Clifford Smith, Vice President
Accepting Authority:	State of Hawaii Department of Transportation 869 Punchbowl Street, Room 301 Honolulu, Hawaiʻi 96813 Contact: Ken Tatsuguchi, P.E. Engineering Program Manager Highways Division
TMK:	(1) 6-8-003: Parcel 015 and along Farrington Highway, F.A.P. No. 35-A(1)
Location:	Waialua, Island of Oʻahu, Hawaiʻi
Project Area:	Less than 1-acre required for pavement installation, striping and installation of signage
Document Preparers:	R. M. Towill Corporation 2024 North King Street, Suite 200 Honolulu, Hawaii 96819 Contact: Brian Takeda, Planning Project Coordinator
County Zoning:	AG-2, General Agricultural District
State Land Use:	Agricultural
Existing Land Uses:	The proposed area of use serves as an intersection along Farrington Highway and will provide entry to the planned Dillingham Ranch Subdivision
Proposed Action:	Intersection improvements consisting of installation of pavement, striping, and signage
Permits that May be Required:	Building and grading permits

Section 1
Project Description

1.1 Project Purpose

Dillingham Ranch ʻĀina, LLC (DRA), proposes a T-intersection along Farrington Highway, a State Department of Transportation (DOT), Highways Division, facility in the Waialua District of Oʻahu. The T-Intersection will be located at the current westerly access road to Dillingham Ranch. This improvement to the current access to Dillingham Ranch will provide a connection to a proposed subdivision of approximately 77 agricultural lots. The roadway will carry traffic in the south and northbound approaches from the subdivision to the Highway.

1.2 Purpose for Preparation of an Environmental Assessment

The purpose of this Draft Environmental Assessment (DEA) is to inform interested parties of the proposed project and to seek public comment on subject areas that should be addressed prior to the acceptance of the Final Environmental Assessment (FEA). The proposed T-intersection, with its connection to a 77 lot, 385 acre subdivision within the approximately 2,700 acre Dillingham Ranch, has the potential for beneficial and/or adverse environmental impacts that are secondary to the proposed project. This EA describes existing conditions at the location of the intersection improvements and addresses the potential for adverse primary environmental impacts, and the secondary environmental impacts associated with the Dillingham Ranch Agricultural Subdivision.

The expanded discussion offered in this EA provides interested parties with additional documentation for the Dillingham Ranch property including comprehensive reports and reviews that directly and indirectly have the potential to affect the following categories: (1) archaeological preservation areas; (2) agricultural sustainability; (3) rockfall hazards; (4) waste water; and (5) proposed water systems. This information complements and expands upon the assessment of the primary environmental factors associated with construction and operation of the T-intersection. Each of the five categories are supported with corresponding copies of the State or County coordination letters as provided in **Appendix A, Documentation Regarding Application for Subdivision**.

This EA complies with Chapter 343, Section 343-5-1, Hawaii Revised Statutes (HRS), 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 which 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".

The proposed project's use of the DOT right-of-way also serves as a trigger for the preparation of an EA in accordance with Section 343-5, HRS. According to Section 343-5:

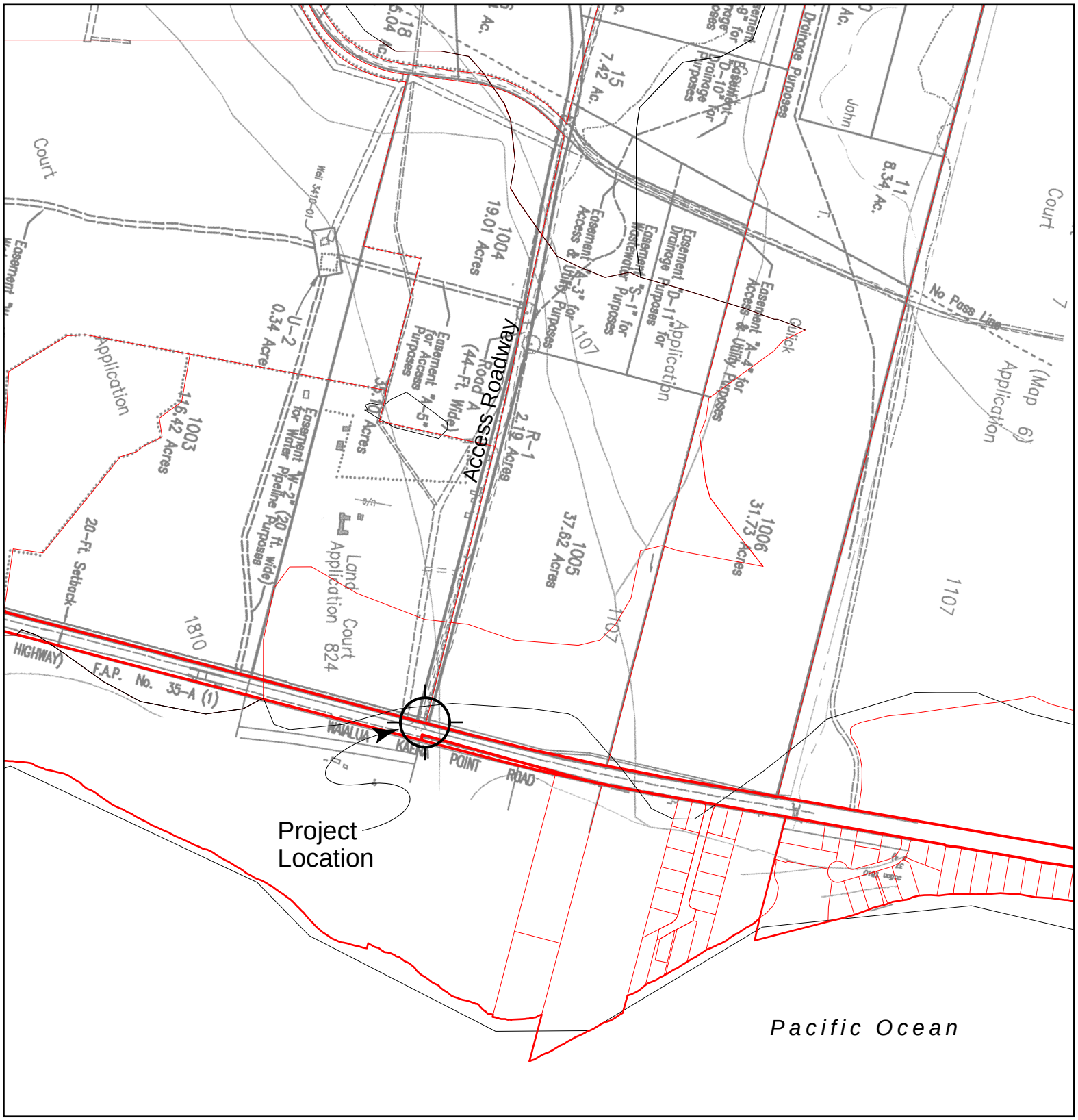
> "(c) Whenever an applicant proposes an action specified by subsection (a) that requires approval of an agency and that is not a specific type of action declared exempt under section 343-6, the agency initially receiving and agreeing to process the request for approval shall prepare an environmental assessment of the proposed action at the earliest practicable time to determine whether an environmental impact statement shall be required ...."

1.3 Project Description

1.3.1 Project Location and Site Characteristics

The proposed project is located in Mokūleʻia, Waialua, along the northern coastline of Oʻahu (See **Figure 1,** Project Location). The location of the subject intersection along the Farrington Highway (F.A.P. 35A(1)) is approximately 750 to 800 feet from shore. The access roadway serving the planned Dillingham Ranch Agricultural Subdivision is located at street address, 68-540 Farrington Highway, Waialua, Oʻahu, Hawaiʻi 96791. The proposed T-intersection improvements will involve use of less than approximately 1 acre. A portion of the intersection improvements will be within the DOT, Highways Division, right-of-way, while the entirety of the access roadway and subdivision is owned by Dillingham Ranch ʻĀina, LLC.

The lands mauka of the proposed project site are in agricultural uses that include ranching, limited diversified agricultural crops, and related pasturage and corral uses. The land on the makai side of the subject intersection is privately owned vacant land that is currently used as a polo field. There are no agricultural activities at the planned intersection improvements.



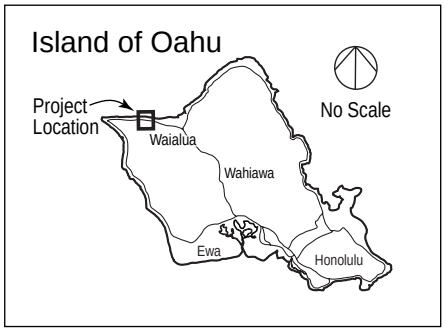


Figure 1 Project Location
Intersection Improvements
Dillingham Ranch ‘Āina, LLC

0 500 Feet 1000

R.M. TOWILL CORPORATION 2008

1.3.2 Proposed Construction Activities

Intersection Improvements

The proposed improvements will consist of limited grading, paving, striping and installation of traffic signage designating the location as a T-intersection connecting the planned subdivision access roadway with the Farrington Highway (**Figure 2,** Proposed T-Intersection). The access roadway will be designed with 12 foot wide travel lanes, paved shoulders, striping and signage to enhance safety and maintenance of the intersection.

The access roadway is planned as a two-lane roadway carrying traffic in both the northbound and southbound directions. A single lane will be provided on the northbound approach that will be shared by traffic making left and right turns onto the highway and a single lane will be provided in the southbound direction into the subdivision.

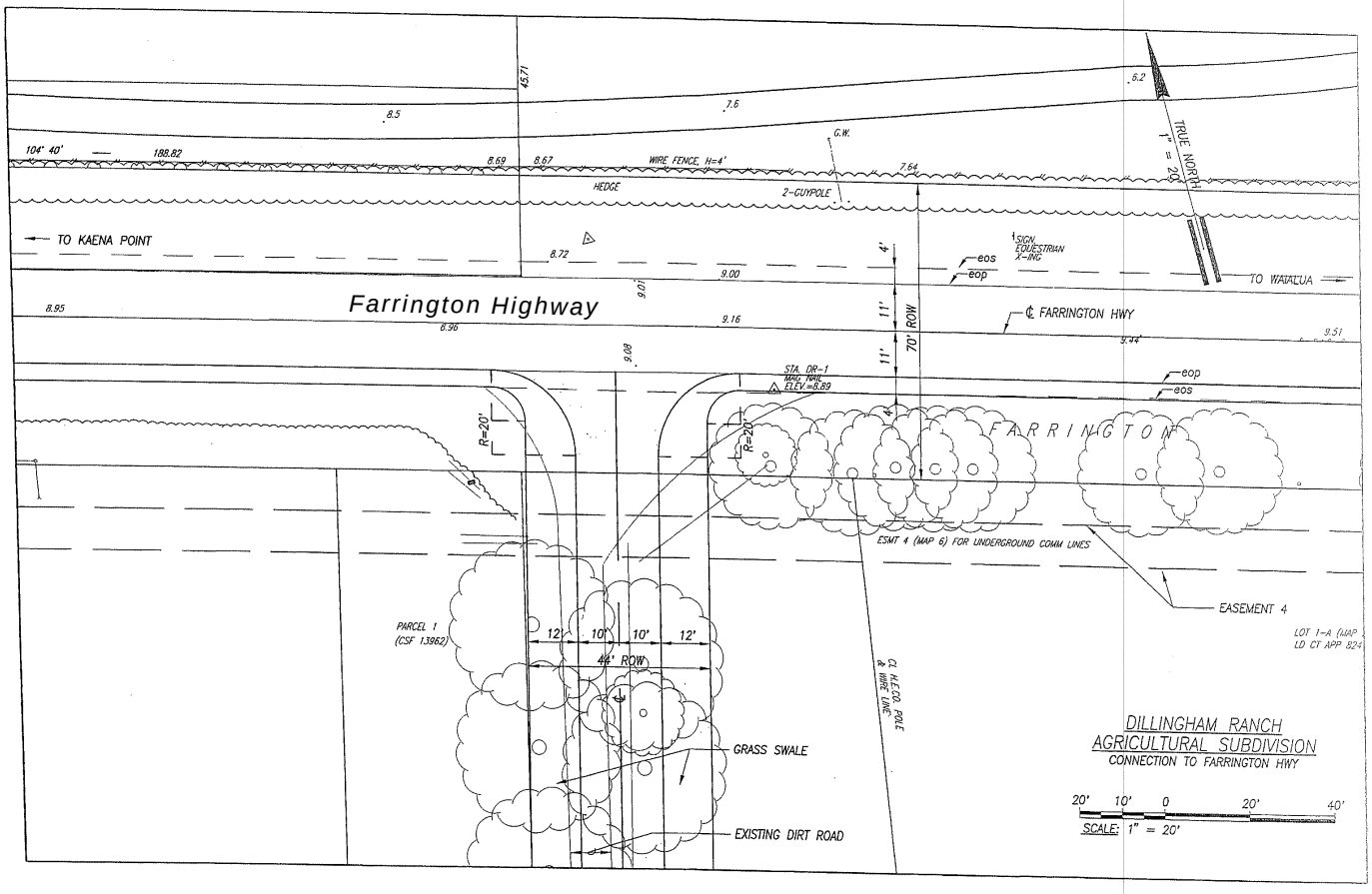
A stop sign will be used to control the northbound approach to the intersection. The intersection will be designed with adequate sight distance for drivers at the stop sign and clearly visible to drivers on the highway. As required, warning signs will be posted on Farrington Highway to improve driver awareness of the new intersection and to alert oncoming traffic to drivers making southbound turns into the Dillingham Ranch Agricultural Subdivision.

Agricultural Subdivision

The proposed T-intersection is designed to provide service to the planned subdivision (see **Figure 3,** Dillingham Ranch Agricultural Subdivision). All lots as identified within the subdivision will be developed in accordance with applicable regulations of the State and City & County of Honolulu. This will include provision of the required infrastructure and utilities including access roads and connection with major public roadways, water, wastewater, power, drainage and solid waste collection.

Status of Agricultural Subdivision

On January 25, 2008 the Department of Agriculture consented to the proposed subdivision and on April 18, 2008 the Department of Planning and Permitting, City & County of Honolulu, issued its Tentative Approval (**Appendix A**).



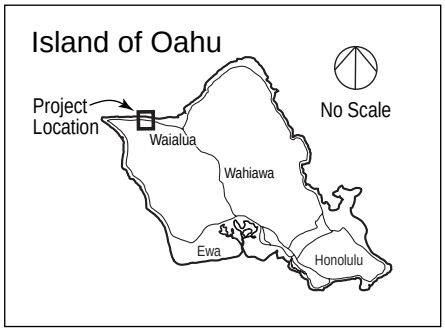
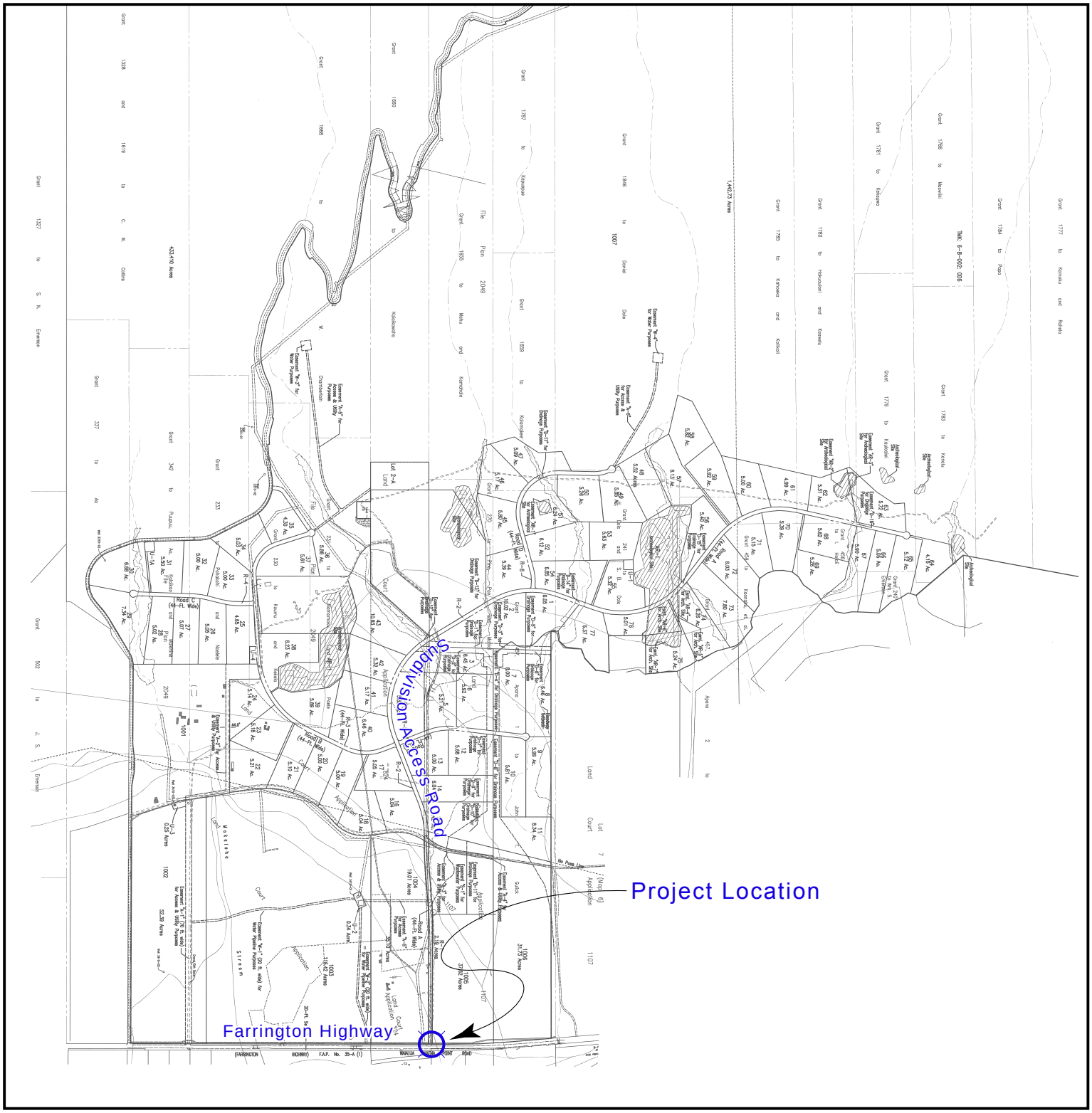


Figure 2 Proposed T-Intersection
Intersection Improvements
Dillingham Ranch ‘Āina, LLC

Graphic Scale as Shown

R.M. TOWILL CORPORATION 2008



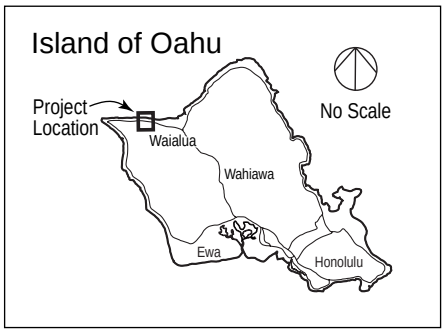


Figure 3
Dillingham Ranch Agricultural Subdivision
Intersection Improvements
Dillingham Ranch ‘Āina, LLC

No Scale

R.M. TOWILL CORPORATION 2008

1.3.3 Project Schedule and Cost

Construction of the proposed project is tentatively scheduled for late 2008. The project duration is anticipated at less than approximately 6 months. The preliminary construction cost estimate for the project is approximately $250,000.

All costs associated with the design and construction of the proposed project will be financed by DRA.

Section 2
Environmental Setting, Potential Impacts and Mitigation Measures

2.1 Physical Environment

2.1.1 Climate

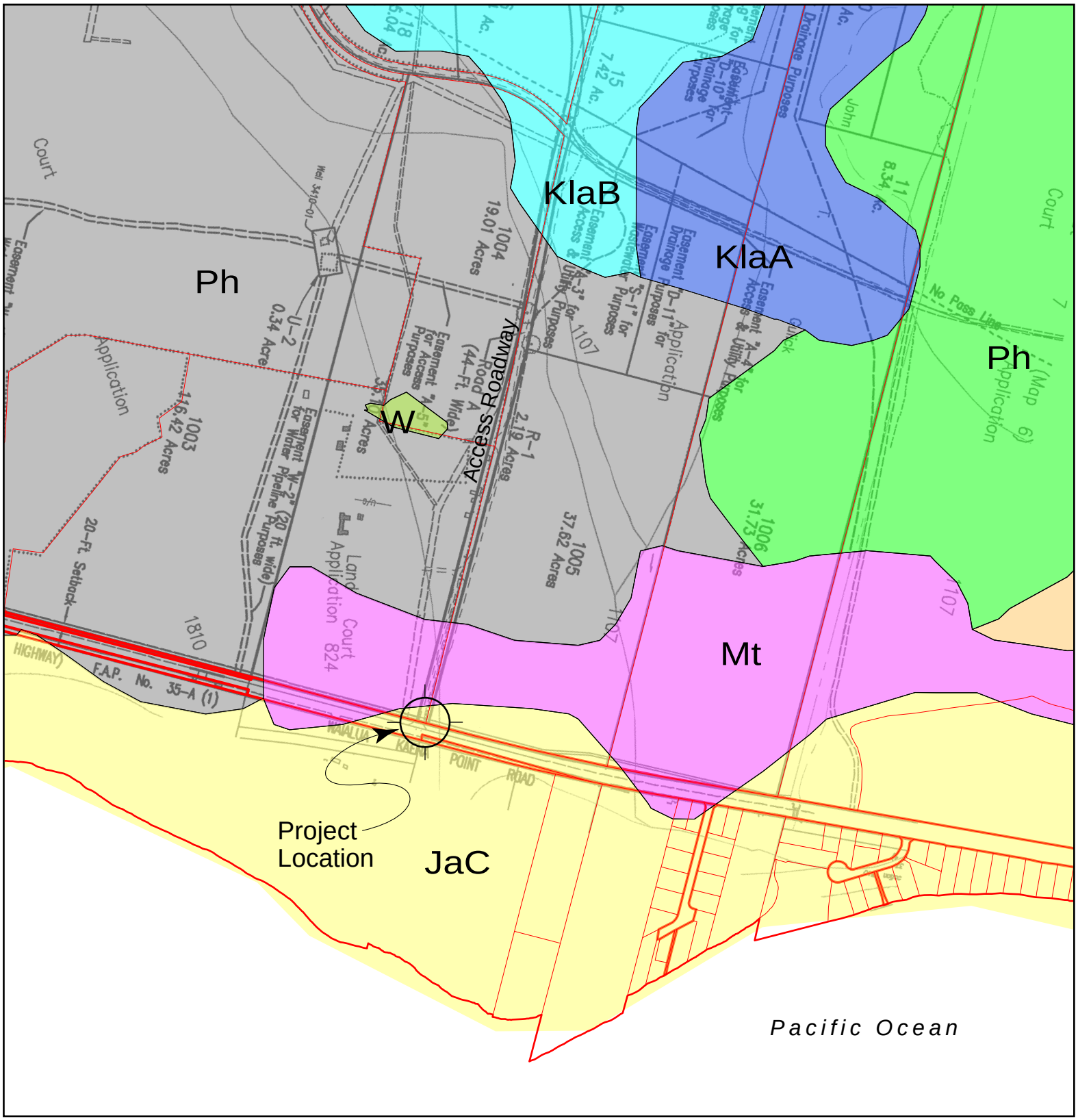
The project site is located along the north shore of O‘ahu. Temperatures along the north shore and statewide are moderate and equable throughout most of the year. This reflects the small seasonal variation in the energy received from the sun and the tempering effect of the surrounding Pacific Ocean. The mean annual temperature recorded at Waialua, O‘ahu, ranges from between the mid-60s and high 80s, with occasional reaches into the +90 degree Fahrenheit (F) range.

Rainfall for the area ranges in excess of 30 inches per year during the winter months from November through January, to an average of approximately 15 to 20 inches throughout the remainder of the year. Winds are generally from the northeast, except during the winter months when storms are usually accompanied by south winds.

2.1.2 Topography and Soils

According to the Soil Conservation Service (SCS), the project site consists of the Ka‘ena-Waialua Soil Association which is normally found on coastal plains and talus slopes and in drainageways. Characteristics include deep, nearly level and gently sloping surfaces, with poorly drained to excessively drained soils that have a fine textured to coarse textured subsoil or underlying material.

Information on the soil type is obtained from the Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii, as prepared by the U.S. Department of Agriculture, 1972. According to the Soil Survey, the soil association at the project location is classified as Jaucas sand, 0 to 15 percent slopes (JaC). See **Figure 4,** Soils. The slope range of this soil is 0 to 15 percent, but in most places the slope does not exceed 7 percent. In a representative profile the soil is single grain, pale brown to very pale brown, sandy, and more than 60 inches deep. In many places the surface layer is dark brown as a result of the accumulation of organic matter and alluvium. The soil is neutral to moderately alkaline throughout the profile. Permeability is rapid, and runoff is very slow to slow.



