DRAFT ENVIRONMENTAL ASSESSMENT

KANEOHE DISTRICT PARK IMPROVEMENTS
CITY & COUNTY OF HONOLULU

March 2008

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SUMMARY SHEET

Project: Kaneohe District Park Improvements, Kaneohe, Oahu, Hawaii. The purpose of this project is to protect the foundation of the park's swimming pool from erosion. The proposed improvements include stabilizing approx. 205 LF of an unnamed drainaged ditch which is a tributary of Keaahala Stream along the northwest side of the swimming pool. The proposed improvements include CRM retaining walls, grouted rip-rap, ungrouted rip-rap, and geotextile fabric.

Short-term Effects: Short term effects will occur during construction. Such effects may include noise, odors, disruption of flora on and near streambanks, disturbances to aquatic life in the ditch channel, and an increase in turbidity and TSS (total suspended solids) in the immediate project area.

Long-term Effects: There are no significant long-term adverse or cumulative impacts to geology, hydrology, flora and fauna, water quality, historic resources, traditional or cultural practices, air quality, noise quality or socio-economic resources. There are no hazardous or toxic substances at this location. The areas adjacent to the project site have been previously modified by filling, grading, paving and facilities development. Exposed areas will be grassed and allowed to revegetate to restore surface areas after construction.. The completed project will halt the present bank erosion which endangers the foundation of the park's swimming pool.

This Environmental Assessment concludes that the proposed action does not constitute an action which significantly affects the quality of the human environment. Therefore, neither a Federal nor a State of Hawaii environmental impact statement is required. This assessment includes a finding of no significant impact (FONSI).

Location	Kaneohe, O'ahu, Hawai'I, City and County of Honolulu
Tax Map Key	1-4-5:004 Portion 010
Project Site	Less than one-half acre.
State Land Use District & Zoning	Urban Land Use District; P-2 General (Public) zoning.
Ownership	City and County of Honolulu
Approving Agency	Department of Design and Construction, City and County of Honolulu, 650 South King Street, Honolulu, Hawai'I 96813.
Proposing Agency	Department of Design and Construction, City and County of Honolulu, 650 South King Street, Honolulu, Hawai'I 96813.
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Required Permits and Approvals	U.S. Army Corps of Engineers Permit to Dredge/excavate or fill; CZM Consistency Declaration; DOH – Water Quality Certification; DLNR-Commission on Water Resources Management - Stream Channel Alteration Permit; Building & Grading Permits.

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CHAPTER 1 - PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

This Environmental Assessment (EA) is prepared in accordance with Chapter 343 of the Hawaii Revised Statutes. The EA considers the impacts of the Proposed Action on the environment and the community. The document states the purpose and need for the Proposed Action in Section 1.2. The Proposed Action and alternatives of the Proposed Action are described in Chapters 2 and 3. The affected environment in which the Proposed Action is situated is described in Chapter 4, while the environmental consequences of the alternatives of the Proposed Action are discussed in Chapter 5. Chapter 6 offers a summary of the environmental impacts related to the Proposed Action. Chapter 7 states the expected determination. Chapter 8 lists the agencies and persons consulted. Chapter 9 includes a list of references, a glossary of acronyms, and the EA preparers.

The Proposed Action, by the City and County of Honolulu, is construction of channel improvements to approximately 205 lineal feet of an un-named stream adjacent to the swimming pool at Kaneohe District Park (Figures 1 & 2), next to Keaahala Road, and immediately downstream of the parking lot at Kaneohe District Court.

1.2 PURPOSE AND NEED

The purpose of the Proposed Action is to protect public health and safety by preventing erosion of the channel banks adjacent to the swimming pool which endangers the structural integrity of the public swimming pool in Kaneohe District Park.. The section of the un-named stream appears to originate from a culvert where the actual source of water may be groundwater seepage and stormwater runoff from lands drained by the culvert. The project was initiated because of problems with streambank erosion which endangered the adjacent public swimming pool.

The design standard for this small un-named stream project consists of permeable materials to prevent erosion of the stream banks for the 205 lineal foot stream segment. This project is consistent with the Master Plan (Figure 3) for Kaneohe District park which shows an open stream which is viewable and accessible to the public.

CHAPTER 2 - DESCRIPTION OF THE PROPOSED ACTION

2.1 Project Location

The project site is on the island of Oahu in the Hawaiian Islands, central Pacific Ocean. The project is located at Kaneohe, Island of Oahu, State of Hawaii. TMK (Tax Map Key) 1-4-5:004 Portion 010; and latitude N21 degrees, 24.51 minutes; longitude W157 degrees, 48.55 minutes. (Figure 1), on Keaahala Road near Kaneohe District Court, Hawaii State Hospital and Windward Community College. The existing stream emerges from a concrete culvert (Photos Figures 1 & 2) on the east side of Pookela Street (Figure 4), flows (as an open channel) through the district park, flows into a culvert and crosses beneath Keaahala Road and flows within a box culvert beneath Kahekili Highway where it emerges as an open channel which eventually discharges into Keaahala Stream.

2.2 Project Features

The proposed project is necessitated because the there are high velocity flows exiting the Pookela Street Culvert which jet storm water from the culvert directly to the un-lined and unstable stream banks on either side of the stream channel downstream of Pookela Street. The existing unlined and eroding stream banks would be lined with permeable materials including filter fabric, CRM (concrete rubble masonry) walls and rock rip rap for an approximate distance of 205 lineal feet from its origin at the Pookela Street culvert (Figures 5, 5A, 5B). The proposed project also includes a concrete beam (dissipater) at the outlet end of the culvert to reduce energy at the outlet and a CRM wall to prevent erosion of the swimming pool foundation. Approximately 90 cubic yards of material would be excavated during construction of the CRM walls and approximately 1.5 cubic yards of concrete is required for the concrete beam (dissipater). The total rip-rap to be placed is 6,500 square feet. About 235 square feet of grouted rip rap will be placed on top of the CRM walls. An area of 0.14 acres will be graded for placement of the rip-rap. A chain link fence (four feet high) will be placed around the project.

Typical low flow in this stream is quite small, less than one cubic foot per second and the width of the stream in this reach is less than one foot. However, under storm runoff conditions this 42-inch culvert is steep and has a capacity of 112 cubic feet per second which accounts for the erosion at the base of the outlet apron and along the swimming pool foundation. Typical depth is only a few inches, depending on flow. The origin of this stream appears to be from groundwater sources which originate upstream of the culvert-of-origin at Pookela Street, and from the storm drains in the parking lot of the Kaneohe District Court (and possibly from other storm drains in the upstream vicinity including Pookela Street and Windward Community College also contribute to this drain system). This stream is not listed as a perennial stream by the State Commission on Water Resources Management.

After completion of installation of the stream bank stabilization materials, vegetation will be allowed to regrow in the impacted area and it is anticipated that eventually the stream will regain a similar appearance with vegetation covering the rip rap.

A fence will be installed along the edges of the proposed project because this segment of the stream has existing steep banks and the banks will be steep after the project so that the public should be deterred from attempting to scale these stream banks.

2.3 Project Schedule and Cost

A schedule for the Proposed Action has not been determined. It is dependent on permitting and agency approvals. The cost of the Proposed Action is estimated to be less than $500,000.

2.4 Required Permits and Approvals

Following is a list of formal permits and approvals required.

A. U. S. Army Corps of Engineers. An "individual" permit to excavate for placement of the filter fabric and rock rip rap is required. The Corps will make a determination as to the specific applicable authority which pertains to the proposed project.

B. State of Hawaii Department of Health (DOH) A Water Quality Certification including approval of monitoring and best management practices may be required.

C. State of Hawaii Commission on Water Resource Management. A Stream Channel Alteration Permit may be required for stream channel modifications.

D. State of Hawaii Department of Business, Economic Development and Tourism, Coastal Zone Management Program. Because a federal permit is required, a Declaration of Consistency with the Hawaii Coastal Zone Management Program will be required to be obtained from the Department.

Coordination has been carried out or is underway[1] between the City and County of Honolulu and:

U.S. Army Corps of Engineers, Honolulu Engineer District

U.S. Fish and Wildlife Service[2]

National Marine Fisheries Service[3]

State of Hawaii, Department of Health

State of Hawaii, Commission on Water Resource Management

State of Hawaii Department of Business, Economic Development and Tourism, Coastal Zone Management Program[4]

City and County of Honolulu, Departments of Design and Construction, and Planning and Permitting

Kaneohe Neighborhood Board

[1]Coordination underway is via the Chapter 343 EA review process.

[2]To be carried out during the permit application process with the U.S. Army Corps of Engineers.

[3]To be carried out during the permit application process with the U.S. Army Corps of Engineers.

[4]To be carried out during the permit application process with the U.S. Army Corps of Engineers.

CHAPTER 3 - ALTERNATIVES CONSIDERED

The alternatives considered in this EA are discussed below.

3.1 NO ACTION - The No-Action alternative is the existing condition consisting of eroding streambanks which continues the exposure of community members to the public health and safety hazards and potential loss of property should the foundation for the Park's public swimming pool eventually fail. Also, discharge of sediment into State receiving waters will continue from the eroding stream banks.

3.2 ALTERNATIVE 1 – Relocate Swimming Pool. In Alternative 1, the existing public swimming pool would be relocated or reconstructed to a reduced length to avoid the streambank erosion hazards. This alternative is not feasible because of high costs and the reduced size of the swimming pool which would adversely impact pool users.

3.3 ALTERNATIVE 2 - (Recommended Alternative) Construct the Proposed Stream Channel Improvement. In Alternative 2, the proposed stream channel improvement of lining using permeable materials would result in erosion prevention while continuing to provide an open and functioning stream.

3.4 ALTERNATIVE 3 - Construct the Proposed Stream Channel Improvement Underground Using Concrete. In Alternative 3, a hardened stream channel using reinforced concrete would be used either in a pipe or box culvert and the entire improvement placed underground. This alternative is not suggested because of high costs and the complete loss of environmental values for the project reach of 205 lineal feet of stream.

Alternative 2 is the recommended alternative for this proposed project because it is the most cost-effective solution to the present streambank erosion problems, it does not result in significant loss of aquatic, recreational or other water quality values, and it maintains the present environmental ambience of the park and conforms to the existing Park Master Plan.

CHAPTER 4 - AFFECTED ENVIRONMENT

This Chapter presents a description of the environment which may be impacted by the Proposed Action. The descriptions are representative of the existing (baseline) environment and are based on historical knowledge, technical studies, previous environmental studies, and site visits.

4.1 Climate

The climate of Hawaii is moderate and can be characterized into two seasons: a) summer, from May 1 to October 31; and b) winter, from November 1 to April 30. The summer months are normally warm and dry with persistent Trade winds (northeasterly winds), while the winter months are wetter and cooler interspersed with Trade winds and Kona winds (southerly winds).

The average annual temperature at Kaneohe District Park varies between 72°F (coolest month) and 81°F (warmest month). The Trade winds typically have a range from 4 to 12 miles per hour, and rarely exceeds 24 miles per hour, though peak gusts have been recorded to 51 miles per hour.[5] Average annual rainfall at the project site is approximately 70 inches .

4.2 Geology and Groundwater Sources

Geology of the watershed overall reflects the volcanic nature of the Island of Oahu. The watershed in general is comprised of fairly steep slopes and a somewhat dissected terrain and with highly erodible soils. Typically, in Hawaii, these upland, erodible areas incur the highest rainfall and the most severe soil erosion. The vicinity of the District Park (including the State Hospital and Windward Community College) of Kaneohe was known historically for the presence of springs.

4.3 Topography

The project area is a sloping stream bed with steep banks which is adjacent to the Kaneohe District Park swimming pool. The stream bed is less that one-foot wide and consists of small rocks and finer sediment.

4.4 Flora

Most of the project site is an aquatic habitat. Flora at the site consists of a variety of non-native species. (See Appendix B). The steep banks and the stream channel include an abundant mix of “California” and “Guinea” grasses, with some “Job’s Tears”.

4.5 Fauna

Most of the project site is aquatic. During field inspections, water birds were not observed within the project site stream channel nor were they seen in the vicinity of the project area. (See Appendix B). Primary aquatic species are “Mexican mollies” and bristle nosed catfish, both are non-native stream fishes.

4.6 Endangered Species

The project area has been extensively disturbed in the past, the flora and fauna of the area consists of non-native species. (See Appendix B). There are no listed, threatened or endangered species.

[5]Climate data source, State of Hawaii *Data Book 1995.*

4.7 Historical and Archaeological Resources; Traditional and Cultural Practices; Public Access

There are no known historic sites or other undocumented archaeological surface remains at or near the proposed project area. Based on a review of a map drawn in 1876 (Figure 6), the site was part of crown lands and (as shown in Figure 6) was within the land division known as *Kea`ahala*[6]. Much of the land area surrounding and in the vicinity of the project site was cultivated in sugar cane. The stream appears to have extended further towards the mountains and it also had a fork[7] with a tributary to the west. Apparently both the tributary and the extension of the stream towards the mountains were "under grounded" during later construction of roads and development of the Hospital, the College, the roads, and the District Court, with the existing small stream as remnant. Also, an open swale can be observed adjacent to the north side of Keaahala Road. This swale may be a remnant of the western tributary.

The project site is downslope from the original Hawaii Insane Asylum (later the Territorial Hospital for the Insane, now known as the Hawaii State Hospital Kaneohe) and the project area can be seen in a photo dated 1928 (Photos Figures 3 & 4). In 1925 the Territorial Legislature appropriated $75,000 to purchase the land at Kaneohe for the new hospital site and construction was completed by about 1930.

The un-named stream (including the project site) appears on USGS maps dated 1928 (Figure 7) and 1943 (Figure 8) and on an older State Tax Map (Figure 9), but is not shown on the current USGS map (Figure 1). An extensive wetland ("swamp"[8]) is shown on the 1943 USGS map and on an older TMK. The wetland boundary is just downstream and outside of the project site limits. The wetland was apparently filled during construction of Kahekili Highway and later during construction of the District Park structures including the gym, restrooms, parking lots, and playing fields (but not by the swimming pool, which is above and outside the extent of the wetland). A remnant of the wetland still occurs across Keaahala Road from the project area. This wetland is fed by the same un-named stream where bank stabilization is proposed upstream just below Pookela Street. The master plan for the District Park (May 1979) recognizes this wetland remnant and proposes lagoons or water features at this location.

