Ms. Genevieve Salmonson, Director  
Office of Environmental Quality Control  
235 South Beretania Street, Suite 702  
Honolulu, Hawaii 96813

Dear Ms. Salmonson:

SUBJECT: Finding of No Significant Impact Revised Final Environmental Assessment Expansion of the Ewa Nonpotable Water System, TMK: 9-1; 9-2-02; and 9-2-03, Ewa, Oahu, Hawaii

The Draft Environmental Assessment (DEA) for the Expansion of the Ewa Nonpotable Water System was originally published in The Environmental Notice on July 23, 2004. In addition, a Finding of No Significant Impact (FONSI) determination was also published on October 23, 2004.

A Revised DEA was subsequently re-published on November 8, 2004, in The Environmental Notice. There were no substantive technical changes to the proposed project since the original publication; however, the Board of Water Supply (BWS) may seek federal assistance for certain waterline projects, which would constitute a federal action. This would require the project to meet all National Environmental Policy Act and Hawaii State Revolving Fund program requirements. As such, impacts and compliance with the cross-cutting federal authorities were incorporated into the Revised DEA and Final Environmental Assessment (FEA). Please be aware that all agencies and organizations, which received the original DEA, were notified in writing about the re-publication by our consultant on this project, Gray, Hong, Nojima & Associates, Inc.
The BWS has reviewed the comments received during the 30-day public comment period, which began on November 8, 2004, and has determined that this project will not have significant environmental effects and has issued a FONSI. Please publish this in the next available Office of Environmental Quality Control (OEQC) notice. We have enclosed the following:

- Completed OEQC Publication Form for the Revised FEA and FONSI
- Four copies of the Revised FEA
- Revised project summary on disk

If you have any questions, please contact Scot Muraoka at 748-5942.

Very truly yours,

[Signature]

CLIFFORD S. JAMILE
Manager and Chief Engineer

Enclosures

cc: Sheryl Nojima (Gray, Hong, Nojima & Associates, Inc.)
Revised Final Environmental Assessment

Expansion of the Ewa Nonpotable Water System

February 11, 2005
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(Revised DEA Publication Date: November 8, 2004)
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CHAPTER ONE

INTRODUCTION

1.1 PROPOSED PROJECT SUMMARY

Oahu’s Ewa district has undergone unprecedented growth via residential, commercial and industrial developments throughout the past decade. Based on the City and County of Honolulu’s (CCH) General Plan (CCH, 1992) and the Ewa Development Plan (CCH, 1997), forecasts of continued growth in the district are expected through the year 2015 and beyond. These developments have and will continue to impact available water resources in terms of both reduced recharge of the existing caprock aquifer due to curtailment of agricultural activity and increased demand for potable water.

Cutbacks in the region’s agricultural operations have dramatically reduced recharge of the aquifer. As a result, the aquifer’s salinity has been rising with ongoing withdrawal from existing wells. In addition, the State of Hawaii Department of Land and Natural Resources (DLNR) has limited new well permits and well permit renewals (R.M. Towill Corporation, 2004 and Analytical Planning, Consultants, 1999).

The City and County of Honolulu Board of Water Supply (BWS) presently owns and maintains the municipal nonpotable (or non-drinking) water system in the Ewa district (refer to Figure 1-1). The existing storage and distribution system currently has the capacity to provide 12.0 million gallons per day (MGD) of nonpotable Reverse Osmosis (RO) and R-1 water. R-1 water is regulated by the Department of Health (DOH) and is being used for irrigation of golf courses, parks, and greenbelts. Non-regulated RO water is being used for industrial processing and cooling at facilities in the region. In addition, the system includes the Honouliuli Water Recycling Facility (WRF), formerly known as the Ewa Water Reclamation Facility (EWRF). The Final Environmental Assessment/Findings Of No Significant Impacts (FONSI) for the existing system was completed by the US Filter Corporation in October 1999.

Because of projected increasing demand for drinking water and the limited basal groundwater supply on Oahu, the BWS plans to expand the nonpotable storage and transmission system, which will facilitate the use of nonpotable water in greater amounts. In turn, this will relieve some of the potable supply that may be preserved for drinking water needs. The BWS estimates an ultimate nonpotable water demand of 26.3 MGD in the Ewa district (R.M. Towill Corporation, 2004). A master plan of the proposed expansion is also shown in Figure 1-1. It should be noted, however, that the proposed nonpotable waterline alignments and sizes, as well as reservoir sites and capacities, are based on projected user locations and demands. These are subject to change by the BWS during the preliminary engineering and design stages, pending actual nonpotable water user development schedules.
Basically, the proposed expansion is focused on increasing the delivery of DOH-regulated R-1 nonpotable water. The following are the anticipated infrastructure developments to be constructed in three phases over the next 15-plus years:

- 44 miles of distribution and transmission mains, 4 to 36 inches in diameter, located primarily within existing state and county rights-of-ways (roads, streets, and highways)

- 15 MG in additional reservoir capacity

Due to the fact that this expansion will require the use of state or county lands and funds, environmental review is mandated under Chapter 343 of the Hawaii Revised Statutes; however, separate environmental assessments (EAs) will be prepared for the various reservoir and booster pump station sites following the completion of site specific feasibility studies.

In addition, certain nonpotable waterline projects may be funded by Federal Funds through the State of Hawaii’s Clean Water State Revolving Fund (SRF) Program, which would constitute a federal action, and will require the project(s) to meet all National Environmental Policy Act (NEPA) and Hawaii SRF program requirements. Compliance with Federal “cross-cutting” criteria is addressed in Chapter 6 of this assessment.

### 1.2 GENERAL INFORMATION

<table>
<thead>
<tr>
<th>Project Name:</th>
<th>Expansion of the Ewa Nonpotable Water System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Proposing Agency:</td>
<td>Board of Water Supply</td>
</tr>
<tr>
<td>(Applicant)</td>
<td>City and County of Honolulu</td>
</tr>
<tr>
<td></td>
<td>630 South Beretania Street</td>
</tr>
<tr>
<td></td>
<td>Honolulu, Hawaii 96843</td>
</tr>
<tr>
<td></td>
<td>Contact: Mr. Scot Muraoka (ph. 748-5942)</td>
</tr>
<tr>
<td>Approving Agency:</td>
<td>Board of Water Supply</td>
</tr>
<tr>
<td></td>
<td>City and County of Honolulu</td>
</tr>
<tr>
<td>Proposed Action:</td>
<td>Expansion of the Ewa nonpotable water storage and distribution system, including distribution and transmission mains, reservoirs, and booster pump stations (site specific environmental assessments will be prepared for reservoirs and booster pump stations)</td>
</tr>
<tr>
<td>Estimated Construction Cost:</td>
<td>$56,063,000 (distribution/transmission mains)</td>
</tr>
<tr>
<td></td>
<td>$54,000,000 (reservoirs)</td>
</tr>
<tr>
<td></td>
<td>$110,063,000 Total</td>
</tr>
</tbody>
</table>
Determination: Finding of No Significant Impact (FONSI)

Project Location: Ewa, Oahu, Hawaii

Tax Map Keys: 9-1; 9-2-02; and 9-2-03

Property Owners: City and County of Honolulu rights-of-way
                  State of Hawaii rights-of-way
                  Various private owners (to be determined)

State Land Use: Urban and Agricultural
                (Refer to Figure 1-2 for State Land Use Map)

County Zoning: A-1 Apartment, Low-density
               A-2 Apartment, Medium-density
               AG-1 Agricultural, Restricted
               AG-2 Agricultural, General
               B-1 Business, Neighborhood
               B-2 Business, Community
               I-2 Industrial, Intensive
               P-2 Preservation, General
               R-5 Residential

                (Refer to Figure 1-3 for Zoning Map)

Flood Hazard Area: Based on Flood Insurance Rate Map (FIRM),
                   November 20, 2000:
                   - Majority in Zone D (areas in which flood
                     hazard are undetermined)
                   - Portion in Zone X (areas outside of 500-yr.
                     flood plain)
                   - Portion in Zone A (areas inundated by 100-yr.
                     flood, no base flood elevations determined)
                   - Portion in Zone AE (areas inundated by 100-yr.
                     flood, base flood elevations determined)

Special Designations: None
                      (no Special Management Areas or Shoreline
                       Setback)

Historic Sites: Oahu Railway & Land Company (OR&L) right-of-way
                (National Registry of Historic Places)
                Onewa Archaeological District
1.3 LOCATION

The proposed project site is located on the Ewa Plain of Oahu's southwest coast line. The nonpotable water distribution system network will extend west to east, from Ko Olina to the Navy Blast Zone on the West Loch Naval Magazine, and makai to mauka, from the West Mamala Bay shoreline to lower Makakilo and mauka of the proposed University of Hawaii West Oahu campus site.

1.4 NEED FOR PROJECT

1.4.1 Consent Decree

In 1993, the U.S. Environmental Protection Agency (EPA) and the State of Hawaii brought enforcement action against the City and County of Honolulu alleging violations of the Clean Water Act stemming from pretreatment program deficiencies. The parties agreed to a settlement resulting in a Consent Decree without further litigation and trial. Pursuant to the terms of the Consent Decree, the City was required to pay a substantial initial fine with the possibility of additional fines that would be waived if the City agreed to implement Supplemental Environmental Projects (SEP). One of these projects involved the reuse of treated wastewater (or effluent) from the Honolulu WWTP for beneficial uses such as irrigating parks and golf courses and cooling industrial processes.

To avoid the additional fines and to meet the need for additional water resources in the Ewa Plain, the City proceeded with the effluent reuse SEP. A proposal for this SEP submitted by US Filter Corporation was selected and awarded by the City. The contract included design, construction, and operation of a new wastewater reclamation facility that would treat wastewater effluent from the Honolulu WWTP.

1.4.2 Consistency with Planning Documents

This section will examine the proposed project's consistency with three planning documents. The first two - the General Plan (CCH, 1992) and the Ewa Development Plan (CCH, 1997) - are the City and County of Honolulu's primary planning documents that provide overall guidance for the Ewa district. Because of the significance of the Barbers Point Naval Air Station (BPNAS) redevelopment in the future of the Ewa community, the Kalaheo Redevelopment Plan (2000) will also be reviewed for relevance pertaining to nonpotable water usage.

General Plan

The City and County of Honolulu's General Plan (CCH, 1992) serves as a planning guide which addresses eleven areas of concern. The following discussion explains the proposed project's consistency with five areas of concern.

- Population - Policy 2 of Objective C calls for the "development of the secondary urban center at Kapolei and the Ewa and Central Oahu urban-fringe areas to relieve developmental pressures in the remaining
urban-fringe and rural areas an to meet housing needs not readily provided in the primary urban center;)

- Physical Development and Urban Design - Policies 1 to 6 of Objective C call for the development of "a secondary urban center in Ewa with its nucleus in the Kapolei area" and

- Economic Activity - Policy 2 of Objective A calls for the encouragement of "development of small businesses and larger industries, which will contribute to the economic and social well-being of Oahu residents."

The Secondary Urban Center is expected to be the focus of significant economic activity and major housing development, as well as a core location for government services. It will entail a myriad of developments: master planned residential developments, heavy and light industrial areas in the vicinity of the Barbers Point Deep Draft Harbor, offices and commercial/retail centers in the City of Kapolei, resort developments at Ko Olina and Ewa Marina, recreational facilities such as golf courses and park complexes, and the University of Hawaii West Oahu campus. The proposed expansion of the Ewa nonpotable water distribution network will continue to support ongoing development through increased water supply and service to various users in the Ewa district.

- Transportation and Utilities - Objective B calls for "an adequate supply of water and for environmentally sound systems of waste disposal."

The proposed project will support both aspects of water supply and waste disposal as stated in this objective. The ongoing development of the Secondary Urban Center will undoubtedly continue add to the existing water demand in the Ewa district. Nonpotable water provides an additional supply of water which will help to meet the needs of the residential and working population in the area, as well as irrigation and industrial users. Expanding the distribution network enables greater use of nonpotable water, which in turn will relieve some of the potable supply for drinking water purposes.

In addition, the reuse of treated wastewater effluent as a nonpotable source reduces the wastewater flow that is discharged through the Barbers Point Deep Ocean Outfall. Thus, the proposed action will result in both increased water supply and waste reduction.