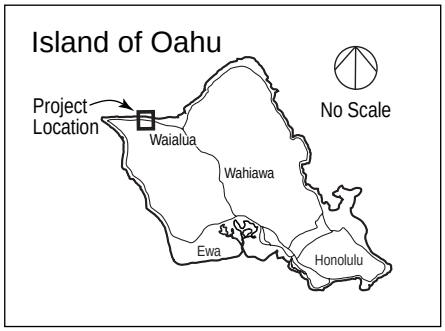


Figure 4 Soils
Intersection Improvements
Dillingham Ranch ‘Āina, LLC

0 500 Feet 1000

R.M. TOWILL CORPORATION 2007

The hazard or water erosion is slight, but wind erosion is a severe hazard where vegetation has been removed. Workability is slightly difficult because the soil is loose and lacks stability for use of equipment. (Department of Agriculture, 1972).

Potential Impacts and Mitigation Measures

The proposed project will involve minor grading, backfill, and paving to accomplish the planned improvements. Excavated materials will be reused on-site for backfill as required. Imported fill is not anticipated to be required. However, if imported fill is used it will be limited to the use of clean and uncontaminated material. Any graded or excavated material that cannot be reused will be disposed of at an approved waste facility in accordance with State and City & County of Honolulu regulations.

Areas that are paved are not expected to constitute an erosion hazard. Areas that are exposed as a result of earthwork will be properly handled using management, structural, and vegetative practices as required to ensure against loss of sediment during periods of rainfall or inclement weather. Management practices will include only excavating the area required to accomplish the installation of the intersection improvements; maintaining open areas with appropriate storm water controls to prevent the commingling of runoff with exposed soils and excavated material; and securing the job site following the end of each work day. Structural controls will include the use of berms, silt screens, and PVC or similar covers for exposed soils, excavated materials, or any construction related stockpile sites susceptible to contact with rainfall or runoff. Vegetative practices will include the use of grassing or other vegetative materials to stabilize areas of exposed soils upon completion of work.

Other measures and practices will be followed as required in accordance with applicable State and City & County of Honolulu standards for grading and related construction activities.

2.1.3 Surface Water

According to the Hawai'i Stream Assessment the only perennial stream within the project vicinity is Makaleha Stream (CWRM, 1990). Although the Hawaii Stream Assessment lists Makaleha as a perennial stream, conditions of no flow have been observed at various times during both the summer and winter months. Other intermittent no name streams are located in the area.

A small man-made pond is located immediately west of the project site on Dillingham Ranch 'Āina property. The pond or water feature was created several years ago by previous ownership to handle runoff upland of the property. It has since become a decorative feature of the nearby equestrian facility.

Potential Impacts and Mitigation Measures

No adverse impact to perennial or intermittent streams or the pond in the vicinity of the project is anticipated. Construction activities associated with the intersection improvements are not located near any streams which would require mitigative measures to otherwise minimize, reduce, or eliminate the potential for adverse effects.

The closest edge of the man-made pond is located approximately 230 feet from the planned intersection improvements. Although runoff from the project site is not expected to affect the upgradient location of the pond relative to the intersection improvements, the contractor will manage all work activities to prevent and reduce erosion from the job site. Construction related fugitive dust, which could be carried by wind blowing toward the pond, will be controlled by regular wetting of the work area as required. Only enough water will be used for dust control to suppress the dust from becoming airborne.

2.1.4 Flora/Fauna

Flora Assessment

A botanical survey of the site was conducted on January 4, 8 and 17, 2008 by AECOS Consultants, Inc. The purpose of the survey was to examine the area of the proposed intersection improvements and to provide information on the surrounding agricultural subdivision. A summary of the survey and findings are provided in the following (AECOS Consultants, Inc., 2008) (**Appendix B**):

Much of the lower half of the site Dillingham Ranch property is developed as a stables and horse ranch, with other areas utilized for pasturing cattle or as residences on agricultural lots. As this lower or makai area is not part of the proposed intersection improvements project, only limited survey time was spent here and around the wetlands. Further, plantings of ornamentals around developed facilities (houses, stables, corrals) were ignored, although special attention was paid to the area of a proposed intersection improvements and connection to Farrington Highway. The highway marks the northern or makai boundary of the ranch property, and improvements at the point where the ranch access road connects to the state highway are responsible for the preparation of an EA for the agricultural subdivision project as required by the state DOT.

Given the diversity of environments present on Dillingham Ranch property, the varied disturbances to the vegetation, and the large area (over 900 ac), it is not surprising that the listing of species is a long one. The listing included most of the species reported by Whistler (1991) along with findings in 2008.

A total of 211 species of flowering plants (plus 4 ferns and 1 gymnosperm) were recorded from the survey area in the vegetation surveys of December 1991 and January 2008. Many more species are present as ornamentals within the managed land area, although ornamentals persisting in abandoned former house lots and prominent trees and shrubs in the managed lands are included. For comparison, 48 species (22%) were seen in 1991 but not recorded in 2008; 47 species (22%) were seen in 2008 but not recorded in 1991. At least some of the species recorded by us as "new" were clearly present in 1991 and for whatever reason left off the 1991 list: several species of Eucalyptus trees in the upland pastures and managed lands, and the several different palm trees (including royal and coconut) found in the lowland palm grove.

The majority of the plant species growing on the property and in the project area are considered exotics naturalized in this area. Only 12 species (5.6%) are native plants (indigenous or endemic species) in the listing. Several of these—Cretan brake *(Pteris cretica)*, käkalaioa *(Caesalpinia bondoc)*, and nehe *(Lipochaeta lobata)*—were not observed in 2008, although previously reported by Whistler from both the koa haole scrub and riparian forest areas. The percentage of native species is substantially less than the 12.3% reported by Whistler. This difference can be attributed to (1) the inclusion in the 1991 survey of a separate upland parcel that added a number of natives not observed by Whistler or by us in the agricultural subdivision project area, and (2) the larger species list combining results of both surveys, adding mostly naturalized species.

Some of the species found are on the property as plantings, either ornamental or agricultural, generally limited to the low elevation, managed land. Many more species are present in this area than included in the list, but landscaping plants were mostly ignored in our survey. The several species of Eucalyptus noted growing higher up near the south boundary of the project area are old ranch plantings.

The subject property has a long history of ranching and the present-day vegetation upslope of the managed lands remains partly in grassland/savanna and partly in secondary forest growth overwhelmingly dominated by introduced species, particularly koa haole. The latter species tends to dominate lowland, somewhat dry environments on Oʻahu and many other islands in the Pacific on lands that have been disturbed and then abandoned. Some elements of the native flora are present and these plants (especially wiliwili and alaheʻe) are deserving of preservation in place, although not especially rare on Oʻahu and not protected species. A more diverse native flora is anticipated to be present on the steep slopes starting above the proposed subdivision lots based on Whistler's 1991 survey that included an area with this steeper topography above 400 ft.

The part of the ranch property and state property that will be disturbed by planned improvements to Farrington Highway to establish a vehicular connection to the planned subdivision is a maintained roadway verge of trees (ironwood), shrubs (Chinese hibiscus or Hibiscus sinensis), several grasses and annual herbs. No botanical resources of significance exist in this area.

No plant species listed by the state or federal governments as threatened or endangered (DLNR, 1998; Federal Register, 2005; USFWS, 2005, 2007) were encountered during the present or during past (Char and Linney, 1986; Whistler, 1991) surveys on the property.

Potential Impacts and Mitigation Measures

The botanical survey found no assemblages or instances of rare, threatened, or endangered species that would be potentially impacted by the proposed project. The planned subdivision will also not displace existing ranching activities and are not anticipated to adversely affect botanical resources. Mitigation measures are not anticipated to be required.

Fauna and Avifauna Assessment

An avifaunal and feral mammal survey of the site was conducted on January 4 and 10, 2008, by Phil Bruner, Ph.D. The purpose of the survey was to (1) document what species of birds and mammals currently occur on and near the Dillingham Ranch property, with special attention to any native or migratory species and (2) note any natural resources important to native and migratory species.

A summary of the findings of the survey indicated (Bruner, 2008) (**Appendix C**):

Site Description
The following habitats can be found on this site: pasture/ranch land, residential, second growth alien forest, ephemeral stream drainage/irrigation ditches, and man-made ponds. The topography is mostly flat except for the mauka portions.

Native land Birds
No native land birds were recorded on the survey. The only possible species that might on occasion forage in this area is the Short-eared Owl or Hawaiian Owl known as Pueo in Hawaiian *(Asioflammeus sandwichensis)*. This species is listed as endangered by the State of Hawaii on the island of Oahu. They range over a wide array of habitats including forest (both native and second growth) as well as agricultural/ranch lands. They nest on the ground in areas of tall grass (Pratt et al. 1987, Hawaii Audubon Society 2005).

Native Waterbirds
Three Black-crowned Night Heron or 'Auku'u *(Nycticorax nycticorax hoactli)* were observed on 10 January at the large pond near the entry road to the property. 'Auku'u are the only native waterbird that is not listed as endangered or threatened. Three endangered waterbirds, the Hawaiian Coot or 'Alae Ke'oke'o *(Fulica alai)*, Hawaiian Moorhen or 'Alae 'ula *(Galllinula chloropus sanvicensis)* and Hawaiian Duck or Koloa *(Anas wyvilliana)* were also observed on this same large pond. An average of 8.5 coot and 2.5 moorhen and 10.5 Koloa were tallied over the 2 days of the survey. The endangered Black-necked Stilt or Ae'o *(Himantopus mexicanus knudseni)* was not recorded on the survey but will

forage in flooded areas following heavy rains. Bruner (1 992) recorded 10 Hawaiian Coots, 2 Hawaiian Moorhens, 8 Black-crowned Night-Herons and 2 Black-necked Stilt on this property in 1992.

Seabirds
Two seabird species were observed flying over the property, the Great Frigatebird or 'Iwa *(Fregata minorpalmerstoni)* and White-tailed Tropicbird or Koa'ekea *(Phaethon lepturus dorotheae)*. A juvenile Koa'ekea was recently found on the property and was photographed and turned over to Sea Life Park, Oahu for care until it could be released (Chrissy Morris an employee at Dillingham Ranch pers. comm.) This species nests on the cliffs above Mokule'ia (pers. observ.) None of the Seabirds observed are listed as endangered or threatened. At nearby Kaena Point Wedge-tailed Shearwater *(Puffinus pacificus)* and Laysan Albatross *(Phoebastria immutabilis)* are now nesting with increasing success.

Migratory Birds
Three species of migratory shorebirds were recorded, the Pacific Golden-Plover or Kolea *(Pluvialis fulva)*, Ruddy Turnstone or Akekeke *(Arenaria interpres)* and Wandering Tattler or Ulili *(Heteroscelus incanus)*. These birds arrive from their arctic breeding grounds in August and depart back to the arctic in late April. The most extensively studied of the three species is Kolea (Johnson et al. 191, 1989, 1993, 2001 a, 2001b). All of these migratory shorebirds are protected by the Migratory Bird Treaty Act. They are not listed as threatened or endangered. An average of 39.5 plover and 15.5 turnstone were tallied over the course of the survey. Only 1 Wandering Tattler was observed. Sixty-eight plover were previously tallied on the property (Bruner 1992). One migratory Northern Pintail Duck *(Anus acuta)* was also seen on the Bruner (1992) survey. This species was not recorded on this 2008 survey but is one of the two most common migratory ducks wintering in Hawaii (Hawaii Audubon Society 2005).

Alien (Introduced) Birds
A total of 26 alien species were recorded on the survey compared with 17 species tallied by Bruner (1992). Table One (see Appendix C) gives the names of these species and information on their relative abundance. None of these alien birds are listed as threatened or endangered. The array of alien birds was typical of this type of habitat in this region of Oahu (Bruner 1982, 1986, 1991, 1992, 1993, 2003, Pratt et al. 1987, Hawaii Audubon Society 2005).

Feral Mammal
The only feral mammals observed on the survey were 4 pigs *(Sus scrofa)* and 2 cats *(Felis catus)*. Roof Rat *(Rattus rattus)* and House Mouse *(Mus musculus)* likely occur in this area. The endangered Hawaiian Hoary Bat or Ope'ape'a *(Lasiurus cinereus semotus)* was not seen despite an evening search using an ultrasound detector. Ope'ape'a are infrequently reported on Oahu. They are not restricted to native forest but can be seen foraging for flying insects in urban and agricultural areas as well as over bays and ponds. They roost solitarily in trees (Tomich 1986, Kepler and Scott 1990).

Summary of Findings
This property has been significantly altered from its natural state by years of agricultural and ranching activity. Three endangered waterbirds (Hawaiian Coot, Hawaiian Moorhen, Hawaiian Duck) and one non-endangered waterbird (Black-crowned Night Heron) were found on the survey. Two indigenous seabirds and 3 migratory shorebirds species were also observed. The endangered Hawaiian Owl was not seen but could occur in this area. An abundance of alien (26 species) birds were tallied. Feral mammals seen included cats and pigs. The endangered Hawaiian Hoary Bat was not detected. This species is infrequently seen on Oahu. The most valuable habitat for native waterbird are the ponds. The actively grazed pastures are important foraging habitat for migratory shorebirds (Pacific Golden-Plovers and Ruddy Turnstones).

Potential Impacts and Mitigation Measures

A number of common, exotic introduced, and rare native, threatened and endangered species were identified in the course of the survey. Most if not all of the species identified as rare, threatened or endangered do not readily utilize the immediate area of the proposed intersection improvements site for habitat or for foraging based on the regular presence of humans and the transit of vehicles along the Farrington Highway and existing Dillingham Ranch property access road.

The closest point of concern would be the area of the pond, which is located approximately 240 feet from the proposed intersection improvements. Existing mitigation is provided to some extent by a row of mature ironwood trees and brush vegetation that serve to isolate the area of the pond from the intersection. As required, the contractor will control dust and debris migrating from the project site and affecting the pond. Noise will be temporarily generated during construction activities. However, during this period all internal combustion powered equipment will be muffled and work will be limited to daytime hours. No night work will be required. Upon completion of work, the area will return to preconstruction noise levels.

Seabirds that have been observed transiting the area are not expected to be adversely affected. No night work is required that would constitute a source of additional lighting that could affect foraging activities.

2.1.5 Scenic and Visual Resources

Existing views from the project site primarily consist of the Farrington Highway. Makai of the intersection across the highway there are views of an existing grassed polo field, ironwood trees and brush vegetation beyond the field. Limited views of the shoreline and ocean can be seen in the distance. Mauka views along the highway include paddocks and corrals at the nearby Dillingham Ranch (Crowbar Ranch), an equestrian facility that provides stable and exercise facilities. Other mauka views are of the Dillingham Ranch ʻĀina property and the Waiʻanae Mountains beyond.

Potential Impacts and Mitigation Measures

No adverse impacts to visual resources of the project site are expected. The visual qualities of the site will be retained and preserved mostly intact. The only changes expected will be of the intersection improvements consisting of an improved roadway, striping, a stop sign and other signage to alert motorists to the presence of the intersection.

As required, vegetative controls will be used to stabilize open areas of soil to reduce erosion hazards. However, no views are expected to be impeded or otherwise negatively altered.

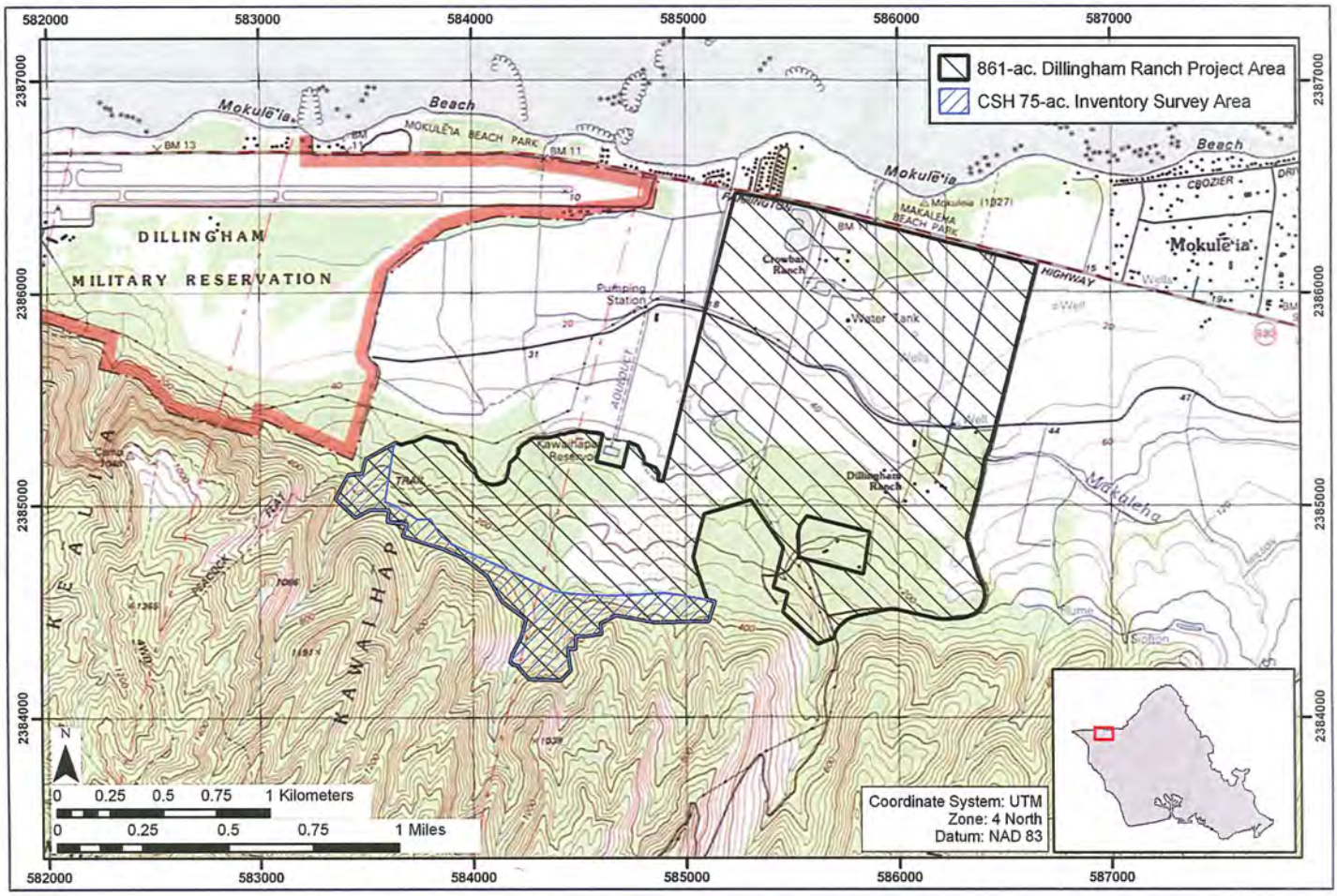
2.1.6 Historic and Archaeological Resources

Background

The proposed project site was included as part of a prior archaeological inventory survey of 787 acres of the Dillingham Ranch property proposed for development. The report was conducted by ERC Environmental and Energy Services Company (ERCE) and detailed in Archaeological Inventory Survey and Evaluation, Mokūleʻia, Waialua District, Oʻahu (TMK 6-8-03 and 6-8-02) (Drolet and Shilz, 1991). This initial report investigated the area of land extending from the Farrington Highway to the uplands as identified in **Figure 5**, Archaeological Study Area. The report was reviewed and accepted by the State Historic Preservation Division (SHPD) in 1992 (Log No. 5155, Doc No. 0682t).

A second archaeological inventory survey was subsequently undertaken in 2007 by Cultural Surveys Hawaiʻi to add approximately 78 acres to ensure sufficient archaeological review of the Dillingham Ranch property planned for an agricultural subdivision. This second report, Archaeological Inventory Survey of an Approximately 75-Acre Portion of the Proposed 861-Acre Dillingham Ranch Development Project, Waialua District, Island of Oʻahu (Tulchin and Hammatt, 2007) (**Appendix D**), was also reviewed and accepted for review by the SHPD in 2007 (Log No. 2007.2421, Doc No. 0712LM03) (The area of investigation is identified in **Figure 5**, Archaeological Study Area).

On January 23, 2008, the SHPD completed its review of the archaeological inventory survey and issued its determination that "no historic properties will be affected" (See **Appendix A**, letter from SHPD, January 23, 2008). The SHPD specifically noted in its determination that because the proposed action for the Dillingham Ranch Agricultural Subdivision involves a "paper transaction" for a proposed zone change, that no ground disturbing activities would occur. However, in order to ensure that construction of the subdivision is consistent with the goal of maintaining preservation of the archaeological and cultural resources of the property, protocols similar to those in place for construction of the T-intersection will be applied to the project when it is constructed (see Potential Impacts and Mitigation Measures, this section).



Source: Base drawing, Figure 1, Portion of USGS 7.5 Minute Series Topographic Map, Ka'ena Quad (1998), showing the location of the CSH 75-acre inventory survey area and the 861-acre Dillingham Ranch project area. Cultural Surveys Hawaii, 2007.

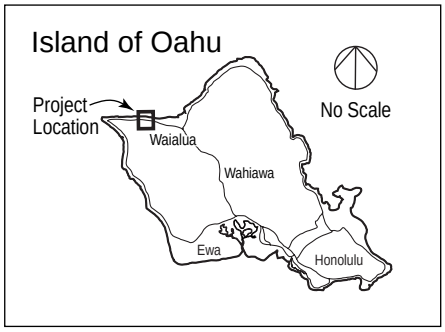


Figure 5 Archaeological Study Area
Intersection Improvements
Dillingham Ranch 'Āina, LLC

0 0.25 0.50 0.75 1 Miles

R.M. TOWILL CORPORATION 2007

History of Project Vicinity

Cultural Surveys Hawai‘i, Inc., provides a summary of the history of the project area in the Tulchin and Hammatt, 2007, report identified above. A summary is provided in the following:

> Traditional Accounts
> The district of Waialua is rich in legends, stories, proverbs, and myths. Waialua is literally translated as "two waters" (Clark 2002) and may refer to the two large stream drainages (Anahulu and Helemano-Poamoho-Kaukonahua) that were once used to irrigate extensive taro fields in the ahupua‘a of Kamananui, Pa'ala'a, and Kawailoa, the more populous ahupua‘a on the eastern side of the district. The ahupua‘a of Kealia, Kawaihāpai, and Mokulē'ia, on the western side of the district, were more arid, and were not as well-watered. However, these western lands were famed for their warm climate, cooling breezes, plant resources, and especially, marine resources.
>
> Early Historic Period
> A picture of pre-contact Hawai'i is painted by the recorded accounts of early foreign explorers. After the death of Captain James Cook on the Island of Hawai'i, the crew of the Resolution continued to sail toward O'ahu under the leadership of Captain Charles Clerke.
>
> Clerke describes the highly populated and lush northwest coast of 0'ahu after anchoring in Waimea Bay:
>
> *I stood into a Bay just to the Wtward [Westward] of this point the Eastern Shore of which was by far the most beautiful Country we have yet seen among these Isles, here was a fine expanse of Low Land bounteously cloath'd with Verdure, on which were situate many large Villages and extensive plantations; at the Water side it terminated in a fine sloping, sand Beach.. .This Bay, its Geographical situation consider'd is by no means a bad Roadsted, being sheltered from the NEbN [Northeast by North] SEterly [Southeasterly] to SWbW [Southwest by West] with a good depth of Water and a fine firm sandy Bottom; it lays on the NW [Northwest] side of this Island of Wouahoo [O'ahu]. . .surrounded by a fine pleasant fertile Country. (Beaglehole 1967:569).*
>
> Economic Changes
> About A.D. 1720-1740, the island of O'ahu was united under the high chief Kūali'i after a series of battles with the chiefs of Kona and 'Ewa. Kūali'i continued his wars of conquest by carrying out raids on the islands of Moloka'i and Hawai'i. This began a time period of intraisland and inter-island wars, referred to as the Conquest Period, that culminated in the conquest of O'ahu by the Hawai'i Island chief, Kamehameha, in A.D. 1795 (Sahlins 1992:36). In 1804, the Hawaii chiefs who supported Kamehameha occupied O'ahu, taking control of the lands of the former ruling chiefs. In 1806, Kamehameha traveled around the island of O'ahu to encourage people to rebuild their war-ravaged agricultural fields and fishponds by his own example.
>
> Kamehameha died in 1819, and his son Liholiho and wife Ka'ahumanu shared the duties of ruling the new kingdom. He selected his younger brother Kauikeaouli to be his chief during his absence during a trip to England and heir in the event that he did not return. Both Liholiho and his wife died in 1824 while in England, and Kauikeaouli, later known as Kamehameha III, became the king at the age of nine, with a guardian Kahalai'a as his kahu (personal attendant). This took place during the Sandalwood Period (A.D. 1812- l830), when the ali'i (high chiefs) made enormous demands upon the common people to gather sandalwood in the upland forests.
>
> Kauikeaouli's assumption of control was marked by the selection of a group of young chiefs and children of important persons, of resident foreigners, and of commoners, to become his favorites, friends, members of his household, and soldiers and sailors to form his bodyguard. This general period ended in the exhaustion of sandalwood on the islands.

Trade continued with visiting whaling ships during the Whaling Period (A.D. 1830-1848) for provisions, but this did not generate the same profits for the ali'i as did the early sandalwood trade. (Sahlins 1992: 108).