Historically, and in general, this upland area in the vicinity of the Hospital was known for its abundance of springs[9] and perhaps the former "marsh" or wetlands at the lower portion of Kaneohe District park may have been used for agricultural purposes, however there is no data to support this.

A Governor's Executive Order 2528, (October 6, 1970) transferred 31.367 acres to the City and County of Honolulu for the Kaneohe District Park and construction began soon after. A master plan (Figure 3)for the Park (May 1979) shows the un-named stream as an open watercourse.

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[6] *Kea`ahala* can mean a stream, land section or playground, and literally the pandanus root *(Place Names of Hawaii*, Pukui & Elbert, 1947, p. 100).

[7] The fork was approximately at the location of the existing project site.

[8] "Swamp" is the actual word used on the map. Technically a swamp is a wetland with trees, and this site may not have been wooded.

[9] Reminiscence of S. Mello relating her father's and grandfather's stories to her when a young girl, both of whom are now deceased and who worked and were familiar with the area.

Several modern practices have been identified to take place along the banks of the subject unnamed stream. These include families and children accessing a segment of the stream immediately downstream[10] of the proposed project, viewing, picnicking near the stream, and "fishing" in the stream by children who use scoop nets or small hook and line rigs. Parents bring their children to this location because the stream is shallow, small, and easily accessible from the stream banks. In addition, the parking lot, public restrooms, swimming pool, and gym are available at the park. Some people may gather the Job's Tears (*Coix lacryma-jobi*) which grow within the stream's banks.

4.8.1 Watershed

The physical watershed cannot be defined today because the drainage basin boundary has been obscured by historic grading and land use changes. However, based on a review of the 1876 map, the watershed would be quite small which would account for the low volume of flow. Some of the watershed has been paved and made impermeable. Also, groundwater springs may have been redirected and drainage from some paved surfaces (District Court parking lot for example) has been added.

4.8.2 Plans, Land Use and Ownership

The project site is located in the State of Hawaii, Land Use District Classification of Urban, owned by the City and County of Honolulu, and the City and County of Honolulu has designated the entire area as P-2 General public facility zoning which is appropriate for use as a public county park.

4.8.3 Wetlands

There are no wetlands shown on the national wetlands inventory maps for this location.

4.8.4 Population

The project site and surrounding areas include the District Park, Castle Hills Subdivision, the District Court, Windward Community College and the State Hospital. There are no residential subdivisions in the immediate area. There are some dwellings for residents at the State Hospital, but this is a very small and stable population.

4.9 Flood Hazard, Tsunami and Flood Classifications

The project site and surrounding areas are shown as Zone X in the City and County of Honolulu's geographic information system. The source of the Zone X designation is the Federal Emergency Management Office, Flood Insurance Rate Maps. The Zone X classification is assigned to areas determined to be outside the 500-year flood plain.

4.10 Hazardous and Toxic Wastes

There are no known Hazardous or Toxic Wastes disposal sites in the area. State of Hawaii Department of Health records[11] do not list any toxic or contaminated releases in this area. The State of Hawaii Department of Health also does not list any reports of problems with leaking USTs (underground storage tanks) at the project location or vicinity.[12]

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[10]The segment of the stream which constitutes the project site has near vertical banks and is heavily overgrown with "California" and "guinea" grass. It is not safely accessible and families tend to access the stream downstream of the project site.

[11]State of Hawaii, Department of Health, HEER (Hazard Evaluation and Emergency Response Office), database 1990 to present.

[12]State of Hawaii, Department of Health, Hazardous and Solid Waste web site for leaking underground storage tanks.

4.11 Air Quality
In general, outdoor air quality at the project site meets federal and state standards because of consistent trade winds and the absence of significant industrial sources of air contamination.

4.12 Noise
Noise in this location is typical of an older neighborhood with low density traffic patterns to and from the Community College, Castle Hills Subdivision, the District Court, and the Hospital. The Park is located adjacent to Kahekili highway.

4.13.1 Water Quality
One water sample was taken and analyzed. At the impact location, the water had the following characteristics: turbidity (1.64 NTU), suspended sediment (TSS 1.0 mg/l), and nutrients (Total N 238 micrograms/liter; Total P 52 micrograms/liter). These results are discussed in Appendix B.

4.14 Coastal Zone Management
The entire State of Hawaii (including all land area and extending three miles seaward from the shore) is within the coastal zone as designated by the National Oceanic and Atmospheric Administration and the Hawaii Coastal Zone Management Program. However, the project site is not within the special management area (SMA) of the City and County of Honolulu, and there is no requirement for a permit to perform construction in the SMA.

4.15 Traffic
Traffic is not generated by the un-named stream itself. Traffic reflects the activity to and from the Community College, the Park, the Hospital, District Court and Castle Hills Subdivision.

4.16 Solid Waste
There are no solid waste facilities in the project area or watershed.

4.17 Sanitary Sewer
There are sanitary sewer lines serving the developed areas. No disruption of sewer services is anticipated.

4.18 Stream Water
This un-named drainage ditch is a tributary of Keaahala Stream. The base source is from underground water and the storm flows are from storm runoff. Historically this un-named stream appears to have been somewhat longer but development of the Community College, Castle Hills Subdivision, the District Court, and the Hospital have modified the drainage area and placed most of the original drainage ways underground.

CHAPTER 5 - ENVIRONMENTAL CONSEQUENCES

5.1 Climate
None of the alternatives are anticipated to have any significant impacts on climate, regional or local.

5.2 Geology and Groundwater Sources
None of the alternatives are anticipated to have any significant impacts on geology or groundwater sources, regional or local.

5.3 Topography
None of the alternatives are anticipated to have any significant impacts on topography, regional or local. Stream contours will not change with the addition of the permeable materials placed to prevent erosion of the stream channel banks.

5.4 Flora
None of the alternatives are anticipated to have any significant impacts on flora, regional or local. Flora consisting mostly of non-native grasses (California, guinea) will be cleared for placement of the permeable materials, but such grasses or other plants will regrow between the voids in the rock rip rap.

5.5 Fauna
None of the alternatives are anticipated to have any significant impacts on fauna, regional or local.

5.6 Endangered Species
None of the alternatives are anticipated to have any significant impacts on endangered species, regional or local.

5.7 Historical and Archaeological Resources
None of the alternatives are anticipated to have any significant impacts on historical or archaeological resources, regional or local. There are no historic sites at the project location (Appendix B). If cultural deposits or burials are found during excavation, the State Historic Preservation Division will be immediately notified and appropriate procedures as mandated by Chapter 6E HRS and HAR Title 13 shall be instituted. Modern cultural practices of families viewing or children playing or “fishing” in the stream will not be affected or altered because these activities take place just downstream of the project limits. The subject project is not anticipated to adversely impact these modern practices since the majority of the practices currently take place immediately downstream of the APE (Area of Potential Effect).

5.8.1 Watershed
None of the alternatives are anticipated to have any significant impacts on the watershed which has been previously modified.

5.8.2 Plans, Land Use and Ownership
None of the alternatives are anticipated to have any significant impacts on land use or ownership, regional or local.

5.8.3 Wetlands
None of the alternatives are anticipated to have any significant impacts on wetlands. The stream channel, though modified by placement of rock rip rap will remain permeable as it is now. There may be minor but beneficial impacts to the wetland across Keaahala Road and downstream of the project site because there will not longer be depositions of eroded soil after the project is in place.

5.8.4 Population

The alternative of "No action" would adversely affect population if the popular public swimming pool should suffer structural damage. All other alternatives benefit the population by providing for health and safety with regard to lessened erosion hazards and maintenance of the structural integrity of the swimming pool.

5.9 Flood Hazard, Tsunami and Flood Classifications

None of the alternatives are anticipated to have any significant impacts on flood hazards, tsunami or flood classifications, regional or local. However, "No action" would result in a continued condition of erosion of the adjacent streambanks.

5.10 Hazardous and Toxic Wastes

None of the alternatives are anticipated to have any significant impacts on hazardous or toxic wastes, regional or local.

5.11 Air Quality

None of the alternatives are anticipated to have any significant impacts on air quality, regional or local.

Short term ambient air quality, may be slightly degraded due to implementation of the proposed plan. Such conditions would be due to emissions from the construction equipment and vehicles which may slightly and temporarily impact air quality in the area. The short-term construction impacts on air quality will be mitigated by compliance with the State of Hawaii, Department of Health rules and regulation on construction activities. Such activities include limitations on hours of operation during normal working hours (see next paragraph) and requirements that all equipment be maintained and operated according to manufacturer's specifications and in compliance with State and Federal laws. Dust control measures will include use of spot-watering, netting or screens as needed. Compliance with air quality rules are the responsibility of the contractor.

5.12 Noise

Construction activities will cause short-term noise impacts in the area. However, these impacts are not expected to be significant. A noise permit could be required by the Department of Health if the proposed equipment to be used during construction would be operated outside of normal working hours (7:00 AM to 5:30 PM, weekdays) or at night. Noise impacts are mitigated by limitations on hours of operation and requirements that all equipment be maintained according to manufacture's specifications, including proper muffling of internal combustion engines. Compliance with noise rules are the responsibility of the contractor.

5.13 Water Quality

The methods of construction will prevent the release of material during excavation and construction. Water quality downstream will not be adversely affected. Because the proposed project is a generator only of eroded soil but not other contaminants, has a short reach and is a small proportion of the total drainage area of Keaahala Stream, it is not anticipated to significantly affect the pollutant loading for the affected drainage basin. Water quality monitoring under the guidance of the DOH Clean Water Branch (CWB) will be conducted prior to, during, and after the proposed project and Best Management Practices will be applied under guidance of the DOH-CWB. Such BMPs may include the use of filters consisting of cloth or other material to prevent the release of suspended solids, the isolation of the work area from the stream through use of sheet pile coffer dams or other measures to be agreed upon by the construction contractor and the Department of Health when permits and BMPs are finalized. Compliance with water quality rules are the responsibility of the contractor.

5.14 Coastal Zone Management

These alternatives are not expected to affect Coastal Zone Management Area programs, activities, plans or policies. Because all land area in the State of Hawaii is considered to be in the coastal zone, a Coastal Zone Consistency Declaration will be filed with the State of Hawaii as part of the application for the U.S. Army Corps of Engineers permit to excavate for the foundation.

5.15 Traffic

Alternatives 2 and 3 require use of trucks on public roadways to transport construction materials. There would be minor adverse but temporary impacts on traffic during those periods of transport which would primarily be during normal working hours. Normal working hours are considered to be between 6:30 AM and 5 PM week-days and excluding state, federal and local holidays.

5.16 Solid Waste

There would be no effect on solid waste facilities. There is not expected to be significant excess material remaining from excavation work. Excess excavated material will be disposed of at an approved landfill site. Material (for example, graded rock) will be imported as necessary to meet design requirements.

5.17 Sanitary Sewer

There would be no impacts on the sanitary sewer system from any of the alternatives.

5.18 Stream Water

The methods of construction will prevent the release of material during excavation and construction. Water quality downstream will not be adversely affected. Stream flow is perennial and its quality is probably highly influenced by the surface areas draining into the storm drain system which transmits the high volume storm water flows through this system.

CHAPTER 6 - MITIGATION

The design of the recommended alternative (Alternative 2) incorporates permeable materials (filter cloth and rock rip rap) which will prevent erosion of the stream banks in the reach of the stream (about 205 lineal feet) directly below the Pookela Street Culvert where stream flow velocities are at erosive levels. Permeable materials were chosen instead of reinforced concrete lining in order to retain some elements of a “natural” stream so that water could both enter and exit into the ground in the impacted reach via voids in the ungrouted rip rap, vegetation can re-grow in the ungrouted rip rap voids, and some aquatic flora and fauna may exist in the flow that arrives and passes through the channel. The recommended alternative is the least impact alternative which can stabilize the stream banks while allowing visual and recreational values to remain.

Prior to construction, the Contractor shall comply with the requirements of the Dept. of Army 404 Permit, Dept. of Health 401 Water Quality Certification, Stream Channel Alteration Permit, and Hawaii Coastal Zone Management Program Federal Consistency Review. Also, if required, the Contractor shall comply with the requirements of the Dept. of Health's NPDES Permit Associated with Construction Activity Dewatering.

Cultural resource protection will require that the contractor notify the contracting office, construction manager, and the State of Hawaii, Historic Preservation Office in the event that burials or archaeological artifacts are encountered.

Construction-related traffic will operate during normal working hours and will follow existing regulations regarding road clean-up (if necessary) resulting from this traffic and utilize traffic control devices to provide safe ingress and egress to the project site.

CHAPTER 7 - EXPECTED DETERMINATION

7.1 **Finding of No Significant Impact (FONSI)**. The proposed improvements will not have a significant effect on the environment and therefore preparation of an environmental impact statement is not required. This document constitutes a Notice of Negative Declaration/Finding of No Significant Impact for the proposed project. This determination was based on review and analysis of the "Significance Criteria" in Section 11-200-12 of the Hawaii'I Administrative Rules, as documented below.

7.2 **Findings and reasons supporting the determination including justifying evidence.**

7.2.1 *No irrevocable commitment to loss or destruction of any natural or cultural resource would result.* There are no sites within the project boundaries, nor would any sites outside the project boundaries be affected.

7.2.2 *The proposed project would not curtail the range of beneficial uses of the environment.* The proposed project will not change the lack of beneficial uses at present in the affected environment.

7.2.3 *The proposed project would not conflict with the state's long-term environmental policies or goals and guidelines.* The state's environmental policies and guidelines as set forth in Chapter 343, Hawaii'I Revised Statutes, "State Environmental Policy", encompass two broad policies: conservation of natural resources, and enhancement of the quality of life. The proposed project will not reduce the natural resources of this segment of the un-named stream, and the health and safety of adjacent residents will be enhanced by providing for increased streambank erosion protection.

7.2.4 *The proposed project will improve the economic and social welfare of the community and the state.* The proposed improvements add to the benefits available to residents by reducing the streambank erosion hazards of the stream and protecting the public swimming pool foundation.

7.2.5 *The proposed project would not substantially affect public health*. The proposed improvements will benefit public health by lessening the present streambank erosion problem and maintaining operation of the public swimming pool

7.2.6 *No substantial secondary impacts, such as population changes or effects on public facilities, are expected.* The project will not alter the present use of the area and will not cause population changes nor will there be any effects on existing public facilities. The area has actually had a slight population decrease in the last 10 years implying that the project is not inducing population growth.