- Housing Activity - Policy 10 of Objective A calls for "the construction of affordable dwellings which take advantage of Oahu's year-round moderate climate" and

- Housing Activity - Policy 3 of Objective C calls for "residential development near employment centers."
A network of master planned residential communities, such as Ewa Marina, the Villages of Kapolei and Ewa by Gentry, will provide a wide variety of housing and accommodate the need for affordable housing. These residential communities will be located in or near Kapolei, the major employment center, including government and business offices, retail areas, and Campbell Industrial Park. As mentioned previously, the proposed expansion of the nonpotable water distribution network will support housing developments by preserving potable supplies for drinking or clean water needs.

*Ewa Development Plan*

The Ewa Development Plan (CCH, 1997) provides maps and policy statements to implement the objectives and policies of the General Plan (CCH, 1992). The year 2020 is the initial phase planning horizon in which the vision for Ewa centers around the development of a Secondary Urban Center for Oahu. This phase is followed by full development of the Ewa district in the years beyond. According to the Ewa Development Plan, population is expected to almost triple from 43,000 in 1990 to 125,000 in 2020, requiring 28,000 new housing units through a series of master planned communities. The Secondary Urban Center will also generate a wide range of employment opportunities increasing the number of jobs from 17,000 to 64,000 in 2020.

The Ewa Development Plan (CCH, 1997) identifies key elements that are critical to the implementation of the vision for Ewa’s future. The proposed expansion of the nonpotable water system is essential to one of the key elements - Conservation of Natural Resources. Specially, this element calls for the development of a dual water distribution system with potable water for drinking and other clean water uses and nonpotable water for irrigation and industrial uses. This system is necessary in order to allocate potable water to meet projected growth. The BWS forecasts an additional 35 MGD of potable water needed in Ewa by the year 2020. Long term demand for nonpotable water for irrigation is estimated at 26 MGD and as much as 10 MGD for agriculture.

The Ewa Development Plan (CCH, 1997) describes the vision for Ewa’s future as a network of linked communities “within a garden.” Another of the plan’s key element, referred to as the Network of Open Space and Greenways, will include natural gulches and drainage ways, shoreline parks, regional and district parks, golf courses and greenway corridors along the major highways and roads. Among the planning principles and guidelines is the use of plantings and landscape treatments for residential and commercial areas and utility and transportation corridors, as well as recreational areas such parks and golf courses. In order to conserve potable water, nonpotable water will be used for irrigation of the golf courses, parks, greenways and other landscaped or planted areas.
Kalaeloa Redevelopment Plan

The Kalaeloa Redevelopment Plan (R.M. Towill Corporation, 2000) was prepared for the Barbers Point Naval Air Station (BPNAS) Redevelopment Commission as a Special Area Plan of the Ewa Development Plan. Essentially it presents the recommended reuse plan for BPNAS and provides a summary of the Barbers Point Community Redevelopment Plan approved by the BPNAS Redevelopment Commission and Governor Cayetano in 1996.

According to the Kalaeloa Redevelopment Plan (R.M. Towill Corporation, 2000), the overall goal for Kalaeloa is to integrate its redevelopment into the surrounding Ewa region such that land uses and urban design are compatible and complementary to the context of the region. The surplus land recommended for redevelopment includes over 2,000 acres, which will be used primarily for airport and aviation training, parks, recreation/sports facilities and light industrial developments. One of the design objectives calls for the enhancement of existing landscape patterns and preservation of existing trees by incorporating them into the design of public areas and development parcels.

Design guidelines for both public areas and site development indicate the reliance on nonpotable water for irrigation purposes:

1. All public area landscaping are to be irrigated with an automatic controller and from a nonpotable water source.

2. All development parcels are to use nonpotable water for irrigation where available.

1.4.3 Water Resources: Increasing Demand and Limited Supply

The unprecedented growth described above will bring an increased demand for both potable and nonpotable water in the Ewa district. According to the Ewa Non-Potable Water Master Plan (R.M. Towill Corporation, 2004), the decline in the sustainable yield in the Ewa caprock aquifer has limited the approval of new well permits and existing permit renewals by the Department of Land and Natural Resources (DLNR). Thus, there is warranted concern over the availability of water to accommodate projected demands of the Ewa district’s urban developments. The proposed action will serve many purposes already discussed - the conservation of potable water, the development of the employment opportunities in the Secondary Urban Center with nearby affordable housing in planned communities, and the reduction of wastewater disposed through the Barbers Point Deep Ocean Outfall.

1.5 PUBLIC COMMENT AND REVIEW

A pre-assessment consultation was conducted for this project prior to preparation of the Draft Environmental Assessment (DEA). Various parties were consulted by letter in March 2002. Substantive comments were received from parties marked below with an
asterisk (*). These comments were taken into consideration in preparing the DEA and were also appended as part of the original DEA dated July 14, 2004. Copies of the comment letters and responses are included in Appendix A.

The DEA was circulated to various agencies, organizations, utilities, and elected officials during the public review period beginning July 23, 2004. Comments received from parties are marked below with double asterisks (**). These comments were incorporated into the subsequent Revised DEA and Final Environmental Assessment (FEA) as appropriate. Copies of the comment letters and responses are included in Appendix B1.

Subsequently, a Revised DEA was prepared and re-published on November 8, 2004, in The Environmental Notice. All agencies and organizations that had previously received the original DEA were notified in writing about the Revised DEA. There were no substantive technical changes to the proposed project. As mentioned previously, however, the Board of Water Supply may seek federal assistance for certain waterline projects, which would constitute a federal action. This would require the project to meet all National Environmental Policy Act (NEPA) and Hawaii State Revolving Fund (SRF) program requirements. As such, impacts and compliance with the cross-cutting federal authorities were incorporated into the Revised DEA and FEA.

Substantive comments from parties responding during the public review period beginning November 8, 2004 are marked with triple asterisks (***) below. Copies of these comments letters and responses are included in Appendix B2.

**Federal Government**
- Naval Air Station Barbers Point
- U.S. Army Corps of Engineers, Honolulu District** ***
- U.S. Coast Guard - District 14
- U.S. Department of the Interior, Geological Survey
- U.S. EPA, Region 9 - Pacific Islands Contract Office
- U.S. Federal Aviation Administration
- U.S. Federal Highway Administration
- U.S. Fish and Wildlife, Pacific Islands Office Ecological Services
- U.S. National Marine Fisheries Service
- U.S. National Park Service - Pacific Islands Support Office
- U.S. Naval Base, Pearl Harbor
- USDA Natural Resources Conservation Service

**State of Hawaii**
- Department of Business and Economic Development and Tourism Office of Planning
- Department of Community Services
- Department of Education**
- Department of Hawaiian Home Lands
- Department of Health**, **

*Revised Final Environmental Assessment - Expansion of the Ewa Nonpotable Water System*
State of Hawaii (continued)
Department of Land and Natural Resources
  Commission on Water Resources Management*
  Division of Forestry & Wildlife*, **
  Land Division, Engineering Branch**
  State Historic Preservation Division*
  Oahu District Land Office**
Department of Transportation*, **
Office of Environmental Quality Control*, **
Office of Hawaiian Affairs*, **
University of Hawaii Environmental Center

City and County of Honolulu
Department of Design and Construction**
Department of Environmental Services**
Department of Facility Maintenance**
Department of Parks and Recreation Services
Department of Planning and Permitting*, **, ***
Department of Transportation Services**
Honolulu Fire Department*, **
Honolulu Police Department*, **

Golf Courses, Private Companies and Utilities
AES Hawaii Inc.
Aina Nui Corporation
Barbers Point Golf Course
Chevron/Texasco Hawaii
Coral Creek Golf Course
Ewa Villages Golf Course
Gentry Companies
Haseko (Ewa) Inc.*
Hawaii Prince Golf Course
Hawaiian Electric Company, Environmental Department
Island Ready-Mix Concrete Inc.
Kahua Nursery & Landscape
Kapolei Golf Course
Ko Olina Partners, LLC***
Ko Olina Resort Operators Assoc. Inc.
Oceanic Cable/Time Warner
St. Francis Medical Center - West
Tesoro Hawaii Corporation
The Estate of James Campbell
The Gas Company
US Filter Operating Services
Verizon Hawaii Inc.*
Community Organizations
Ewa Neighborhood Board No. 23
Historic Hawaii Foundation
Neighborhood Board No. 34

Elected Officials
Council Member, District 9
Senator, District 19
Senator, District 20
Representative, District 41
Representative, District 42
Representative, District 43

Libraries
Ewa Beach Public & School Library
Municipal Library

1.6 APPROVALS AND PERMITS
During the implementation stages of the proposed project, the applicant will be working with other utilities and agencies in the City and County of Honolulu for examination and approval of project construction plans and specifications. In addition, federal, state and city permits and approvals will be obtained as required. In addition, certain nonpotable waterline projects may be funded by Federal Funds through the State of Hawaii's Clean Water State Revolving Fund (SRF) Program, which would constitute a federal action, and will require the project(s) to meet all National Environmental Policy Act (NEPA) and Hawaii SRF program requirements. Compliance with Federal "cross-cutting" criteria is addressed in Chapter 6 of this assessment.

U.S. Government
Department of the Army Permit
Department of the Army,
U.S. Army Engineer
District, Honolulu

State of Hawaii
Coastal Zone Management Consistency Determination
Department of Business,
Economic Development
and Tourism

Community Noise Control Permit
Department of Health
Section 401 Water Quality Certification
Department of Health

National Pollutant Discharge Elimination System General Permits
- Discharge of Stormwater Associated with Construction Activity
- Discharge of Hydrotesting Waters
- Construction Dewatering
Department of Health

Stream Channel Alteration Permit
Department of Land and
Natural Resources
<table>
<thead>
<tr>
<th><strong>City and County of Honolulu</strong></th>
<th><strong>Department of Planning and Permitting</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Grubbing, Grading and Stockpiling Permit</td>
<td></td>
</tr>
<tr>
<td>Trenching Permit</td>
<td></td>
</tr>
<tr>
<td>Street Usage Permit</td>
<td>Department of Transportation Services</td>
</tr>
<tr>
<td>Traffic Control Plans</td>
<td>Department of Planning and Permitting</td>
</tr>
<tr>
<td>Building Permit (if encroach in sidewalks)</td>
<td>Department of Planning and Permitting</td>
</tr>
</tbody>
</table>

| **Private Property Owners**            |                                          |
|----------------------------------------|                                          |
| Easements for Nonpotable Water Lines   |                                          |
CHAPTER TWO

DESCRIPTION OF THE PROPOSED PROJECT

2.1 EXISTING NONPOTABLE WATER RESOURCES

The Ewa district is supplied by two major nonpotable water sources that are described in greater detail below - recycled water from the City and County of Honolulu Board of Water Supply (BWS) Honolulu Water Recycling Facility (WRF) and brackish water from the Ewa Caprock Aquifer.

2.1.1 Recycled Water from the BWS Honolulu Water Recycling Facility (WRF)

Nonpotable water that is recycled wastewater effluent begins as a by-product from the City and County of Honolulu's Honolulu Wastewater Treatment Plant (WWTP). This effluent receives secondary treatment at the plant before it is piped to the WRF. Essentially, the secondary treated effluent from the WWTP is the WRF's influent. At the WRF the wastewater receives further treatment known as tertiary treatment so that it can be reused as nonpotable water for non-drinking uses such as irrigation and industrial processing. The wastewater effluent that is intended for recycling at the WRF must receive secondary treatment at the WWTP in order to remove solids and organic matter in the wastewater. The remainder of the effluent that is not treated at the WRF is discharged through the 78-inch diameter Barbers Point Deep Ocean Outfall. This wastewater effluent can be treated to a lower level of treatment known as primary treatment which is aimed at solids removal.

To meet the State of Hawaii Department of Health's (DOH) Guidelines for the Treatment and Use of Recycled Water (2002), the wastewater effluent undergoes a rigorous purification process. The Ewa WRF produces two grades of recycled water, R-1 for irrigation and RO (Reverse Osmosis) for industrial users. In either case, the recycled water will not be used for drinking or potable uses.