Between 1830 and 1850, the demands of the ali'i on the maka'āinana (common people) were severe. The missionary, John Emerson, commenting on the burdensome taxes on the people, wrote that the ruling chiefs "get hungry often and send a vessel to Waialua for food quite as often as it is welcomed by the people" (MsL: 10 Feb 1834, cited in Sahlins 1992:145).

Population Decline

In the pre-contact period, villages in the Waialua District were concentrated along the coast and the well-watered valleys of the ahupua'a on the eastern side of the district. The population of these ahupua'a had been estimated at 6,000 to 8,000 people before Western Contact (Sahlins 1992:20).

The first missionary census of the district, in 1831-32, recorded 2,640 people in Waialua, probably down 20-30 percent from the first decade of the century. The population continued to decline in the first part of the nineteenth century, and by 1848, the population was down to 1,616 persons. Much of this decline was due to a high death rate from newly introduced diseases, such as smallpox, typhus, and venereal diseases.

Mid- to late-1800s

In 1850, a law was passed that allowed foreigners to buy land fee-simple. Two descendants of missionaries, William Emerson and John T. Gulick, were the first foreigners to buy land in Mokule'ia and Kawaihāpai. Over the next few years, Emerson continued to buy land from the original grantees or later owners until he owned a total of 2,605 acres in Waialua (Alameida 1993:xii).

In 1852, the first Chinese were brought to the islands to work in the sugar cane fields. Some of these Chinese later moved to Waialua to begin rice cultivation. A market for rice in California had developed as increasing numbers of Chinese laborers immigrated there since the mid-19th century. Similarly, as Chinese immigration to the islands also accelerated, a domestic market for rice developed.

By 1876 there was still a considerable amount of former taro land available for rice farming. The great demand for rice land brought disused taro patches into requisition - especially because water rights attached to them…(Coulter and Chun 1937: 11).

1900s

By the early 1900s, sugarcane plantations and large ranches came to dominate the lands of western Waialua. Cattle were known to have grazed on the lowlands of Waialua as early as the 1840s (Sahlins 1992:148). In 1897, B.F. Dillingham purchased the Kawailoa Ranch in Mokule'ia. The ranch included over 2,000 head of cattle and over a hundred horses and mules on 10,000-acres of land (Yardley 1981:193). Dillingham also leased additional property in Mokule'ia, including the Gaspar Silva Ranch, the James Gay Estate, and other lands in the area that he could secure. Dillingham's plan was to later sublease or sell the land at a profit, as the lands had potential for being developed into large-scale sugar plantations. He anticipated the land would become valuable once extensive irrigation systems were in place, and when the O'ahu Railway and Land Co. (O.R. & L.) railroad was constructed around Ka'ena Point and along the north shore to Kahuku.

By 1898, the O.R. & L railroad was constructed through the Waialua District. Soon thereafter, Dillingham began selling off or subleasing much of his lands in western Waialua. However, Dillingham retained as his personal ranch "a great strip of mountainside and beaches with flat land in between and a homestead in the middle" (Yardley 1981:206). This land would remain ranch land,

with sugar plantations located to the east and west. The Dillingham Ranch was developed into a horse ranch, including stables, pastures, equestrian areas, and a polo field, along with a large, wood-framed house for the Dillingham family (Yardley 1981:193- 194).

By 1946, Robert P. Patterson, Secretary of War of the United States, executed a "Declaration of Taking," which stated that the land of Mokule'ia, Auku'u, Kawaihāpai, Keālia, and Ka'ena, Waialua, O'ahu, Territory of Hawaii; Mokule'ia Ranch and Land Company, Limited, et al. "is taken.. .to provide for a military airfield, an ordnance storage area, and related military purposes incident thereto. The said land has been selected by me for acquisition by the United States for use in connection with such purposes, and for such other uses as may be authorized by Congress or by Executive Order, and is [r]equired for immediate use." Several of the native Hawaiian families, who had retained their small plots of land through the 19th and early 20th centuries, now lost lands through this confiscation (Alameida 1993: 113).

Modern Land Use
With the announcement of the Oahu Railway and Land Company's decision to discontinue service in 1947, the Waialua Agricultural Company began to switch to truck transportation. The change was slowly made, until the last railroad line was closed in 1952. Subsequent historic maps and aerial photographs indicate a general lack of development in the area through the 1970s. Lands in the makai (northern) portion of the project area consisted of improved pasture and ranch activity areas, including the Dillingham family residence and other smaller residences. Lands in the mauka (southern) foothills portion of the 861-acre Dillingham Ranch project area generally appeared to be unimproved pasture areas.

The lands occupied by the Crowbar Ranch, Campbell Ranch, and Dillingham Ranch were later consolidated under the control of the Mokule'ia Land Company. At present, the project area, again known as the Dillingham Ranch, is an active horse and cattle ranch. Much of the level coastal plain portion of the project area is used for equestrian stables and activity areas. The sloping foothills of the project area are used as pasture for grazing cattle. The Dillingham residence remains on the property, as well as a coconut and palm tree farm.

Archaeological Inventory Survey

According to Drolet and Shilz, 1991, an archaeological inventory survey undertaken for the Dillingham Ranch property including the area of the proposed project, found 19 archaeological sites and 41 cultural features. According to the report:

In March, April, and December of 1991, ERC Environmental and Energy Service Co., Inc. conducted an inventory survey of the coastal plains and foothills at Mokuleia (Drolet and Schilz, 1991). The study covered 897 acres and represents one of the first extensive surveys completed in the north shore area. Nineteen sites with forty-one cultural features were identified, the most numerous consisting of enclosures (13), terraces (9), stone walls (11) and platforms (3). These were found in association with stone alignments, cleared areas, and connected habitation/garden features. The sites were situated exclusively in the upland zone, clustered along flat, adjacent terraces, each bordered by a seasonal stream channel. Three principal terrace top settlement clusters were identified, all showing similar ecological placement and field constructions. The configuration of sites contained prehistoric features dong with some historic constructions consisting of stone paddocks used as ranch corrals. Two of these stone enclosures (4435 and 4437) appear to be those reported by Barrera in his 1987 survey. (Drollet and Shilz, 1991).

None of the features identified in the report were located in the vicinity of the intersection improvements as indicated in **Figure 6**, Drolet and Shilz Archaeological Site Locations (1991).

Potential Impacts and Mitigation Measures

The proposed project is located along the Farrington Highway and serves as an existing developed vehicular entry to the Dillingham Ranch. Although no archaeological sites were identified in the immediate project area, it is always possible that iwi or other cultural remains may be uncovered by earthwork or grading to construct the planned intersection improvements. Should this occur, work will be temporarily halted and the SHPD immediately notified at (808) 692-815 for further instructions. Work will only be resumed upon appropriate notification to do so by the SHPD.

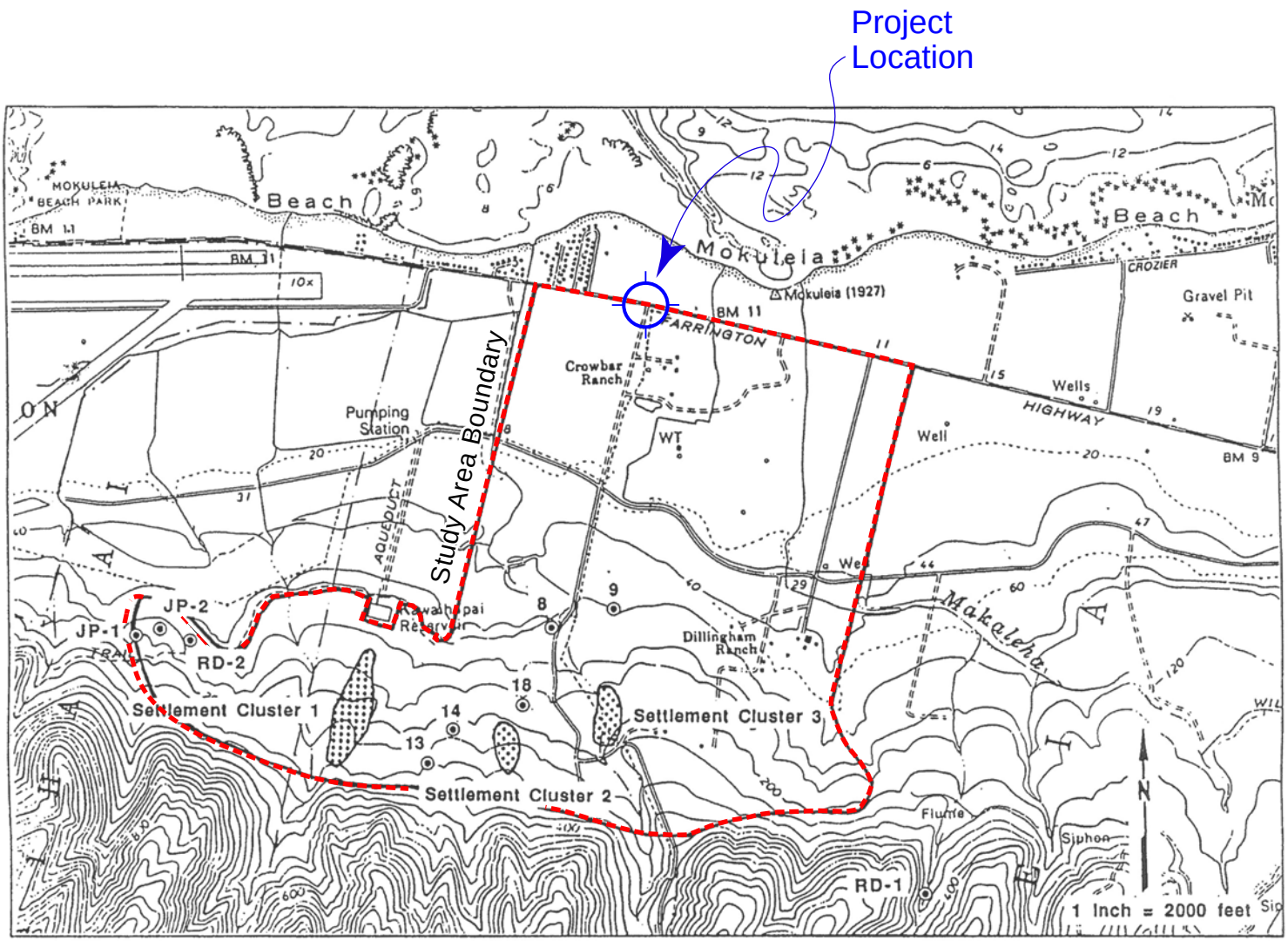
A similar precautionary approach will be applied to work activities for the planned subdivision. All work will be coordinated with the SHPD, including the temporary cessation of earthworking activities in the event that any undocumented inadvertent cultural or archaeological deposits are discovered by the construction contractor. The SHPD will be immediately notified and work may only be resumed upon proper notification to do so by the SHPD.

2.1.7 Beach Erosion and Sand Transport

The project site is located within a small portion of the Dillingham Ranch property and State DOT, Farrington Highway, right-of-way. This location is not normally subject to natural shoreline processes involving the seasonal and tidal movement of sand. Beach erosion as a result of the project is not anticipated or expected based on the project location, the limited nature of work, and preventative measures that will be taken by the contractor to ensure against erosion of soils from the project site.

2.1.8 Noise

Existing sources of noise in the project area are limited to surf, motor vehicles traveling along Farrington Highway, aircraft from the nearby Dillingham Air Field, wind from trees, and avifauna and human associated activities in the area (primarily equestrian activities and groundskeeping associated with the equestrian facilities). Most, if not all of these sources of noise are limited and do not ordinarily constitute an acoustic nuisance.



ERCE

ARCHAEOLOGICAL SITE LOCATIONS

FIGURE 2

Source: Base drawing from ERCE, 1991

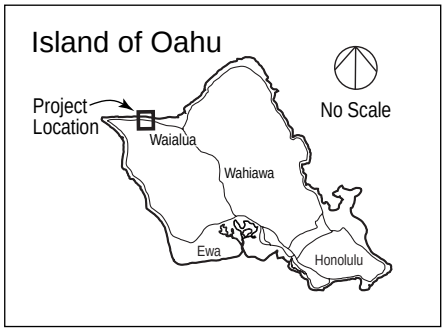


Figure 6 Drolet & Shilz
Archaeological Site Locations (1991)
Intersection Improvements
Dillingham Ranch ‘Āina, LLC

0 500 Feet 1000

R.M. TOWILL CORPORATION 2007

Potential Impacts and Mitigation Measures

Construction of the proposed project will introduce increased noise in the area immediately surrounding the project site from work crews and the operation of construction equipment. The construction equipment is expected to include, but not be limited to, a compactor, grader, bulldozer, concrete mixer and delivery trucks, and powered hand tools.

The project area is located within a rural, country setting. The closest residences and structures to the project site are identified in **Figure 7,** Proximity of Residences/Structures. According to Figure 7, the closest residences include private homes and the Mokūleʻia Beach Colony at a distance of approximately 800+ linear feet. A maintenance building for upkeep of a polo field is located across the Farrington Highway at a distance of approximately 320 linear feet as shown.

The small scope and scale of the work suggests that there is limited potential for construction related noise to adversely affect residences. Mitigative measures to minimize or reduce potential noise impacts will include construction activities to daylight working hours from about 8:00 am to 4:00 pm and inspecting all combustion powered machinery to ensure the equipment is properly muffled.

2.1.9 Air Quality

No information on air quality was collected. Construction activities are expected to have little or no impact since the project will be of limited duration and where engine exhausts may be a source of potential air pollution, all internal combustion equipment will be governed in accordance with applicable state and county regulations.

Potential Impacts and Mitigation Measures

During construction, fugitive dust may be generated which can constitute a nuisance to traffic along the Farrington Highway. Residences in the area of the project are not anticipated to be affected. The prevailing northeast trade winds should direct any fugitive dust towards the undeveloped hillsides and ravines of the Dillingham Ranch property. Should infrequent Kona winds occur, any construction related fugitive dust would be directed across the polo field or the City's undeveloped Makaleha Beach Park property.

To reduce the incidence of fugitive dust the construction contractor will regularly wet disturbed soil areas or areas that are susceptible to the generation of dust.

Source: Base photo, Google Earth, 2007. Dillingham Ranch Agricultural Subdivision overlay, R. M. Towill Corp., 2007.

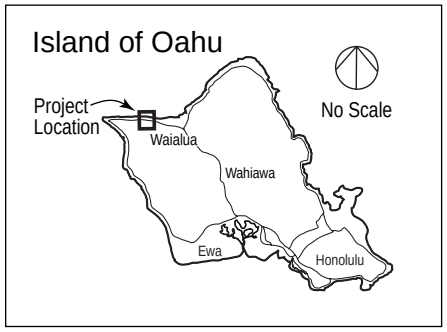


Figure 7
Proximity of Residences/Structures
Intersection Improvements
Dillingham Ranch ‘Āina, LLC

No Scale

R.M. TOWILL CORPORATION 2008

2.1.10 Flood Hazard

Federal Emergency Management Agency (FEMA), Flood Insurance Rate Map (FIRM), Map No. 15003C0085F, dated September 30, 2004, the project site is in an area designated as Zone AE (**see Figure 8,** FEMA FIRM Map). The Zone AE designation is the flood insurance rate zone that corresponds to the 1-percent annual chance floodplains that are determined in the Flood Insurance Study by detailed methods of analysis. The Base Flood Elevation determined for this zone is undetermined.

Potential Impacts and Mitigation Measures

Although the proposed facility will be located within the zone AE, it is noted that no habitable structures are proposed that would constitute an unreasonable risk to life or property. Given the traffic control nature of the project, the proposed use is considered reasonable and is not anticipated to have a significant impact on flood conditions. No further mitigation measures are planned or proposed.

2.2 Public Facilities

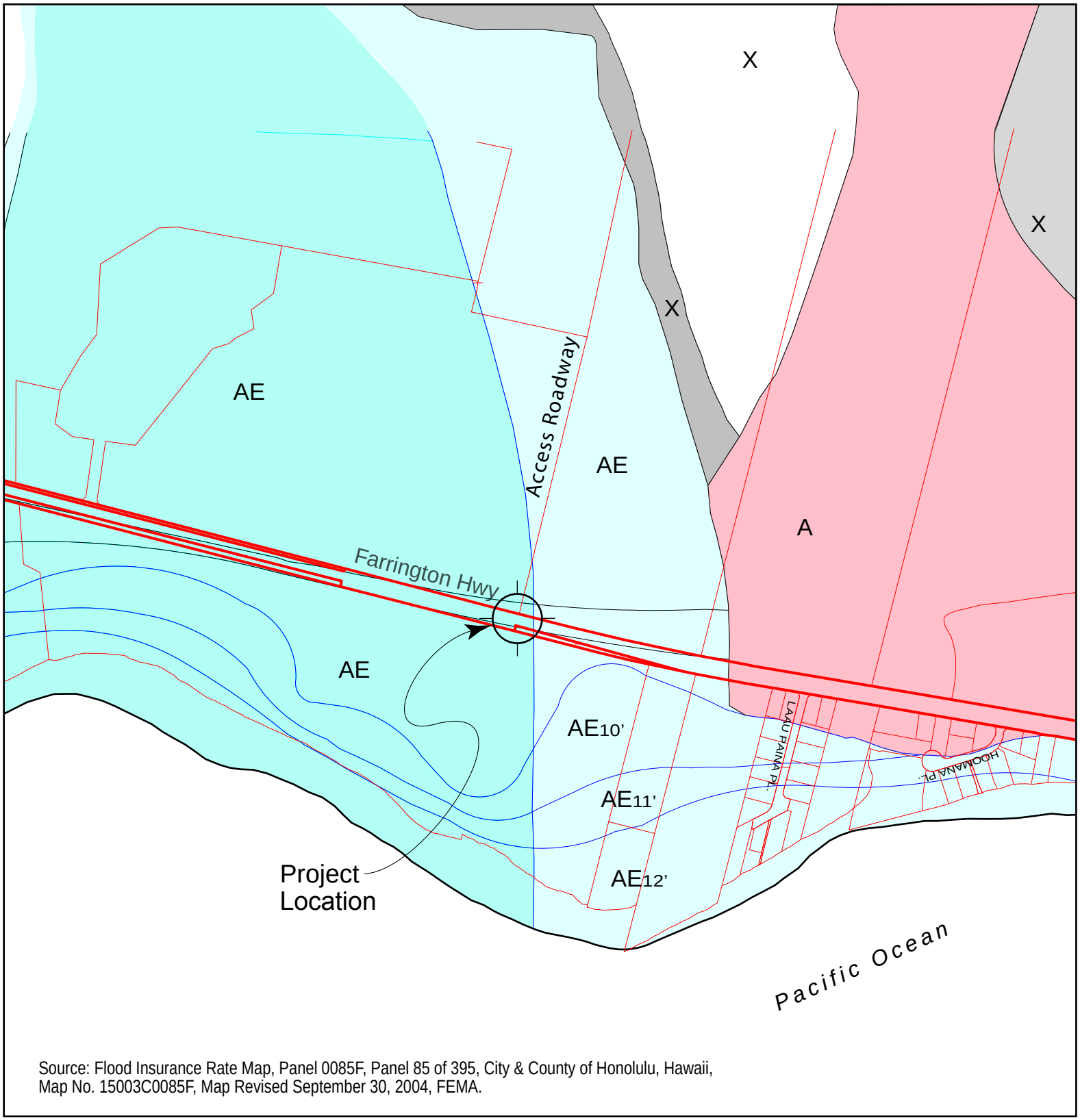
2.2.1 Access

The proposed project will not affect public shoreline access. It is located along the existing Farrington Highway and will provide for improvements to an existing point of entry to the Dillingham Ranch property.

2.2.2 Traffic and Roadways

A Traffic Assessment for the proposed Dillingham Ranch Agricultural Subdivision was completed on January 4, 2008 (Julian Ng, Inc., 2008, See **Appendix E**). The planned subdivision of about 900 acres will create approximately 77 agricultural lots requiring access to the Farrington Highway. The finding of the traffic report was that the existing roadway system would be sufficient to accommodate the anticipated increase in traffic. According to the report:

> Vehicular access to the subdivision will be provided by a dedicated project roadway that intersects Farrington Highway as the stem of a "T"-intersection. Traffic on the project roadway's northbound approach to the intersection will be controlled by a "STOP" sign. The project roadway, a two-lane roadway carrying traffic in both the northbound and southbound directions, will have a single lane on the northbound approach that will be shared by traffic making left turns and right turns onto the highway.



Source: Flood Insurance Rate Map, Panel 0085F, Panel 85 of 395, City & County of Honolulu, Hawaii, Map No. 15003C0085F, Map Revised September 30, 2004, FEMA.

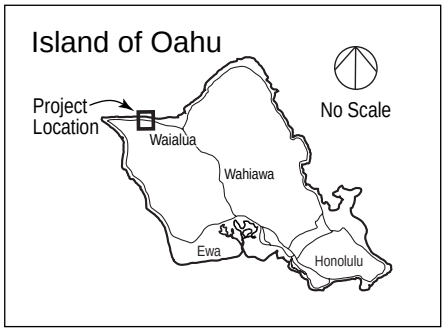


Figure 8 FEMA FIRM Map
Intersection Improvements
Dillingham Ranch ʻĀina, LLC

0 500 Feet 1000

R.M. TOWILL CORPORATION 2008

Existing Traffic Conditions

Traffic volumes on Farrington Highway are based on the latest published count data from a 48-hour traffic count taken by the State Highways Division on Farrington Highway at Kapalaau Bridge near the project site in March 2005; the daily totals and peak hour volumes from this count are shown in Table T-1.

Table T-1
Existing Traffic on Farrington Highway

	24-hour total		AM Peak Hour		PM Peak Hour	
	April 19-20, 2004	April 20-21, 2004	April 19-20, 2004	April 20-21, 2004	April 19-20, 2004	April 20-21, 2004
Westbound	1164	1099	120	73	89	76
Eastbound	1154	1177	53	67	93	91
Total	2318	2276	173	140	182	167
Peak Hour			7:15-8:15	7:30-8:30	3:45-4:45	3:00-4:00

Source: State of Hawai‘i, Department of Transportation, Highways Division, *Traffic Count Summary-Island of O‘ahu 2004*. Station C-23-D, Farrington Highway at Kapalaau Bridge.

Project Impact

The traffic impact of the proposed subdivision was evaluated for approximately 77 new agricultural lots. These lots will typically generate only small volumes of traffic during peak hours; however, in order to determine the potential traffic impact, peak hour traffic volumes generated by these lots were estimated using trip rates for suburban detached (single-family) dwellings from the Institute of Transportation Engineers[1], which assume that residents commute regularly. Table T-2 shows the estimates of peak hour traffic generation (shown to nearest 5 vehicles).

Table T-2
Traffic Generation

	Trip Rates* detached dwellings		Traffic Generated 80 dwelling units	
	Trips per dwelling	% entering	Entering site	Exiting site
Average weekday	9.57	50%	380	380
AM Peak Hour	0.75	25%	15	45
PM Peak Hour	1.01	63%	50	30
*Source: Institute of Transportation Engineers, *Trip Generation, 7th Edition.*				

[1] Institute of Transportation Engineers, *Traffic Access and Impact Studies for Site Development, A Recommended Practice, 1991*

The traffic generated by the project is well below the 100 vehicles per hour in the peak direction that has been suggested by the Institute of Transportation Engineers as the threshold for conducting a traffic impact or site access study.

With Farrington Highway terminating approximately three miles to the west near Kaena Point and no significant destinations for peak hour residential traffic located in that direction, all of the project traffic is expected to use Farrington Highway to the east.

Future Conditions at Proposed Access Intersection

Peak hour conditions at the proposed intersection of the project access road and Farrington Highway would determine if additional improvements will be needed. Future conditions at the intersection, therefore, were analyzed.

The most recent available estimates of the Average Daily Traffic (ADT) volumes on the segment of Farrington Highway between Dillingham Airfield and Puuiki Street, located in Waialua approximately 3 miles to the east of the project, are shown in Table T-3.

Table T-3
Historic Trend in Highway Traffic Volumes

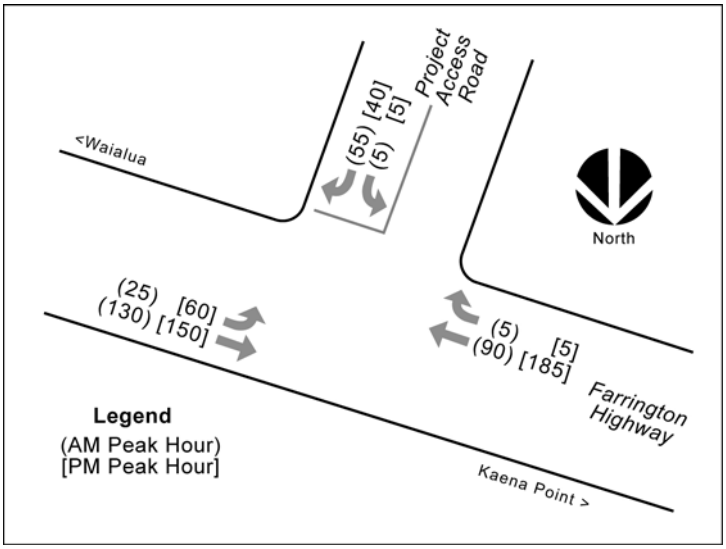
Year	Average Daily Traffic
1999	3,794
2000	3,953
2001	3,743
2002	4,053
2003	4,074

Source: State of Hawai‘i Department of Transportation Highways Division, *Traffic Summary - Island of O‘ahu, 2003*.