7.2.7 *No substantial degradation of environmental quality is expected due to the proposed project.* Construction activities would have potential short-term impacts on ambient environmental quality, although these impacts are expected to be minor. In the long term, the completed project will improve the environmental quality of the surrounding community due to reduction of the stream channel erosion problem which puts property at risk. Also, sediment loads to Keaahala Stream will be slightly reduced due to placement of the permeable filter cloth and rock rip rap.

7.2.8 *No cumulative effect on the environment or commitment to larger actions will be involved.* The proposed improvements affect only the existing project and are part of the required maintenance of the facility.

7.2.9 *No rare, threatened or endangered species or their habitats are affected.* No impacts are anticipated on any candidate, proposed or listed endangered species or their habitats. There are no known threatened/endangered species or their habitats within the project limits.

7.2.10 *The proposed project will not detrimentally affect air or water quality or ambient noise levels.* Construction activities may cause short-term impacts to air, noise and water quality which will be mitigated to the extent practicable.

7.2.11 *The proposed project will not detrimentally affect environmentally sensitive areas such as flood plains, tsunami zones, beaches, erosion-prone areas, geologically hazardous lands, estuaries, fresh waters or coastal waters.* The proposed project will harden the stream channel in order to reduce streambank erosion in this reach of the un-named stream. This area is not geologically erosion prone, but the streambank erosion problems have resulted from urbanization of this area with concomitant loss of natural stream area.

7.2.12 *The proposed project will improve scenic vistas and view planes identified in county or state plans or studies.* The proposed improvements have little or no impact on scenic vistas because the basic stream channel is below the typical line of sight towards the ocean, mountains or horizon.

7.2.13 *There will be no requirement for substantial energy consumption.* Construction of the project will not require substantial energy consumption.

CHAPTER 8 - AGENCIES AND PERSONS CONSULTED OR TO BE CONSULTED & PERMITS REQUIRED

The following agencies or groups have been or will be consulted with regard to the draft environmental assessment for the proposed project. The following permits or approvals are or may be required.

Agency or Person to be Consulted	Permit or Approval Required
Department of the Army, Corps of Engineers, Honolulu Engineer District	Permit required to dredge/excavate/ stream.
Department of Interior, Fish and Wildlife Service	Coordination required per the federal Endangered Species Act.
Department of Commerce, National Marine Fisheries Service	Coordination required per the federal Coastal Zone Management Act
State of Hawaii Department of Health	Water Quality Certification if Corps permit per the Clean Water Act; NPDES permits for construction dewatering and construction site storm water management may be required; compliance with State Water Quality Standards.
State of Hawaii Commission on Water Resource Management	A Stream Channel Alteration Permit will be required.
State of Hawaii, Department of Land and Natural Resources, Historic Preservation Division	Coordination required with the State Historic Preservation Officer per the Federal Historic Preservation Act through circulation of the EA.
State of Hawaii, Coastal Zone Management Program	CZM Consistency Declaration.
City and County of Honolulu, Departments of Design and Construction & Planning and Permitting	Approval of the EA required. Grading Permit.
Neighborhood Board	Coordination done through circulation of the EA for public comment and presentation at the Neighborhood Board.
Community Groups	Coordination done through circulation of the EA for public comment.
Individuals	Coordination done through circulation of the EA for public comment.

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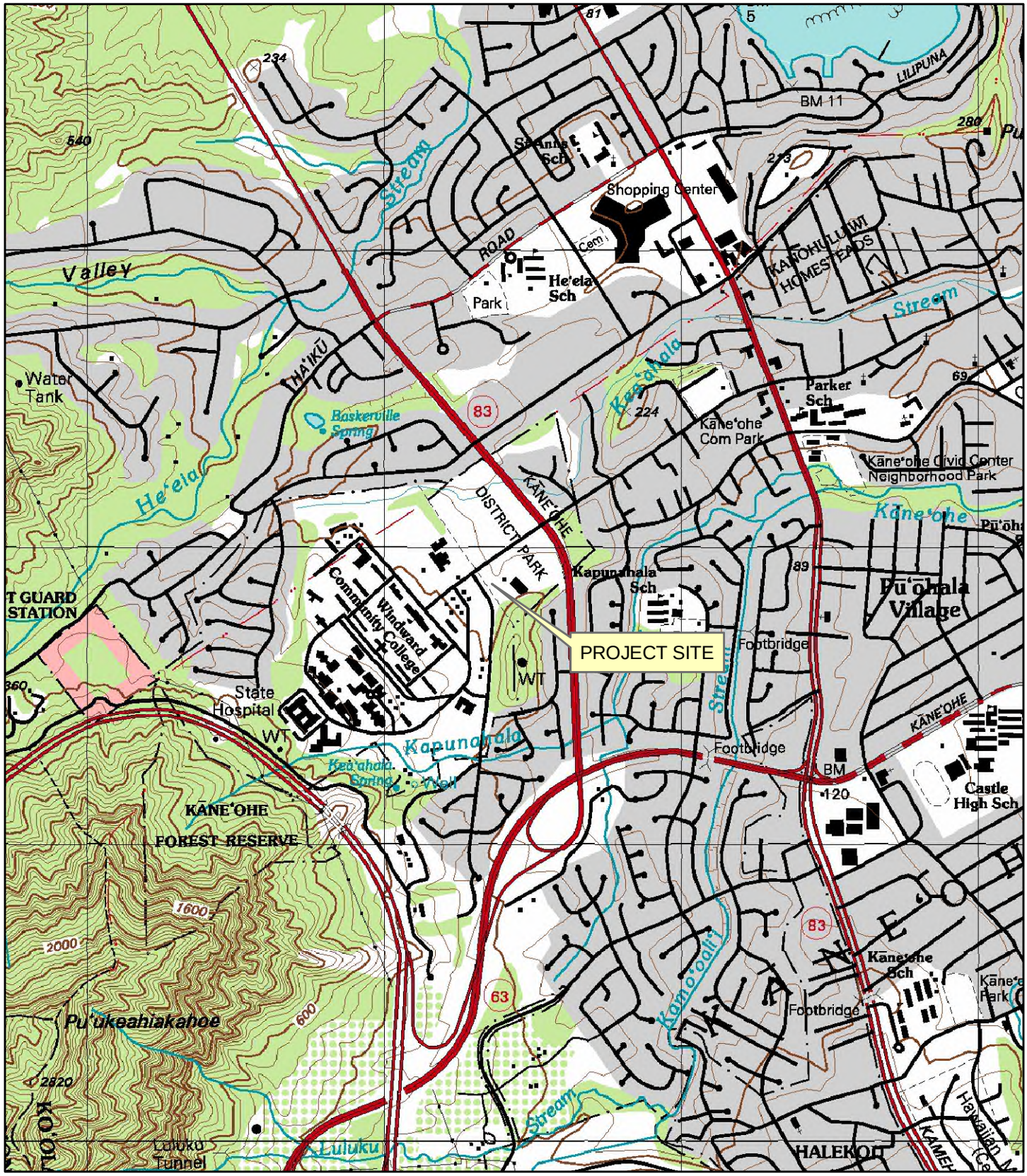
GLOSSARY

APE	Area of Potential Effect
BMP	Best Management Practices
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
COE, USACE	U.S. Army Corps of Engineers
CRM	Concrete Rubble Masonry
CWA	Clean Water Act
CZM	Coastal Zone Management
DLNR	Department of Land and Natural Resources, State of Hawaii
DOD	Department of Defense, U. S.
DOH	Department of Health, State of Hawaii
EA	Environmental Assessment
EIS	Environmental Impact Statement
HEER	Hazard Evaluation and Emergency Response, DOH, State of Hawaii
NMFS	National Marine Fisheries Service, U.S. Department of Commerce
NOI	Notice of Intent
NPDES	National Pollution Discharge Elimination System
Riprap	Rock which is rough, coarse, jagged, or angular, of an appropriate dimension
SHPO	State Historic Preservation Officer, DLNR, Historic Preservation Division
SMA	Special Management Area
TSS	Total Suspended Solids
USFWS	U.S. Fish and Wildlife Service, Department of the Interior

ENVIRONMENTAL ASSESSMENT PREPARER

CONSULTANT

Name:	Eugene P. Dashiell, Member, American Institute of Certified Planners
Company:	Environmental Planning Services
Area of Expertise:	Environmental Planning and Analysis
Years of Experience:	25 years



2,500 1,250 0 2,500 Feet

N

Kaneohe District Park
Miscellaneous Improvements
LOCATION MAP
FIGURE 1

E. Dashiell
Honolulu 8/25/07

N

620 310 0 620 Feet

Kaneohe District Park
Miscellaneous Improvements
VICINITY MAP
FIGURE 2

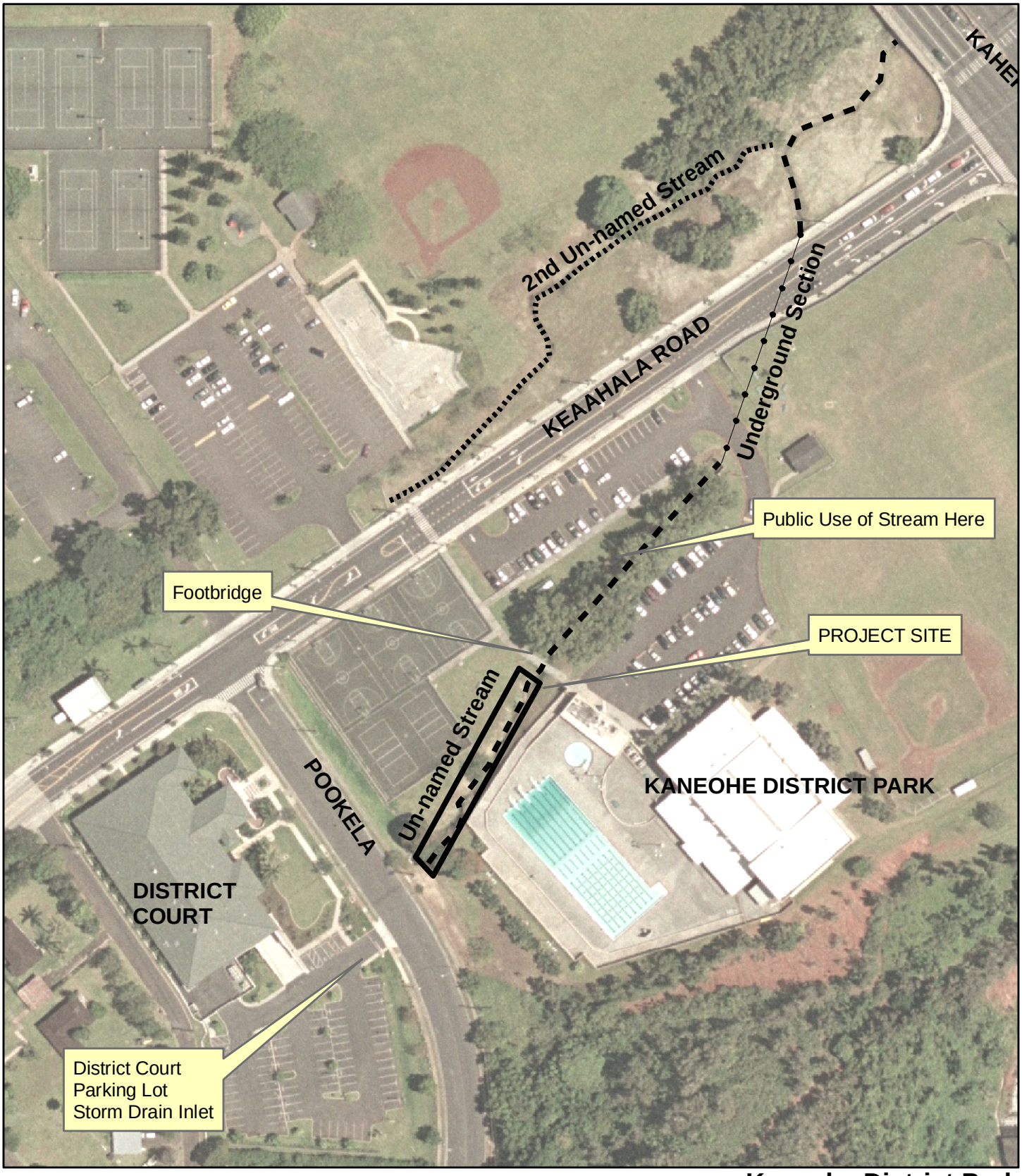
E. Dashiell
Honolulu 8/25/07

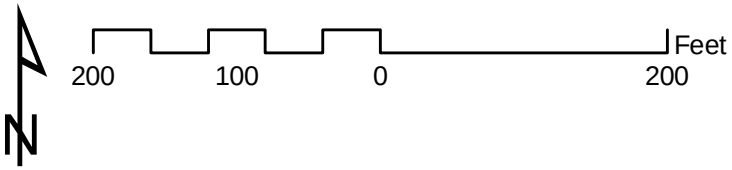
N

150 75 0 150 Feet

Kaneohe District Park
Miscellaneous Improvements
PARK MASTER PLAN - 1979
FIGURE 3