- R-1 is the highest level of treatment as regulated by the Hawaii Department of Health. R-1 water is currently being used for irrigation of golf courses, schools, green spaces, and crops such as bananas, papayas, ornamental plants and seed corn.

- RO water is an ultra pure water suitable for industrial purposes, such as refineries and power plants. It is named after the Reverse Osmosis process, which is the method of treatment used for RO water production. RO water is not currently regulated by the DOH. It is being sold to power and petro-refining companies primarily at Campbell Industrial Park for boiler feed water, process water, and make up water for cooling towers.
Of the total production of nonpotable water produced by the Ho'ouluili WRF, an excess of 1 MGD will be allocated for RO use, 2 MGD for R-1 water to be used by the Ho'ouluili WWTP, and the remaining R-1 water will be delivered to various users in Ewa. The original distribution system was constructed as part of the construction of the Ho'ouluili WRF. These included separate R-1 and RO distribution lines to various users in the Ewa district (refer to Figure 2-1).

2.1.2 Brackish Water from the Ewa Caprock Aquifer

In a 1989 report prepared for the State of Hawaii Department of Land and Natural Resources (DLNR) Commission on Water Resource Management (CWRM), George A.L. Yuen and Associates (1996) divided the Ewa caprock resource into three management sectors based on geography, hydrogeology, and land use (refer to Figure 2-2). These three sectors and their estimated future yields were indicated as follows:

- Honouliuli/Puuoolo - < 10 MGD
- Kapolei/Barbers Point Naval Air Station - < 5 MGD
- Malakole - < 1 MGD

As the entity that is delegated authority for administration of the State Water Code, CWRM has overseen groundwater management issues pertaining to land-based surface waters and groundwaters, such as the Ewa Caprock Groundwater Management Area. Consequently, the withdrawal of groundwater within the management area may be made only in accordance with permits issued by CWRM:

- Well Construction Permit - construction and testing of any well
- Pump Installation Permit - installation of a pump and pumping equipment in any well
- Water Use Permit - use of water in any Groundwater Management Area

Because of its moderate salinity, Ewa Caprock water had been a long-standing source of irrigation for sugarcane lands in the Ewa Plain from the late 1800s. The caprock aquifer was considered fully exploited in the 1930s when Ewa Plantation drilled approximately 70 artesian wells (Analytical Planning Consultants, 1999). Though it is effectively separated from contact with the basal aquifer, the Ewa Caprock Aquifer receives fresh groundwater from leakage of the underlying basal aquifer. It is recharged through infiltration of rainfall and/or excess irrigation water (Visher and Mink, 1964).

Based on the DLNR's groundwater database (obtained April 2002), major permit holders in the Ewa caprock region include the Estate of James Campbell, the U.S. Navy, Coral Creek Golf Course, Kalaeea LP, Chevron USA, Seibu Hawaii (Prince Golf Course), and Gentry Properties (refer to Appendix C for listing of wells). The database indicates that primary uses of the 160 wells in this region are under the classifications of irrigation and industrial, although roughly one-third of the wells are reported as unused and sealed.
Cutbacks in the region's agricultural operations and the lack of new sources of irrigation recharge have relinquished the Ewa Caprock Aquifer as a significant future source of nonpotable water. Due to concerns about declining caprock and basal water quality, there has been a restriction in the number of well drilling permits and the amount of groundwater withdrawn from the caprock aquifer (Belt Collins Hawaii, 1999). In addition, since 1998, permits have been issued with limited duration as a result of looming uncertainties in the caprock's sustainable yield (Belt Collins Hawaii, 1999).

Thus, the BWS does not foresee the development new brackish wells or well fields in the Ewa-Kapolei area as a significant source of nonpotable water. Any additional supply will be developed in the form of R-1 water and is contingent on expansion of both the R-1 process at Honolulu WRF and the secondary treatment process at Honolulu Wastewater Treatment Plant (WWTP). Funding for expansion of both these facilities are still being programmed in the City and County of Honolulu's 6-year capital improvement program (CIP) budget and separate environmental assessments will be prepared for each of these projects.

Instead, existing brackish supplies may serve as backup nonpotable water sources, which can be blended with R-1 water on an as-needed basis during periods of high demand. Existing brackish wells are located at the following golf courses: West Loch Golf Course, Hawaii Prince, Kapolei, Coral Creek, and New Ewa Beach. Brackish wells are also located in Kapolei Villages and the City of Kapolei. Blended water will be classified and regulated as R-1 water if/when brackish water is mixed with R-1 water.

2.2 EXISTING AND PROJECTED NONPOTABLE WATER DEMANDS

Prior to projecting nonpotable water demands, potential users were identified and located. According to the Ewa Non-Potable Water Master Plan (R.M. Towill Corporation, 2004) the geographical areas under consideration for reuse were based on the following concerns raised by the Department of Wastewater Management (1995):

a. The proximity of the area to the Honolulu Water Recycling Facility
b. The general scarcity of potable and/or non-potable water within the area
c. The determination that reclaimed effluent can be used to satisfy non-potable water demands in the area
d. The reuse site location in relation to the Ewa Caprock which overlays and protects the potable basal aquifer
e. The reuse site location in relation to the DOH Underground Injection Control and BWS No-Pass Lines

Irrigation for parks, golf courses and roadway landscaping, and other common area will have priority for effluent reuse. The BWS, however, will continue to explore other non-irrigation uses, such as toilet flushing in new commercial projects approved by the
DOH and at such time that the City and County of Honolulu has adopted provisions in the plumbing code pertaining to dual water plumbing in buildings.

The master plan also explains that CWRM well permittees in the Puuloa and Kapolei Sectors of the Ewa Caprock Groundwater Management Area are potential customers of R-1 water, because historically they have been allowed to pump only 6.0 MGD, but in fact have applied for 16.8 MGD in their permit applications (R.M. Towill Corporation, 2004). Golf courses and parks are typical land uses in this area, which are suitable R-1 uses. Moreover, groundwater at the Ewa and Onelua Beach parks are too saline for landscape irrigation and can benefit from other nonpotable sources (George A.L. Yuen and Associates, 1996). Thus, R-1 water could satisfy future needs.

On the other hand, the permittees in the Malakole Sector, which are located primarily in the vicinity of Campbell Industrial Park, are presently using nonpotable water for different purposes. Since various permittees in this sector use groundwater for cooling towers, they would be more likely prefer RO water for specific industrial needs.

### 2.2.1 Existing Average Daily Demand

Current nonpotable water demand in the Ewa region have been furnished as follows in the Ewa Non-Potable Water Master Plan (R.M. Towill Corporation, 2004):

<table>
<thead>
<tr>
<th>User</th>
<th>Average Daily Demand (MGD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>R-1 Demand (Regulated)</td>
<td>0.7000</td>
</tr>
<tr>
<td>Coral Creek Golf Course</td>
<td>1.0000</td>
</tr>
<tr>
<td>Ewa Villages Golf Course</td>
<td>0.5000</td>
</tr>
<tr>
<td>Hawaii Prince Golf Course</td>
<td>1.0000</td>
</tr>
<tr>
<td>Kapolei Golf Course</td>
<td>0.5000</td>
</tr>
<tr>
<td>West Loch Golf Course</td>
<td>1.0000</td>
</tr>
<tr>
<td>Fort Weaver Road Irrigation</td>
<td>0.1661</td>
</tr>
<tr>
<td>Honolulu WWTP</td>
<td>2.0000</td>
</tr>
<tr>
<td>Ewa Mahiko Community Park</td>
<td>0.1617</td>
</tr>
<tr>
<td><strong>Subtotal - R-1 Demand</strong></td>
<td><strong>6.278 MGD</strong></td>
</tr>
<tr>
<td>RO Demand (Non-Regulated)</td>
<td></td>
</tr>
<tr>
<td>AES Hawaii (Power Plant)</td>
<td>0.1446</td>
</tr>
<tr>
<td>Chevron</td>
<td>0.494</td>
</tr>
<tr>
<td>Citizen Gas</td>
<td>0.0488</td>
</tr>
<tr>
<td>Kalaeloa Partners</td>
<td>0.5486</td>
</tr>
<tr>
<td>Tesoro Hawaii (Refinery)</td>
<td>0.3244</td>
</tr>
<tr>
<td><strong>Subtotal - RO Demand</strong></td>
<td><strong>1.5158 MGD</strong></td>
</tr>
</tbody>
</table>

---

*Revised Final Environmental Assessment - Expansion of the Ewa Nonpotable Water System*
TABLE 2.1 (continued)

<table>
<thead>
<tr>
<th>User</th>
<th>Average Daily Demand (MGD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brackish Demand*</td>
<td></td>
</tr>
<tr>
<td>Villages of Kapolei</td>
<td>0.8096</td>
</tr>
<tr>
<td>Ko Olina Golf Course</td>
<td>0.6936</td>
</tr>
<tr>
<td>Ko Olina Property Development</td>
<td>1.2963</td>
</tr>
<tr>
<td>City of Kapolei</td>
<td>0.5000</td>
</tr>
<tr>
<td>Subtotal - Brackish Demand</td>
<td>3.2995 MGD</td>
</tr>
<tr>
<td>Total Existing Demand (R-1, RO, and Brackish)</td>
<td>11.3431 MGD</td>
</tr>
</tbody>
</table>

*Blended water will be regulated as R-1 water if/when brackish water is blended with R-1 water.

In addition to the R-1 and RO demands shown above, there are three interim brackish nonpotable water systems that are currently in use – Ko Olina, City of Kapolei and Villages of Kapolei (refer to Figure 2-1). These brackish systems will eventually be connected to the R-1 system, though they may still serve as backup sources during periods of high demand. Brackish water blended with R-1 water will be classified as R-1 water, and thus, will be regulated by DOH.

- Ko Olina is currently being serviced by the existing Barbers Point 215’ Reservoir, which is supplied by two brackish wells. Ko Olina’s nonpotable uses include irrigation of various landscaped areas and the golf course. The BWS will eventually connect this reservoir during Phase 1 - at that time the Ko Olina system will begin conversion to the R-1 system.

- The City of Kapolei’s nonpotable water system is partially completed, and brackish water is being delivered along Kamokila Boulevard in the vicinity of Haumea, Wakea and Manawai Streets (R.M. Towill Corporation, 2004).

- Similarly, part of the Villages of Kapolei is currently served by two 1.0 million gallon (MG) capacity reservoirs and two brackish wells. This separate system is presently maintained by the State of Hawaii. Both the City of Kapolei and the Villages of Kapolei systems will be converted to R-1 water service during Phase 1.

### 2.2.2 Projected Demands

The Board of Water Supply’s Ewa Non-Potable Water Master Plan (R.M Towill Corporation, 2004) establishes three phases of nonpotable water system expansion which are dependent upon expansion of both Honolulu WWTP and Honolulu WRF:

- Phase 1 - Present to 2009
- Phase 2 - 2010 to 2014
- Phase 3 - 2015 and beyond
Increases in future nonpotable water demand will be exclusively R-1 water (refer to Table 2-2). Initially, this increase is projected at 4.4 MGD in Phase 1, while the largest boost is expected during Phase 2 adding 9.1 MGD. The additional demand during Phase 3 is contingent on whether the Navy Blast Zone is going to be serviced by the Honolulu WWTP (R.M. Towii Corporation, 2004). Based on present figures, the projected use by the Navy Blast Zone would account for roughly one-half of the increase in demand during Phase 3.

The majority of the new demand over the three phases will be used for irrigation of golf courses, parks, schools (including UH West Oahu), and roadway landscaping. More detailed discussion on the proposed expansion of the nonpotable waterline network that will serve the new customers is provided in Section 2.3.2. Table 2-2 lists the new R-1 users and their projected demands that are expected to be added during the three phases of the project. In addition, Figure 2-1 indicates the potential water reuse areas associated with the existing nonpotable water system and the proposed expansion. It should be noted, however, that the proposed nonpotable waterline alignments and sites, as well as reservoir sites and capacities, are based on projected user locations and demands. These are subject to change by the BWS during the preliminary engineering and design stages, pending actual user development schedules.