The average rate of increase in traffic volumes from 1999 to 2003 was 1.8% per year. At this average rate of increase, traffic volumes in the future year 2030 would be 56% higher than in 2005. Average Daily Traffic at this rate of growth would be 4,450 vehicles per day in 2008 and 6,600 vehicles per day in 2030. As a comparison, the traffic generated by the project (760 vehicles on an average weekday, from Table T-2) would be approximately 17% of the existing traffic on the highway.

Figure T-2 shows estimates of future (year 2030) peak hour traffic volumes at the intersection of the project access road with Farrington Highway. The through volumes on the highway are based on the average peak hour volumes counted at the nearby station in 2005 and the annual rate of increase discussed above. The turning volumes assumed that all of the project traffic would turn to or from the east (Waialua direction). The traffic assignments include additional turning movements to and from the east (an additional 10 vehicles per hour in each direction) to account for other traffic that may use the project access road. Additional traffic movements of 5 vehicles per hour were also added for turning movements to and from the west (Kaena Point direction).

Figure T-2
Traffic Assignments (2030)



The procedure described in the Highway Capacity Manual[2] (HCM) was used to analyze the intersection and acceptable conditions at the intersection were found, as summarized in Table T-4. The analysis estimates average delays based on traffic volumes, these delays are described by "Levels of Service" for the controlled movements at the intersection; the HCM defines the Level of Service (LOS) for unsignalized intersections as follows (Level of Service C or better is considered acceptable):

[2] Transportation Research Board, National Research Council, *Highway Capacity Manual*, Washington, D.C., 2000.

Transportation Related Levels of Service (LOS)

LOS	General Description of Delay	Average Delay (second per vehicle)
A	Little or no delay	≤ 10
B	Short traffic delays	> 10 and ≤ 15
C	Average traffic delays	> 15 and ≤ 25
D	Long traffic delays	> 25 and ≤ 35
E	Very long traffic delays	> 35 and ≤ 50
F	Very long traffic delays	> 50

Table T-4
Intersection Levels of Service (2030)

	Westbound left turns from highway		Northbound approach (shared lane, stop sign)	
	Delay	LOS	Delay	LOS
AM Peak Hour	7.5 seconds	A	9.3 seconds	A
PM Peak Hour	7.8 seconds	A	10.0 seconds	B

While left turns from the highway can be made with minimal delays, the need for a separate left turn lane on the highway was also evaluated. The "green book" design manual published by the American Association of State Highway and Transportation Officials (AASHTO) provides a table showing conditions under which a separate left turn lane should be considered on two-lane highways. The AASHTO table is used to determine the advancing volume at which a separate turning lane should be considered. As shown in Table T-5, the estimates of the advancing volume (from Figure T-2) are less than the volumes at which a separate left turn lane should be considered.

Table T-5
Traffic Characteristics for Consideration of a Separate Left Turn Lane

	AM Peak Hour	PM Peak Hour
Proportion left turns (from Figure 2)	16%	29%
Opposing volume (from Figure 2)	95	190
Advancing volume (from Figure 2)	155	210
Advancing volume at which separate turn lane should be considered, for an operating speed of 50 miles per hour (interpolated)*	380	275
Consider separate left turn lane?	not necessary	not necessary

* Based on Exhibit 9-75 of *A Policy on Geometric Design of Highways and Streets,* from American Association of State Highway and Transportation Officials, Washington, D.C.

A simple connection to the highway with a stop sign controlling the side street will adequately serve future traffic volumes at the intersection. A separate left turn lane on the highway will not be needed.

Conclusions and Recommendations

The proposed subdivision is not expected to have a significant impact to traffic conditions on Farrington Highway. The estimated peak hour volumes at the intersection of the project access road and the highway do not meet the guidelines for consideration of adding a separate left turn lane.

The intersection should be designed with adequate sight distance for drivers at the stop sign on the side street. The intersection should be clearly visible for drivers on the highway; if necessary, warning signs should be considered to improve driver awareness of the new intersection.

Potential Impacts and Mitigation Measures

The proposed project is not expected to significantly alter the existing volume of traffic along Farrington Highway. However, construction-related work, including delivery of building supplies, and construction vehicles may temporarily affect traffic flow. These effects are expected to be short-term and will be experienced only during construction of the project. Construction activity is planned during the daytime hours with no night work anticipated to be required.

As required, adequate sight distance for drivers will be provided at the stop sign and along Farrington Highway. Warning signs will also be evaluated for use to improve driver awareness of the new intersection.

2.2.3 Police, Fire and Ambulance Service

The project site is readily accessible for police and fire service based on its location along Farrington Highway. Police services are provided for the area from the Wahiawa Police Station. Fire protection is provided by the Waialua Fire Station No. 14, located in Haleʻiwa. If additional fire fighting service

is required, the Sunset Beach Fire Station No. 11, would be called on to respond. Ambulance service is provided by the City & County of Honolulu facilities at the Waialua and Wahiawa Fire Stations.

Potential Impacts and Mitigation Measures

The proposed project in itself is not expected to generate any new demand for police, fire or ambulance service. During construction, however, these services may be temporarily required but are not expected to result in the requirement for new personnel or construction of new police, fire or ambulance facilities.

No impacts and no mitigation measures are proposed.

2.3 Additional Information Concerning the Potential for Secondary Impacts Associated with the Dillingham Ranch Agricultural Subdivision

This section provides additional information and references to studies, reports and correspondence prepared for the subdivision. Further discussion is provided regarding the potential for secondary impacts as a result of the proposed project involving the T-intersection improvement and its relationship to the planned agricultural subdivision.

2.3.1 Agricultural Feasibility Report

Background

In November 2007, an Agricultural Feasibility Report was prepared to support the processing of an application for the consolidation and resubdivision of the Dillingham Ranch property (Development Strategies, LLC, November 2007). The following is a brief summary of the major items of the Report (**Appendix F**).

The report focused on the creation of an approximately 77 lot subdivision within an agricultural community and provides information on the agricultural activities of the Dillingham Ranch and the plan for its sustainable future.

DRA acquired the 2,722 acre property in 2006, and intends to restore the existing infrastructure and make other improvements to maintain the Ranch in active cattle production and other agricultural activities consistent with the character of the Mokūleʻia -Waialua area. A major part of the effort will

involve restoration of the Dillingham House, a historically significant structure located on the premises.

The North Shore Water Company, wholly owned by DRA, operates two active wells on the property and delivers potable and non-potable water to sustain the day-to-day operation of the Ranch. In addition, as a quasi-public utility, the North Shore Water Company provides domestic water to 120 customers in the adjacent community of Mokūleʻia located to the west of the Ranch. The provision of domestic water is an essential public service based on the termination of the Board of Water Supply system approximately a half mile in the Waialua direction (east) of the bulk water meter that provides domestic water to other customers of the region. The North Shore Water Company anticipates that it will continue to provide domestic water service to the Mokūleʻia community for the foreseeable future.

Agricultural Subdivision Concept

The Dillingham Ranch Agricultural Subdivision concept is based on the consolidation and resubdivision of 12 of the 13 existing parcels of the property to create 77, five acre lots, 6 bulk lots ranging in size from 32 acres to 116 acres in The Flats, and an additional large bulk parcel comprising 1,484 acres of The Mauka Lands (collectively known as the "Ranch Lots") (see page 9, Figure 4, of the report).

Agricultural Plan

The Agriculture Plan for the working ranch is intended to restore the Ranch to an efficient, self-sustaining operation. The Plan supports this by focusing on improvements to the existing core activities of the Ranch, making more productive use of the property and enhancing the quality of the products and services provided to the various market segments, rather than attempting to launch new and unfamiliar ventures. This strategy capitalizes on the existing expertise of the Ranch personnel, but redirects the focus to maximizing efficiency and accessing new, untapped markets for existing goods and services:

Cattle

Revenue from the propagation of cattle is marginal and needs to be improved. A modest increase in the size of the herd, along with an upgrade of the stock for the natural food

market, is contemplated over the next 3 to 4 years, given the strong demand for range fed beef.

Part of the strategy calls for calves to be kept until they are 8 months old and weigh about 400 pounds. Heifers and steers of this size appeal to both local ranches and mainland operations that service natural food retailers like Whole Foods.

The quality of an open pasture is highly dependent on soil conditions, amount and seasonality of rainfall, micro-climate of the area, type of pasture grass and the topography. Future grazing activities would utilize a gross area of about 1,900 acres. The projected size of the expanded herd would be approximately 220 cows and 15 bulls. In addition to making productive use of the land, the grazing of cattle would also reduce the unchecked growth of vegetation, mitigating the potential for wild fires like those the plagued the Waialua-Mokūleʻia area in 2007.

Coordination of cattle ranching operations in tandem with development of the infrastructure to service the Subdivided Lots will be essential, as the source of drinking water for the cattle will be provided from common water lines. Extension of water lines beyond the perimeter of the agricultural community will be handled by the ranch crew, with backflow prevention devices installed to ensure that the domestic water system is not contaminated.

In addition to the water lines, approximately 30,000 linear feet of cattle fencing will be installed to replace dilapidated fencing. The fencing would be installed incrementally, as the size of the herd is increased.

While it is anticipated that the dollar return is nominal, the grazing of cattle will retain The Mauka Lands in open space, preserve scenic vistas of the Waiʻanae Mountains, reduce the potential for wild fires and maintain the area in valuable watershed.

Tree Farm

The propagation of new coconut trees to replace sold field stock and to meet contracts is anticipated to expand the tree farm by roughly 25%. Expansion of the tree farm by 15 to 20 acres would be into the adjacent underutilized portion of The Flats which are presently subject to occasional flooding by storm water from Makaleha Stream. However, the

expansion area is located in the flood fringe, where the back-up of storm water comes from the parcel across the highway that was conveyed to the City & County of Honolulu ("City") for a future park site in 2000.

To mitigate these occasional impacts, DRA has taken the lead and is presently clearing overgrown vegetation in the site of the future park. In addition to vegetation, accumulated silt and debris from an area that is supposed to function as a retention basin is also being removed. This work is being done in conjunction with the City's Department of Parks & Recreation and Department of Facilities Maintenance which have issued the necessary permits to DRA. With this clean-up completed, storm water will be able to flow freely under the bridges on Farrington Highway, into the retention basin and eventually out to the ocean. This will minimize the times that the expansion area for the tree farm is subject to inundation.

With the initial expansion of the tree farm, seedlings will be planted. The future inventory from the expansion area will enable the stock in the existing tree farm to be depleted so that seedlings can eventually be planted with the required on center spacing.

In addition to adequate spacing, drip irrigation will be utilized to improve the growth rate of seedlings. The objective is to quickly grow the trees to the 15' to 25' height that is highly marketable. Properly spaced, trees can be efficiently watered by drip irrigation for an average of 400 to 500 gallons per acre/day.

Drip irrigation significantly lowers water loss during application, minimizes labor costs and has the advantage of limiting the growth of weeds as water is delivered directly to the root ball. The installation of a drip irrigation system in the expansion area would involve nominal expense, as a water distribution line presently runs across area. Flexible drip irrigation lines are easy to handle and relatively inexpensive. The cost for additional extension of distribution lines and drip irrigation tubing is estimated to be $35,000.

Additional access to the landscape community would be provided through membership in the Landscape Industry Council of Hawaii ("LICH"). Another good resource is the Hawaii Chapter of the American Society of Landscape Architects. Both of these organizations

provide access to an effective network to landscape contractors and landscape design professionals on Oahu.

Boarding and Equestrian Activities

DRA will shortly initiate a program to completely replace the fencing for the existing paddocks and pasture area. The reconfiguration will create more paddocks with a uniform 70' by 120' size, which is an industry standard.

Up to date pasture management practices will be employed to increase the growth of pasture grass and Giant Bermuda will be introduced incrementally to achieve a better yield per acre of forage. The combination of the foregoing activities is anticipated to enable the Ranch to maintain the equivalent number of horses stabled within the reconfigured and upgraded paddocks and fenced pasture areas with increased efficiency.

A new fenced, multi-horse pasture will be created on the Kaena (west) side of the main entry road into Dillingham Ranch. The new pasture area will be implemented once the combined leach field for the agricultural community has been installed (underground piping). The pasture will not be irrigated and is intended to only be used as part of a systematic rotation designed to provide a chance for the smaller paddocks to regenerate. At this time, there are no plans for this to become an expansion area for the boarding of horses.

At some point in the future, a polo field may be constructed on a portion of the new fenced pasture area. At most, the polo field would be a seasonal use of the pasture area, possibly on a concession or licensed basis to an independent operator. The grassed pasture/polo field will not affect the leach filed or alter the intermittent flow of runoff from the areas inland.

As the clean-up of the future City park area is completed to mitigate the occasional inundation of The Flats, an additional fenced, multi-horse pasture may be an option for the most flood prone area of the Ranch, just inland of the frontage along Farrington Highway. The additional multi-horse pasture will be used for the rotation of horses to enhance regeneration of the individual paddocks and as an alternate pasture site during the polo season. This area is not intended to become a permanent pasture for the boarding of horses and will not be irrigated.

As part of the upgrades to the Ranch, the office and related buildings at the Equestrian Center will be renovated. The existing training facilities will also be upgraded to provide more areas for simultaneous multi-horse activities. To facilitate the foregoing, new fencing will be erected to create separate areas for specialized training, such as dressage.

Two new improvements planned for the area of the Equestrian Center are a feed barn, to replace the present use of a tent, and a *horspital* to permit certain treatments to be performed on-site. The *horspital* will enable sick or injured animals to be isolated while they are being treated. The *horspital* will also contain a small office for use by veterinarians and a separate room where minor procedures can be done on site. These facilities will significantly improve the services offered as part of the boarding operation to further differentiate Dillingham Ranch from other stables.

In total, improvements to the paddocks, pasture areas and the Equestrian Center will amount to about $1,897,500, with all of the upgrades to be in place in 2008. Additional improvements to the on-site water system are anticipated to cost $575,000, with other upgrades and improvements to be done to the makai area at a cost of $617,000.

Other Activities

Income from the sale of coconuts, horse shows and Pony Club events is anticipated to remain steady. With the development of the agricultural community, an additional source of revenue for the working ranch will come from the provision of pasture management services to the individual owners of the Subdivided Lots. While still in an embryonic stage, pasture management is contemplated to encompass monitoring the health of the pasture grass, maintenance of the irrigation system, cycling of the areas to be irrigated and tending to the livestock (including a feeding program), particularly when the owner cannot be present. The fees for these services have not been established at this stage.

Revenue from commercial filming, photo shoots and special events at the Dillingham House will drop in the near term while the facility is being restored.

In addition, restoration of the Dillingham House and the grounds will enable DRA to actively market the Ranch to the Japanese wedding market, solely for wedding ceremonies.

Due to the high cost of weddings in Japan, Hawai'i has become an attractive destination for young couples to come for their exchange vows.

The restoration work required for the historically significant Dillingham House will be extensive, with costs anticipated to reach $2,119,000. Renovations necessary for the kitchen area to handle special events (catered), such as receptions, is projected to cost an additional $778,000. Earlier in 2007, the old cesspool was upgraded to a state-of-the-art aerobic treatment system and leach field meeting the requirements of the State Department of Health at a cost of $250,000. The new treatment system has been sized to accommodate the larger occasional special events planned to be held at the restored Dillingham House.

The Agricultural Community

The agricultural community is an integral part of the Agriculture Plan, as the capital infusion required to refurbish and upgrade existing infrastructure systems and fund other improvements for the working ranch will be recovered from the sale of the Subdivided Lots. The in-place income received by a landowner for the long-term commitment of land to agricultural activities is modest and alone does not support the up-front commitment of the funds necessary to restructure the working ranch.

The creation of an agricultural community, the "80 Five Acre Lots" noted in the prior Agricultural Feasibility Study, is a critical component of the Agriculture Plan contained herein (Note: the updated Preliminary Map has a total of 77 Subdivided Lots). The sale of the Subdivided Lots is the mechanism by which DRA will recover its significant, upfront expenditure of capital for the improvements necessary to reposition the working ranch and in turn contribute to increased future revenues from all current income sources (as well as association dues for those amenities shared by the individual members of the agricultural community).

The Subdivided Lots that comprise the agricultural community will be ranching oriented. This is in keeping with the long history of Dillingham Ranch in the Mokūle'ia community, which has always been in cattle and horses, not in the cultivation of sugarcane or other farming activities. Ranching, the grazing of cattle, pasturing of horses and livestock propagation, is a bone fide agricultural activity. Pursuant to the provisions of Chapter 205, Hawaii Revised Statutes ("HRS"), the property

will be subject to recorded covenants requiring that the Subdivided Lots be used for agricultural activities.

Development of the agricultural community will be a major undertaking. The costs associated with the provision of roadway access and related off-site and on-site infrastructure improvements to support the Subdivided Lots are high due to the distance from the highway, topography, and the limited utility service available in this rural area. In compliance with the Subdivision Rules & Regulations, all infrastructure improvements will be designed and constructed to City standards.

Conclusion

Dillingham Ranch has suffered a prolonged period of decline since the height of the plantation era of the early 1900s. The lack of reinvestment in the Ranch by a series of prior owners has left the working ranch operating on seriously deteriorated infrastructure where years of neglect are evident.

The acquisition of the property by DRA is based on recognition of the unique opportunity to reposition the Ranch as the heart of the Mokūleʻia community. While part of this effort will repair and upgrade the physical infrastructure and other facilities of the property, the larger task involves the restructuring of the "working ranch" to ensure its long-term viability.

In addition to a significant investment in the facilities at the Ranch, the Agriculture Plan is premised on a revamping of the core activities of the working ranch, rather than attempting to launch new and unfamiliar ventures. The focus maximizes the value of existing expertise and is directed at achieving more efficient day-to-day operations, enhancing the quality of the goods and services offered by the Ranch and tapping into new and expanded markets for existing products.

Implementation of the Agriculture Plan will require a significant up-front expenditure of capital by DRA. Such outlays cannot be recovered by the existing operations of the working ranch – cattle, trees, boarding and special events. This is the reason the subdivision and sale of five acre agricultural lots within an agricultural community on the Ranch is an integral component of the Agriculture Plan. This is the critical element that will generate the capital necessary to make implementation of the Plan a reality.

The core activities of the working ranch are in compliance with the provisions of Section 205.45, HRS, and the City's Land Use Ordinance (LUO), both of which regulate uses and activities on agricultural land. The creation of managed pasture, orchards or other crops on the five acre Subdivided Lots has been covered in a previous Agricultural Feasibility Report prepared for DRA.

Based on the foregoing, the proposed consolidation/resubdivision action to create the Ranch Lots and the Grazing Lot for the working ranch and the 77 Subdivided Lots in the agricultural community forms the foundation for generating the capital necessary to reposition the Dillingham Ranch for the future.

Potential for Secondary Impacts

The proposed agricultural plan and subdivision will constitute the continuation of agricultural uses that will be substantively similar to ranching activities that were once practiced by the original owners of the property dating to the 1900s. The potential for adverse secondary impacts associated with the continued agricultural use of property and the proposed T-intersection to support access to the property are not anticipated. As required, all continued activities involving upgrades to the infrastructure and facilities of the Dillingham Ranch and subdivision will be in accordance with state and county laws and regulations.

2.3.2 Rockfall Potential Evaluation

Background

In February 2008, a Rockfall Potential and Hillside Slope Evaluation Report was prepared to evaluate the potential for rockfall exposure associated with the Dillingham Ranch Agricultural Subdivision (Geolabs, Inc., February 15, 2008). This report superseded an earlier version of the report dated August 13, 2007, to address comments from the DPP concerning the need for sufficient protection of the lots planned for the Dillingham Ranch Agricultural Subdivision. The following summarizes the major report findings including comments from the DPP (**Appendix G**).

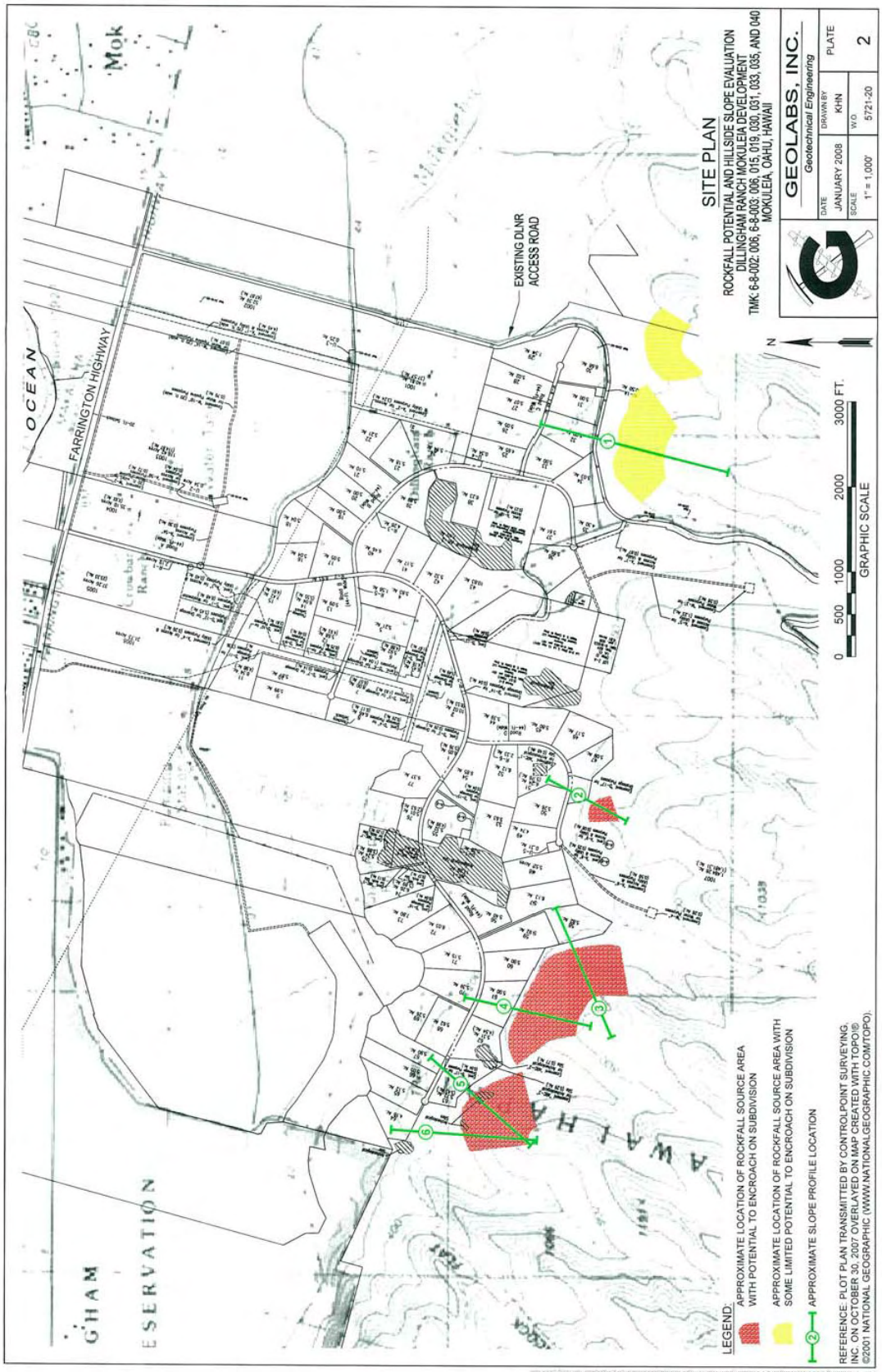
The purpose of the report was to conduct geological reconnaissance and evaluation of the existing hillslope conditions to develop a generalized data set to analyze and formulate a preliminary rockfall hazard assessment including rockfall hazard mitigation measures. The report provided for the following tasks (Geolabs, Inc., 2008):

1. Research and review available development plans and in-house (Geolabs, Inc.) soils and geological information, including aerial photographs from the project site and vicinity.
2. Perform a geological reconnaissance (visual observations) of the project site to evaluate the existing hillslope conditions and surface exposures of rock outcroppings and boulders by Geolabs, Inc., geologists.
3. Engineering analyses of the field data, including the performance of preliminary potential rockfall simulation modeling using the computer-based Colorado Rockfall Simulation Program (CRSP) to develop a statistical basis for the rockfall hazard assessment.
4. Prepare a letter report presenting preliminary findings and recommendations.
5. Coordinate all work on the project with the project geologist.
6. Provide quality assurance of the overall work on the project and the client/design team consultation with the Geolabs, Inc., principal engineer.
7. Miscellaneous work effort involving administration of the project.

Existing Potential Rockfall Conditions

Based on the site reconnaissance and evaluation, 9 proposed lots (identified as Lot Nos. 47 and 58 through 65) appear to have a moderate to high risk for potential rockfall encroachment from adjacent high mountain slopes outside of the development boundary. These higher risk lots are along and adjacent to the southern development boundary at the western and central portions of the site as shown on the Site Plan, Plate 2 (refer to report for detailed graphic). The 9 lots reside along alternating ridge and valley topography associated with the Waianae Range. In general, the areas of potential rockfall hazard are fronting the ridgeline nose and side slopes of the mountain ridges. (Geolabs, Inc., 2008).