E. Dashiell
Honolulu 8/25/07





Kaneohe District Park
Miscellaneous Improvements
UN-NAMED STREAMS
FIGURE 4

E. Dashiell
Honolulu 8/25/07

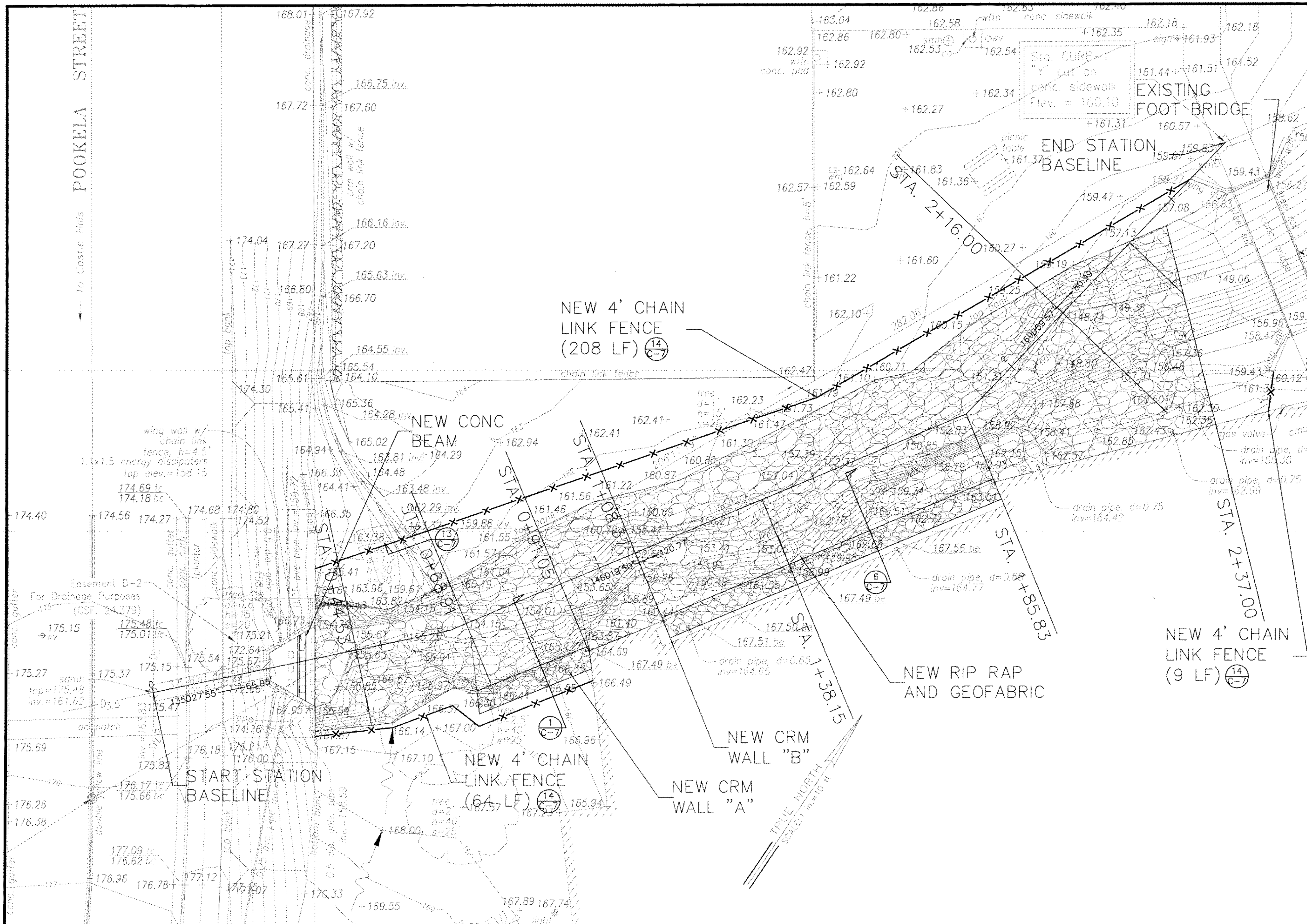
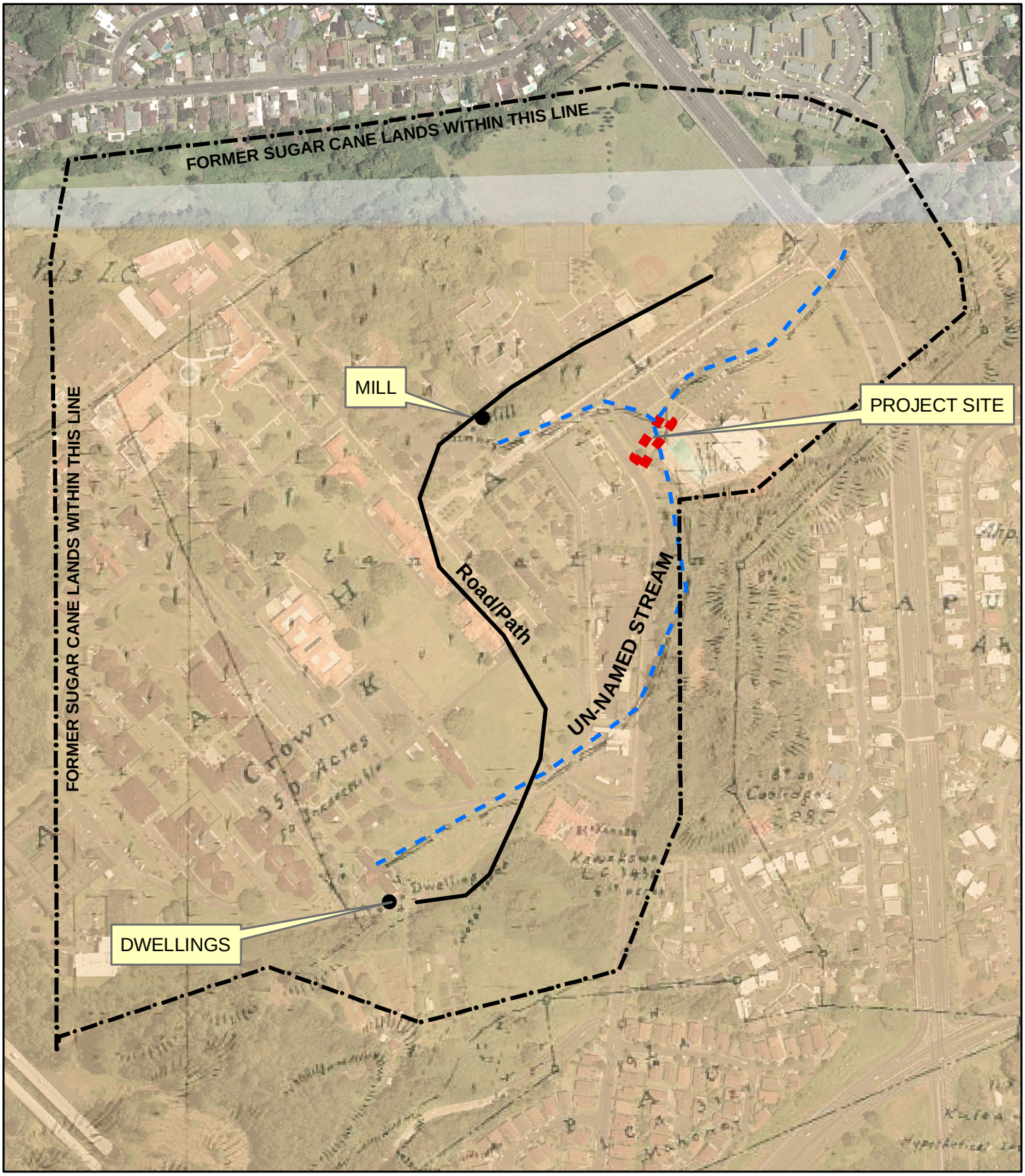

POOKELA STREET
To Castle Hills
NEW 4' CHAIN LINK FENCE (208 LF) 14/C-7
NEW CONC BEAM
EXISTING FOOT BRIDGE
END STATION BASELINE
STA. 2+16.00
STA. 0+24.53
STA. 0+68.91
STA. 0+91.05
STA. 1+08.57
STA. 1+38.15
STA. 1+85.83
STA. 2+37.00
NEW 4' CHAIN LINK FENCE (9 LF) 14/C-7
NEW RIP RAP AND GEOFABRIC
NEW CRM WALL "B"
NEW CRM WALL "A"
NEW 4' CHAIN LINK FENCE (64 LF) 14/C-7
START STATION BASELINE
Easement D-2 For Drainage Purposes (CSF. 24,379)
TRUE NORTH
Sta. CURB "Y" cut on conc. sidewalk Elev. = 160.10
KENT R. MORIMOTO LICENSED PROFESSIONAL ENGINEER No. 6974-C HAWAII, U.S.A.

FIGURE 5
SITE PLAN

DEPARTMENT OF DESIGN AND CONSTRUCTION
CITY & COUNTY OF HONOLULU

KANEOHE DISTRICT PARK
MISCELLANEOUS IMPROVEMENTS
SITE PLAN

JOB NO.
DRAWING NO. C-4
SHEET NO. 5 OF 8
FILE NO.