<table>
<thead>
<tr>
<th>PHASE</th>
<th>USER</th>
<th>Average Daily R-1 Demand (MGD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Barbers Point Golf Course</td>
<td>0.5000</td>
</tr>
<tr>
<td>1</td>
<td>*City of Kapolei</td>
<td>0.5000</td>
</tr>
<tr>
<td>1</td>
<td>Grace Pacific</td>
<td>0.2500</td>
</tr>
<tr>
<td>1</td>
<td>*Villages of Kapolei</td>
<td>0.8096</td>
</tr>
<tr>
<td>1</td>
<td>New Ewa Beach Golf Course</td>
<td>0.6000</td>
</tr>
<tr>
<td>1</td>
<td>Ocean Pointe Golf Course (260 acres)</td>
<td>1.0608</td>
</tr>
<tr>
<td>1</td>
<td>*Ko Olina Golf Course</td>
<td>0.6936</td>
</tr>
<tr>
<td></td>
<td><strong>Subtotal for Phase 1 Additions</strong></td>
<td><strong>4.4140</strong></td>
</tr>
<tr>
<td>2</td>
<td>Campbell Schools (3)</td>
<td>0.1059</td>
</tr>
<tr>
<td>2</td>
<td>City of Kapolei</td>
<td>0.3780</td>
</tr>
<tr>
<td>2</td>
<td>East Kapolei Detention Basins 1 and 2</td>
<td>0.7000</td>
</tr>
<tr>
<td>2</td>
<td>Ewa Beach Community Park</td>
<td>0.0537</td>
</tr>
<tr>
<td>2</td>
<td>Ewa Beach Elementary School</td>
<td>0.0159</td>
</tr>
<tr>
<td>2</td>
<td>Ewa Beach Park</td>
<td>0.0199</td>
</tr>
<tr>
<td>2</td>
<td>Ewa Elementary (8 acres, 770 students)</td>
<td>0.0231</td>
</tr>
<tr>
<td>2</td>
<td>Ocean Pointe District Park (20 acres)</td>
<td>0.0816</td>
</tr>
<tr>
<td>2</td>
<td>Geiger Park</td>
<td>0.0408</td>
</tr>
</tbody>
</table>

*TABLE 2-2. PROPOSED ADDITIONS OF R-1 NONPOTABLE WATER DEMAND*
<table>
<thead>
<tr>
<th>PHASE</th>
<th>USER</th>
<th>Average Daily R-1 Demand (MGD)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Ocean Pointe Development (4,850 units)</td>
<td>0.3180</td>
</tr>
<tr>
<td>2</td>
<td>Island Ready Mix</td>
<td>0.0800</td>
</tr>
<tr>
<td>2</td>
<td>Kailua Elementary School</td>
<td>0.0234</td>
</tr>
<tr>
<td>2</td>
<td>Kalaeea Regional Park (Kapolei Community Development Park)</td>
<td>2.4480</td>
</tr>
<tr>
<td>2</td>
<td>Kapolei Business Park</td>
<td>2.3400</td>
</tr>
<tr>
<td>2</td>
<td>**Ko Olina Property Development</td>
<td>1.2963</td>
</tr>
<tr>
<td>2</td>
<td>Oneula Beach Park</td>
<td>0.1224</td>
</tr>
<tr>
<td>2</td>
<td>Parks</td>
<td>0.0638</td>
</tr>
<tr>
<td>2</td>
<td>Puuola Neighborhood Park</td>
<td>0.0177</td>
</tr>
<tr>
<td>2</td>
<td>UH West Oahu Campus (East Kapolei)</td>
<td>0.7344</td>
</tr>
<tr>
<td>2</td>
<td>Additional Villages of Kapolei</td>
<td>0.2030</td>
</tr>
<tr>
<td></td>
<td>Subtotal for Phase 2 Additions</td>
<td>9.0649</td>
</tr>
<tr>
<td>3</td>
<td>Aloun Farms (Campbell East Kapolei)</td>
<td>2.2032</td>
</tr>
<tr>
<td>3</td>
<td>Navy Blast Zone Area</td>
<td>2.6125</td>
</tr>
<tr>
<td></td>
<td>Subtotal for Phase 3 Additions</td>
<td>4.8157</td>
</tr>
<tr>
<td></td>
<td>TOTAL ADDITIONS (Phases 1 - 3)</td>
<td>18.2946</td>
</tr>
</tbody>
</table>

**City of Kapolei, Ko Olina Golf Course, and Villages of Kapolei to be converted from brackish water to R-1 water in Phase 1.**

**Ko Olina Property Development to be converted from brackish water to R-1 water in Phase 2.**

Note: No additional RO and brackish demands in Phase 1, 2 and 3.

2.3 INFRASTRUCTURAL COMPONENTS

2.3.1 Existing System Infrastructure

2.3.1.a Honolulu Water Recycling Facility

The Honolulu WRF receives secondary treated wastewater effluent supplied by the WWTP and processes up to 12.0 MGD for reuse. Two parallel liquid stream treatment process schemes are in operation at the Honolulu WRF which produce the two grades of nonpotable water. Schematic diagrams for both processes are shown in Figure 2-3.

R-1 treatment consists of a direct filtration process in which polyaluminum chloride is used as a coagulant added to the rapid mix tanks and vigorously mixed using vertical shaft mixers. The wastewater then flows into flocculation tanks which brings particles into contact so that they will collide, stick together as floc and reach a size that will readily settle. The coagulated floc material is then removed in a sand filter. Filtrate from the clear well is then taken to the ultraviolet disinfection system, which inactivates potential disease-causing pathogenic bacteria. The disinfected water is then stored onsite in one of two 1 MG tanks before being pumped into the R-1 distribution system. R-1 treatment meets the Hawaii Department of Health’s Guidelines for the Treatment and Use of Recycled Water (2002), also known as the “reuse guidelines” for R-1 water. R-1 water is being used primarily for irrigation.

RO treatment uses reverse osmosis (RO) with continuous micro-filtration (CMF) as the method of treatment. Upon entering the WRF, the wastewater is first pre-filtered through self-cleaning strainers (approximately 500 microns screens) to remove debris that could severely impact downstream processes. The pre-filtered wastewater is then run through the US Filter CMF system which uses a 0.2 micron hollow fiber membrane. Filtrate from the CMF is then fed into the RO units. Basically, reverse osmosis is a diffusion technique that uses a semipermeable membrane as a barrier to dissolved salts. Pressure is applied to the more concentrated solution on one side of the semipermeable membrane and forces pure water through leaving the salts behind. The pure RO water is then stored onsite in a separate RO storage tank before being pumped out through the RO distribution system. Currently there is no RO water classification in the DOH reuse guidelines. As such, RO water is not regulated by the DOH.

2.3.1.b Existing Distribution Systems

- Existing RO and R-1 Distribution Systems

The existing RO and R-1 distribution systems include separate lines for each grade of water. The systems were designed to operate within a pressure range of 40 to 80 PSI (Analytical Planning Consultants, 1999). RO and R-1 water are delivered to customers based upon water level in their storage tanks. As the water level drops, the WRF pumps begin pumping and a supply valve is electronically opened to fill the storage tank. Each customer has a flow control and meter at the point of delivery. The flow control valve is motorized and enables automatic start and stop of flow to the customer.
Valve position is controlled by the WRF's electronic supervisory control and data acquisition (SCADA) system.

All present and future RO users are located at the Campbell Industrial Park (CIP). The existing RO distribution system consists of approximately 5 miles of 14-inch and 3 miles of 10-inch polyvinyl chloride (PVC) pipe conveying approximately 1 MGD of industrial quality water to RO users at the CIP. The 14-inch PVC line exits the Honouliuli WRF towards the west and follows the Oahu Railway and Land Company (OR&L) right-of-way (ROW) towards the Villages of Kapolei, past the City of Kapolei in the direction of the drainage ditch on the east boundary of CIP (refer to Figure 2-1). The 14-inch RO line then turns south and feeds a 0.7 MG storage tank in CIP. The RO tank allows for 70 PSI at peak flows (R.M. Towill Corporation, 2004). A 10-inch discharge line from the RO tank heads south and turns west on Olai Street. This line serves two RO users - the AES Power Plant and the Tesoro Refinery.

The existing R-1 distribution system spans both east and west of the Honouliuli WRF. There are presently two PVC R-1 lines exiting the WRF. Both head west in the same direction as the RO line. One of the R-1 lines is a 16-inch PVC line that is currently inactive. This inactive line follows the same alignment as the RO line. It continues towards the existing drainage ditch on the east boundary of CIP. There the line splits into a 16-inch stub at Kalaekoa Boulevard and a 12-inch pipe which turns south following the same alignment as the RO line described above.

A second R-1 line, 20-inch PVC, presently delivers R-1 water to the Villages of Kapolei, the Fort Weaver Road irrigation area, and the golf courses at Kapolei, Ewa Villages, West Loch, Coral Creek, and the Hawaii Prince. This line also runs west as it exits the WRF, however, it turns north within the City and County of Honolulu’s easements along the future North-South Road (refer to Figure 2-1). The 20-inch line then makes another turn heading east at the makai boundary of the Ewa Villages golf course. There it is also reduced to a 16-inch line and continues towards the southeast boundary of the golf course. The line splits into two 12-inch lines, one serving the Ewa Villages Golf Course and another that continues towards Fort Weaver Road. The 12-inch line then heads north on Fort Weaver Road, continuing on towards the West Loch Golf Course. At this junction on Fort Weaver Road, an abandoned 16-inch water main in Fort Weaver Road was converted and connected to the 12-inch nonpotable R-1 line by the BWS. This has allowed service to the Hawaii Prince Golf Course. In addition, a 16-inch stub has been provided for the Ocean Pointe’s (Ewa Marina) District Park.

The existing R-1 and RO distribution systems installed by US Filter were designed in accordance with the following standards and specifications (Analytical Planning Consultants, 1999):

American Water Works Association (AWWA) C900 - Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 4 in. through 12 in., for Water Distribution

AWWA C905 - Polyvinyl Chloride (PVC) Pressure Pipe, and Fabricated Fittings, 14 in. through 48 in., for Water Transmission and Distribution.


Existing Nonpotable (Brackish) Water Distribution System

As mentioned previously, even after they are converted to the R-1 system, existing brackish water supplies may serve as backup sources, which can be blended with R-1 water as needed during periods of high demand. Ka Olina is presently receiving brackish water for irrigation of their golf course and other roadway and common landscaped areas. This system is served by the existing Barbers Point (West Beach) 215' nonpotable reservoir (refer to Figure 2-1). Two brackish wells are supplying the reservoir during the interim period. A 24-inch transmission main is routed from the reservoir to Farrington Highway. At the highway, the main is reduced to a 16-inch line which travels west along Farrington Highway toward Ka Olina. The line is again reduced along Aliinui Drive to a 12-inch main which also provides 8-inch stub-outs at each of the connecting roads.

The Villages of Kapolei is also supplied by interim brackish wells. The 12-, 14- and 16-inch diameter transmission mains convey nonpotable water from the reservoirs in the northerly direction along the Navy boundary line. The 12- and 14-inch lines continue in the westerly direction along Kapolei Parkway before being reduced to an 8-inch line. Nonpotable brackish water is being used for irrigation of existing developments in the area on an interim basis. The reservoirs and transmission infrastructure have been designed to accommodate future nonpotable demands.

Twelve-inch mains of the partially completed nonpotable system in the City of Kapolei are also being supplied on an interim basis by brackish wells. The 12-inch lines along Kamokila Boulevard have been constructed with lateral connections along portions of Hauneea, Wakea and Manawai Streets (R.M. Towill Corporation, 2004). The wells are located nearby at the intersection of Kapolei Parkway and Kamokila Boulevard.
2.3.2 Proposed Infrastructure

As mentioned previously, the Board of Water Supply's Ewa Non-Potable Water Master Plan (R.M. Towill Corporation, 2004) establishes three phases of nonpotable water system development which are dependent upon expansion of both Honolulu WWTP and Honolulu WRF. The following section described the work that is being planned for the distribution and storage systems under each of the three phases. However, it should be noted that the proposed nonpotable waterline alignments and sizes, as well as reservoir sites and capacities, are based on projected user locations and demands. These are subject to change by the BWS during the preliminary engineering and design stages, pending user development schedules.