5 lots (identified as Lot Nos. 30, 31, 32, 34, and 35) appear to have a low risk for potential rockfall encroachment from adjacent mountain slopes outside of the development boundary. The 5 lots reside along the flatter terrain of the lower elevation flanking mountain slopes. These lower risk lots are along the southern development boundary at the eastern end of the project site downslope and adjacent to the existing Department of Land and Natural Resources (DLNR) access road, as shown on the Site Plan, Plate 2. (Geolabs, Inc., 2008).



Source: Rockfall Potential and Hillside Slope Evaluation, Dillingham Ranch Mokuleia Development, Geolabs, Inc., 2008.
Notes: See Report in Appendix G for additional detail.

The report indicated that other proposed lots below the adjacent mountain slopes (including Lot Nos. 46, 48 through 50, and 57) is not anticipated to be affected by rockfall encroachment because of the following observed conditions (Geolabs, Inc., 2008):

1. The limited source of upslope boulders and rock outcroppings;
2. The lots are at a greater distance from the observed potential rockfall source areas;
3. Gentle hill slopes provide natural buffering terrain; and,
4. Some existing natural topographic barriers such as ravines.

A large volume of widely scattered boulders in generally stable ground surface settings were observed throughout the project site interior. The boulders represent old alluvial and colluvial deposits from the early erosion and geological evolution of the Wai‘anae Range. It is believed that the old boulder deposits within the subdivision development have a low potential for producing hazardous rockfall conditions due to the gently sloping and generally stable depositional terrain. Boulders are expected to be encountered during the grading and development of the individual lots. The individual lot owners should therefore be advised to obtain the services of a competent geotechnical engineer to evaluate existing boulder deposits within their lots for potential instability and possible rockfall hazard mitigation. (Geolabs, Inc., 2008).

Based on the Geolabs, Inc., observations, some broad trends in the rockfall hazard potential and level of rockfall hazard risk with respect to the lots along the southern development boundary were identified. In general, the potential for rockfall activity to encroach upon the development increases from east to west across the southern development boundary. This is based on the following (Geolabs, Inc., 2008):

1. Upslope mountain ridges (rockfall source region) gradually steepen toward the west.
2. Foothill pediment slopes (probable rockfall run-out region encompassed by the lots) gradually steepen towards the west.
3. The distribution and relief of source rock outcrops increases toward the west.
4. The distribution of existing non-embedded surface boulders increases toward the west.

The existing ground surfaces within the lots along the upslope development boundary are composed of mixed soils containing an appreciable volume of basaltic cobbles and boulders. Surface boulders ranging between 3 and 12 feet in dimension were observed in generally stable ground settings within the lots. The larger surface boulders were generally encountered at the upper elevations of the western end of the project site. Most of the surface boulders encountered are partly embedded and are believed to be erosional remnants of old regional colluvial fan deposits that had accumulated a very long time ago. However, the distribution of non-embedded surface boulders (potentially more recent fallen rock) appears to increase toward the southwestern corner of the project site, in the vicinity of Lot Nos. 58 through 63. The greater distribution of existing surface boulders towards the southwestern corner of the development (vicinity of Lot Nos. 58 through 63) appears to correlate with the observed increased occurrence of upslope rock outcroppings consisting of higher relief, fractured rock. (Geolabs, Inc., 2008).

Existing Slope and Drainage Conditions

A number of existing well-established drainage ravines emanate from the large inland valleys. These substantial drainage ravines transect from south to north through the proposed development. The incised ravines provide near-surface exposures of the colluvial/alluvial fan deposits including scoured exposure of localized basalt rock formation in some upslope locations. The normally dry drainage ravines are believed to transmit appreciable runoff derived from the interior mountains during periods of high rainfall. As a result, the ravines should be considered as potential flash-flood conduits and future building sites should be set back at appropriate distances from the established channels. Hydrologic study should be performed as a basis for the designation of the infrastructure set backs from the drainage ravines. (Geolabs, Inc., 2008).

Overt visible signs of active, large-scale ground instability were not revealed within the project site. Because the drainage ravines incise the colluvial/alluvial fan deposits composed of unconsolidated and semi-consolidated hard cobbles and boulders, the existing ravine slopes appear to be naturally armored by the rocky and semi-consolidated deposits. However, some erosion and raveling of the natural stream banks composed of soils and rocky deposits should be anticipated; therefore, appropriate setback restrictions for future structures, roadways, and other improvements should be established by the project geotechnical engineer. (Geolabs, Inc., 2008).

Geological evidence related to the occurrence of other natural hazards such as recent debris flow and landslide activity was not encountered. Historic documentation or records of past occurrences of these natural hazards at the project site was not revealed. (Geolabs, Inc., 2008).

Discussion and Recommendation

Site reconnaissance and literature review was performed to assist in the evaluation of the existing project site conditions with respect to natural hazards such as rockfall potential, hill slope stability, and debris flowflash flood potential. In addition to the reconnaissance and literature review, computer simulation and statistical analysis was performed of potential rockfall activity using CRSP (CRSP) Version 4. (Geolabs, Inc., 2008).

Based on the evaluation of the existing project site conditions with respect to potential natural hazards such as rockfall, slope instability, and debris flow, it was the opinion of Geolabs, Inc., that the site is suitable for residential subdivision development and is feasible from a geotechnical point-of-view provided that the recommendations are implemented. Once the final grading plans for the project are available and have been reviewed, Geolabs, Inc., will render an opinion addressing the stability of slopes in the post-development condition. (Geolabs, Inc., 2008).

Rockfall Simulation Analysis

The CRSP is a computer program that is a widely accepted engineering tool used to estimate potential rockfall behavior by simulating probable rockfall activity based on input parameters that are assigned on a site-specific basis. Information obtained from the CRSP analysis includes the predicted falling rock velocity, bouncing height, kinetic energy, and roll-out distance. The output information is useful to assist in the site-specific design of various rockfall mitigation schemes such as rockfall impact barriers or other rockfall containment systems. (Geolabs, Inc., 2008).

Six selected hill slope model profiles identified as Slope Profiles 1 through 6 were developed for the CRSP analysis. The approximate locations of the six slope profiles used in our analysis are shown on the Site Plan, Plate 2. (Geolabs, Inc., 2008).

The CRSP analysis was performed using spherical shaped boulders (conservative rolling scenario) ranging in size from 2 to 8 feet in dimension rolling from the source area(s) identified during the field reconnaissance. For each simulation run, 1,000 source rocks were utilized to develop a statistical distribution of the results. (Geolabs, Inc., 2008).

The rockfall protection criterion is defined as the probable interception and catchment of 90 percent of possible rockfall hazards assessed by the computer rockfall simulation analysis (CRSP). The 90 percent catchment criteria is a target that is commonly used in engineering practice for evaluation criteria that can be quantified by a statistical and probability analysis using model data for natural occurrences such as rockfall activity. Since the analyses are based on statistics and probability, a 100 percent criterion is impractical to achieve. (Geolabs, Inc., 2008).

Based on the analysis (Geolabs, Inc., 2008):

- Rockfall encroachment at Lot Nos. 30 through 35 is anticipated to be limited and of low risk due to the existing gently sloping terrain adjacent to the development and the presence of the existing DLNR access road between the observed potential rockfall source area and the subdivision lots. Less than 2 percent of the simulated rockfall could encroach beyond the DLNR roadway corridor upslope of the development.

- No rockfall encroachment at Lot Nos. 46, 48 through 50, and 57 is anticipated.

- At Lot No. 47, the western half of the lot is exposed to potential rockfall hazards from the north and east facing slopes of the hillside bordering the lot. Approximately 50 to 85 percent of the simulated rockfall could encroach into the western side of Lot No. 47.

- For Lot Nos. 58 through 65, the lots are exposed to potential rockfall hazards from the adjacent northerly facing mountain slopes. Approximately 25 to 100 percent of simulated rockfall could encroach upon the lots, depending on the location along the mountain slopes.

Conceptual Rockfall Mitigation System

Nine (9) lots (Lot Nos. 47, and 58 through 65) were identified as exposed to moderate to high levels of risk for potential rockfall encroachment. For these 9 lots, Geolabs, Inc., recommends the construction of an appropriate rockfall containment system such as a rockfall impact barrier fence on the hillside above the affected lots to reduce the potential for rockfall encroachment. (Geolabs, Inc., 2008).

Five (5) other lots are believed to have some limited exposure to potential rockfall hazards from the hill slopes outside of the subdivision boundary. The 5 low risk lots include Lot Nos. 30, 31, 32, 34, and 35. For these 5 lots the recommendation is to construct an appropriate rockfall containment system such as a low capacity rockfall impact barrier fence or chain link fencing adjacent to and above the existing DLNR roadway corridor to minimize the potential for rockfall encroachment. (Geolabs, Inc., 2008).

The proposed rockfall containment system would consist of specialized rockfall impact barrier fences and associated graded access trails within land owned by DRA above the subdivision lots. The construction of graded access trails along the higher capacity rockfall impact barrier alignments was also recommended to facilitate the heavy barrier construction and the future maintenance of the barriers, which will traverse rough and irregular terrain containing many existing large boulders. At the eastern end of the development above Lot Nos. 30 through 35, the recommendation is to construct a low capacity rockfall impact barrier fence (or chain link fencing where appropriate) on the upslope side of the existing DLNR access road. Because of the existing access provided by the DLNR roadway, a graded access trail along the fence alignment may not be necessary if construction access to the site could be granted via the existing paved DLNR roadway. (Geolabs, Inc., 2008).

Rockfall Impact Barrier

Rockfall impact barriers are used worldwide as an effective rockfall mitigation and protection system. Rockfall impact barriers are commonly constructed on hillsides where the protection of down slope areas from varied and widespread sources of falling rock is necessary. Rockfall impact barriers are considered to be a viable rockfall protection measure where a specific and limited source of potential rockfall cannot be readily identified and stabilized, or

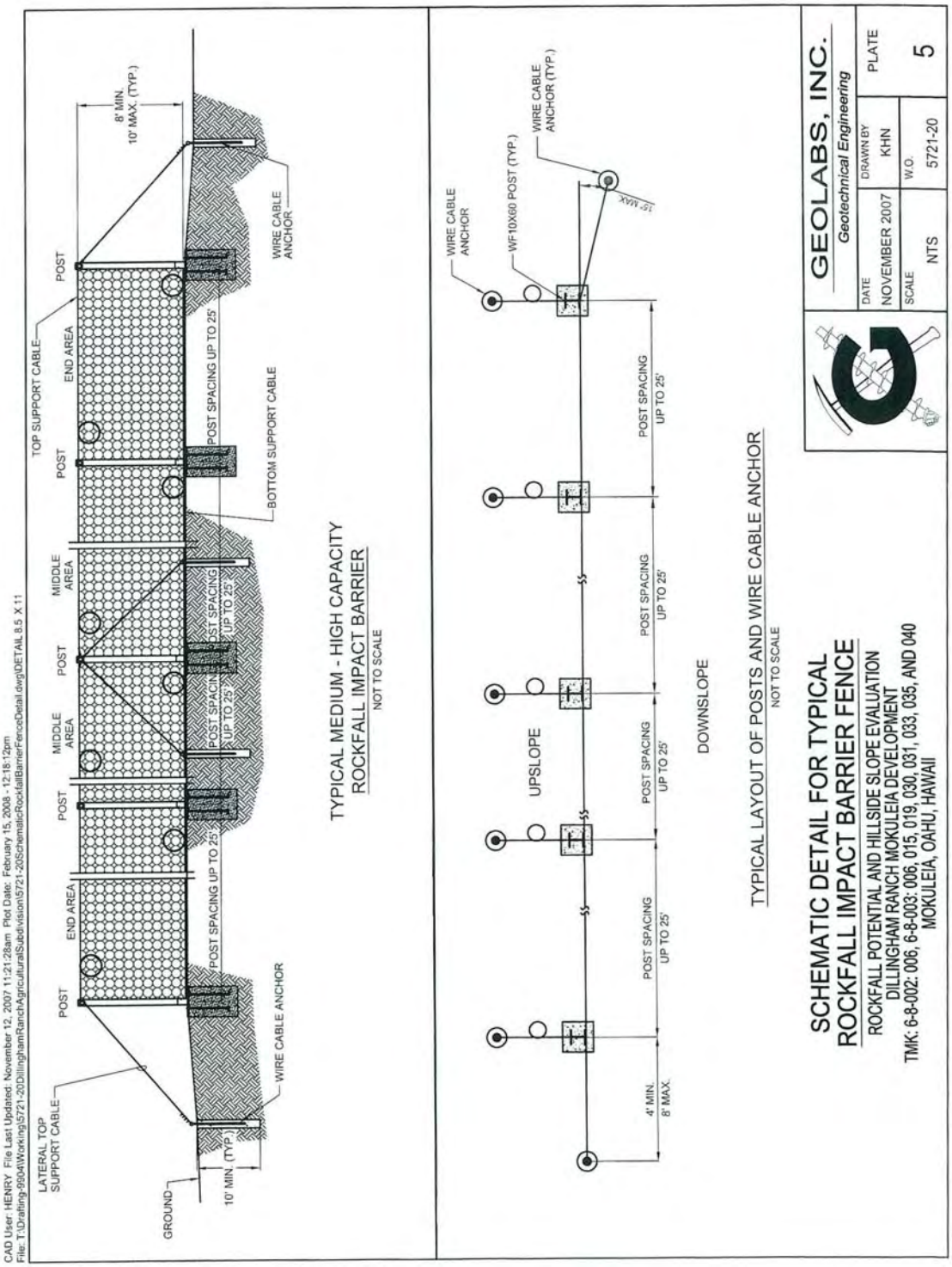
where the source area may encompass disturbance-sensitive land that makes other mitigation measures impractical to implement. (Geolabs, Inc., 2008).

Rockfall impact barriers are specially designed fences consisting of steel support beams linked by wire rope (cable) or steel wire ring nets, which are designed to flex and absorb rockfall impact energy. Rockfall barrier fences require periodic inspection and possible future maintenance to remove accumulated boulder debris and replace worn components. Portions of the barrier may require repair or replacement following a very large impact where severe deformation of the system is experienced. Ultimately, the rockfall barrier will require replacement of components affected by natural environmental degradation such as corrosion. (Geolabs, Inc., 2008).

The roughly estimated effective life of the steel barrier system in the Mokuleia near coastal environment would be approximately 30 to 40 years, at which time replacement of components such as nets, ground anchors and support beams may be required to maintain the desired level of protection. Stainless steel components and special surface coatings are available to increase resistance to corrosion but at a significant extra cost. A schematic of a typical medium-high capacity rockfall impact barrier is presented on Plate 5 (refer to report for detailed graphic). (Geolabs, Inc., 2008).

Rockfall Protection at Lot No. 47

A rockfall impact barrier is recommended to protect the western side of Lot No. 47 and a short segment of the subdivision Road "D" fronting the nose of a mountain ridge. The southern and western lot lines at Lot No. 47 are proposed based on a recent visual assessment of the area to allow for the provision of a rockfall impact barrier on suitable terrain upslope of the lot boundary. A ground topographic survey will be conducted in the project design phase to verify the constructability of a rockfall barrier at the desired location above Lot No. 47 and the subdivision roadway. (Geolabs, Inc., 2008).



Source: Rockfall Potential and Hillside Slope Evaluation, Dillingham Ranch Mokuleia Development, Geolabs, Inc., 2008.
Notes: See Report in Appendix G for additional detail.

If suitable terrain for an effective rockfall barrier cannot be identified by the topographic survey along the western side of Lot No. 47, the lot may be further reduced in size to accommodate an appropriate rockfall barrier to protect Lot No. 47 and the adjacent subdivision roadway. In the unlikely event that Lot No. 47 is eliminated from the development plan, the portion of the proposed rockfall impact barrier for Lot No. 47 could be reduced in length and replaced with a section of rockfall impact barrier along a limited segment of the proposed Road "D."

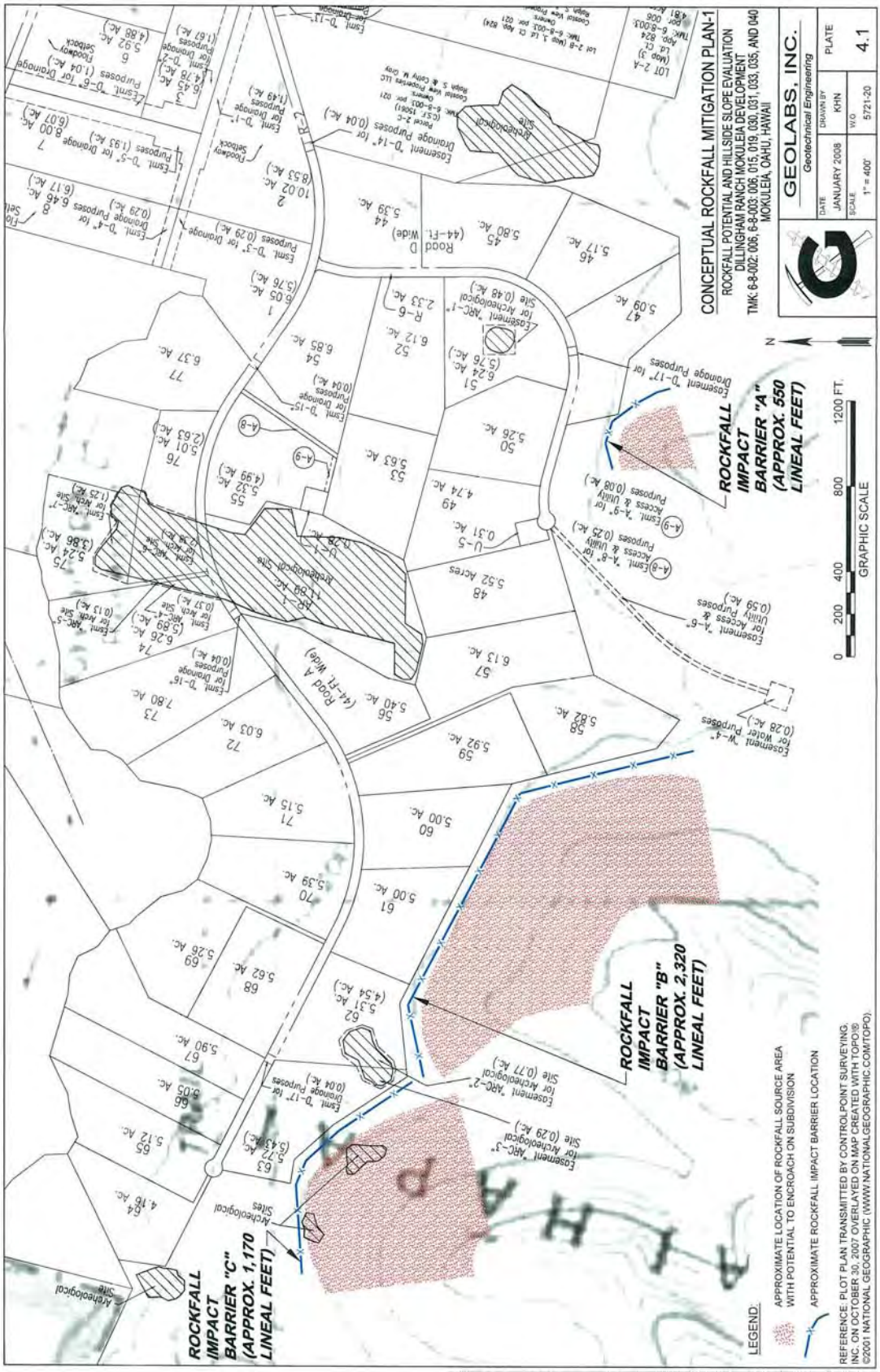
Based on the preliminary CRSP analysis, an 8 to 10-foot high rockfall impact barrier is estimated to be approximately 550 lineal feet in length with a capacity of about 100 to 150 foot-tons. The approximate location of Rockfall Impact Barrier "A" at Lot No. 47 and the adjacent subdivision roadway is shown on the Conceptual Rockfall Mitigation Plan 1, Plate 4.1 (refer to report for detailed graphic). (Geolabs, Inc., 2008).

To facilitate the construction and future maintenance of the rockfall impact barrier fence, a graded access trail should be constructed along the barrier alignment. A conceptual typical section for the rockfall barrier and access trail construction is presented on Plate 6 (refer to report for detailed graphic). (Geolabs, Inc., 2008).

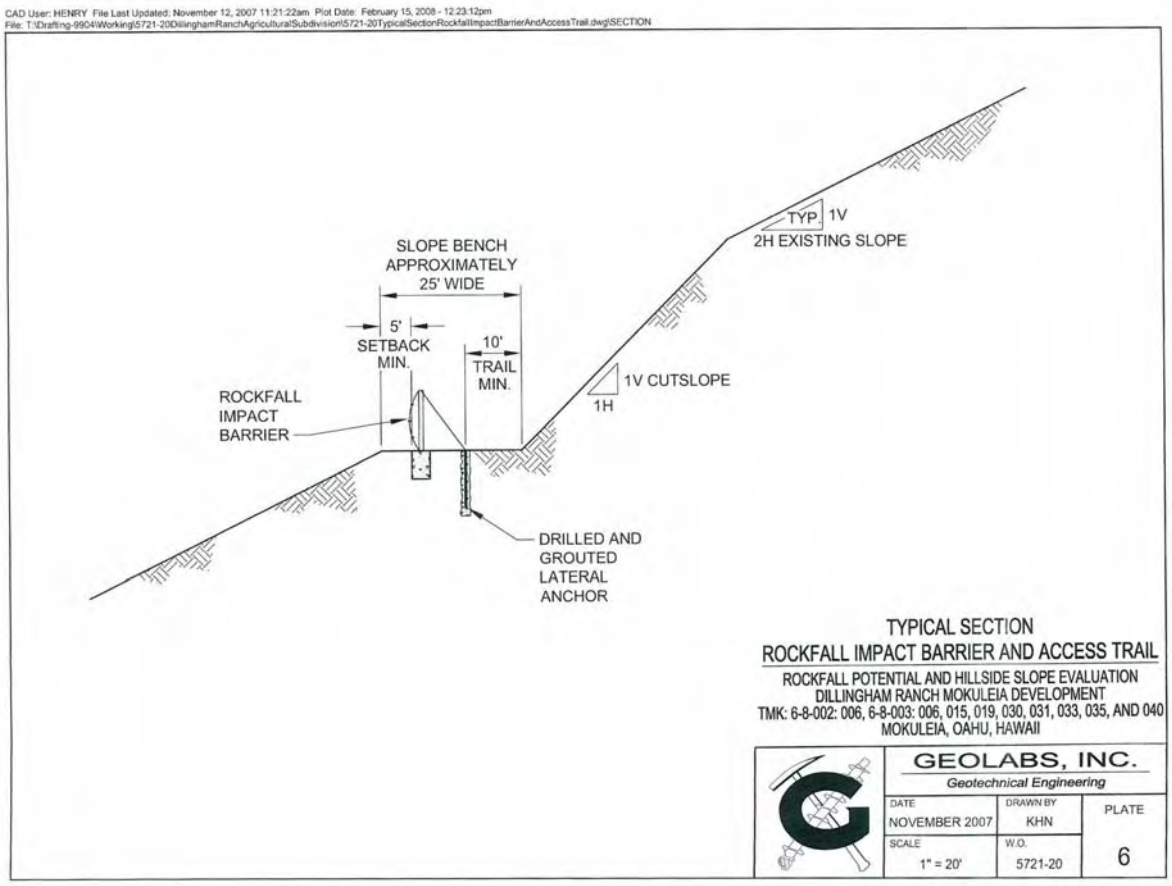
Rockfall Protection at Lot Nos. 58 through 65

A rockfall impact barrier is recommended to protect the lots from potential rockfall encroachment from the adjacent high mountain slopes. The approximate and preliminary location of the rockfall barrier was identified by field reconnaissance. A ground topographic survey will be conducted along the barrier alignment in the project design phase to assist in the design of the improvements.

The rockfall impact barrier above Lot Nos. 58 through 65 could consist of two segments of barrier fencing with a break provided for the existing drainage gulch in the vicinity of Lot Nos. 62 and 63. The approximate location of Rockfall Impact Barriers "B" and "C" for Lot Nos. 58 through 65 is shown on the Conceptual Rockfall Mitigation Plan 1, Plate 4.1.



Source: Rockfall Potential and Hillside Slope Evaluation, Dillingham Ranch Mokuleia Development, Geolabs, Inc., 2008.
Notes: See Report in Appendix G for additional detail.



Source:
Rockfall Potential and Hillslope Evaluation, Dillingham Ranch Mokuleia Development, Geolabs, Inc. 2008.
Notes:
See Report in Appendix F for additional detail.