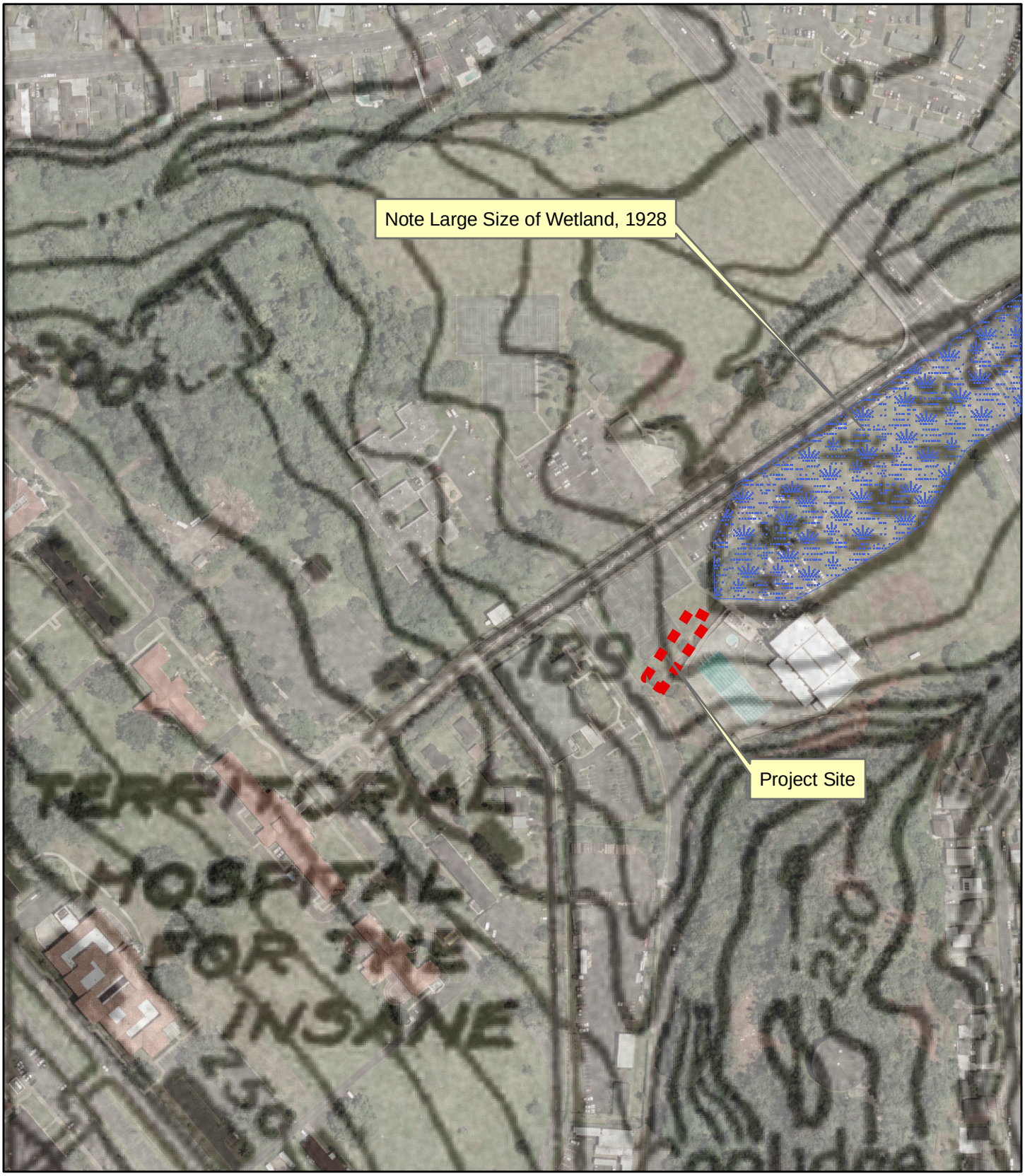


N

500 250 0 500 Feet

Kaneohe District Park
Miscellaneous Improvements
1876 MAP BY LYONS
FIGURE 6

E. Dashiell
Honolulu 8/25/07



N

500 250 0 500 Feet

Kaneohe District Park
Miscellaneous Improvements
USGS Map 1928
FIGURE 7

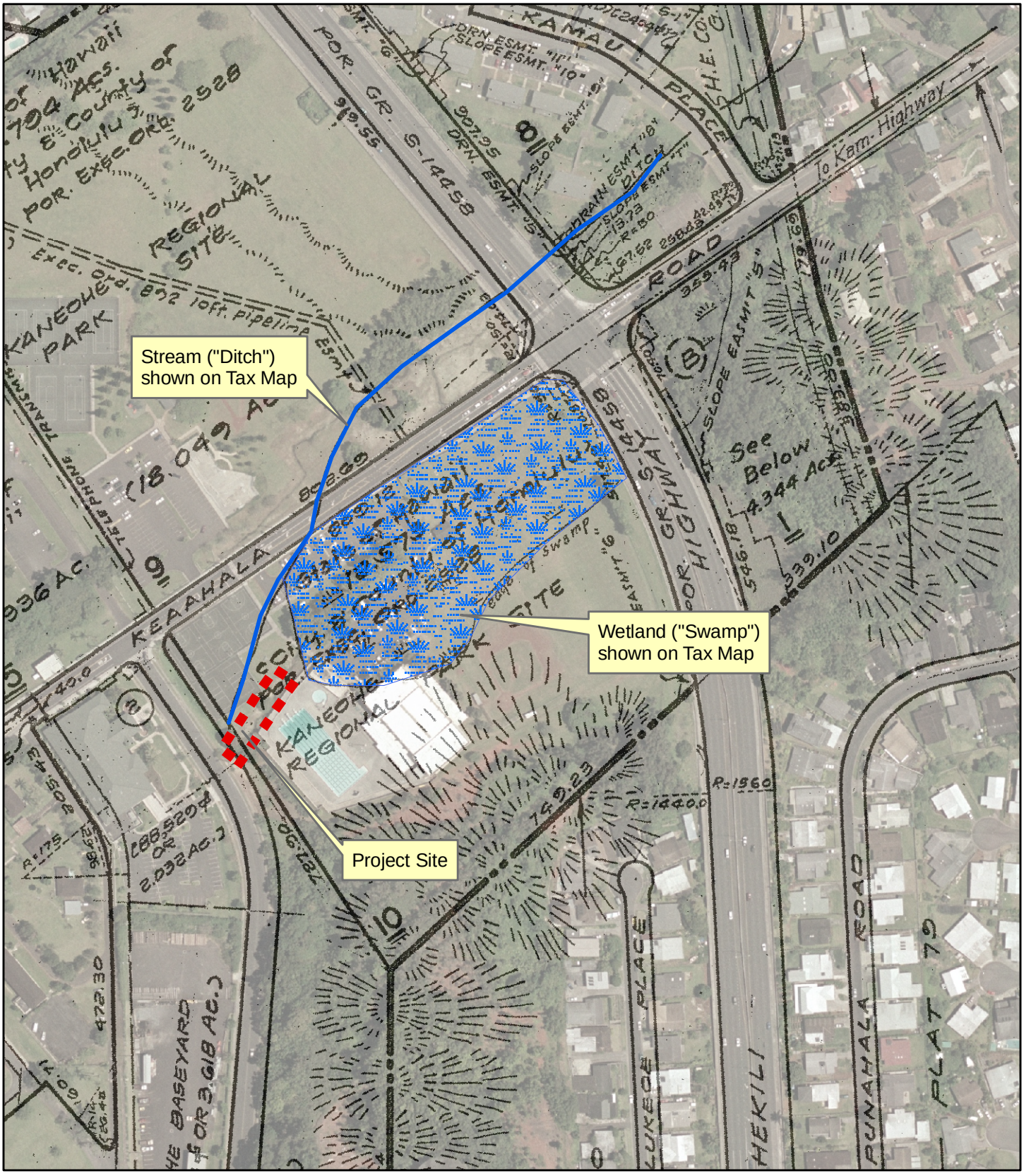
E. Dashiell
Honolulu 7/14/07

500 250 0 500 Feet

N

Kaneohe District Park
Miscellaneous Improvements
USGS Map 1943
FIGURE 8

E. Dashiell
Honolulu 7/14/07



Kaneohe District Park
Miscellaneous Improvements
TAX KEY MAP
FIGURE 9

E. Dashiell
Honolulu 7/14/07

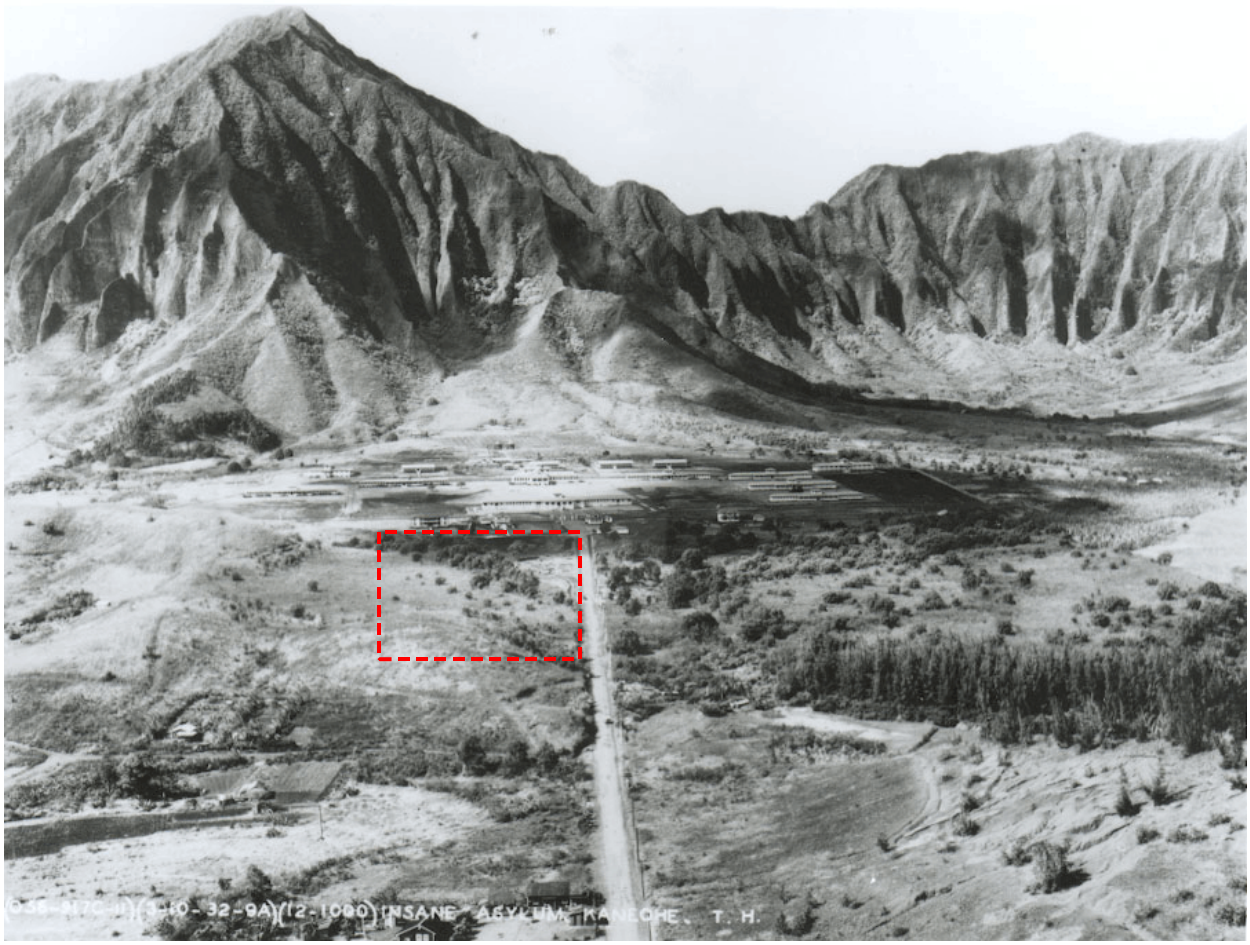


Figure 1A. Territorial Hospital, 1932. Keaahala Road shown in foreground directly to the hospital. Kaneohe District Park site (rectangular area) is left of Keaahala Road, just before entering the hospital grounds.
Figure 2A (Below) detail of park site note stream alignment and unpaved road.

APPENDIX A

ARCHAEOLOGICAL ASSESSMENT

ASC090701

Archaeological Assessment Report:
Kane`ohe District Park Improvements
Stream Bank Erosion Control and Stabilization
Kane`ohe *ahupua`a*, Ko`olaupoko District, O`ahu Island
TMK: (1) 4-5-04: Portion 10

September 2007

Aki Sinoto Consulting
2333 Kapiolani Blvd., No. 2704
Honolulu, Hawai`i 96826

ASC090701

Archaeological Assessment Report:
Kane`ohe District Park Improvements
Stream Bank Erosion Control and Stabilization
Kane`ohe *ahupua`a,* Ko`olaupoko District, O`ahu Island
TMK: (1) 4-5-04: Portion 10

for:

Austin Tsutsumi & Associates, Inc.
501 Sumner Street;
Honolulu, Hawai‘i 96817-5031

by:

Aki Sinoto

and

Eugene Dashiell

September 2007

Aki Sinoto Consulting
2333 Kapiolani Blvd., No. 2704
Honolulu, Hawai`i 96826

ABSTRACT

At the request of Austin Tsutsumi & Associates of Honolulu, representing the City and County of Honolulu, Aki Sinoto Consulting undertook an archaeological assessment survey, in conjunction with the proposed Kane`ohe District Park Improvements. The purpose of the improvement project is to protect the foundation of the swimming pool which is threatened by erosion of the banks of an adjacent un-named stream. The proposed improvements involve the implementation of stream bank erosion control and stabilization immediately adjacent to the northeast of the swimming pool deck at Kane`ohe District Park. The Area of Potential Effect occupies an approximately 200 ft long section of the small, probable spring-fed, unnamed stream, *makai* from where it emerges from a concrete culvert passing under Pookela Street.

No significant archaeological or historic remains or other evidence of human activities were encountered within the boundaries of the subject project area. Mass grading and other ground surface alteration activities associated with the construction of the District Park during the 1970s, including the swimming pool complex, and subsequent construction of Po`okela Street would all have extensively impacted the immediate project area.

Based on the negative results of the current assessment procedure as well as the extensive previous modifications that took place during large-scale, historic-period, agricultural endeavors and modern-period construction of the district park; no further historic preservation-related procedures, including archaeological monitoring during construction, are recommended in conjunction with the proposed erosion prevention activities.

Cover Photo: Pineapple Fields in Southern Kaneohe (*Paradise of the Pacific, Dec. 1923*)

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LIST OF FIGURES

INTRODUCTION

At the request of Austin Tsutsumi & Associates of Honolulu, representing the City and County of Honolulu, Aki Sinoto Consulting undertook an archaeological assessment survey, in accordance with Chapter 6E and HAR Title 13-276, in conjunction with the proposed Kane`ohe District Park Improvements. The purpose of the improvement project is to protect the foundation of the swimming pool which is threatened by erosion of the banks of an adjacent un-named stream. The proposed improvements involve the implementation of stream bank erosion control and stabilization immediately adjacent to the northeast of the swimming pool deck at Kane`ohe District Park.

PROJECT AREA

The project site, encompassing less than one-half acre, is located in the southwest quadrant of the intersection of Keaahala Road and Pookela Street *makai* and across from Kaneohe District Court. The Area of Potential Effect occupies an approximately 200 ft long section of the small, probable spring-fed, unnamed stream, *makai* from where it emerges from a concrete culvert passing under Pookela Street. The Kane`ohe District Park (TMK: (1) 4-5-04: Portion 10) is located *mauka* of Kahekili Highway and *makai* of Windward Community College and the State Hospital, in Kane`ohe *ahupua`a*, Ko`olaupoko District, O`ahu Island (Fig. 1). The un-named small stream, traverses across the district park, as an open channel, crossing Keaahala Road along a west to east orientation and flows through a box culvert beneath Kahekili Highway and re-emerges as an open channel which eventually merges into Keaahala Stream.

ENVIRONMENT

The project area occurs on the windward slopes of the Ko`olau mountain range in the inland portion of Kane`ohe *ahupua`a* known for its many springs and groundwater seeps. The majority of the area contained within the current project boundaries can be characterized as aquatic. Vegetation at the site consists of a variety of exotic species commonly used for landscaping. In the immediate area of the stream banks are a mix of grasses, most notably Job's Tears (*Coix lacryma-jobi*).

The annual rainfall is estimated to average 70 inches and the prevailing winds are northeasterly (tradewinds) ranging from 4 to 24 miles per hour. The generally moderate climate can be described as having two seasons; summer from May to October and winter from November to April. The winter months are generally cooler and wetter.

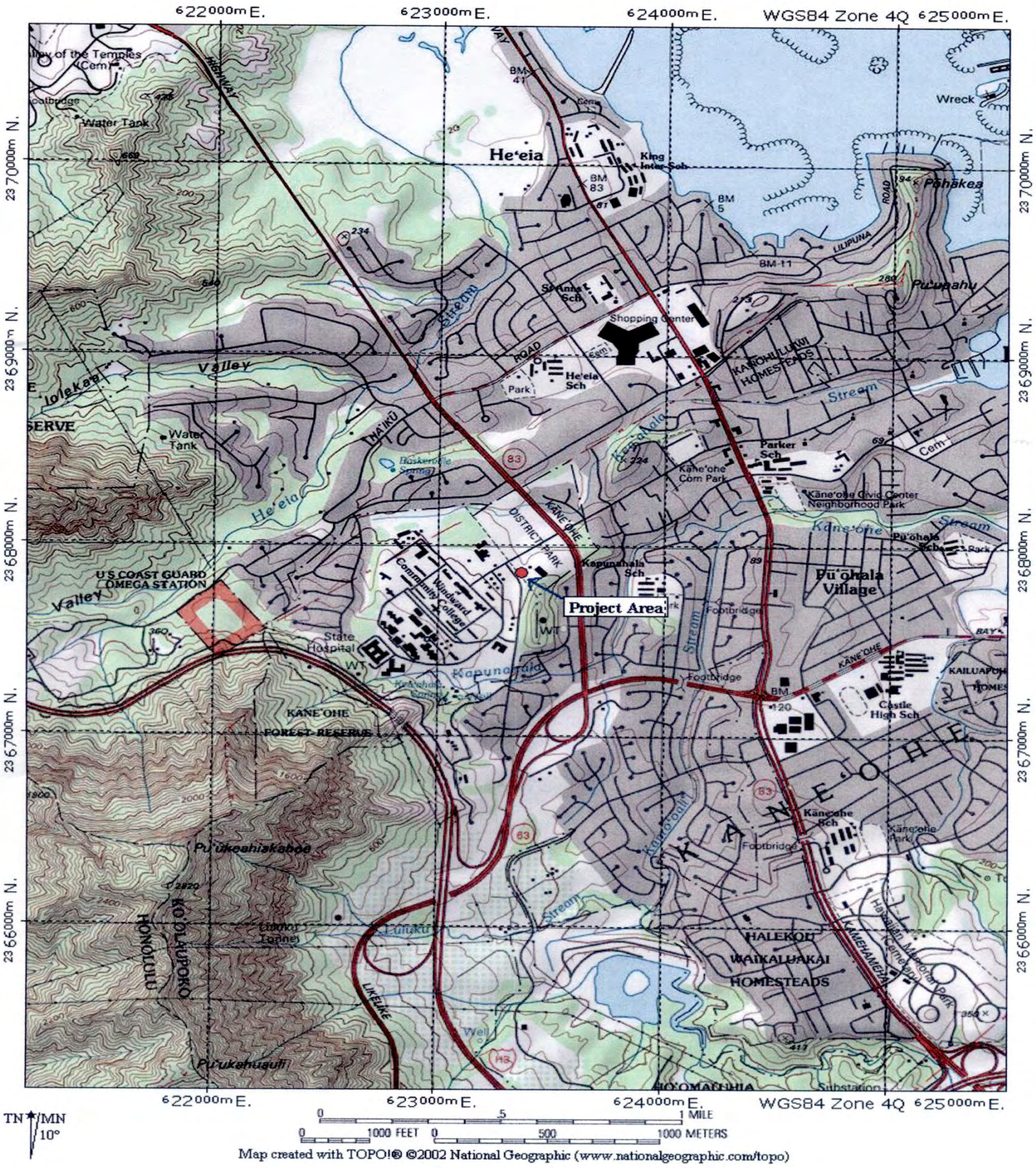

Figure 1. Location of Project Area on USGS Kane`ohe Quadrangle

Two major soil groups, the Hanalei and Lolekaa series, are represented in the area. The Hanalei series of soils are developed in alluvium derived from basic igneous rock, with slow runoff and slight erosion hazard. The gently sloping lands with this type of soil are used for sugarcane, taro, and pasture. The Lolekaa series of soils occurring on fans and terraces on windward O`ahu are well-drained and developed in gravelly colluvium and alluvium. Ranging from gently sloping to very steep, lands with these soils with slow runoff and slight erosion hazard are used for pasture, homesites, truck crops, bananas, and papayas (Foote et al. 1972). Generally the Lolekaa soils occur in areas of higher elevation than the Hanalei soils.