2.3.2.a Proposed Expansion of Distribution System

Phase 1 - Present to 2009

Significant nonpotable water main construction will commence during Phase 1. The following are identified in the master plan:

- Existing Barbers Point 215' Reservoir (1.5 MG capacity) servicing Ko Olina and the City of Kapolei will be connected to an existing junction of a 20-inch slip lined waterline and a 16-inch waterline on Farrington Highway.

- 36-inch waterline from Palailai interchange along Old Farrington Highway and existing dirt road.

- 16-inch waterline from Kapolei Parkway to the Oahu Railway ROW servicing Campbell Industrial Park.

- 24-inch waterline along existing dirt road to intersection of Kalaeloa Boulevard and Kapolei Parkway.

- 10-inch waterline along Makakole Street off of the existing 12-inch main, which will connect Grace Pacific.

- 16-inch waterline off of an existing 16-inch main on Gelger Road, which will service the Barbers Point Golf Course.

- 16-inch waterline connecting to an existing 16-inch stub at Kalaeloa Boulevard to service the City of Kapolei (nonpotable wells may then be reserved for backup capacity).

- Upon transfer from the State of Hawaii, existing brackish waterlines serving the Villages of Kapolei will be converted to R-1 services through an existing connection at the Kapolei nonpotable reservoirs (nonpotable wells may then be reserved for backup capacity). At this time, the blended water will be classified and regulated as R-1 water by the DOH.
• 16-inch waterline from Renton Road to existing 16-inch main serving the Villages of Kapolei and the Kapolei Golf Course to allow flexibility in serving these users.

• 16-inch waterline from Fort Weaver Road to Kapolei Parkway.

• 30-inch and 24-inch waterline from Honolulu WRF through Geiger Road to Kapolei Parkway.

• 20-inch and 12-inch waterlines from Geiger Road to Haseko Ocean Pointe.

• 12-inch waterline from Fort Weaver Road through Hawaii Prince Golf Course to serve the New Ewa Beach Golf Course.

Phase 2 - 2010 to 2014

The majority of the proposed nonpotable R-1 water system will be constructed by the Board of Water Supply during Phase 2 of the project. The following infrastructure are to be completed within the five-year period of the project’s second of three phases (R.M. Towill Corporation, 2004):

• 30-inch waterline will run from the Honolulu WRF through the WWTP site to Geiger Road, where it will split into a 24-inch and a 20-inch line. The 20-inch line will run west to service the Kalaeloa Regional Park. The other will run parallel with the existing 16-inch east on Geiger Road.

• 12-inch waterline will connect to the existing 20-inch line and run along Renton Road connecting to the existing 16-inch line in Fort Weaver Road. This new line will serve parks and schools.

• 16-inch waterline will connect to the existing 20-inch line and continue along the easement for the future North-South Road. This north bound 16-inch line will service the East Kapolei Detention Basins, Aloun Farms, and the Future UH West Oahu.

• Network of 8-inch and 12-inch waterlines will connect to the existing 16-inch line on Kapolei Parkway to service the City of Kapolei and Villages of Kapolei.

• Network of 8-inch through 24-inch waterlines in the Kapolei Business Park will connect to the existing 16-inch stub on Kalaeloa Boulevard. A 12-inch line will also run from the business park south through Campbell Industrial Park.
- Two reservoir sites - total capacity of 10.0 MG

The Barbers Point 215’ Reservoir No. 2 will be constructed near the existing Barbers Point 215’ Reservoir with an influent/effluent line connecting to the 20-inch slip-lined waterline (former 24-inch line) in Farrington Highway. The primary service areas of this reservoir will be the City of Kapolei.

The North-South 215’ Reservoir will be located mauka of the H-1 Freeway at the former UHWO Campus site. A 24-inch influent/effluent line to the reservoir will connect to a 16-inch line constructed during Phase 2 along North-South Road. This reservoir will improve service at higher elevations, including mauka areas of East Kapolei.

Phase 3 - 2015 and Beyond

According to the Ewa Non-Potable Water Master Plan (R.M. Towill Corporation, 2004), Phase 3 represents the ultimate build-out for the nonpotable water system in Ewa. The following are the proposed developments scheduled for Phase 3:

- 16-inch waterline off of the 16-inch main on North-South Road, which will serve the Aloun Farms.

- If acquired, the U.S. Navy’s existing 8-inch fuel line will be converted to a nonpotable line servicing the Navy Blast Zone.

- Additional reservoir capacity of 5.0 MG must be constructed to handle the expected increase in average day demand.

2.3.2.b Basis of Analysis and Design

Hydraulic analysis for the nonpotable system was done as part of the Ewa Non-Potable Water Master Plan by R.M. Towill Corporation (2004). All new waterlines were assumed to be of polyvinyl chloride (PVC) construction. It was also assumed that high density polyethylene (HDPE) would be the material used for slip-lining of existing lines. The CYBERNET program developed by Haestad Methods was used for the analysis with a C value of 150 for PVC and HDPE waterlines.

The Ewa Non-Potable Water Master Plan, R.M. Towill Corporation (2004) has generally followed average water average daily demand factors and peaking factors established in the preceding Ewa Water Master Plan (Belt Collins and Associates, 1987). The various criteria used for pipe sizing and storage requirements are summarized in the following table:
### TABLE 2-3. PROPOSED NONPOTABLE WATER DESIGN CRITERIA

1. **Average Day Demand Factor.** For land uses to be served by a dual system, a 1.2 factor is applied to the AVERAGE WATER USE rates to derive the AVERAGE DAY DEMAND. For land uses served only by potable system, AVERAGE WATER USE and AVERAGE DAY DEMAND are identical.

2. **Peak Hour Demand Factors**
   a. PEAK HOUR RATE = 3.0 x AVERAGE DAY DEMAND for all other areas that will rely on BWS storage but can irrigate over a 12-hour period (MAX FACTOR = 1.5)
   b. PEAK HOUR RATE = 2.0 x AVERAGE DAY DEMAND for golf courses and agricultural areas that will rely on BWS storage but can irrigate over a 16-hour period (MAX FACTOR = 1.33)
   c. PEAK HOUR RATE = 1.5 x AVERAGE DEMAND for golf courses, urban areas and agricultural lands with storage or uses such as cooling towers that can receive reclaimed water over a 24-hour period (MAX FACTOR = 1.5)

3. Fire protection can be met in either the potable or non-potable system subject to meeting all present fire protection standards.

4. **Reservoir Size**
   a. The non-potable reservoir volume shall be equivalent to AVERAGE DAY DEMAND.
   b. Existing storage capacity at the Hawaii Prince, Kapolei, West Loch, Ewa Villages, Ko Olina, and Coral Creek Golf Courses will be considered as part of the system storage requirement in Phase 1.

5. Potable and nonpotable pipelines shall be sized for PEAK HOUR flow rates with a minimum residual pressure of 40 PSI or determined by the BWS Manager and Chief Engineer. Maximum velocity in the mains shall not exceed 8 feet per second. Hydraulic analyses will utilize tank spillway elevations as the initial hydraulic grade line elevations. Hydraulic analyses will use three-quarters full tank water surface elevations as initial hydraulic grade-line elevations. Maximum static pressure of 125 PSI.

6. Well pumps for potable & nonpotable systems shall provide MAXIMUM DAY in an operating time of 16 hrs.

7. For the Navy Blast Zone 5,000 GPD/acre is used for nonpotable water irrigation as stated in the Water Systems Standards for the Island of Maui.

8. Nonpotable demands for industrial users are based on the US Filter water audit and current RO demands and current RO demands.

**Source:** Ewa Non-Potable Water Master Plan (R.M. Towill Corporation, 2004).

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To the extent possible, the proposed distribution system will be identified designed in accordance with the Water System Standards (BWS, 2002). Although, it is recognized that the underlying premise of the master plan (R.M. Towill Corporation, 2004) was to permit deviations from the current standards, since they are intended for potable water systems. In particular, the following exceptions have been identified in the master plan: (1) maximum velocity in water mains without fire flow was increased to 8
feet per second (FPS) instead of 6 FPS in order to reduce residence time in the nonpotable lines; (2) peak factors were also adjusted because nonpotable water is commonly drawn in set blocks of time as opposed to continuous draw in the case of potable water; (3) minimum residual pressure for peak hour flow may be reduced to below 40 PSI as determined by the BWS Manager and Chief Engineer, since some nonpotable users install a private booster pump to increase onsite water pressure as necessary.

2.3.2.c Storage Capacity of Nonpotable Reservoirs

When the Secondary Urban Center becomes fully developed, the total nonpotable water minimum storage requirement will be 26.3 MG. This requirement was determined based on the average daily water demand for the entire Ewa region (R.M. Towill Corporation, 2004). At present two nonpotable reservoirs are serving the Ewa system - a 1.5 MG reservoir at Barbers Point and a 5.0 MG tank at the Honolulu WRF. As mentioned previously, the Phase 1 system storage requirement will be fulfilled by available storage capacities at existing golf courses in the region.

Additional reservoir storage capacity will have to be constructed as shown in Table 2-4 below; however, it should be noted that reservoir sites and capacities are subject to change by the BWS, pending actual nonpotable water user development schedules. Site specific feasibility studies will be conducted for each new nonpotable reservoir site along with the preparation of a separate environmental assessment based on the feasibility study.

<table>
<thead>
<tr>
<th>Site</th>
<th>Existing Available Capacity (MG)</th>
<th>Required Additional Capacity (MG)</th>
<th>Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barbers Point 215'</td>
<td>1.5</td>
<td>—</td>
<td>Existing brackish R-1 connection in Phase 1</td>
</tr>
<tr>
<td>Honolulu WRF</td>
<td>5.0</td>
<td>—</td>
<td>Existing/Phase 1</td>
</tr>
<tr>
<td>Existing golf courses</td>
<td>5.0</td>
<td>—</td>
<td>Existing/Phase 1</td>
</tr>
<tr>
<td>North-South 215' &amp; Barbers Point 215 No. 2</td>
<td>—</td>
<td>10.0</td>
<td>Proposed Phase 2</td>
</tr>
<tr>
<td>To Be Determined</td>
<td>—</td>
<td>5.0</td>
<td>Proposed Phase 3</td>
</tr>
</tbody>
</table>

PROJECTED ULTIMATE BUILD-OUT = 26.5 MG
2.4 PRELIMINARY COST ESTIMATE

The preliminary estimated construction cost of the proposed Ewa nonpotable distribution system (not including pumping) is about $110 million over the three phases as summarized below (refer to Appendix D for Preliminary Construction Cost Estimate). These cost estimates, however, are subject to change should there be modifications in waterline alignments and sizes by the BWS during the preliminary engineering and design stages.

In the short-term, labor costs associated with a project of this magnitude will provide a positive economic impact on the construction industry. In the long run, the expansion of the nonpotable water system will support planned economic growth and development in the Ewa district, reserving potable water for drinking water requirements and allocating nonpotable water to irrigation and industrial needs.

<table>
<thead>
<tr>
<th>TABLE 2-5. SUMMARY OF PRELIMINARY CONSTRUCTION COSTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Phase 1</td>
</tr>
<tr>
<td>Subtotal Phase 1</td>
</tr>
<tr>
<td>Reservoirs</td>
</tr>
<tr>
<td>Subtotal Phase 1</td>
</tr>
<tr>
<td>Phase 2</td>
</tr>
<tr>
<td>Waterlines</td>
</tr>
<tr>
<td>Reservoirs</td>
</tr>
<tr>
<td>Subtotal Phase 2</td>
</tr>
<tr>
<td>Phase 3</td>
</tr>
<tr>
<td>Waterlines</td>
</tr>
<tr>
<td>Reserviors</td>
</tr>
<tr>
<td>Subtotal Phase 3</td>
</tr>
<tr>
<td>TOTAL</td>
</tr>
<tr>
<td>Waterlines</td>
</tr>
<tr>
<td>Reservoirs</td>
</tr>
<tr>
<td>Total Phases 1 through 3</td>
</tr>
</tbody>
</table>
R-1 Process
High Quality Water for Irrigation (Regulated by Department of Health)

RO Process
High Quality Water for Industry (Not Regulated by Department of Health)

CHAPTER THREE

DESCRIPTION OF THE AFFECTED ENVIRONMENT AND PROPOSED MITIGATIVE MEASURES

3.1 THE PHYSICAL ENVIRONMENT

3.1.1 Topography and Soils

Existing Conditions:
The proposed expansion of the Ewa nonpotable water system will traverse the entire Ewa Plain. Extending from Campbell Industrial Park to the Navy Blast Zone, the proposed project site is relatively flat with mild slopes up to 3 percent. The only areas in which the nonpotable water lines would encounter considerable slope are mauka of the H-1 Freeway in the vicinity of the proposed reservoir sites - the North-South 215' site and the Kapolei 215' site near Puu Palai (west of Makakilo). The slopes in these two areas are likely to exceed 10 percent. As such, transmission and distribution lines mauka of the freeway toward the proposed the proposed reservoir sites are expected to reach the 200 feet elevation.