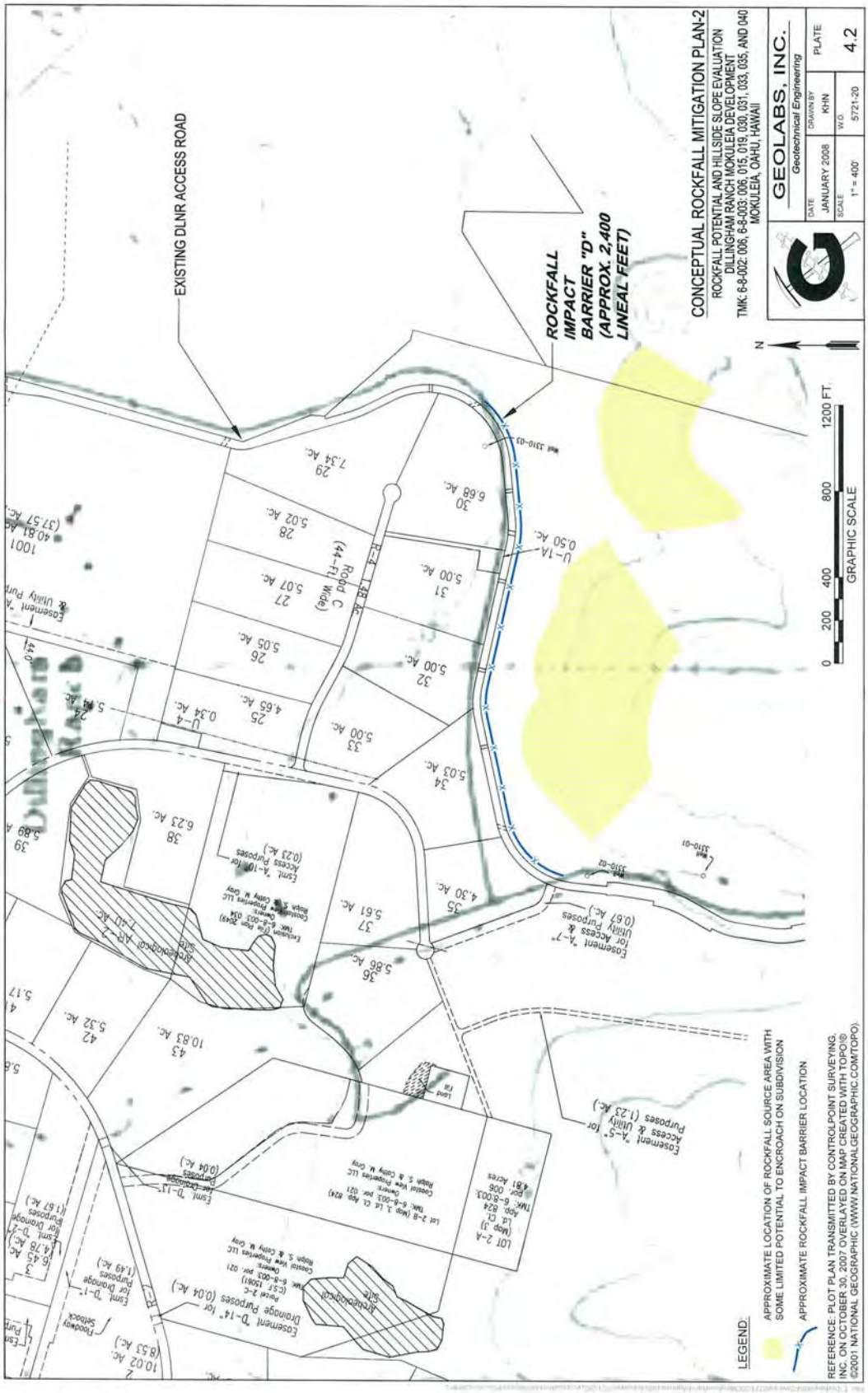
Based on the preliminary CRSP analyses, an approximately 8 to 10-foot high Rockfall Impact Barrier "B" and "C" would be an estimated 3,490 lineal feet in length with a capacity of about 200 to 250 foot-tons. To facilitate the construction and future maintenance of the rockfall impact barrier fence, a graded access trail should be constructed along the barrier alignment. A conceptual typical section for the rockfall barrier and access trail construction is presented on Plate 6.

Rockfall Protection at Lot Nos. 30, 31, 32, 34, and 35

Geolabs, Inc., previously recommended "Dwelling Location Restrictions" for these lots due to the relatively low risk and large lot sizes. However, the current development concept does not include "Dwelling Location Restrictions".

Based on evaluation of the existing site conditions in the vicinity of Lot Nos. 30 through 35 and the existing DLNR roadway, a low capacity rockfall impact barrier (or chain link fencing at appropriate non-critical locations) is recommended to reduce the risk for potential rockfall encroachment at the lots. Based on the preliminary design concept, the fence could be constructed approximately 10 to 20 feet upslope from the existing DLNR road Right-of-way within land owned by DRA. A ground topographic survey should be conducted in the project design phase to verify the constructability of the fencing at the desired location. Some clearing of existing boulders along the fence alignment may be necessary to facilitate the construction of the barrier structure.

Based on the preliminary CRSP analysis, the recommended 6 to 8-foot high rockfall impact barrier would be approximately 2,400 lineal feet in length with a capacity of about 30 foot-tons or less. The approximate location of Rockfall Impact Barrier "D" for Lot Nos. 30 through 35 and the adjacent DLNR roadway is shown on the Conceptual Rockfall Mitigation Plan 2, Plate 4.2 (refer to report for detailed graphic). (Geolabs, Inc., 2008).



Source: Rockfall Potential and Hillside Slope Evaluation, Dillingham Ranch Mokuleia Development, Geolabs, Inc., 2008.
Notes: See Report in Appendix G for additional detail.

According to the report, the recommended rockfall hazard mitigation scheme should significantly reduce the potential for dangerous rockfall activity to affect downslope development at the proposed DRA project site. While there are no guarantees in the professional engineering and architectural design fields with respect to potential rockfall hazards, the construction of rockfall impact barriers as described in the conceptual-level context of the report should provide a high level of safety against rockfall hazard based on past applications of similar mitigation methods.

Potential Drainage and Debris Flow Hazards

A number of large natural drainage ravines emanating from the upland valleys transect the proposed development. The ravines are capable of transmitting appreciable runoff through the development, especially during widespread storm runoff conditions. A rapid increase in stream flow during storm conditions (flash-flood conditions) should be anticipated in the normally dry drainage channels. The stream flow hydrology should be assessed by a qualified engineering consultant to address possible safety setback requirements for development adjacent to the stream channels.

No record or documentation of previous debris flow activity at the project site is known; however, the potential for transmission of debris flow materials within the larger valley draining stream channels is considered to be a possibility due to the well-developed character of the primary drainage ravines and extensive area of the upslope off-site drainage basins. Field evidence of past debris flow activity resulting from slope instability occurring within the project limits and adjacent to the upslope development boundary were not encountered.

Phase II Rockfall Mitigation Design

According to Geolabs, Inc., the recommended rockfall mitigation plan offers a comprehensive and cost effective mitigation scheme to provide a high level of rockfall protection for development downslope of the rockfall protection improvements shown on the Conceptual Rockfall Mitigation Plans 1 and 2, Plates 4.1 and 4.2.

Following the acceptance of the conceptual rockfall mitigation plan by the owner, the design of the rockfall mitigation improvements may proceed. A topographic ground survey should be performed at the locations surrounding the probable barrier construction sites to obtain detailed topographic information necessary for design and construction. Additional rockfall simulation using the CRSP

should be performed to obtain more detailed information for the design of the rockfall impact barriers. Design of the grading for the rockfall impact barrier access trails along the barrier alignments should be performed by the project civil engineer with input provided by Geolabs, Inc.

Response to Rockfall Potential and Hillside Slope Evaluation Report

On February 29, 2008, the DPP responding to the contents of the report identified the following conditions (*italicized* for convenience) for the approval of the subdivision (**Appendix A**):

> *Condition 1*
> *Submittal of a "Final" Geotechnical Engineering Exploration Report and Phase II Rockfall Potential and Hillside Slope Evaluation Report. These reports shall be submitted concurrently with the grading and construction plans (Refer to Item 3).*
>
> Comment: DRA acknowledges and will comply with this requirement.
>
> *Condition 2*
> *The owner of Lot 1007 shall be responsible for inspecting, maintaining, repairing and removing accumulated talus debris along Rockfall Impact Barriers "A, "B" and "C" as shown on Plate 4.1 of the subject report. In addition, Dillingham Ranch 'Āina LLC, the owner of TMK: 6-8-003: 005, shall be responsible for inspecting, maintaining, repairing and removing accumulated talus debris along Rockfall Impact Barrier "D" as shown on Plate 4.2 of the report.*
>
> *These conditions shall be incorporated into restrictive covenants running with the land. Draft covenants shall be submitted concurrently with the grading and construction plans (Refer to Item 3) for review and approval.*
>
> Comment: DRA acknowledges and will comply with this requirement. Furthermore, these conditions will be incorporated into the restrictive covenants and a draft of the covenants will be submitted by DRA with the grading and construction plans to the DPP for review and approval.
>
> *Condition 3*
> *Submittal and approval of grading and construction plans in accordance with Section 6-601 of the Subdivision Rules and Regulations. The plans shall incorporate and be in general conformance to the recommendations of the reports mentioned under Item 1. If the subdivision application is granted tentative approval, then submit these plans, one copy each of the reports mentioned under Item 1 and a copy of the draft restrictive covenants to the Subdivision Branch for processing.*
>
> Comment: DRA acknowledges and will comply with this requirement in accordance with Section 6-601, Subdivision Rules and Regulations, relating to Construction Plans. Furthermore, upon granting of the tentative approval for subdivision the following will be

submitted to the DPP: (1) the grading and construction plans; (2) the restrictive covenants; and (3) the "Final" Geotechnical Engineering Exploration Report and Phase II Rockfall Potential and Hillside Slope Evaluation Report.

Condition 4
Upon completion of the mitigation work, submittal of a final assessment report (FAR) prepared by a licensed geotechnical engineer, in accordance with Section 14-5.1(n)(2) [SIC, reference should be 14-15.1(n)(2)] of the Revised Ordinances of Honolulu (ROH). The FAR shall contain verification that the mitigation improvements were constructed in accordance with the approved plans.

Comment: DRA acknowledges and will comply with this requirement stipulating the submittal of a Final Assessment Report (FAR) in accordance with Section 14-15.1 (n)(2), which states:

Article 15. Grading, Grubbing and Stockpiling; Section 14-15.1 Conditions of permit; "(n) Report After Grading. (1) When grading involves cuts or fills for which an engineer's soils report was required, the permittee shall submit a final report, prepared by an engineer, upon the completion of such work. This report shall contain: (A) A description of materials used in the fill and its moisture content at the time of compaction, the procedure used in depositing and compacting the fill, the preparation of original ground surface before making the fill, but not limited to benching and subsurface drainage, and a plan or tabulation showing the general location and elevation of compaction tests made in the fill together with a tabulation of relative compaction densities obtained at each location, the location of subdrains and other pertinent features of the fill necessary for its stability. (B) A certification that the work was done in conformity to this chapter, the approved plans and specifications and the engineer's soils report."

The close of the response letter notes: *"Since future development of the proposed lots would require further geotechnical investigation and consultation by a licensed, geotechnical engineer, you shall be responsible for disclosing this to future property owners."*

Comment: DRA acknowledges that future development of the proposed lots may require additional geotechnical investigation and consultation by the purchasers of the lots. Future prospective purchasers of the lots will be provided with this notification as an item of full disclosure.

Potential for Secondary Impacts

The potential for rockfall hazards exists within a portion of the planned subdivision. In order to address this potential a rockfall hazard investigation and revised update were prepared identifying mitigation measures and practices to reduce or eliminate the potential for significant adverse impacts to property and human life. While the proposed T-intersection is designed to support access to the planned subdivision, it does not in itself constitute or create the conditions for secondary impacts relating to rockfall hazards. In as much as the potential for rockfall hazards are a known and existing concern, it has been sufficiently and appropriately addressed to maintain the safety and security of the site. No adverse impacts, including secondary impacts associated with the proposed T-intersection, are anticipated.

2.3.3 Waste Water Systems

Background

Treatment of wastewater from the planned Dillingham Ranch agricultural subdivision will be addressed with the use of Individual Wastewater Systems (IWS) in accordance with the Agricultural District farm dwelling provisions of the City & County of Honolulu Land Use Ordinance.

Department of Health Review of IWS System for Dillingham Ranch

On March 9, 2007, Best Industries USA, on behalf of DRA submitted an application to the DOH, Wastewater Branch, for installation of an Individual Wastewater System (IWS) to handle wastewater flows from the approximately 77 lot agricultural subdivision (**Appendix H**). An important purpose for the submittal of the IWS application was to support DRA's filing of the application for subdivision that was under review by governmental agencies.

The proposed IWS system is designed to provide sufficient wastewater treatment for the planned agricultural subdivision based on the following design criteria:

- The wastewater treatment is based on a unit flow of 1,000 gallons per day (gpd) from each dwelling (each containing a maximum of 5-bedrooms).
- The IWS selection is based on a total of 80 units (lots) with a maximum flow of 1,000 gpd per unit.
- The disposal system design involves use of a centralized absorption bed located

below the "No Pass" underground injection control line as required by the DOH.

The IWS system is based on:

Percolation Rate: 12 minutes/inch

Required Absorption Area per Unit:

(175 square feet (sf)/200 gpd) x 1,000 gpd/unit = 875 sf/unit

Required Absorption Area of Centralized Disposal System:

875 sf/unit x 80 units = 70,000 sf = 1.61 acres

Absorption Bed Dimensions = 250 feet x 400 feet

Available Absorption Area = 250 feet x 400 feet = 100,000 sf = 2.3 acres

Required Land Area for Subdivision =

(10,000 sf/IWS unit) x (80 IWS units) = 800,000 sf

Available Land Area of Subdivision = 433.9 acres or 18,900,684 sf

Department of Health Response to IWS Application

On February 25, 2008, the DOH responded to the proposed subdivision, concurring with the planned use of the IWS system (see **Appendix A** for a copy of the DOH letter). DOH noted that their concurrence would be contingent on each of the lots subject to deed restrictions requiring the installation of the IWS; that the DOH would not sign off on any building permits until the deed restrictions are properly recorded; and that the DOH reserves the right to review the detailed wastewater plans (construction documents) for conformance with Hawai‘i Administrative Rules (HAR), Chapter 11-62, Wastewater Systems, and other applicable requirements.

Potential for Secondary Impacts

The potential for adverse environmental effects due to wastewater treatment of the planned subdivision are not anticipated. The application for use of the IWS system has been approved in principle by the DOH through the granting of the subdivision contingent on the completion of the conditions as noted above. DRA will commit to fulfilling these conditions and ensuring that appropriate notifications to prospective lot owners are made.

While the proposed T-intersection is designed to support access to the planned subdivision, the potential for secondary impacts as a result of providing wastewater treatment to the planned subdivision will be addressed through compliance with the requirements of HAR, Chapter 11-62.

Potential for adverse effects from improper wastewater treatment will be sufficiently addressed and no adverse impacts, including secondary impacts associated with the proposed T-intersection, are anticipated.

2.3.4 Water System

Background

The North Shore Water Company (NSWC), a quasi-public entity owned by DRA, provides water for all private users west of the DRA property. Water service by the Honolulu Board of Water Supply (BWS) is not possible because the end of the existing BWS water main is located along the Farrington Highway near the eastern boundary of the DRA property. In order to provide water service to the planned agricultural subdivision and other private users it is necessary to upgrade the existing NSWC water system identified as Public Water System (PWS) No. 326.

On January 17, 2008, the Preliminary Water System Report for the Dillingham Ranch Agricultural Subdivision was completed and submitted to the DOH to evaluate the water system requirements for the planned agricultural subdivision and other water system users served by the DRA (**Appendix I**). The report provided water system upgrade recommendations for PWS No. 326, and included the following analyses: (1) calculation of sizes required for the private water system mains; (2) calculation of the requirements for water reservoirs; and (3) identification of the water sources needed to support the planned subdivision. (RMTC, 2008).

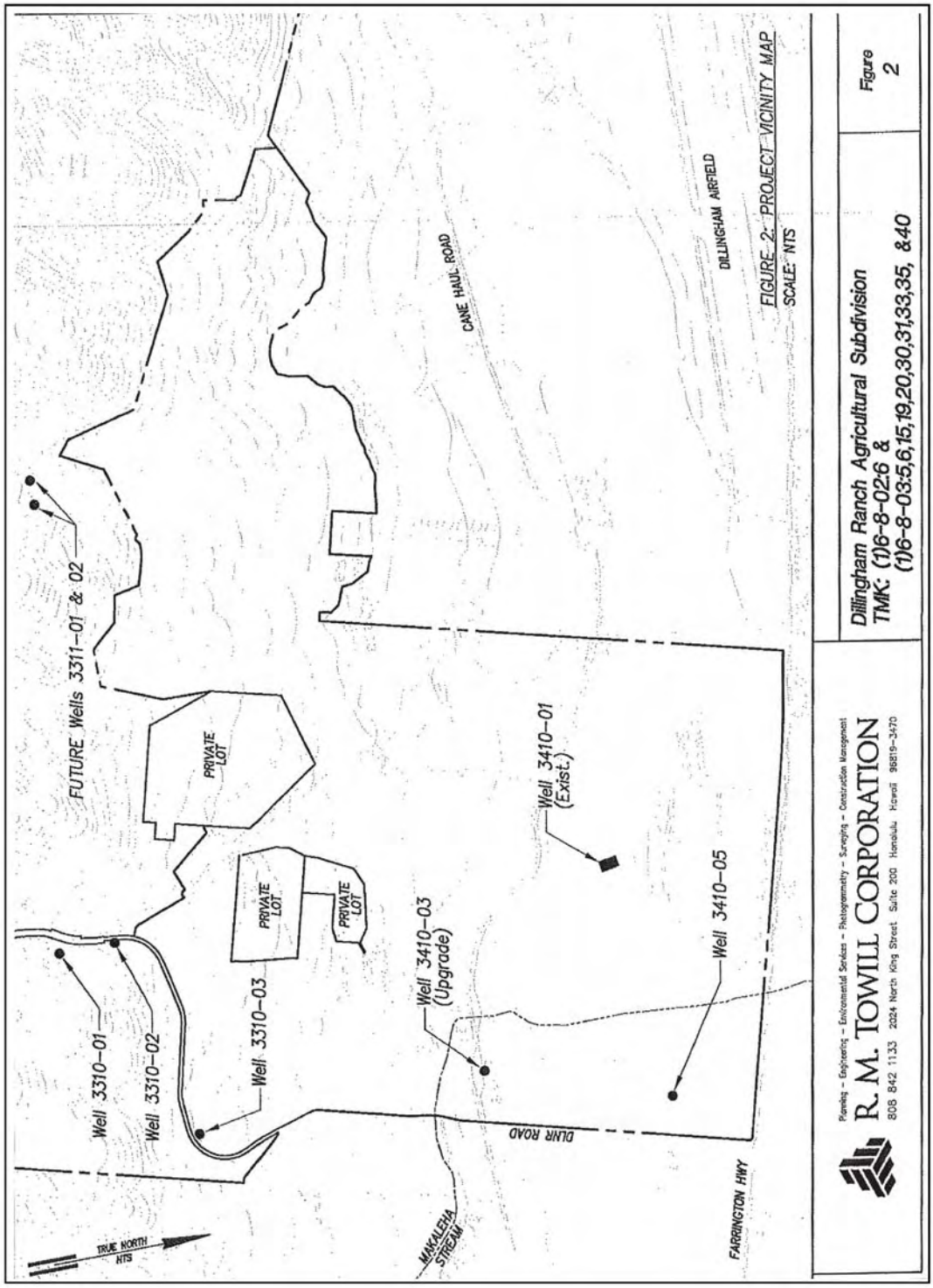
The following is a summary of the report findings and recommendations.

Existing Water Infrastructure

Well No. 341 0-01

Well No, 3410-01 is an existing water source that will be upgraded. The well was drilled sometime prior to 1911 and is located 1,800 feet mauka of the Farrington Highway. Records state the well has a 6-inch casing which extends to a depth of 388 feet below sea level, with 25 feet of open hole to a depth of 417 feet below sea level. The well had a reported head of 18.2 feet when it was first developed. Figure 2 of the report identifies the locations of the wells. (RMTC, 2008).

See Figure 2, Well Location Map, for the location of wells as provided in the report.



Source: Preliminary Water System Report, Dillingham Ranch Agricultural Subdivision, Mokuleia, Oahu, Hawaii, R. M. Towill Corporation 2008.
Notes: See Report in Appendix I for additional detail.

This well has 4 pumps; two 3 horsepower (hp), one 7.5 hp, and one 15 hp pump. Pump testing resulted in normal operation at 400 gallons per minute (gpm) at 50 pounds per square inch (psi). The existing piping is a current limitation and the well pumps and piping will be upgraded to increase pumping capacity. (RMTC, 2008).

The water use permit for this well allows for a drawdown of up to 0.5 million gallons per day (mgd) for domestic, livestock, and irrigation use (approved 9/11/81 and transferred to Metropolitan Mortgage and Securities Co., Inc. on 2/10/03). (RMTC, 2008).

Well No. 3410-03

Well No. 3410-03 will be an additional source of supply for the expansion of PWS No. 326. The construction of this well occurred sometime after Well 3410-01, although the exact date is unknown. The well has 398 feet of 10-inch casing and 105 feet of open hole below the casing. The depth of the well is 498 feet, with its bottom at 468 feet below sea level. (RMTC, 2008).

The semi-confined groundwater tapped by this well has a piezometric head of about 17 feet above sea level and very low salinity. Pump testing in August 2007 resulted in less than three feet of drawdown at 800 gpm. Authorized use of the well by the Commission on Water Resource Management is 1.5 mg (Water Use Permit No. 779 issued in September 1981). The well pump was installed in August 2007. (RMTC, 2008).

Design Criteria for Upgrade of PWS No. 326

The design criteria for the upgraded water system is based on the Water Supply Standards (for Oʻahu), State of Hawaiʻi, 2002 (WSS). The design criteria generally follows the WSS with the following augmentation (RMTC, 2008):

1. Pipeline Sizing Basis. The average daily demand of 500 gallons per unit (Residential) in addition to 1,145 gallons per acre for irrigation will be applied to each lot. The average daily demand of 5,080 gallons per lot, instead of 4,000 gallons per acre (Agricultural zoning), is assumed to irrigate a 4-acre lot and provide residential usage.

2. Pipeline Sizing Basis: The maximum daily demand of 750 gallons per unit (Residential multiplied by max demand factor of 1.5) in addition to 2,085 gallons per acre for maximum irrigation will be applied to each lot. The maximum daily demand of 9,090 gallons per lot is assumed to irrigate a 4-acre lot and provide residential usage. The maximum irrigation rate of 2,085 gallons per acre is also applied to peak hour demand scenarios.

3. The well pump capacity has an operating time of 24 hours instead of 16 hours.

Design Analysis

PWS No. 326, served by existing Well No. 3410-01, will be upgraded to create two service zones within the subdivision site. Currently, the existing water system serves 56 existing meters (120 residence units) along Farrington Highway. These users include the Mokuleia Beach Colony's 52 condominium units, and Camp Mokuleia. (RMTC, 2008).

During the interim period Well No. 3410-01 and Well No. 3410-03 will initially serve the proposed subdivision, the Dillingham Ranch House, and other users along Farrington Highway. An application to convert Well No. 3410-03 to a potable well is being filed with the State DOH by DRA. (RMTC, 2008).

The existing users of PWS No. 326 and 52 lots of the proposed subdivision will receive water from the lower zone served by a reservoir with a 310-foot elevation spillway. The upper zone will serve 25 lots of the subdivision with a reservoir with a 500-foot elevation spillway. In total, the water system will serve all 77 lots of the agricultural subdivision. The sizing of the reservoirs is summarized in the following (RMTC, 2008):

	Flowrates for Design		
	Average Day (gpd)	Max Day (gpd)	Fire Flow (gpm)
Upper Zone			
500-Foot Elevation Reservoir Demand*	12,500	18,750	1,000
Lower Zone			
310-Foot Elevation Reservoir Demand**	118,000	177,000	2,000

*New water system users

**Existing and new water system users

Ultimately, the subdivision will be served by future potable Well No. 3311-01 and Well No. 3311-02 located next to the 500-ft spillway elevation reservoir. Until this occurs, existing Well Nos. 3410-01 and 3410-03 (with upgraded pumps) will meet the required demand. Together these wells will need to meet the maximum daily domestic demand along with the maximum irrigation requirement for a 24 hour period. (RMTC, 2008).

Future potable Well No. 3311-01 and Well No. 3311-02 will each be outfitted with pumps capable of providing the maximum daily demand in a 16 hour period. Combined, these wells will provide the maximum daily demand along with the maximum irrigation requirement in a 24 hour period. (RMTC, 2008).