For a more detailed description of the natural environment, the reader is referred to Appendix B of the Environmental Assessment document containing the biological consultant's report.

HISTORIC BACKGROUND

Oral traditions regarding Kane'ohe often refer to its rich resources and high productivity. Kamakau referred to Kane`ohe as the "most valuable part" of Ko`olaupoko in the 1830s (Kamakau 1961:303). Important personages in legend and during the early historical period favored Kane`ohe for its fertile lands, abundant fresh water, and marine resources. Taro cultivation flourished in the uplands, stream sides, and coastal flats with fishpond aquaculture along the immediate shoreline areas. Kamehameha I retained the *ahupua`a* of kane`ohe as his personal lands and much of it went to his sons, Kamehameha II and III. During the Mahele, Queen Kalama, the wife of Kamehameha III was awarded 9,500 acres of Kane`ohe. The project area is located within former Crown lands and no Land Commission Awards (LCA) are present.

By 1860, commercial agriculture began with rice and sugar and large tracts of land changed ownership. Rice cultivation overtook taro and dominated the coastal lowlands. Cultivation, milling, and commerce of rice were controlled by Chinese immigrants at its height around the turn of the 19th to 20th centuries. By the 1920, rice production in Kane`ohe slowed. During the latter part of the 1800s, cattle ranching also flourished with 12,000 acres and 2000 head of cattle belonging to Kane`ohe Ranch. During a short period between 1910 to 1925, pineapple cultivation also took place, mostly in the *mauka* lands and mid-elevation plateaus.. Following the decline of pineapple cultivation, the former fields became pasture or scrub forest. Early 20th century maps show a large area designated "Keaahala U.S. Military Reservation." The nature of the military use of the area is uncertain and no installations are listed in the area. Between 1925 and 1930, the Territorial Legislature purchased lands and completed construction of the Territorial Hospital for the Insane (Kaneohe State Hospital).

According to Handy and Handy (1972:455), the area around Kea`ahala Stream was heavily developed as taro *lo`i* with major areas still under cultivation into 1953, including some of the *mauka* areas. Upland Kane`ohe was also noted for sweet potato, banana, *wauke*, and *lauhala*.

PREVIOUS ARCHAEOLOGY

Although Kane`ohe *ahupua`a* is one of the most intensively studied *ahupua`a* on O`ahu Island, no archaeological investigations have previously been undertaken within the boundaries of the district park. However, a number of small projects have been completed in the neighboring areas and a sampling of these is summarized here in chronological order of the undertaking.

In 1977, Bishop Museum conducted a Phase I archaeological survey in conjunction with a segment of the proposed H-3 Interstate Highway. The proposed alignment spanned the highway corrider between Halekou Interchange to the Windward Portal of the Ko`olau Tunnel (Dye 1977). Four previously recorded sites were further investigated during the course of this project. One site with possible burials was recommended for monitoring and possible further mitigation work. The three other sites were considered to have realized their significance based on the recovered data.

In 1992, Cultural Surveys Hawaii conducted an archaeological inventory survey in conjunction with a proposed access road connecting Po`okela Road from the Castle Hills Estates residential subdivision to Kea`ahala Road (Hammatt et al. 1992). No archaeological sites were recorded and surface artifacts consisted of fragments of modern glass and porcelain sherds.

In 1993, Aki Sinoto Consulting conducted an archaeological inventory survey within the adjoining He`eia *ahupua`a* in conjunction with a proposed perimeter fencing installation for the Haiku Valley Federal Quarantine Station (Nakamura et al. 1993). The project area was located roughly a kilometer to the west of the Hawaii State Hospital. No significant remains or evidence of past cultural activities were encountered during the survey.

In 1996, Aki Sinoto Consulting in association with Scientific Consultant Services conducted data recovery investigations in conjunction with the proposed Hope Chapel Driveway located about 300 meters southeast of the State Hospital complex. The survey of the driveway corridor resulted in no significant remains, however, a wetland, Kapunahala Marsh, adjoining the driveway was considered to warrant further testing although previous investigators had dismissed it by characterizing it as the vestige of modern development in the vicinity. Wet sediment coring, completed under a sub-contract by International Archaeological Research Institute (Athens and

Ward, 1996) resulted in conclusive evidence that the Marsh was indeed a long existing natural feature, provided a continuous pollen record for the region, and permitted the identification of significant paleo-ecological events such as pre-Polynesian colonization, changes brought about by human settlement, and the introduction of new species through time. Palm roots identified attested to the presence of *Pritchardia* palm forests at this location during the Holocene period.

In 1997, Ogden Environmental and Energy Services Co, Inc. conducted an archaeological reconnaissance survey and limited testing in conjunction with a proposed family housing project at the U.S. Coast Guard Omega Transmitter Facility in Haiku Valley in the neighboring He`eia *ahupua`a* (Williams and Nees 1997). Two sites consisting of eroded natural boulders and some lithic artifacts were recorded. No surface structural remains were encountered.

In 1998, an archaeological inventory survey was completed for the proposed Hope Chapel Church by Scientific Consultant Services, Inc. Secondary deposits of lithic artifacts and one subsurface exposure of a prehistoric *imu* feature (AD 1383-1531) were encountered (McGerty and Spear 1998). Data recovered during the course of this project completed all mitigation requirements.

In 2006, Garcia and Associates conducted an archaeological assessment of ten land parcels within the Castle Hills subdivision in conjunction with proposed State and County drainage improvements (McElroy 2006). The area is located approximately 600 meters south of the Kaneohe District Park pool complex. No significant remains were encountered.

There are no known or significant archaeological or historic sites within the subject project area. Selected buildings of the Kane`ohe State Hospital complex, in the neighboring parcel, are considered historic sites.

The settlement pattern evident in Kane`ohe *ahupua`a* is that of permanent habitation in the coastal and mid-elevation areas. *Lo`i* are found in the coastal wetland flats, alongside streams, and in the inland valleys with temporary habitation associated with agriculture and inland resource procurement and processing activities. With the subject project area being part of an environment characterized as "aquatic," *lo`i* and other features associated with wetland agricultural systems can be expected. However, the compounded effects of extensive historic and modern developments in the immediate area, most likely have severely impacted or destroyed any surface manifestations of pre-historic and early historic human activities in the project area.

METHODS

The current assessment procedure entailed a walk-through on-site inspection of the immediate project area as well as the surrounding areas. Since the study area has previously been extensively developed, literature and archival searches were conducted to obtain pertinent information regarding previous land-use, original topographic conditions, and archaeological data. Older topographical maps, archaeological reports, and relevant planning-related documents for projects in the area, such as C.J. Lyons 1876 map, USGS Quadrangle maps from 1928 and 1943, and the EIS for the Koolaupoko District Courthouse, were reviewed. Eugene Dashiell, M.A. was the principal investigator and Aki Sinoto was the project director.

SURVEY RESULTS

No significant archaeological or historic remains or other evidence of human activities were encountered within the boundaries of the subject project area. Mass grading and other ground surface alteration activities associated with the construction of the District Park during the 1970s, including the swimming pool complex, and subsequent construction of Po`okela Street would all have extensively impacted the immediate project area. A historic map dated 1876 by C.J Lyons (Fug. 2) depicts sugar cane fields with "plantation" labeled within 350 acres of Crown (K) Lands, a mill and chimney, and a "water course" in the approximate vicinity of the current project area. The USGS Quadrangle of 1943 (Fig. 3) depicts a large wetland or marsh and a stream in the current district park area. The marsh feature has subsequently been filled and only a small remnant is still extant *makai* of Kahekili Highway. The extensive landscape modifications that took place over time in the subject area are documented by these maps.

RECOMMENDATIONS

Based on the negative results of the current assessment procedure as well as the extensive previous modifications that took place during large-scale, historic-period, agricultural endeavors and modern-period construction of the district park; no further historic preservation-related procedures, including archaeological monitoring during construction, are recommended in conjunction with the proposed erosion prevention activities. However, should any subsurface remains be inadvertently exposed during construction, work shall be halted in the immediate vicinity of the discovery, and a qualified archaeologist shall be contacted to implement necessary mitigation measures and undertake coordination with the State Historic Preservation Division.

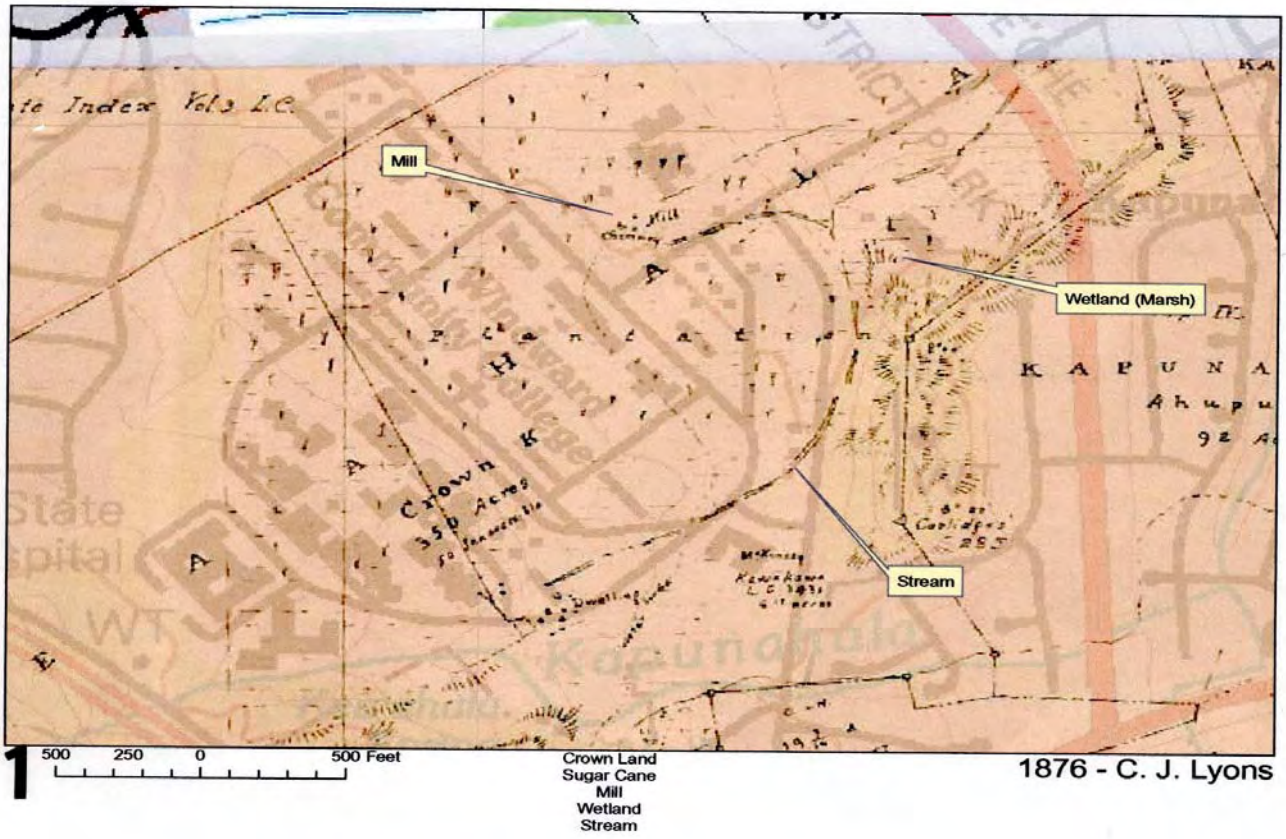

Figure 2. C.J. Lyons 1876 Map Overlaid on Current USGS Quadrangle

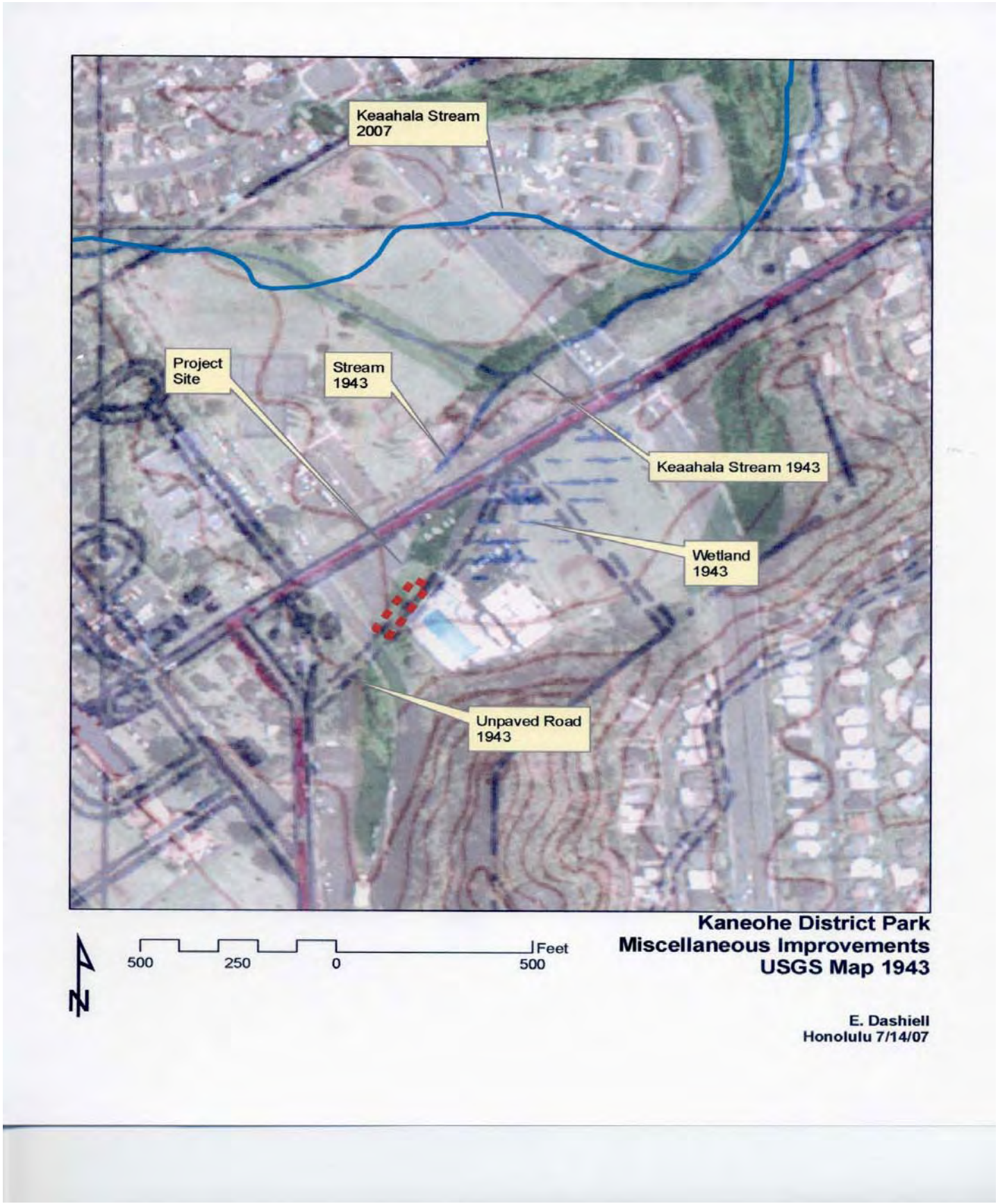

Figure 3. 1943 USGS Quadrangle Overlaid on Current Aerial Photo

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APPENDIX B

WATER QUALITY AND BIOLOGICAL REPORT

Water quality and biological reconnaissance of an unnamed tributary to Kea‘ahala Stream at Kāne‘ohe District Park, Kāne‘ohe, O‘ahu, Hawai‘i[1]