The Soil Survey for the Islands of Kauai, Oahu, Maui, Molokai, and Lanai (U.S. Department of Agriculture, 1972) identifies several soil classifications in the proposed project area which have been used in agricultural operations for sugarcane, truck crops, and pasture. In addition, the lowland areas include coral outcrop (CR), fill lands (FL) filled with bagasse and slurry from sugar mills, and mixed filled lands (FL) filled with material dredged from the ocean or excavated from adjacent upland areas.

The areas in the vicinity of Campbell Industrial Park and Kapolei Business Park consists primarily of coral outcrop (refer to Figure 3-1 for Soil Classification Map). There are also pockets of Mamala stony silty clay loam (MnC, 0-2 percent slopes) and Ewa stony clay loam (EmA, 0-2 percent slopes). The Ewa and Mamala series are both well-drained soils with moderate permeability. Runoff tends to be slow and the erosion hazard ranges from slight (EmA) to moderate (MnC). The upper most reaches of the water system in this area will be in various clays and loams including Honouliuli clay (HpA, 0-2 percent slopes, and HxB, 2-6 percent slopes), Lualualei extremely stony clay (LPE, 3-35 percent slopes), Makai stony clay loam (MuC, 7-15 percent slopes, and MuD, 15-25 percent slopes). The Honouliuli clay is also a well-drained soil with moderately slow permeability and slow runoff. The erosion hazard is no more than slight. As indicated, MuC and MuD are found in steeper areas where runoff is medium, and the erosion hazard is moderate to severe. Similarly, LPE is found on talus slopes, moderately sloping to steep. As the name implies, there are many stones in the surface layer, making this an impractical soil to cultivate. Runoff is medium to rapid, and the erosion hazard is also moderate to severe.
Soil types in the flat areas of the eastern half of the Ewa Plain below Farrington Highway (between West Loch and the Villages of Kapolei) is predominately Honolulu clay (HxA and HxB), Mamala stony clay loam (MnC), and Ewa silty clay loam (EmA and EmB). The areas closer to the shoreline and military installations and shoreline, such as the Pearl Harbor and Barbers Point Naval Air Station, have been filled (FL and Fd) or remain as coral outcrop (CR).

The proposed waterline route along Farrington Highway between Fort Barrette Road and Pahoa Road will encounter several soil types - Ewa silty clay loam (EaB, 3-6 percent slopes), Molokai silty clay loam (MuC), Honolulu clay (HxA and HxB), and Ewa stony silty clay (Ewa, 0-2 percent slopes). Ewa and EaB are also part of the Ewa series described above. Permeability is moderate and the erosion hazard is light in the EaB type. The Ewa also has very slow runoff, and the erosion hazard in no more than slight.

The Kawailoa clay loam (KIB, 0-2 percent slopes), and Kawailoa stony clay loam (KlaB, 2-6 percent slopes), Kawailoa very stony clay loam (KlbC, 0-15 percent slopes), MuD, and HxA are found along the proposed nonpotable water pipeline route from Farrington Highway up to the proposed UHWO reservoir site. The Kawailoa series consists of well-drained soils. Runoff is slow, and the erosion hazard is slight in both KIB and KlaB. KlbC can be found in steeper areas, with medium runoff and moderate erosion. Similarly, the erosion hazard is slight along the lower slopes (KlaA and KIB) and may become moderate at the higher slopes.

Environmental Impacts and Mitigation Measures:

The topography along the proposed waterline routes is relatively level except for the mauka most region above the H-1 Freeway where the nonpotable water mains would approach the proposed reservoir sites. For the most part, the Ewa Plain soil types identified above do not appear to be susceptible to erosion and runoff, except for the those mauka areas where soil types tend to be more stony with medium runoff and moderate erosion hazard.

According to the Soil Survey (U.S. Department of Agriculture, 1972), the Ewa, Molokai and Kawailoa soils are generally suitable as a source of topsoil and road fill. However, significant concerns are not anticipated even with the remaining soil types that are considered poor sources. In all cases, trenching will be designed and constructed with the minimum 3-foot cover and appropriate backfill in accordance with the Water System Standards (2002).

3.1.2 Hydrology

Existing Conditions:

3.1.2.a Surface Water

There are no surface waters in the form of perennial stream flows throughout the proposed project site. In addition, the project area is not subject to contact with any
proposed or approved water body segments designated on the State of Hawaii 303(d) List of Water Quality Limited Waters.

The Ewa Plain does serve as a natural drainageway for runoff originating in the mountains of the Waianae Range during rainstorms. This runoff proceeds downgradient through normally dry gulches located mauka of the H-1 Freeway (refer to Figure 3-2). The following gulches traverse the proposed nonpotable water system and are designated as intermittent streams (USGS Ewa Quad Map for Oahu, 1983):

- Makaiwa Gulch
- Palaiai Gulch
- Awanui Gulch
- Makakilo Gulch
- Makalapa Gulch
- Hunehue Gulch
- Kalai Gulch

Environmental Impacts and Mitigation Measures:

The proposed project will not impact any perennial stream flows or channels. In addition, the proposed infrastructure will not come into contact with any 303(d) Water Quality Limited Waters, thus will not burden waters that are already impaired. The proposed nonpotable water line alignments, however, will cross natural and manmade drainageways, which are designated as intermittent streams (USGS Ewa Quad Map for Oahu, 1983).

Some of the proposed alignments will be located in areas that are already developed, while others in areas where developments are forthcoming. In either case, the proposed nonpotable waterlines will be designed within road rights-of-ways (ROW) to the extent possible, so as to confine the area of potential impact(s). Whether a particular alignment is located in an existing or future ROW, necessary approvals and permits will be obtained during planning and design phases covering federal, state, and county requirements for water quality and water resource issues. In addition, the contractor will be required to adhere to temporary erosion control best management practices during construction. Permits may include, but not be limited to, the following:

- NPDES General Permit Coverage
  - Construction Dewatering
  - Discharge of Stormwater Associated with Construction Activity (disturbed areas greater than or equal to one acre)
  - Discharge of Hydrotesting Waters
- Stream Channel Alteration Permit (SCAP)
- Department of the Army Permit
- Section 401 Water Quality Certification

Preliminary indications from the Department of Land and Natural Resources, Commission on Water Resource Management (DLNR-CWRM) are that SCAPs will not
be required based on the proposed alignments (correspondence of May 21, 2003). According to CWRM, the dry gulches at the proposed crossings are not considered streams because they are not natural watercourses and/or do not have sufficient flows to support instream uses.

In summary, compliance with current rules and regulations will ensure that the quality or quantity of surface water in the Ewa region is not compromised or diminished as a result of the proposed project. Applicable permits will be obtained by the BWS or contractor during the design or construction phase of the project. Construction activities are short-term and will be conducted in accordance with pertinent statutory and permit requirements. As such, significant impacts related to surface water courses are not anticipated.

3.1.2.6 Groundwater

The Pearl Harbor Aquifer is one of three aquifer sectors in the Southern Oahu Aquifer as designated under the U.S. Environmental Protection Agency's Sole Source Aquifer Program (U.S. EPA website, 2004 and Analytical Planning Consultants, 1999). The proposed project area will be located in the lower coastal portion of the Waipahu-Waiauwa and Ewa-Kunia systems in the western half of the Pearl Harbor Aquifer (refer to Figure 2-2 and Appendix C for listing of wells from DLNR groundwater database). The two types of groundwater have been identified in the two systems as basal and caprock aquifers.

The basal aquifer which serves as the potable water source is formed where a thick layer or lens of fresh water floats on and displaces denser seawater within the pore spaces, fractures and voids of subsurface basalt rock. It is considered irreplaceable and highly vulnerable to contamination, ranging from 500 to 800 feet thick beneath the project area. According to Analytical Planning Consultants (1999, p. 4-12), "Recharge of the basal aquifer has been found to occur mainly in the high rainfall, highland area upgradient of the site via direct infiltration or temporary storage in dike compartments and subsequent percolation to the aquifer."

A second groundwater type also occurs in the coastal areas of the Ewa-Kunia and Waipahu-Waiauwa systems known as the Ewa Caprock Aquifer (refer to Figure 2-2). The caprock aquifer consists of basal water that is confined by a wedge-like sediment barrier or caprock that has a highly permeable upper layer and relatively impermeable confining layer below. The caprock itself consists of a porous limestone strata and serves to restrict the seaward flow of the underlying basal groundwater. This allows the basal lens to be thicker than it would be without the caprock.

The caprock aquifer can be recharged by "fresh groundwater from leakage of the underlying basal aquifer and recharge from infiltration or irrigation water" (Visher and Mink, 1964). The quality of the caprock water in this area is dependent upon excess irrigation of the Ewa Plain because there is not enough natural recharge to sustain the existing and proposed demands. Unlike the basal aquifer, the caprock aquifer is...
considered replaceable, though it is highly vulnerable to contamination (Analytical Planning Consultants, 1999).

Caprock water quality is generally brackish and not suitable for potable use (Kumagai, 1996). Over the years, the caprock salinity has been steadily rising from 500 to 900 mg/L chloride (George A.L. Yuen & Associates, 1989) and more recently up to 1,200 mg/L (Department of Wastewater Management, 1995). In their correspondence of July 25, 2000, it was confirmed that the Department of Health does not consider the Ewa Caprock to be a designated public drinking water aquifer.

Environmental Impacts and Mitigation Measures:

Impacts on the Ewa Caprock Aquifer may be considered in terms of outflows (pumping from wells) and returns (recharge). As for outflows, the BWS does not foresee the development new brackish wells or well fields in the Ewa-Kapolei area. The Ewa Caprock Aquifer cannot be regarded as a significant future source of nonpotable water, as all three sectors (Puuoa, Makakilo, and Kapolei) are already committed for other uses. Thus, as mentioned previously, any additional nonpotable water supply will be developed in the form of R-1 water and is contingent on expansion of both the R-1 process at Honolulu WRF and the secondary treatment process at Honolulu Wastewater Treatment Plant (WWTP). Funding for expansion of both these facilities are still being programmed in the City’s 6-year capital improvement program (CIP) budget and separate environmental assessments will be prepared for each of these projects.

In reality, recharge of the caprock aquifer is not expected to occur in any substantial amount. The major use of nonpotable water in this area will be for landscaping and golf course irrigation. According to the BWS, unlike the large return irrigation component of furrow irrigated sugar cane, it is expected that water reuse on landscaped areas, including golf courses would be at significantly reduced levels. Moreover, there would not be any economic advantage to over irrigate in any application. The irrigation or application rate is expected to be maintained at a level less than or equal to the vegetation’s evapotranspiration rate. In addition, because of the Ewa Plain’s predominately arid climate, it would be unusual to find gains from precipitation on a continuous basis.

The protection of the state’s underground sources of drinking water and coastal waters is regulated via Title 11 of the Hawaii Administrative Rules (HAR). These regulations govern State of Hawaii Department of Health (DOH) programs and activities, including those associated with the location and operation of wastewater disposal systems. Chapter 11-62 Wastewater Systems offers the most extensive coverage of wastewater systems involving both wastewater treatment works and individual wastewater systems. The DOH’s Guidelines for the Treatment and Use of Recycled Water (also referred to as the ‘reuse guidelines’) more specifically addresses the requirements for reuse of treated wastewater which are in the process of being incorporated into Chapter 11-62.
Groundwater recharge criteria and requirements are provided in the Guidelines for the Treatment and Use of Recycled Water (DOH, 2002, pp. 26-27) based on different classifications of recharge:

"The classification is based on whether the recharge directly affects a non-potable or potable aquifer. For projects that are over an aquifer classified as potable, the application rates that exceed the consumptive evapotranspiration of the vegetative cover will be considered a recharge project. For projects that are over an aquifer classified as non-potable, where the design monthly (deep) percolation rate (DMPR) is greater than 20 percent of the maximum monthly application rate (MMAR) minus the DMPR, the project will be designated as a recharge project. In other words, when the design monthly application rate is greater than 1.2 times the vegetative consumption rate, then the project would be considered a recharge project."