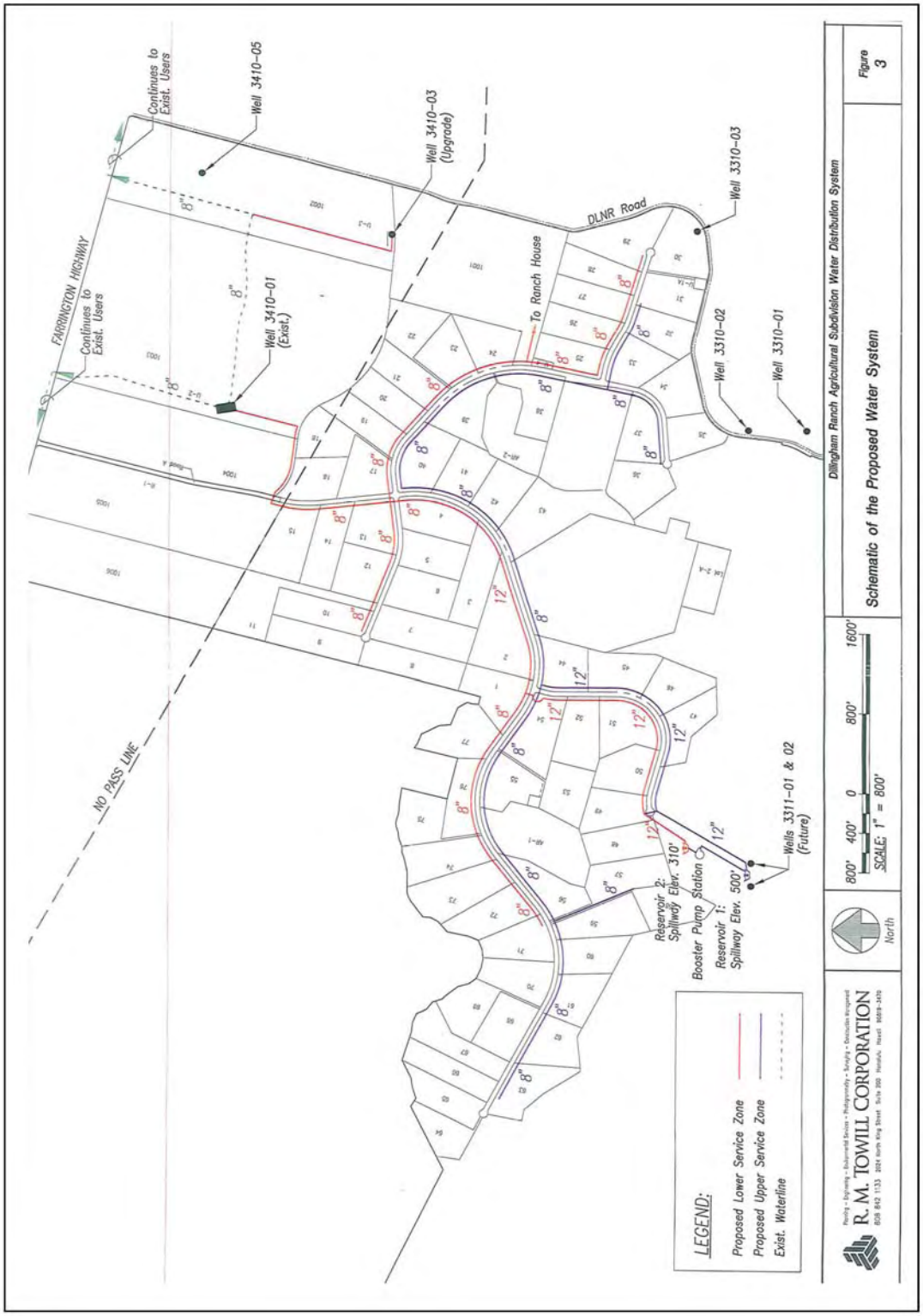
Analysis and design of the water system for this report were completed using a water distribution modeling software system, WaterCAD by Haestad Methods, Inc. This program allows the designer to develop a hydraulic model of a pressurized pipe system and was used for this report to perform the following analyses (RMTC, 2008):

1. Steady-state analysis of the water system, including pipes and reservoirs;
2. Extended period simulation to analyze the system under varying supply and demand conditions; and
3. Fire flow analysis.

The proposed distribution system is shown in Figure 3 of the report (refer to report for detailed graphic) and is comprised of nodes or pressure junctions that connect or end multiple pipe segments. Demands were assigned to the nodes based on the number of lots that are being sewed at that particular node. (RMTC, 2008).

Department of Health Review of Dillingham Ranch Agricultural Subdivision Preliminary Water System Report

On January 28, 2008, the DOH responded to the proposed water system upgrades and provided the following comments (see **Appendix A** for a copy of the DOH letter):



Source: Preliminary Water System Report, Dillingham Ranch Agricultural Subdivision, Mokuleia, Oahu, Hawaii, R. M. Towill Corporation 2008.
Notes: See Report in Appendix I for additional detail.

1. The infrastructure of the existing Dillingham Ranch Public Water System (System No. 326) will be upgraded and expanded to provide water to the new Dillingham Ranch Agricultural Subdivision.
2. The Dillingham Ranch Public Water System will continue to provide water to its existing customers. In the April 7, 2007 proposal, the Dillingham Ranch Public Water System would stop water service to its customers and turn over this service to the Honolulu Board of Water Supply.
3. A new public water system for the Dillingham Ranch Agricultural Subdivision as previously indicated in the April 7, 2007, and the November 30, 2007 proposals, will not be created.

In summary, according to DOH, the planned water system upgrades and expansion to provide water service to the planned subdivision will not affect the water system's status as an existing community public water system. The DOH noted,

> "As such, the Dillingham Ranch Public Water System will not be required to implement the Federal and State technical, managerial, and financial capacity regulations which are required for new public water systems."
>
> "The upgrade and expansion of the existing Dillingham Ranch water system infrastructure will require Department of Health (DOH) approval of the construction plans in accordance with HAR, Section 11-20-30 [relating to new and modified public water systems]. The conversion of the irrigation well (Well No. 3410-03) to drinking water will require DOH approval in accordance with HAR 11-20-29 [relating to use of new sources of raw water for public water]." (DOH Letter to RMTC, January 28, 2008).

Potential for Secondary Impacts

The potential for adverse environmental effects due to upgrades to PWS No. 326 to serve the planned agricultural subdivision and other private water system users are not anticipated. However, the construction documents for the proposed upgrades will require review and approval by the BWS in accordance with HAR, Section 11-20-30, relating to new and modified public water systems. DRA will commit to the filing of these construction documents as required by the BWS in order to address any concerns regarding the proper design, installation, and operation of the system.

While the proposed T-intersection is designed to support access to the planned subdivision, the potential for secondary impacts as a result of providing water system upgrades to support the planned subdivision is not expected. Sufficient water supply is available from the North Shore Water Company. No adverse impacts, including secondary impacts associated with the proposed T-intersection, are anticipated.

Section 3
Project Alternatives

3.1 Alternatives to the Proposed Project

Three alternatives to the proposed project were considered: (1) the No Action and Delayed Action Alternative; (2) an Alternative Location for the T-Intersection; and (3) the Preferred Alternative.

3.2 No Action and Delayed Action

The No Action Alternative would involve no further action to develop the project. Inasmuch as the intersection improvements would support access to the planned Dillingham Ranch Agricultural Subdivision, the proposed project is a necessary requirement of the City & County of Honolulu Subdivision Standards and the State Department of Transportation, for providing a safe point of entry and exit from Farrington Highway. While the No Action Alternative would avoid the expenditure of resources for design and construction of the facility, it would fail to provide for the required traffic improvements. For this reason, it is not considered a viable option.

The Delayed Action Alternative differs from taking no action in that the proposed project would be undertaken, but at a later point in time. Delayed action to construct the intersection improvements would adversely affect the completion of the agricultural subdivision. Because the project is intended to support the subdivision with access to the Farrington Highway in compliance with requirements, the delayed action alternative would similarly fail to accomplish the purpose of the project. For this reason, it is also not considered a viable option.

3.3 Alternative Location for the T-Intersection

The planned location for the project is based on existing and future proposed land uses of the Dillingham Ranch ʻĀina property. The intersection improvements will be located on an existing access road that presently serves the Dillingham Ranch providing access to the equestrian facilities, administrative offices, and field offices and facilities used to manage the property. This configuration provides a rational and efficient means of entry to the planned agricultural subdivision based on existing uses that will not have to be immediately relocated, demolished, or otherwise removed.

An alternative location for the T-intersection may be possible along other portions of the Dillingham Ranch property, but is considered an optimal approach given existing land uses that

include diversified agriculture, a pond, equestrian and corral facilities, and maintenance facilities. Thus, while an alternative location is possible, major disruption to existing land uses and operations would result while the planned T-intersection improvements would require essentially the same construction effort.

3.4 Preferred Alternative

The preferred alternative involves the design and construction of the T-intersection at its present location at its intersects with the Farrington Highway. Factors that support this decision include:

(1) Area residents are already aware of this entry to the Dillingham Ranch property. Directly adjacent to the existing entry is a clearly marked crosswalk crossing Farrington Highway, and horse crossing signage posted in both directions along the highway.

(2) The proposed location will minimize disruption to the existing operations of the Dillingham Ranch. While the planned agricultural subdivision is anticipated to require future changes in land that is used by the Dillingham Ranch, these changes will be more easily made with the integration of a planned intersection improvement with existing and future land uses.

(3) The traffic assessment conducted for the proposed project indicates there will be limited and minimal traffic impacts associated with the intersection improvements. No major impacts to local or transiting motorists to the area are anticipated or expected.

(4) Sufficient measures and practices to address the potential for adverse environmental impacts have been considered and can be implemented for the project. With the implementation of the mitigation measures as described in this document, no adverse environmental impacts are anticipated or expected.

Section 4
Relationship to State and City & County Land Use Plans and Policies

4.1 Hawai'i State Plan and Functional Plans

4.1.1 Hawai'i State Plan

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

The proposed project is consistent with the following provisions of the State Plan:

> Section 226-7 Objective and policies for the economy-agriculture. (a) Planning for the State's economy with regard to agriculture shall be directed towards achievement of the following objectives: (2) Continued growth and development of diversified agriculture throughout the State. (b) To achieve the agriculture objectives, it shall be the policy of this State to:
> (5) enhance agricultural growth by providing public incentives and encouraging private initiatives.

The proposed project involves the construction of transportation improvements by a private party to serve a planned agricultural subdivision. The planned subdivision will allow for new diversified agricultural activities and in so doing, would contribute to its continued growth and development, maintaining consistency with the State Plan.

> Section 226-17 Objectives and policies for facility systems-transportation.
> (b) To achieve the transportation objectives, it shall be the policy of this State to:
> (3) Encourage a reasonable distribution of financial responsibilities for transportation among participating governmental and private parties.

The proposed intersection improvements will be entirely financed by a private party who will be responsible for the cost of design and construction. In this regard, the proposed project will address the State Plan objective of encouraging the reasonable distribution of financial responsibility for ensuring completion of the project by the private sector.

4.1.2 State Functional Plans

The State Functional Plans are designed to implement the broader goals, objectives, and policies of the State Plan through specific actions identified as Implementing Actions (IA). While the proposed project is not specifically identified as an IA, the project maintains consistency with the Transportation and Agricultural Functional Plans through the following:

> State Transportation Functional Plan
> Objective I.F: Improving and enhancing transportation safety
> Objective III.A: Expansion of revenue bases for transportation improvements.
> Policy III.A.2. Pursue private sector participation in the financing of transportation systems, developments and projects.

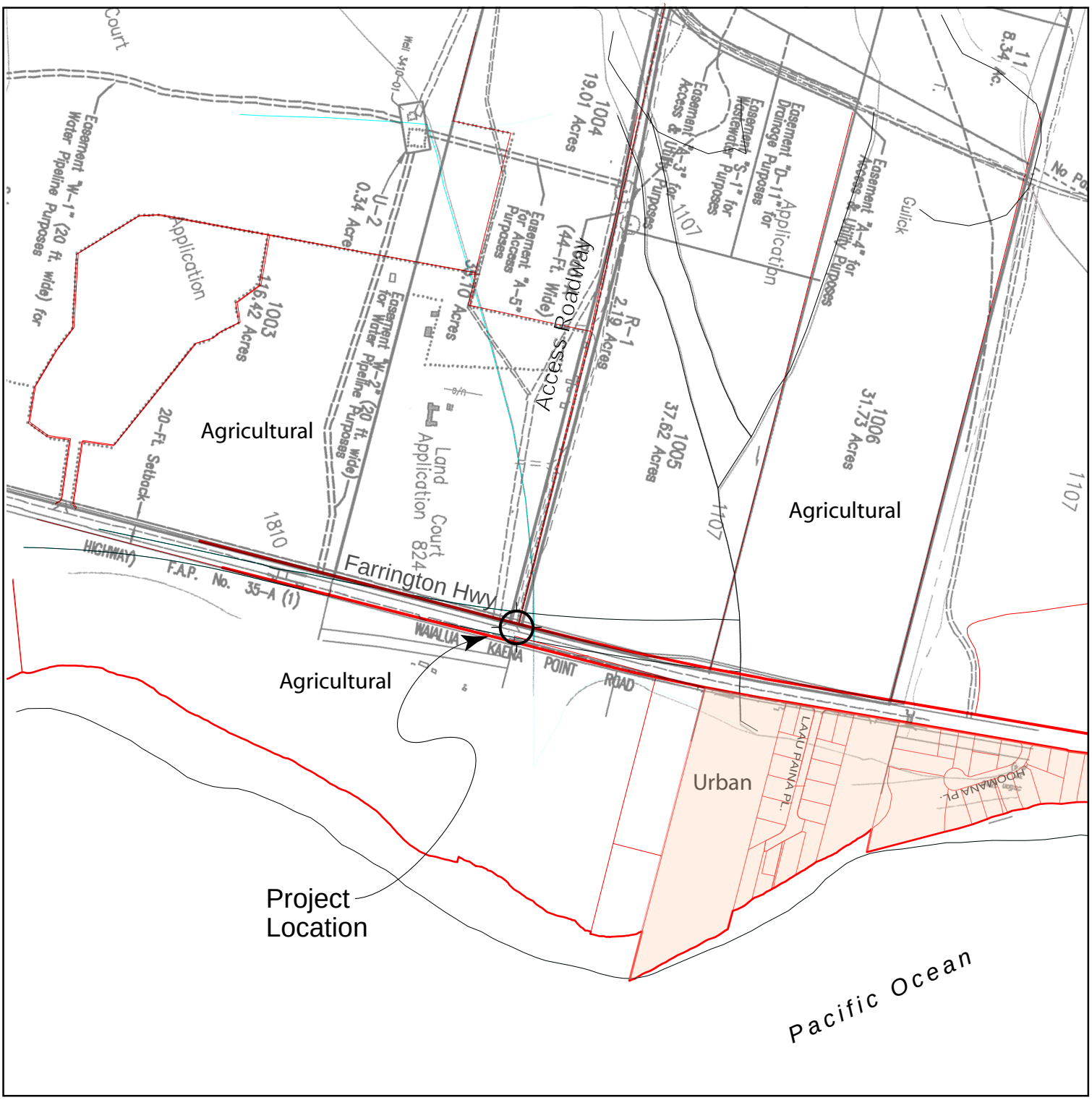
The proposed project involves the design and construction of a privately financed intersection improvement along Farrington Highway that will serve an agricultural subdivision. The project will comply with State and City & County of Honolulu requirements to meet safety of the driving public.

> State Agricultural Functional Plan
> Objective B: Achievement of an orderly agricultural marketing system through product promotion and industry organization. Policy B(2): Encourage the development of Hawai‘i's agricultural industries.

Although the proposed project does not directly involve the promotion of the agricultural industry, it represents an important supporting feature that will facilitate the development of an agricultural subdivision. The subdivision in turn, will provide for greater land opportunities for the growth of diversified agriculture.

4.2 State Land Use District

The project site and the surrounding land use is within the State Agricultural District. The use of the Farrington Highway and the proposed intersection improvements project is consistent with this land use designation. See **Figure 9**, State Land Use District.



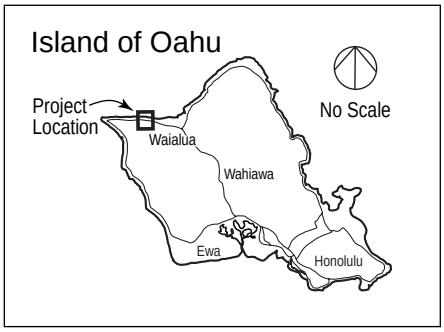


Figure 9 State Land Use District
Intersection Improvements
Dillingham Ranch ‘Āina, LLC

0 500 Feet 1000

R.M. TOWILL CORPORATION 2008

4.3 General Plan

The current edition of the General Plan for the City & County of Honolulu was adopted in 1977, revised in 1992, and was last updated in October 2006. The Plan is a comprehensive statement of objectives and policies for the future development of Honolulu. The proposed project is consistent with the following objectives and policies of the City and County of Honolulu's General Plan:

Transportation & Utilities

The objectives and policies for transportation related improvements are stated in Section V, Transportation & Utilities.

> Objective A: To create a transportation system which will enable people and goods to move safely, efficiently, and at a reasonable cost; serve all people, including the poor, the elderly, and the physically handicapped; and offer a variety of attractive and convenient modes of travel.
> Policy 5: Improve roads in existing communities to reduce congestion and eliminate unsafe conditions.

The planned intersection improvements will constitute an improvement and upgrade over existing conditions by providing new paving, striping and signage. These improvements will be in accordance with the requirements of the City & County of Honolulu, and State DOT, that promote the safe and efficient transportation of residents and users along this segment of the Farrington Highway.

> Objective D: To maintain transportation and utility systems which will help Oahu continue to be a desirable place to live and visit.
> Policy 4: Evaluate the social, economic, and environmental impact of additions to the transportation and utility systems before they are constructed.

The proposed project is under review of these factors as part of the environmental review process stipulated by Chapter 343, HRS. Based on the analysis undertaken for the subject document, social, economic, and environmental factors will be reviewed and evaluated to ensure that sufficient mitigative measures will be provided prior to the construction of the project.

4.4 North Shore Development Plan/Sustainable Communities Plan

The project site is designated as Agriculture in the North Shore Development Plan Land Use, Open Space, and Public Facilities Maps. While the proposed project at its intersection with the Farrington Highway (designated a "minor arterial") is not specifically identified, the project is consistent with the North Shore Development Plan, Section 4.1.5, General Policies, through the following:

- "Provide adequate access between residences, jobs, shopping, and recreation areas on the North Shore. Improve access to adjacent areas, especially to Central Oahu."

The proposed intersection improvements will promote adequacy and sufficiency of service to and from the planned Dillingham Ranch Agricultural Subdivision to the Farrington Highway.

- "Approve new residential and commercial development in the North Shore only if the State Department of Transportation and the City Department of Transportation Services certify that adequate transportation access and services can be provided."

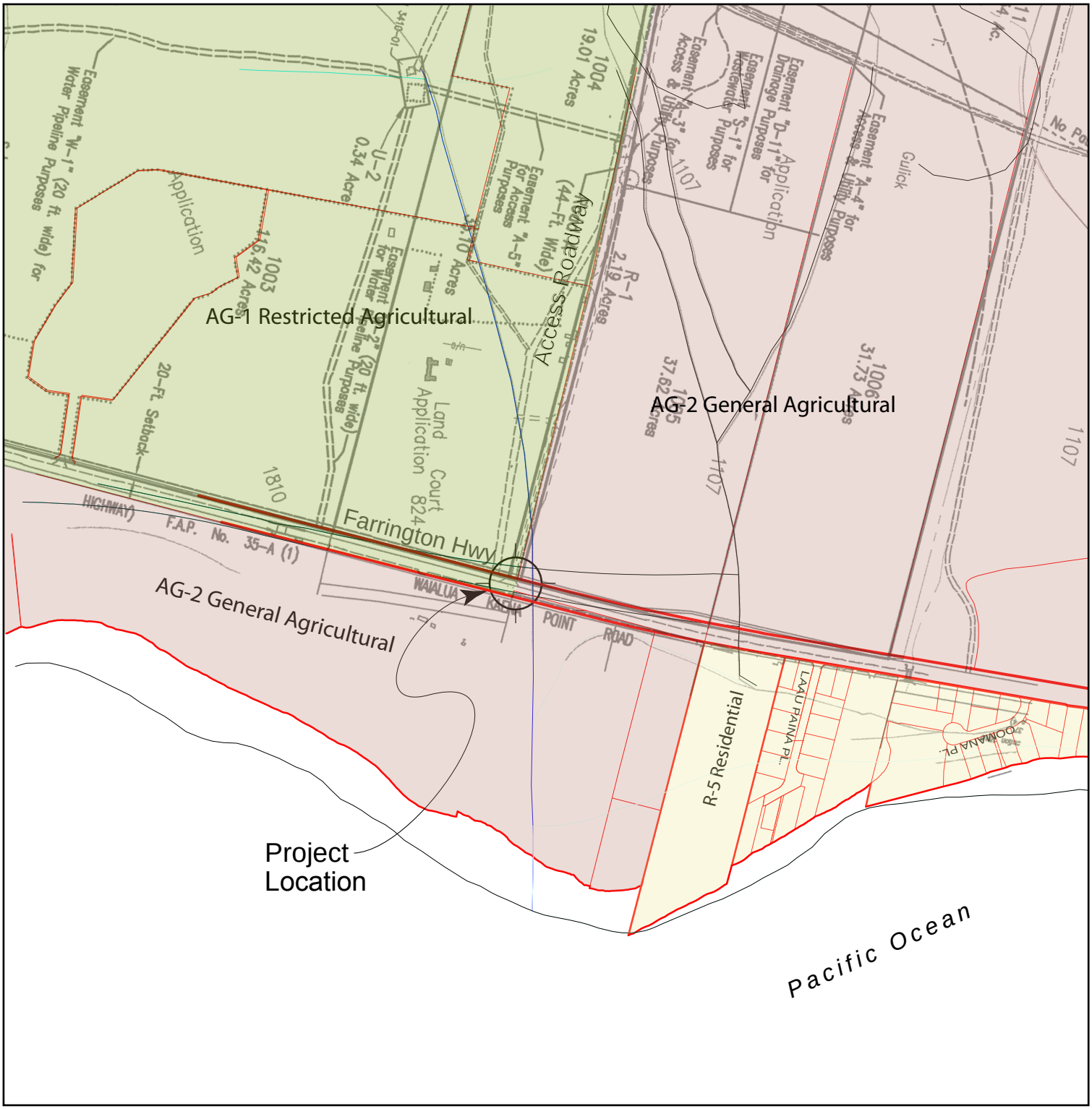
The proposed intersection improvements will address and meet the requirements of the State DOT and the City & County of Honolulu for the construction the intersection. The intersection improvements have been further evaluated with respect to capacity and the ability to provide access along Farrington Highway without adverse impacts to existing traffic conditions (Julian Ng, Inc., 2007).

See **Appendix A**, relating to conditional letters for the Subdivision Application from DOT, Highways Division, February 21, 2007, December 24, 2007, and February 25, 2008.

4.5 City & County of Honolulu Zoning

The project site is within the AG-2, General Agricultural District. See **Figure 10,** Zoning. According to Chapter 21, Land Use Ordinance, Section 21-3.50 Agricultural Districts, Purpose and Intent:

> (a) The purpose of the agricultural districts is to maintain a strong agricultural economic base, to prevent unnecessary conflicts among incompatible uses, to minimize the cost of providing public improvements and services and to manage the rate and location of physical development consistent with the city's adopted land use policies. To promote the viability and economic feasibility of an existing agricultural operation, accessory agribusiness activities may be permitted on the same site as an adjunct to agricultural uses. These accessory activities must be compatible with the on-site agricultural operation and surrounding land uses;



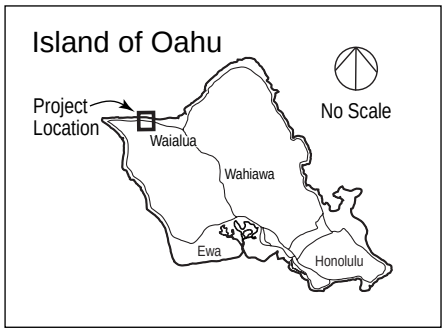


Figure 10 Zoning
Intersection Improvements
Dillingham Ranch ‘Āina, LLC

0 500 Feet 1000

R.M. TOWILL CORPORATION 2008

(d) The intent of the AG-2 general agricultural district is to conserve and protect agricultural activities on smaller parcels of land; and

(e) The following guidelines shall be used to identify lands which may be considered for the AG-2 general agricultural district:
(1) Lands which are in the state-designated agricultural or urban district and designated agricultural by adopted city land use policies;
(2) Lands which are predominantly classified as other under the agricultural lands of importance to the State of Hawaii system; and
(3) Lands which are used or are suitable for agricultural purposes and where a substantial number of parcels are less than five acres in size. (Added by Ord. 99-12; Am. Ord. 02-63).

The proposed project will address the City & County of Honolulu and State DOT requirements for the design of an adequate and sufficient intersection improvement serving the Dillingham Ranch Agricultural Subdivision. In this regard, the proposed project will help to maintain existing agricultural land uses of the area consistent with the AG-2 zoning of the site.