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Introduction

On February 22, 2007, *AECOS* biologists conducted a reconnaissance survey of a small tributary to Kea‘ahala Stream in the Kāne‘ohe District Park on the windward coast of O‘ahu. The purpose of the survey was to ascertain biological resources and assess water quality of the stream in the vicinity of the Kāne‘ohe District Swimming Pool in support of a project proposed to prevent on-going erosion at the park. The project will construct cement rubble masonry (CRM) walls along the eroding stream bank and install rip-rap boulders with geotextile fabric on the stream bed. The biologists documented the aquatic fauna found within the proposed project area and looked for sensitive native aquatic species and federally-listed species in the stream. This report presents the findings of those surveys.

General Site Description

Kea‘ahala Stream is a continuously flowing, perennial stream given State ID No. 3-2-09. The Hawaii Stream Assessment (Hawaii Cooperative Park Service Unit, 1990) identifies the stream as having wetland resources and as discharging into an embayment (Kāne‘ohe Bay). The assessment indicates that at least four native aquatic species and four introduced aquatic species reside in the stream. Kea‘ahala Stream is given a “moderate” ranking for aquatic and recreational resources. Bishop Museum surveys conducted for aquatic species in Kāne‘ohe Bay estuaries (Englund, et al., 2003) from 2001 to 2003 found ten native and six introduced aquatic fishes, mollusks, and crustaceans in the Kea‘ahala estuary. However, most of these native

[1] This report was prepared for use by Eugene Dashiell, AICP, in an Environmental Assessment for stream bank repairs to a tributary of Kea‘ahala Stream. The EA will become part of the public record.

animals would not be expected to occur in freshwater segments of the stream, as at the project site.

The main branch of Kea'ahala Stream arises at about 61 m (200 ft) elevation just north of Windward Community College and flows for 3.8 km (2.4 mi) into the southern portion of Kāne'ohe Bay (Englund, et al., 2003). The tributary to Kea'ahala Stream involved in the present project area is short (less than 1000 m or 3280 ft long). This tributary arises just northeast of the Kāne'ohe District Courthouse, flows through Kāne'ohe District Park and under Kea'ahala Road, and converges with the main branch of Kea'ahala Stream north of Kahekili Highway. This tributary is not shown on the USGS topographic map (7.5 minute Series, Kane'ohe quadrangle, 1998). According to the Kea'ahala Road Widening Project preconstruction monitoring report (*AECOS*, 2001), this unnamed tributary receives a fair amount of its flow from spring or influent groundwater seepage.

Vegetation

The vegetation along the banks of the tributary to Kea'ahala Stream are maintained by City and County of Honolulu park staff. Wedelia (*Sphagneticola trilobata*), Guinea grass (*Urochloa maxima*), and *honohono* (*Commelina diffusa*) are the dominant species in the project area. A large guava tree (*Psidium guajava*) is growing along the left bank near the swimming pool and a row of Java plum trees (*Syzygium cumini*) have been planted downstream from the project area. *Bacopa monnieri* (*'ae'ae*)—an indigenous herb and an obligate wetland plant (Reed, 1998)—is found growing in the stream bed at the project site (Fig. 1). Table 1 is a plant species listing from the project area.

Table 1. Checklist of plants found in the vicinity of the unnamed tributary to Kea'ahala Stream in Kāne'ohe District Park, Kāne'ohe, O'ahu.

Species	Common name	Status	ABUNDANCE
	FERNS AND FERN ALLIES		
NEPHROLEPIDACEAE			
Nephrolepis multiflora (Roxb.) Jarrett ex Morton	sword fern	nat.	U
PTERIDACEAE			
Pteris vittata L.	ladder brake	nat.	U
THELYPTERIDACEAE			
Christella parasitica (L.) H. Lev.	christella	nat.	U

Table 1 (continued).

Species	Common name	Status	ABUNDANCE
	FLOWERING PLANTS		
	DICOTYLEDONES		
ARALIACEAE			
Schefflera actinophylla (Endl.) Harms	umbrella tree	nat.	O
ASTERACEAE			
Bidens alba (L.) DC	beggar's tick	nat.	U
Emilia fosbergii Nicolson	*pualele*	nat.	U
Sphagneticola trilobata (L.) Pruski	Wedelia	nat.	A
Youngia japonica (L.) DC	Oriental hawksbeard	nat.	O
BIGNONIACEAE			
Spathodea campanulata P.Beauv	African tulip tree	nat.	O
CLUSIACEAE			
Clusia rosea Jacq.	autograph tree	nat.	O
EUPHORBIACEAE			
Chamaesyce hirta (L.) Millsp.	garden spurge	nat.	U
FABACEAE			
Macroptilium lathyroides (L.) Urb.	cow pea	nat.	U
Mimosa pudica L.	sensitive plant	nat.	U
MELASTOMATACEAE			
Clidemia hirta (L.) D. Don var. *hirta*	Koster's curse	nat.	C
MYRTACEAE			
Syzygium cumini.(L.) Skeels	Java plum	nat.	O
ONAGRACEAE			
Ludwigia octovalvis (Jacq.)P.H.Raven	primrose willow	**pol?**	C
OXALIDACEAE			
Oxalis corniculata L.	yellow wood sorrel	**pol?**	O
PLANTAGINACEAE			
Plantago major .L.	common plantain	nat.	U
RUBIACEAE			
Paederia foetida.L.	*maile pilau*	nat.	C
SCROPHULARIACEAE			
Bacopa monnieri (L.) Wettst.	*'ae'ae*	**ind.**	O
URTICACEAE			
Pilea microphylla (L.) Liebm.	artillery plant	nat	O
	MONOCOTYLEDONES		
ARACEAE			
Xanthosoma roseum Schott	*'ape*	nat.	R
COMMELINIACEAE			
Commelina diffusa Burm. f.	*honohono*	nat.	A

Table 1 (continued).

Species	Common name	Status	ABUNDANCE
CYPERACEAE			
Cyperus gracilis R. Br.	McCoy grass	nat.	U
Cyperus polystachyos Rottb.	manyspike flatsedge	**ind.**	U
Kyllinga nemoralis (J.R.& G. Forster) Dandy ex Hutch.& Dalz.	*kili`o`opu*	nat.	C
POACEAE (GRAMINEAE)			
Coix lacryma-jobi L.	Job's tears	nat.	C
Cynodon dactylon (L.) Pers.	Bermuda grass	nat.	U
Echinochloa colona (L.)	jungle-rice	nat.	O
Echinochloa crus-gali (L.) P.Beauv.	barnyard grass	nat.	U
Paspalum urvillei Steud.	vasey grass	nat.	U
Sacciolepis indica (L.) Chase	glenwood grass	nat.	U
Sorghum halepense (L.)Pers.	Johnson grass	nat.	U
Urochloa maxima (Jacq.) R. Webster	Guinea grass	nat.	A
Urochloa mutica (Forssk.) T.Q. Nguyen	para grass	nat.	C
indet. lawn grass	--	nat.	A

Legend:

Status = distributional status
- **end**. = endemic; native to Hawaii and found naturally nowhere else.
- **ind**. = indigenous; native to Hawaii, but not unique to the Hawaiian Islands.
- nat. = naturalized, exotic, plant introduced to the Hawaiian Islands since the arrival of Cook Expedition in 1778, and well-established outside of cultivation.
- orn. = exotic, ornamental; plant not naturalized at this location (not well-established outside of cultivation).
- **pol**. = Polynesian introduction before 1778.

Abundance = occurrence ratings for plants
- R – Rare - only one or two plants seen.
- U - Uncommon - several to five plants observed.
- O - Occasional - found between five and ten times; not abundant anywhere.
- C - Common - considered an important part of the vegetation and observed numerous times.
- A - Abundant - found in large numbers; may be locally dominant.
- AA - Abundant - abundant and dominant; defining vegetation type.

None of the species observed is listed as threatened or endangered, or otherwise would be considered rare or special by the state or federal governments (DLNR, 1998; Federal Register, 1999a, b, 2001).

Aquatic Biota

Observations during this survey extended from the culverts at Po'okela Street, downstream to the road crossing at Kahekili Highway. None of the aquatic animals observed in this tributary of Kea'ahala Stream is federally Threatened, Endangered,

or rare (Federal Register, 1999a, b, 2001); in fact, none is native to Hawai'i (Table 2). The bristle-nose catfish (*Ancistris* cf. *temminckii*) and the Mexican molly (*Poecilia mexicana*) are abundant throughout the tributary, with the catfish abundant on the muddy bottom and the molly abundant in the water column. We observed one species of thiarid snail throughout the tributary and also a relatively recently introduced atyid shrimp, *Neocaridina denticulata sinensis*.

Figure 1. *Bacopa monnieri* or *'ae'ae* with *Commelina difusa* or *honohono* in the stream bed of the unnamed tributary to Kea'ahala Stream in Kane'ohe District Park, Kane'ohe, O'ahu.

Water Quality

On February 22, 2007, AECOS biologists collected water samples from three sites on the unnamed tributary of Kea'ahala Stream near the Kāne'ohe District Park Pool (Fig. 2). "Upstream" Station was located just downstream from the culverts under Po'okela Street, "Impact" Station was located adjacent to the center of the erosion near the swimming pool about 30 m (98 ft) downstream from the culverts, and

Table 2. Checklist of aquatic biota observed in the unnamed tributary to Kea'ahala Stream in Kāne'ohe District Park, Kāne'ohe, O'ahu on February 22, 2007.

Species	Common name	Status	QC Code	Abundance
	INVERTEBRATES			
MOLLUSCA, GASTROPODA	(mollusks)			
THIARIDAE				
Melanoides tuberculata	melanid snail	Nat	20	C
ARTHROPODA, CRUSTACEA	(crustaceans)			
ATYIDAE				
Neocaridina denticulata sinensis	atyid shrimp	Nat	20	O
CAMBARIDAE				
Procambarus clarki	American swamp crayfish	Nat	10	C
ARTHROPODA, INSECTA	(insects)			
ZYGOPTERA, COENAGRIONIIDAE				
Ischnura ramburi	Rambur's damselfly	Nat	10	R
	VERTEBRATES			
VERTEBRATA, AMPHIBIA	(amphibians)			
RANIDAE				
Rana catesbeiana	Amer. bullfrog	Nat	10	R
VERTEBRATA, PISCES	(fishes)			
LORICARIIDAE				
Ancistris cf. *temminckii*	bristle-nose catfish	Nat	10	A
POECILIIDAE				
Poecilia mexicana	Mexican molly	Nat	10	A
Poecilia reticulata	rainbow fish or guppy	Nat	10	O
Xiphophorus helleri	green swordtail	Nat	10	C
VERTEBRATEA, AVES	(birds)			
ANATIDAE				
Anas platyrhynchos	mallard duck	Nat	10	R

KEY TO SYMBOLS USED IN TABLE 2:

Status:

Nat – naturalized. An introduced or exotic species.
Ind – indigenous. A native species also found elsewhere in the Pacific.
End – endemic – A native species found only in the Hawaiian Islands.

QC Code:

10 – Observed in the field by aquatic biologist on February 22, 2007.
20 – Collected; identified in the laboratory; specimen(s) not saved.

Abundance categories:

R – Rare – only one or two individuals seen.
U – Uncommon – several to a dozen individuals observed.
O – Occasional – regularly encountered, but in small numbers.
C – Common - Seen everywhere, although generally not in large numbers.
A – Abundant – found in large numbers and widely distributed.
P – Present – noted as occurring, but quantitative information lacking.