As indicated in Figure 3-3, the majority of the distribution areas of the proposed nonpotable system will be located over the Ewa Caprock Aquifer. Since the DOH does not consider the Ewa Caprock as a designated public drinking water aquifer, groundwater monitoring requirements of the reuse guidelines will not not be applicable. provided the monthly application rate does not exceed 1.2 times the vegetative consumption rate (non-recharge projects). However, the DOH will evaluate all proposed recharge projects (new and expansion) in which the 1.2:1 ratio is exceeded. The groundwater recharge criteria would also apply to those systems overlying public drinking water aquifers, such as the Pearl Harbor Aquifer, in which the monthly application is expected to exceed the consumptive rate (1:1 ratio). Evaluation of recharge project would be based on relevant aspects, including the following factors: treatment provided, effluent quality and quantity, effluent or application spreading area operation, soil characteristics, hydrogeology, resident time, and distance to withdrawal.

In certain circumstances, a disposal project may also be subject to DOH regulations governed by the underground injection control (UIC) program in Title 11 of HAR, Chapter 23 Underground Injection Control. Chapter 11-23 has jurisdiction over injection wells through which "subsurface disposal of fluid or fluids occurs or is intended to occur by means of injection." Injection can take place "either under pressure or by gravity flow into a subsurface formation or formations." The regulations stipulate that the construction of an injection well or wells cannot be started without first applying for a UIC permit. In addition, a well or wells cannot be operated, modified, or abandoned without obtaining a UIC permit from the DOH. In order to obtain a UIC permit, the DOH requires a substantive submission of engineering well data as well as a public notice of the proposed application prior to the issuance of a permit. During the public notice period, any interested person or groups may request the department for a public hearing with respect to the UIC application.

In summary, the DOH regulations and reuse guidelines provide significant safety considerations that must be approved prior to implementation of a recharge or an underground disposal project. This will ensure that the use of R-1 water in the Ewa district will not pose serious threat to the potable basal aquifer.
3.1.3 Climate and Air Quality

Existing Conditions:
The project's distribution system will be situated on southwest Oahu's Ewa coastal plain where weather is normally warm and arid. Mean annual rainfall is 20 inches per year, with monthly averages ranging from 0.1 to 3.9 inches (Analytical Planning Consultants, 1999). Average temperatures range from 72 degrees Fahrenheit (°F) in winter to 79°F in the summer, with daily fluctuations of about 13°F (Analytical Planning Consultants, 1999). Northeastely tradewinds prevail over Oahu and the surrounding waters throughout the year; however, the winds are typically less pronounced in the Ewa area. Humidity is moderate ranging from 75 to 85 percent.

Air quality is generally good due to the effects of the tradewinds and lack of stationary source of pollutants. The DOH currently monitors air quality at three stations located in the project area: West Beach (Ko Olina Golf Course), Makalua, and Kapolei. The West Beach and Kapolei stations monitor NO₂, PM₁₀, CO, and SO₂ while the Makalua station is monitoring only SO₂. According to the DOH's Annual Summary Hawaii Air Quality Data (2003), the State of Hawaii, including Oahu, was in attainment for all federal ambient air quality standards.

Environmental Impacts and Mitigation Measures:
Construction activities associated with the proposed project will produce emissions primarily from two sources: (1) fugitive dust from trenching operations and (2) exhaust from construction vehicles and equipment. These emissions are temporary or short-term and will cease upon the completion of construction. The key human receptors are the construction workers and residents along the pipeline route. Pedestrians and motorists temporarily using or commuting through the project area and immediate surroundings may also be exposed to short-term construction related emissions.

The contractor will be required to comply with Title 11 of HAR, Chapter 60.1 Air Pollution Control, and take the following precautions to the extent possible:

- Providing adequate water source and watering of exposed surfaces;
- Planting of vegetative cover as soon as final grades are established;
- Controlling dust from shoulders, project entrances, and access roads;
- Allowing for adequate control measures during off hours;
- Covering all moving, open-bodied trucks transporting material and debris which may result in fugitive dust;
- Wet-cutting (or dry-cutting with other dust control measures) of existing asphaltic concrete pavement along the waterline route in public streets and highways; and
The contractor will also be required to maintain and properly tune all equipment and engines, as well as minimize unnecessary idle time in order to control exhaust emissions. The suggested mitigative measures will alleviate the production of emissions and dust and should not result in significant impacts to air quality.

3.1.4 Natural Hazards

3.1.4.a Floods and Hurricanes

Existing Conditions:

According to the Central Pacific Hurricane Center, hurricane season in the Hawaiian Islands officially begins on June 1 and ends on November 30. However, tropical cyclones can occur at any time. The strong winds associated with hurricanes can also bring torrential rain that can lead to flash flooding and high waves.

The alignments of the proposed nonpotable water distribution system are located in the following Federal Emergency Management Agency Flood Insurance Rate Maps (FIRM) for the City and County of Honolulu (Effective Date November 20, 2000): 15003C0220 E, 15003C0305 E, 15003C0310 E, 15003C0315 E, 15003C0320 E, and 15003C0330 E.

The majority of the proposed nonpotable system is located in Zone D, or areas in which flood hazards are undetermined. There are few exceptions as described below:

- Kaloi Gulch along Renton Road and Kapolei Parkway. Some of the proposed waterlines will be located in Zone X, which are areas determined to be outside the 500-year flood plain.

- Fort Weaver Road at the bend towards Ewa Beach Community Park and New Ewa Beach Golf Course. The proposed 12-inch nonpotable waterline will be located in a Zone A area which would be inundated by the 100-year flood, though base flood elevations have not been determined (refer to Figure 3-4).

- Two short segments in the vicinity of Kaloi Gulch situated in Zone AE where base flood elevations have been determined for areas inundated by the 100-year flood (refer to Figure 3-5). The first is a 12-inch nonpotable line that is planned for Renton Road at the existing Kaloi Gulch bridge crossing. The base flood elevation at this location is 42 feet. The second location is about 0.9 mile upstream of the first location, where the base flood elevation is reported at 65 feet. A proposed 16-inch nonpotable line will be connected to an existing 20-inch US Filter R-1 line.
Environmental Impacts and Mitigation Measures:

Except for booster pumping stations, above ground storage reservoirs, and the proposed crossing of Kaloi Gulch at Renton Road, the proposed distribution system is likely to be constructed underground in its entirety. While, the impacts on such a buried system related to flooding are improbable, all nonpotable water main project sites located in Zones A and AE will comply with applicable rules and regulations of the National Flood Insurance Program (NFIP) and the City and County of Honolulu.

Separate site specific environmental assessments will be prepared for each new reservoir and pumping station after feasibility studies have been conducted. The impacts of flooding on these facilities will be addressed accordingly.

The bridge on Renton Road crossing Kaloi Gulch is an existing structure under the jurisdiction of the City and County of Honolulu (CCH). The proposed 12-inch nonpotable water line will be strapped under the bridge deck, mitigating potential damage to the water main in the event of a flood.

3.1.4.b Tsunamis

Existing Conditions:

A tsunami is a series of destructive ocean waves that can affect coastal areas. The Oahu Civil Defense Agency's Evacuation Zone Maps indicate areas that are to be evacuated in such an event (CCH web site, 2003). Within the proposed project site, the entire shoreline from Fort Weaver Road to Barbers Point is identified as a tsunami evacuation area.

Environmental Impacts and Mitigation Measures:

As mentioned above, except for booster pumping stations, above-ground storage reservoirs, and the proposed crossing of Kaloi Gulch at Renton Road, the proposed distribution system will be underground in its entirety. The impacts on such a buried system related to tsunamis are very unlikely. In addition, separate site specific environmental assessments will be prepared for each new reservoir and pumping station after feasibility studies have been conducted. The impacts of tsunamis on these facilities will be addressed accordingly.

3.1.4.c Earthquakes

Existing Conditions:

The entire island of Oahu is classified as Seismic Zone 2A under the Uniform Building Code (International Conference of Building Officials, 1997). These areas are considered low potential for ground motion created by seismic activity.

Environmental Impacts and Mitigation Measures:

Because of the low potential for ground motion, there are no special design considerations required for the proposed underground nonpotable waterlines. As
mentioned previously, separate environmental assessments will be prepared for each above ground storage reservoir which will address the impacts of seismic activity and the necessary design considerations.

3.2 THE BIOLOGICAL ENVIRONMENT

3.2.1 Flora and Fauna

Existing Conditions:

The majority of the proposed nonpotable water line alignments will traverse through existing rights-of-ways. These areas have been previously cleared, excavated, and graded during prior construction activities.

According to the Final Environmental Assessment for the Honolulu Wastewater Reclamation Plant (Analytical Planning Consultants, 1999), the dominant vegetation zone on the Ewa Plain is comprised of kiawe and lowland shrub. Endemic or native plant species found only in Hawaii occurring on the Ewa Plain include the sub-shrub hinahina (Heliotropium anomalum var. argentum) and the herb nama (Nama sandwichensis) in the coastal strand zone, and the small shrub-like sandalwood tree (Santalum ellipticum) in the kiawe and lowland shrub zone (Ogden Environmental and Energy Services, 1994). Indigenous or native plant species found in Hawaii and elsewhere in the coastal strand zone include the seaside heliotrope herb (Heliotropium curassavicum) and the ohelo kai shrub (Lycium sandwichensis).

The most dominant form of wildlife are the birds, which include at least 17 introduced species and five indigenous species (Analytical Planning Consultants, 1999). Introduced birds such as cardinals, doves, mynas, ricebirds, sparrows and white-eyes are common to the low lying elevations, which provide a natural habitat and feeding areas (Wilson Okamoto & Associates and Brown and Caldwell Associates, 2001). Other wildlife consist of feral dogs, and cats, rodents and mongooses and introduced freshwater fish, including mosquito fish and tilapia (Analytical Planning Consultants, 1999).

Environmental Impacts and Mitigation Measures:

Since the majority of the construction will take place in areas that have been already cleared and disturbed by prior excavation and grading, there will be no direct impacts on flora and fauna habitats. Existing vegetation along the waterline trenches may be temporarily damaged during construction, but will be restored to original or better condition by the contractor.

The proposed nonpotable water system will include underground pipelines, which will not directly affect terrestrial biota on a long-term basis. However, various plant and animal species could be exposed to the nonpotable water as direct spray or runoff from irrigated areas, or through waterline failures. The nonpotable water will be of R-1 quality, which is suitable for exposure to plants and animals (Department of Health,
The dissolved nutrients in the recycled R-1 water may also stimulate plant growth in the area, and the irrigation water, itself, would generally benefit the existing wildlife in the warm and arid climate (Analytical Planning Consultants, 1999).

The use of corrosion-resistant pipe materials will also be considered during the design phase to minimize future failures resulting from pipe deterioration. Subsequently, nonpotable water main leaks or breaks will receive high priority consideration and will be repaired immediately by the BWS.

In summary, the proposed infrastructure expansion, itself, is not expected to result in significant impacts to region's wildlife and vegetation. The effects of irrigation spray, if any, could be beneficial.

3.2.2 Threatened and Endangered Species

The Final Environmental Assessment (FEA) for the Honolulu Wastewater Reclamation Plant (Analytical Planning Consultants, 1999) provided a discussion on threatened and endangered plants and wildlife in the Ewa Plain, including Campbell Industrial Park (CIP) and Naval Air Station Barbers Point (BNAS). Data and information for the FEA was obtained from the Hawaii Natural Heritage Program (HNHP) database. The two following sub-sections are taken from the FEA (pp. 4-29 to 4-31) and have been updated to reflect the HNHP database as of April 2002 (refer to Appendix E for listing of species and Figure 3-6 for rare species location map).