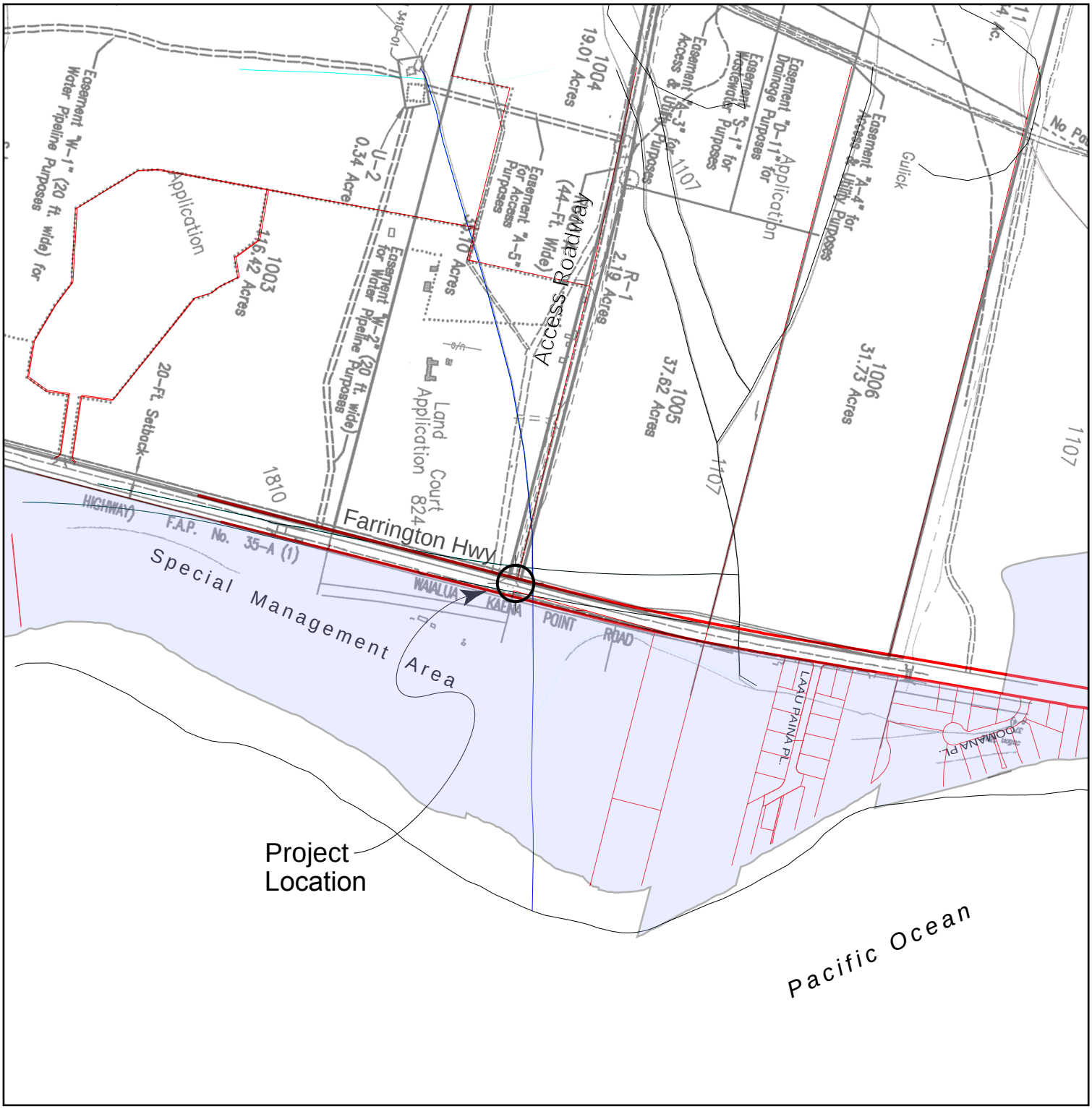
4.6 Special Management Area

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

The proposed project site and the proposed agricultural subdivision is located outside of the designated SMA zone as shown in **Figure 11**, Project Site in Relation to SMA.

4.7 Coastal Zone Management, HRS 205(A)

The State of Hawai'i designates the Coastal Zone Management Program (CZMP) to manage the intent, purpose and provisions of the federal Coastal Zone Management Act, and HRS, Chapter 205(A)-2, as amended, for the areas from the shoreline to the seaward limit of the State's



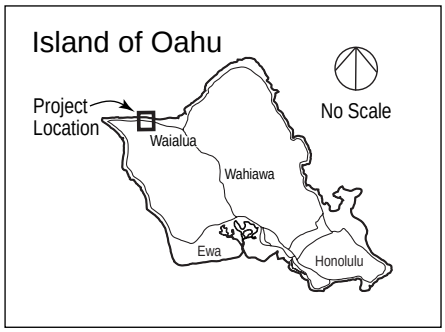


Figure 11 Project Site in Relation to Special Management Area
Intersection Improvements
Dillingham Ranch ‘Āina, LLC

0 500 Feet 1000

R.M. TOWILL CORPORATION 2008

jurisdiction, and any other area which a lead agency may designate for the purpose of administering the CZMP.

The following is an assessment of the project with respect to the CZMP objectives and policies set forth in Section 205(A)-2.

1. Recreational resources
Objective: Provide coastal recreational opportunities accessible to the public.
Policies:
A) Improve coordination and funding of coastal recreational planning and management; and
B) Provide adequate, accessible, and diverse recreational opportunities in the coastal zone management area by:
(i) Protecting coastal resources uniquely suited for recreational activities that cannot be provided in other areas;
(ii) Requiring replacement of coastal resources having significant recreational value including, but not limited to, surfing sites, fishponds, and sand beaches, when such resources will be unavoidably damaged by development; or requiring reasonable monetary compensation to the State for recreation when replacement is not feasible or desirable;
(iii) Providing and managing adequate public access, consistent with conservation of natural resources, to and along shorelines with recreational value;
(iv) Providing an adequate supply of shoreline parks and other recreational facilities suitable for public recreation;
(v) Ensuring public recreational uses of county, state, and federally owned or controlled shoreline lands and waters having recreational value consistent with public safety standards and conservation of natural resources;
(vi) Adopting water quality standards and regulating point and nonpoint sources of pollution to protect, and where feasible, restore the recreational value of coastal waters;
(vii) Developing new shoreline recreational opportunities, where appropriate, such as artificial lagoons, artificial beaches, and artificial reefs for surfing and fishing; and
(viii) Encouraging reasonable dedication of shoreline areas with recreational value for public use as part of discretionary approvals or permits by the land use commission, board of land and natural resources, and county authorities; and crediting such dedication against the requirements of section 46-6.

Discussion:

Recreational and shoreline facilities, and public access to the shoreline will not be affected by the project. The proposed project area is located along the Farrington Highway, a State transportation facility.

2. Historic resources
Objective: Protect, preserve, and, where desirable, restore those natural and manmade historic and prehistoric resources in the coastal zone management area that are significant in Hawaiian and American history and culture.
Policies:
(A) Identify and analyze significant archaeological resources;
(B) Maximize information retention through preservation of remains and artifacts or salvage operations; and

(C) Support state goals for protection, restoration, interpretation, and display of historic resources.

Discussion:

No adverse impacts to archaeological or historic resources associated with construction or operation of the proposed project are expected. However, in the event that unidentified archaeological remains or deposits are uncovered during construction, work will cease in the immediate area and the State Historic Preservation Office will be contacted. As appropriate, mitigative measures will be proposed and coordinated with State Historic Preservation Division (SHPD), Department of Land and Natural Resources, prior to the resumption of work.

The potential for adverse impacts to cultural practices or resources are not expected as a result of the proposed project. The immediate project site has been utilized for vehicular entry to the Dillingham Ranch property, is located along a developed and designated transportation facility, and is not identified with traditional or cultural gathering practices.

3. Scenic and open space resources
Objective: Protect, preserve, and, where desirable, restore or improve the quality of coastal scenic and open space resources.
Policies:
(A) Identify valued scenic resources in the coastal zone management area;
(B) Ensure that new developments are compatible with their visual environment by designing and locating such developments to minimize the alteration of natural land forms and existing public views to and along the shoreline;
(C) Preserve, maintain, and, where desirable, improve and restore shoreline open space and scenic resources; and
(D) Encourage those developments that are not coastal dependent to locate in inland areas.

Discussion:

The proposed project will involve the use of a stop sign, striping on pavement surfaces, and other signage advising motorists of an intersection ahead. These project requirements are based on vehicular safety considerations and are not expected to adversely affect scenic and open space resources.

4. Coastal ecosystems
Objective: Protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.
Policies:
(A) Exercise an overall conservation ethic, and practice stewardship in the protection, use, and development of marine and coastal resources;
(B) Improve the technical basis for natural resource management;
(C) Preserve valuable coastal ecosystems, including reefs, of significant biological or economic importance;

(D) Minimize disruption or degradation of coastal water ecosystems by effective regulation of stream diversions, channelization, and similar land and water uses, recognizing competing water needs; and
(E) Promote water quantity and quality planning and management practices that reflect the tolerance of fresh water and marine ecosystems and maintain and enhance water quality through the development and implementation of point and nonpoint source water pollution control measures.

Discussion:

The proposed project is not expected to have any adverse effect on coastal ecosystems or resources. The project location is in an area that is not subject to coastal processes and will be undertaken in a manner that will minimize or otherwise avert the potential for environmental impacts.

5. Economic uses

Objective: Provide public or private facilities and improvements important to the State's economy in suitable locations.
Policies:
(A) Concentrate coastal dependent development in appropriate areas;
(B) Ensure that coastal dependent development such as harbors and ports, and coastal related development such as visitor industry facilities and energy generating facilities, are located, designed, and constructed to minimize adverse social, visual, and environmental impacts in the coastal zone management area; and
(C) Direct the location and expansion of coastal dependent developments to areas presently designated and used for such developments and permit reasonable long-term growth at such areas, and permit coastal dependent development outside of presently designated areas when:
(i) Use of presently designated locations is not feasible;
(ii) Adverse environmental effects are minimized; and
(iii) The development is important to the State's economy.

Discussion:

The proposed project has been assessed for potential social, visual, and environmental impacts. With the implementation of the mitigation measures identified in this document, no adverse impacts are expected to result.

The County zoning designation for the project site is AG-2, General Agricultural District. The proposed traffic improvement project will be in compliance with the LUO requirements for this zoning district.

While an alternative site for the proposed project was investigated by the applicant, the proposed location is considered to be optimal for the planned intersection improvements and is consistent with the surrounding agricultural related land uses along the Farrington Highway.

6. Coastal hazards
Objective: Reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.
Policies:
(A) Develop and communicate adequate information about storm wave, tsunami, flood, erosion, subsidence, and point and nonpoint source pollution hazards;
(B) Control development in areas subject to storm wave, tsunami, flood, erosion, hurricane, wind, subsidence, and point and nonpoint source pollution hazards;
(C) Ensure that developments comply with requirements of the Federal Flood Insurance Program; and
(D) Prevent coastal flooding from inland projects.

Discussion:

The subject property is located along Farrington Highway in the Waialua District of O'ahu. According to FEMA FIRM Map No. 15003C0085F, the project site is in an area designated as Zone AE. See **Figure 8,** FEMA FIRM Map.

The development of the project will be in compliance with the requirements of the Federal Flood Insurance Program, the City & County of Honolulu Drainage, Grading and Development standards for Flood Hazard Districts, and the LUO, Section 21-9.10, Flood Hazard Districts.

7. Managing development
Objective: Improve the development review process, communication, and public participation in the management of coastal resources and hazards.
Policies:
(A) Use, implement, and enforce existing law effectively to the maximum extent possible in managing present and future coastal zone development;
(B) Facilitate timely processing of applications for development permits and resolve overlapping or conflicting permit requirements; and
(C) Communicate the potential short and long-term impacts of proposed significant coastal developments early in their life cycle and in terms understandable to the public to facilitate public participation in the planning and review process.

Discussion:

The project site is within the State Agricultural Land Use District. Land uses within this designation are subject to regulation by the City & County of Honolulu. The county's zoning designation is AG-2, General Agricultural District.

All improvement activities will be conducted in compliance with State and County environmental rules and regulations. This EA document is prepared to identify and, where necessary, propose mitigation measures to address the potential for impacts anticipated from the construction and

operation of the project. This document will be published for public review in compliance with procedures set forth by the Office of Environmental Quality Control (OEQC), Chapter 343, HRS, and Chapter 11-200, Hawai'i Administrative Rules (HAR).

8. Public participation;
Objective: Stimulate public awareness, education, and participation in coastal management.
Policies:
(A) Promote public involvement in coastal zone management processes;
(B) Disseminate information on coastal management issues by means of educational materials, published reports, staff contact, and public workshops for persons and organizations concerned with coastal issues, developments, and government activities; and
(C) Organize workshops, policy dialogues, and site-specific mitigation to respond to coastal issues and conflicts.

Discussion:

Public involvement in the project will consist of public notice of the proposed action in the OEQC Bulletin. See Section 8, Agencies, Organizations, and Individuals Consulted for a list of the agencies, organizations and individuals that have been or will be consulted for this project. All written public comments will be provided with a written response. Where appropriate, mitigation measures will be developed to address issues and concerns raised during public review of the project.

9. Beach protection;
Objective: Protect beaches for public use and recreation.
Policies:
(A) Locate new structures inland from the shoreline setback to conserve open space, minimize interference with natural shoreline processes, and minimize loss of improvements due to erosion;
(B) Prohibit construction of private erosion-protection structures seaward of the shoreline, except when they result in improved aesthetic and engineering solutions to erosion at the sites and do not interfere with existing recreational and waterline activities; and
(C) Minimize the construction of public erosion-protection structures seaward of the shoreline.

Discussion:

The proposed project is not located in proximity to the beach and will have no effect on beach or shoreline processes.

10. Marine resources
Objective: Promote the protection, use, and development of marine and coastal resources to assure their sustainability.
Policies:
(A) Ensure that the use and development of marine and coastal resources are ecologically and environmentally sound and economically beneficial;
(B) Coordinate the management of marine and coastal resources and activities to improve effectiveness and efficiency;

(C) Assert and articulate the interests of the State as a partner with federal agencies in the sound management of ocean resources within the United States exclusive economic zone;
(D) Promote research, study, and understanding of ocean processes, marine life, and other ocean resources in order to acquire and inventory information necessary to understand how ocean development activities relate to and impact upon ocean and coastal resources; and
(E) Encourage research and development of new, innovative technologies for exploring, using, or protecting marine and coastal resources.

Discussion:

The proposed project will have no effect on marine resources. The scope and scale of the project will be limited to the installment of pavement surfacing and traffic controls to ensure safety and security of the intersection.

Section 5
Permits and Approvals that May be Required

5.1 City & County of Honolulu

Subdivision Approval (Tentative Approval granted on April 18, 2008, see **Appendix A** for documentation regarding coordination with governmental agencies).

Grading Permit

Building Permit

5.2 State of Hawai‘i

Department of Transportation Approval of Construction Plans & Specifications

Department of Transportation Permit to Perform Work Upon State Highways

Section 6
Cultural Impact Assessment Evaluation

6.1 Impacts to Traditional/Cultural Resources

The use of the site for traditional or cultural practices is not expected based on the location of planned project next to the existing Farrington Highway and Dillingham Ranch equestrian facility driveway intersection. The modified condition of the project area includes the presence of introduced plant species not normally associated with cultural gathering or use activities. The plants present at the site include ironwood and other introduced tree species, grasses contained within the adjacent equestrian facility and polo field located across the Farrington Highway, and various other low laying weed and grass species located along the roadway.

The developed and paved condition of the area is also not conducive to the presence of wahi pana (storied place) or other sites associated with the gathering of important native species that may include tī, flowering plants, or other species bearing fruit.

Potential Impacts and Mitigation

The potential for adverse impacts to traditional and cultural practices is not anticipated based on the location and existing use of the site as an intersection along the Farrington Highway. Across the Farrington Highway, the use of an existing polo field may be affected by the temporary generation of noise. However, all work practices will be in accordance with noise regulations of the State and City & County of Honolulu.

As noted in Section 2.1.6, Historic and Archaeological Resources, should iwi or other cultural remains may be uncovered by earthwork or grading activities all work will be temporarily halted and the SHPD immediately notified at (808) 692-815 for further instructions. Work will only be allowed to be resumed upon appropriate notification to do so by the SHPD.

Section 7
Agencies, Organizations and Individuals Consulted

The following agencies, organizations, and individuals were/will be contacted regarding the preparation of the Draft and Final EA for this project.

7.1 City & County of Honolulu

Department of Planning and Permitting

Department of Environmental Services

Department of Design and Construction

Fire Department

Police Department

7.2 State of Hawai‘i

Department of Health

Department of Land and Natural Resources

- Land Division
- State Historic Preservation Division

Department of Transportation - Highways Division

7.3 Federal Government

U.S. Army Corps of Engineers

U.S. Fish and Wildlife Service

National Marine Fisheries Service

7.4 Organizations and Individuals

Mokūle‘ia Community Association

North Shore Neighborhood Board No. 27

Councilman Donovan M. Dela Cruz

Honolulu City Council

Section 8
Summary of Impacts and Significance Determination

8.1 Short Term Impacts

Short term impacts are expected to be limited and will last for only the duration of construction. The construction contractor will access the project site via Farrington Highway and noise will be generated from construction and related mobilization of equipment.

Construction equipment is expected to include a compactor, grader, bulldozer, concrete mixer, delivery trucks, and powered hand tools. All equipment will be muffled in accordance with standard engine operating practices. The work will be limited to weekday daylight hours and engine exhausts will be governed in accordance with applicable state and county regulations. Upon construction completion, noise levels will return to ambient levels.

Dust and associated nuisance problems are expected to be slight to insignificant due to the limited scope and scale of the project. Fugitive dust will be controlled with the use of dust screens and/or regular wetting of the soil by the contractor.

Construction activity will temporarily disturb soils. To minimize soil erosion, silt fences, berms and other applicable erosion control devices will be utilized to prevent construction-related soil and silt from leaving the active work area. If required, exposed soils will be covered with PVC sheet plastic or similar material to prevent inadvertent contact and mixing with storm water.

All necessary environmental permit applications and building permit approvals will be secured prior to initiation of construction activities.

8.2 Long Term Impacts

Long term benefits derived from this project include the provision of an intersection improvement that will be constructed in compliance with State and City & County standards. No long term adverse impacts are anticipated. Upon completion, all construction equipment used on-site will be demobilized and all debris and waste materials will be disposed of at an approved refuse facility.

8.3 Significance Criteria

Based on the significance criteria set forth in HAR, Title 11, Chapter 200, Environmental Impact Statement Rules, the proposed project is not anticipated to result in significant environmental impacts. The recommended preliminary determination for the proposed project is a Finding of No Significant Impact (FONSI). The findings and reasons supporting this determination are summarized as follows:

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

The proposed project will not result in the adverse loss of natural or cultural resources. There are no threatened or endangered species of plants or wildlife that inhabit the immediate area of the project site. Given the transportation related use of the site, historic or archaeological sites are not known to be present. However, in the unlikely event of a discovery of significant historic or archaeological resources, the SHPD, DLNR, will be immediately notified for appropriate action and treatment.

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

The subject property is utilized for transportation related purposes. The proposed use is consistent with the industrial designation of the site and will be contained entirely within the property. The proposed action does 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 is consistent with the environmental policies, goals and guidelines expressed in HRS, Chapter 343. Potential sources of adverse impacts have been identified and appropriate measures have been developed to either mitigate or minimize potential impacts to negligible levels.

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

The proposed project will not affect the economic and social welfare of the community or state. However, the proposed intersection improvements will constitute a new facility promoting safety of motorists transiting the Farrington Highway in the area of the project. The construction of the facility will be regulated in accordance with City & County of Honolulu and State regulations.

5. *Substantially affects public health*

Factors affecting public health, including air quality, water quality, and noise levels, are expected to be only minimally affected, or unaffected. The proposed project does not pose a direct threat to public health and safety. Potential impacts will be mitigated in accordance with regulations.

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

The proposed activity is expected to have little to no secondary or indirect impacts such as population changes or effects on public facilities based on the limited scope and scale of the project.

7. *Involves a substantial degradation of environmental quality*

Impacts to air and water quality, noise levels, natural resources, and land use associated with the planned improvements are anticipated to be minimal. Mitigation measures will be employed as practicable to further minimize potentially detrimental effects to the environment. 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*

Although the proposed T-intersection is itself individually limited, the Dillingham Ranch Agricultural Subdivision, exclusive of the T-intersection providing connection of the proposed 77 lot subdivision with the Farrington Highway, could be considered as providing the context for "larger actions." Mitigation measures to address the potential for these "larger actions" have been provided within the Application Process for Tentative Subdivision Map Approval by the Department of Planning and Permitting, City & County of Honolulu. Mitigation measures to address the subdivision are materially provided within this EA document and include an evaluation of the areas of archaeology, continued agricultural viability, rockfall and slope concerns, waste water, flora, fauna, and traffic for the planned subdivision as well as the planned T-intersection.

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

There are no rare, threatened or endangered plants or animal species at the subject project site. Other project activities associated with the planned subdivision are not located near avifauna located in the area of the pond.

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

On a short-term basis, ambient air and noise conditions may be affected by construction of the proposed facility improvements, but these are short-term and can be controlled by the mitigation measures as described in this EA. Once the project is completed, air and noise in the project vicinity will be allowed to return to preconstruction conditions.

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*

A portion of the project area is located within an area determined by the Federal Emergency Management Agency to be within the 1-percent annual chance floodplain. The proposed action is not expected to have a significant impact on flood conditions.

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

Minimal to no impacts to scenic vistas and viewplanes are expected. The project will involve the use of a stop sign and may include other signs advising motorists of an intersection ahead. The use of these signs and striping of the pavement will not adversely affect scenic views or view planes.

13. Requires substantial energy consumption

Construction and daily activities associated with the proposed site improvements will not require substantial amounts of energy.

Section 9
Findings

In accordance with the provisions set forth in HRS, Chapter 343, and the significance criteria in HAR, Section 11-200-12 of Title 11, Chapter 200, it is anticipated that the proposed project will have no significant adverse impacts, including secondary or cumulative impacts, to water quality, air quality, existing utilities, noise levels, social welfare, archaeological sites, or wildlife habitat. All anticipated impacts are expected to be temporary in duration and will not adversely impact the environmental quality of the area. It is expected 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

AECOS Consultants, Inc., January 2008. Botanical survey in support of an environmental assessment document for intersection improvements, Dillingham Ranch Agricultural Subdivision, Mokuleʻia, O'ahu, Hawai'i. R. M. Towill Corporation, January 2008.

Art Whistler, Botanical Consultant, December 1991. Botanical Impact Study of The Mokūleʻia Development Plan, Mokūleʻia, Oʻahu. Mokūleʻia Land Company, Mokūleʻia, Oʻahu.

Phillip L. Bruner, Ph.D., January 2008. Avifaunal and Feral Mammal Field Survey of the Proposed Dillingham Ranch Subdivision, Mokūleʻia, Oʻahu. R. M. Towill Corporation, January 16, 2008.

Cultural Surveys Hawaiʻi, 2007. Archaeological Inventory Survey of an Approximately 75-Acre Portion of the Proposed 861-Acre Dillingham Ranch Development Project, Waialua District, Island of Oʻahu.

Chu, Michael S and Jones, Robert B., 1987. Coastal View Study, Department of Land Utilization. City and County of Honolulu. State of Hawaiʻi.

Department of Geography, University of Hawaiʻi, 1983. Atlas of Hawaii, University of Hawaiʻi Press, Honolulu.

Department of Planning and Permitting, 2006. General Plan for the City and County of Honolulu. City & County of Honolulu. State of Hawaiʻi. http://www.honoluludpp.org/Planning/OahuGenPlan.asp

Department of Planning and Permitting, 2000. North Shore Sustainable Communities Plan (Ordinance 0015, Bill 71 (1999), CD2). City & County of Honolulu. State of Hawaiʻi. http://honoluludpp.org/planning/NorthShore/NSord00-15.pdf

Development Strategies, LLC, 2007. Agriculture Feasibility Report (Expanded Supplement on the Working Ranch), Dillingham Ranch. Dillingham Ranch ʻĀina, LLC, Beverly Hills, California.

ERC Environmental and Energy Services Company, 1991. Archaeological Inventory Survey and Evaluation, Mokūleʻia, Waialua District, Oʻahu (TMK 6-8-03 and 6-8-02).

ERC Environmental and Energy Services Company, 1991. Archaeological Inventory Survey and Evaluation, Mokūleʻia, Waialua District, Oʻahu (TMK 6-8-03 and 6-8-02).

Federal Emergency Management Agency (FEMA), 2000. Federal Insurance Rate Map (FIRM), City and County of Honolulu. Map No. 15003C0085F, dated September 30, 2004.

Geolabs, Inc. 2008. Rockfall Potential and Hillside Slope Evaluation, Dillingham Ranch Mokuleia Development.

R. M. Towill Corporation, 2008. Preliminary Water System Report, Dillingham Ranch Agricultural Subdivision, Mokūleʻia, Oʻahu, Hawaiʻi, dated January 17, 2008.

U.S. Department of Agriculture, 1972. Soil Survey of Islands of Kauai, Oahu, Maui, Molokai, and Lanai, State of Hawaii. U.S. Department of Agriculture, Soil Conservation Service and University of Hawaiʻi Agriculture Experiment Station, Washington, D.C.