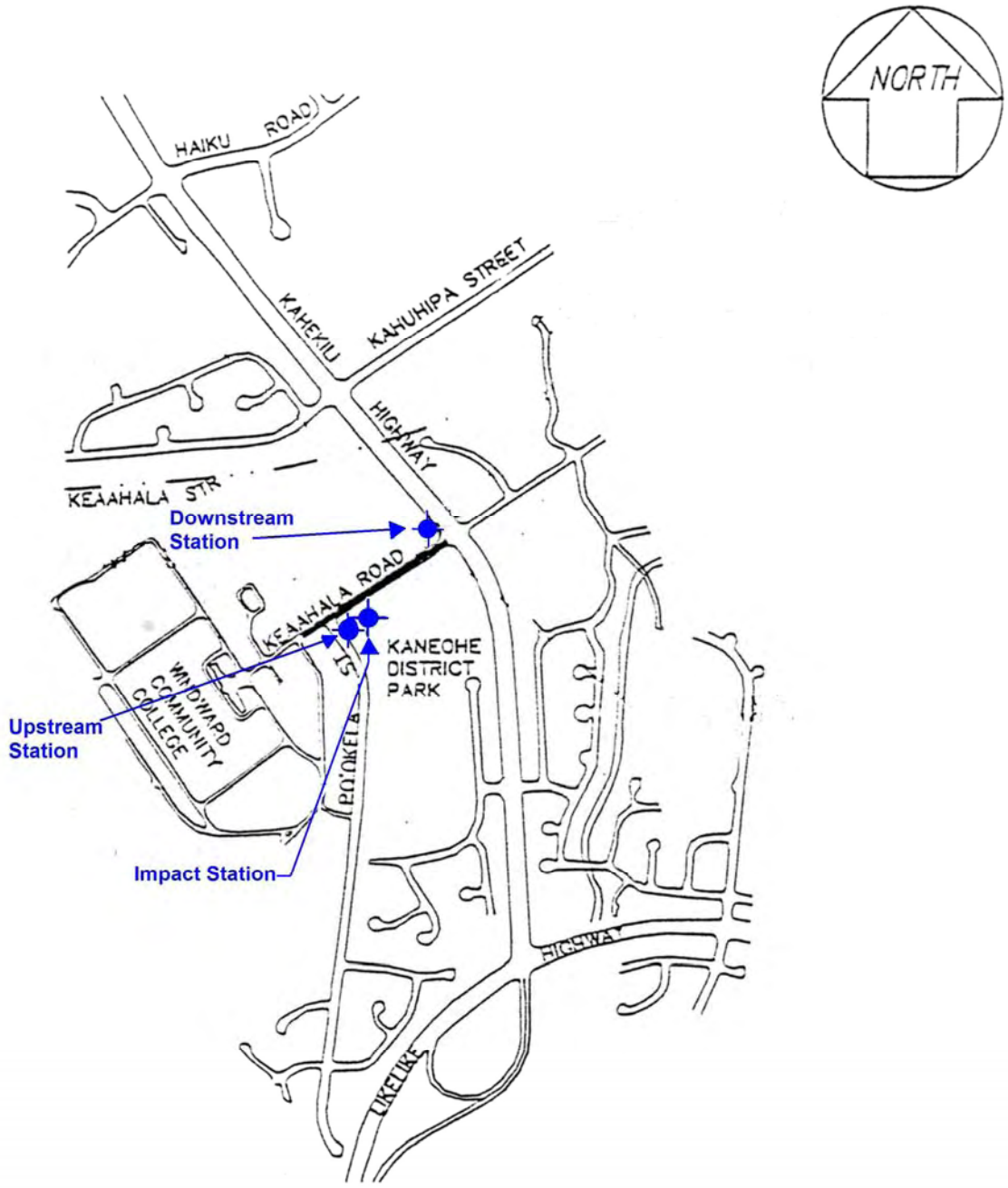

Figure 2. Locations for the February 22, 2007 water quality sampling of an unnamed tributary to Kea'ahala Stream.

"Downstream" Station was located just upstream from the culverts under Kahekili Highway.

Some parameters were measured by field meter and others from water samples collected in appropriate containers and taken to the *AECOS* Laboratory in Kāne'ohe (laboratory Log No. 22582). Table 3 lists field instruments and analytical methods used with these samples.

Table 3. Analytical methods and instruments used for the February 22, 2007 water quality sampling of an unnamed tributary to Kea'ahala Stream, O'ahu.

Analysis	Method	Reference	Instrument
Ammonia Nitrogen	EPA 350.1M	Grasshoff et al. (1986)	Technicon AutoAnalyzer II
Dissolved Oxygen	EPA 360.1	EPA (1979)	YSI Model 55 DO meter
Nitrate + Nitrite	EPA 353.2	EPA (1993)	Technicon AutoAnalyzer II
pH	EPA 150	EPA (1993)	Hana pHep meter
Temperature	EPA 170.1	EPA (1979)	YSI Model 55 DO meter
Total Nitrogen	persulfate digestion/EPA 353.2	D'Elia et al. (1977) / EPA (1993)	Technicon AutoAnalyzer II
Total Phosphorus	EPA 365.1/Hach 8190	EPA (1993)/Hach (2003)	Technicon AutoAnalyzer II
Total Suspended Solids	EPA 160.2	EPA (1979)	Mettler Toledo AG204 balance
Turbidity	Method 2130B (EPA 180.1)	Standard Methods 20th Edition (1998)/ EPA (1993)	Hach 2100N Turbidimeter

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The primary purpose of the February 22, 2007 water quality measurements was to characterize existing aquatic environments, not to set baseline values or determine compliance with Hawaii's Water Quality Standards. In fact, the State criteria for all nutrient measurements, TSS, and turbidity are based upon geometric mean values and a minimum of three separate samples per location would be needed to compute a geometric mean (HDOH, 2004). Nonetheless, our results can be evaluated against the appropriate water quality criteria for streams (Table 4) as long as limitations regarding a possible lack of representativeness are realized.

Table 4. State of Hawaii water quality criteria for streams (geometric means in the table; HAR §11-54-5.2(b)(1)).

	Total Nitrogen	**Ammonia Nitrogen**	**Nitrate + Nitrite Nitrogen**	**Total Phosphorus**	**Total Suspended Solids**	**Turbidity**
	(µg N/l)	(µg N/l)	(µg N/l)	(µg P/l)	(mg/l)	NTU
Wet season (Nov 1-April 30)	250.0	ns	70.0	50.0	20.0	5.0
Dry season (May 1-Oct 31)	180.0	ns	30.0	30.0	10.0	2.0

- pH – not vary more than 0.5 units from ambient and not be lower than 5.5 nor higher than 8.0.
- Dissolved oxygen – not less than 80%.
- Temperature – not vary more than 1 °C from ambient.

The water quality data obtained from the tributary to Kea'ahala Stream on February 22 (Table 5) are fairly typical of a low-flowing, urban stream. The water quality samples show normal temperatures, slightly depressed levels of oxygen in the two upper stations but normal in the downstream station, depressed pH in the upper station but normal pH level in the two downstream stations, low turbidity and total suspended solids (TSS) in the two upper stations and elevated turbidity and TSS in the downstream station. Ammonia is present in all of the stations, with the highest level found at the downstream station. Nitrate + nitrite levels are high in the upper two stations, accounting for the majority of the total nitrogen at these stations. Organic nitrogen makes up the majority (65%) of the total nitrogen in the downstream station, where the ammonia level is also high—not surprising because ammonia is an intermediate breakdown product of organic nitrogen. Total phosphorus levels appear elevated and fairly consistent among all three stations.

Table 5. Water quality characteristics of the tributary to Kea'ahala Stream from samples taken on February 22, 2007.

	Time	**Temp.** (°C)	**DO** (mg/l)	**DO** % sat	**pH**	**Turbidity** (ntu)
Upstream	1525	23.6	6.33	75	5.47	0.78
Impact	1520	23.9	6.02	71	6.70	1.64
Downstream	1510	24.2	7.56	90	7.35	12.0

	TSS (mg/l)	**Ammonia** (µg N/l)	**Nitrate + nitrite** (µg N/l)	**Total N** (µg N/l)	**Total P** (µg P/l)
Upstream	0.8	4	180	260	49
Impact	1.0	11	160	238	52
Downstream	12	30	117	338	58

The low DO and pH in the Upstream Station is perhaps indicative of a spring. Turbidity and TSS are also low at this station, while nitrate+nitrite levels are high. Groundwater influence is also observed at the Impact Station by the still elevated nitrate+nitrite levels. The water quality at the Downstream Station has little influence from groundwater, but is instead influenced by the surrounding wetland and sluggish water flow.

These data from 2007 can be compared with the means of measurements made at nearby locations (Fig. 3) in 1995 (Table 6) and 2001 (Table 7) for preconstruction monitoring efforts for nearby road projects. The "Impact" Station is located about 100 m (330 ft) upstream of WQMS #1. The "Downstream" Station is at the same location as Keaahala I for the Kahekili Road Widening Project (*AECOS*, 1998) and WQMS #3 for the Kea'ahala Road Widening Project (*AECOS*, 2001). At the Downstream Station in 1995, the average temperature and pH were about the same as they were in 2007, but the geometric mean values for DO, turbidity, TSS, and nutrient levels were much lower in 1995. In 2001, all measured parameters (temperature, DO, pH, turbidity, and TSS) were higher at both stations than they were in 2007; however the monitoring report indicates that an upstream source of high levels of turbidity and TSS may have been present during this monitoring period (*AECOS*, 2003).

Table 6. Mean values of preconstruction water quality samples collected in a tributary to Kea'ahala Stream during the dry season of 1995 (*AECOS*, 1998).

	Temperature (°C)	**DO** % sat	**pH** (pH units)	**Turbidity**† (ntu)
Keaahala I (Downstream)	24.9 n=10	42 n=10	7.08 n=10	4.82 n=10
	TSS† (mg/l)	**Nitrate + nitrite**† (µg N/l)	**Total N**† (µg N/l)	**Total P**† (µg P/l)
Keaahala I (Downstream)	2.9 n=10	22 n=10	156 n=10	17 n=10

† indicates geometric mean, all other values are arithmetic means

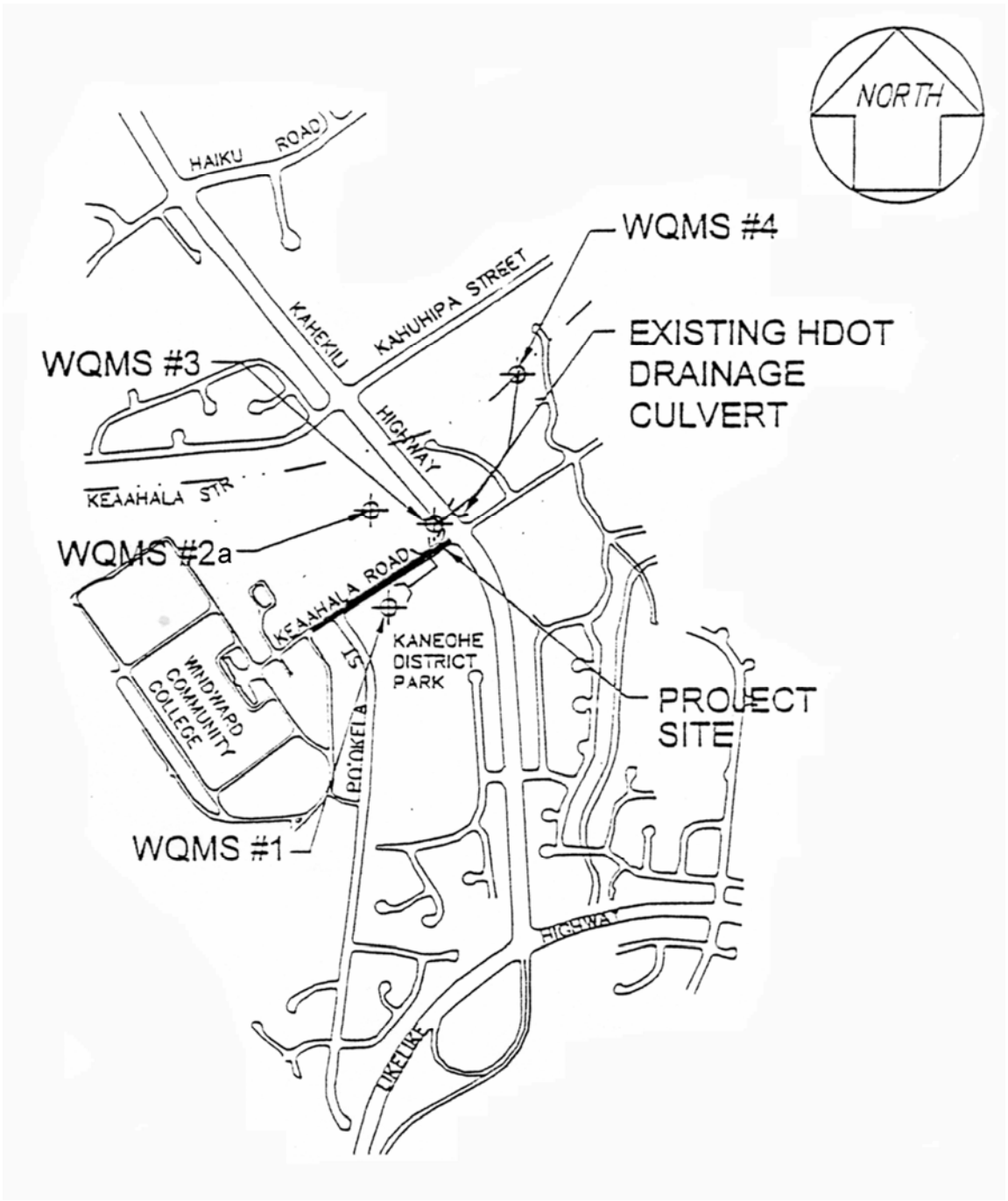

Figure 3. Location of monitoring stations for Kea'ahala Road Widening Project (*AECOS*, 2001).

Table 7. Mean values of preconstruction water quality samples collected in a tributary to Kea'ahala Stream during the dry season 2001 (*AECOS*, 2001).

	Temperature (°C)	**DO** (% sat)	**pH** (pH units)	**Turbidity**† (ntu)	**TSS**† (mg/l)
Station 1 (Impact)	25.1 n=10	73 n=10	7.23 n=10	13.48 n=10	7.3 n=10
Station 3 (Downstream)	27.0 n=10	92 n=10	7.75 n=10	15.90 n=10	13.1 n=10

† indicates geometric mean, all other values are arithmetic means

Discussion

The subject stream is a perennial tributary of Kea'ahala Stream, which discharges into Kāne'ohe Bay, an embayment classified as "AA" by the Hawai'i Department of Health (HDOH, 2004). Restoration of the right bank should contribute to reducing erosion thereby having a long-term effect of improving water quality of the stream and Kāne'ohe Bay by reducing the sediment load. Construction impacts to water quality of the stream are unavoidable in the immediate project area, although they will be short-term. During construction, best management practices (BMPs) to prevent soil from eroding into the stream channel should be employed.

Construction of a CRM wall along the eroding stream bank adjacent to the swimming pool and installation of permeable rip-rap with geotextile fabric on the stream bed should not have any long-term adverse impact on the flora or fauna of this small tributary to Kea'ahala Stream. Some, but not all, benthic and water column habitat will be replaced with the boulders. It is unlikely that any native migratory (amphidromous) aquatic animals live in this tributary, so it would be acceptable to divert or block the stream flow during construction as needed.

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