3.2.2.a Terrestrial Plants

Existing Conditions:

Location 8334, east (moku) of Camp Malakole, harbors a population of the federally endangered okoko shrub (Chamaesyce skottsbergii var. skottsbergii). Populations in the vicinity of the deep draft harbor have been destroyed, and additional populations will be lost as the harbor expands. A colony of this plant formerly grew within CIP, on the west side of Hanua Street (8336), but has been destroyed. Other colonies were reported from the east side of Saratoga Street in CIP (8339) and on BNAS (8337, 8338).

The rare Ophioglossum concinnum (pololei) was recorded at location 12101, on an unimproved road about 200 feet north of the OR&L right-of-way north of the BNAS boundary. It has not been observed since 1912.

The endemic round-leaved chaff-flowershrub (Achyranthessplendens var. rotundata), a federally listed endangered species, occurs at low elevations in open, dry forest remnants, open thickets, on talus or rocky slopes, or on coastal plains (Wagner, Gerbst, and Sohmer, 1990). Several populations exist on the Ewa Plain; two are in CIP (5946, 5947), one in Camp Malakole (5948) and one is at BNAS (5945). The Achyranthess at location 5947 occurs in Myoporum sandwicense (naia) coastal dry shrubland. In addition, pua pilo (Capparis sandwicense var. zohary), an endemic shrub federally listed as a species of concern (8145, 12130), occurs in kiiwai and
lowland scrub zones (Ogden Environmental and Energy Services, 1994), and is known to exist in the same area as the A. splendens.

The federally endangered naupaka (Scaevola coriacea) was formerly seen near the site of Barbers Point Beach Park (8868), but the last sighting was in 1919.

The federally endangered ihi ihi or ihi la au (Marsilea villosa) used to occur under kiawe trees just north of the Honolulu Wastewater Treatment Plant site (12070). The plants have not been seen there since 1932, and the area has since been graded.

According to the Division of Forestry & Wildlife, Department of Land and Natural Resources (correspondence of March 14, 2002), the ongoing North-South Road project in Ewa was undergoing mitigative actions for the protection of Abutilon menziesii. A Habitat Conservation Plan for this project was approved by the State of Hawaii Board of Land and Natural Resources on April 8, 2004. Due to the fairly recent timing of this observation, the locations and detailed information had not been incorporated into the HINHP database as of April 2002. However, the general location of the A. menziesii is shown on Figure 3-6.

Impacts and Mitigation Measures:

Due to recent observations of A. menziesii and potential evidence of other endangered plants in Ewa, prudent planning practices are recommended to avoid needless mitigation later during the construction phase. As such, the planning phase for new waterline alignments in undisturbed areas will include an on-site reconnaissance survey by a trained botanist to determine whether endangered plants are present. Since the nonpotable water system is being proposed primarily within areas that are already developed, namely, existing right-of-ways, the impacts on endangered species are expected to be minimal, if any.

Other mitigative measures such as the use of corrosion resistant materials will also be considered during the design phase so as to retard pipeline deterioration. This will help to minimize future failures, including water main leaks and breaks.

In summary, necessary precautions will be followed during all phases of the project, from planning to design to operation. Thus, the proposed project is not expected to further endanger nor threaten rare plant species.

3.2.2.b Wildlife

Existing Conditions:

Three federally endangered waterbirds were observed in the CIP from the late 60s to the mid 70s: Hawaiian Gallinule alae-ulua (1039), Hawaiian Coot alae ke oke o (1117), and the Hawaiian Stilt alae o (1378).

The federally endangered Oahu elepaio (Chasiempis sandwichensis ibidis) was last seen on the Ewa Plain in 1984 (1796) at a location which formerly harbored rare plants,
including Lipochaeta lobata var. loata (6594) and Portulaca villosa (9676), as well as
the endangered Centaurium sebaeoides (8613). It has been more than 60 years since
any of these were seen there.

A pupillid land snail (Lyropupa perlonga), a federal species of concern, was observed
near Malakole Road (5867) in 1980. The obscure pentarthrum weevil (Pentarthurum
absurrum), another federal species of concern, was last seen northwest of Tenney
Village (4804) in 1974.

There are several anchaline ponds on the Ewa Plain (4095, 4096, 4097), at least one of
which (4767) contains the federal species of concern, Metabetaeus lahena.

Impacts and Mitigation Measures:
The proposed nonpotable water system will include underground pipelines, which will
not directly affect endangered or threatened wildlife on a long-term basis. The use of
corrosion resistant materials will be considered during the design phase so as to retard
pipeline deterioration and minimize future failures, including water main leaks and
breaks.

The DOH reuse guidelines (2002) prohibit ponding of recycled water, limiting the
multiplication of residual microbial populations. In addition, the application of R-1
water and its dissolved nutrients to areas presently not irrigated could allow for
consequent plant growth and provide habitat for prey and forage areas for owls and
waterbirds (Analytical Planning Consultants, 1999).

Thus, the proposed infrastructure expansion, itself, is not expected to result in significant
impacts to region's wildlife and will not further endanger/threaten rare species. The
effects of irrigation spray, if any, should be beneficial.

3.2.2.3 Marine Species

Existing Conditions:
The threatened and endangered green sea turtle (Chelonia mydas) is known to
frequent the area immediately offshore (3988), which is known for an abundance of
seaweed. The humpback whale (Megaptera novaangilae), a state and federally
listed endangered species, may be present in the vicinity from November to May;
however, densities offshore of NASBP are among the lowest in Hawaii (Ogden
Environmental and Energy Services, 1994). The Hawaiian Monk seal (Monachus
schaufinlandi) has been seen along the coast at Oneula Beach Park (3913), Barbers
Point Beach Park (3928), Ko Olina Resort Lagoons (3930, 3931, 3954), Ewa Beach Park
(3914), and Paradise Cove (3956).

Impacts and Mitigation Measures:
It is unlikely that reclaimed water will reach the ocean. There should be no impacts to
turtles and other protected marine species.
3.3 THE HUMAN ENVIRONMENT

The region has been in transition from agricultural to urban uses, and is the location of Oahu’s fastest growing residential communities.

3.3.1 Social and Economic Resources

3.3.1.a Demographics

Existing Conditions:

Ewa’s population in 1990 was at 42,931 (1990 Census ST1 File; Planning Division, Department of Planning and Permitting, January 2002). This accounted for 5.1 percent of the City and County of Honolulu’s population. Ewa’s population increased to 68,718 in 2000 or 7.8 percent of the population of the City and County of Honolulu (2000 Census ST1 File; Planning Division, Department of Planning and Permitting, January 2002). Of Ewa’s total population, 31.7 percent were children under the age of 18, 61.5 percent adults and 7.8 percent senior citizens 65 years and older in 2000. According to the 2000 Census, nearly three-fourths of the Ewa’s 2000 population resided in three areas: (1) Ewa Gentry/West Loch, Ewa Beach/Kealohia Point and Makalapa/Makaiwa Hills/Keaunui. Overall there was a 60 percent population increase in Ewa over the 10-year period or 4.8% average annual growth.

Using forecasts by the City and County of Honolulu and the State of Hawaii Department of Business, Economic Development, and Tourism (DBEDT) projections, the Transportation for Oahu Plan (TOP) 2025 has projected an increase in Ewa’s population to 114,000 in the year 2025 (Carter & Burgess, 2001). This represents growth of more than 65 percent beyond the 2000 Census population.

Impacts and Mitigation Measures:

Construction of the proposed facilities will have no significant effects on population or demographics.

Operation and maintenance of the proposed distribution system will have indirect effects on population growth. It will allow planned development of the Ewa Plain to proceed with less of a burden on Oahu’s potable aquifers.

3.3.1.b Employment

Existing Conditions:

Economic activity on Oahu is concentrated in the Primary Urban Center (Honolulu area), although the job share in Secondary Urban Center is expected to increase to more than 64,000 in 2020 (CCH, 1997). The majority of this growth will be located in the City of Kapolei, which will provide work sites for 25,000 private jobs and 5,000 City and State jobs. In addition, the development of the University of Hawaii West Oahu campus is expected to have 800 faculty and staff by 2020. Ongoing non-residential (commercial, industrial and resort) expansion at Campbell Industrial Park, Kapolei
Business Park, Ko Olina Resort and Ewa Marina will provide employment opportunities in the Ewa district.

**Impacts and Mitigation Measures:**

The proposed project will have a direct impact on the construction industry over the 1.5 years of construction. While the construction workers will not necessarily be from the Ewa area, they are likely to be Oahu residents. This will be a boost to the construction industry in Hawaii.

There will also be indirect impacts as a result of the proposed project. The availability of an alternate water source will allow for overall growth and development that is envisioned for the Ewa area, providing more diverse job opportunities for present and potential Ewa residents. Living and working in Ewa will be an attractive option for these residents as they will be able to avoid a long daily commute. The Final Environmental Assessment for the Honolulu Wastewater Reclamation Facility (Analytical Planning Consultants, 1999) indicated that more than one-fifth of the residents commuted for more than 45 minutes each way to and from work.

3.3.1.c Household Income

**Existing Conditions:**

Data from the U.S. Census Bureau's Census 1990 and Census 2000 pertaining to household income were available for six census designated places (CDPs) in Ewa: Barbers Point, Ewa Beach, Ewa Gentry, Ewa Villages, Iroquois Point and Makakilo City. The data is summarized below; however, it should be noted that the six areas represented 85 percent of the Ewa population in 1990 and 58 percent in the 2000 census.

<table>
<thead>
<tr>
<th>CDP</th>
<th>1990 Median Household Income ($)</th>
<th>1990 Unemployment Rate (%)</th>
<th>2000 Median Household Income ($)</th>
<th>2000 Unemployment Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barbers Point</td>
<td>23,908</td>
<td>20.9</td>
<td>65,625</td>
<td>0</td>
</tr>
<tr>
<td>Ewa Beach</td>
<td>45,184</td>
<td>5.0</td>
<td>57,073</td>
<td>7.1</td>
</tr>
<tr>
<td>Ewa Gentry</td>
<td>45,824</td>
<td>1.0</td>
<td>61,462</td>
<td>3.6</td>
</tr>
<tr>
<td>Ewa Villages</td>
<td>40,924</td>
<td>1.8</td>
<td>51,451</td>
<td>7.1</td>
</tr>
<tr>
<td>Iroquois Point</td>
<td>29,593</td>
<td>8.0</td>
<td>44,200</td>
<td>16.2</td>
</tr>
<tr>
<td>Makakilo City</td>
<td>50,284</td>
<td>4.8</td>
<td>66,515</td>
<td>5.2</td>
</tr>
<tr>
<td>Weighted Average</td>
<td>42,595</td>
<td>5.3</td>
<td>59,777</td>
<td>6.1</td>
</tr>
<tr>
<td>Honolulu County</td>
<td>40,851</td>
<td>3.5</td>
<td>51,914</td>
<td>6.2</td>
</tr>
</tbody>
</table>

Source: U.S. Census Bureau (1990 and 2000).
The median household incomes and unemployment rates in Ewa appear to be following the same trend as the overall figures for the City and County of Honolulu. Median household income made a significant gain between 1990 and 2000, although both unemployment and poverty levels worsened in the same period. In 1990, 4.4 percent of the population was below poverty level and 6.7 percent in 2000.

Approximately one-fourth of the homeowners (of owner-occupied units) in the Ewa area were paying 35 percent or more of their household income on housing costs. A similar proportion of renters were also paying 35 percent or more of their household income on rent (U.S. Bureau of Census, 2002).

Impacts and Mitigation Measures:

Workers, during construction or operations, will not necessarily be from the Ewa area, but from Oahu in general. Construction activities will not have a direct significant impact on household income.

3.3.1.d Housing

Existing Conditions:

Housing in Ewa has expanded rapidly since the early 1990s as agricultural lands have been converted to residential developments such as Ewa Villages, Ewa Beach, Makakilo, Ewa by Gentry, West Loch, Iroquois Point [Navy Housing], and Kapolei. In 1990, Ewa had 11,722 housing units with a 2.6 percent vacancy rate (1990 Census ST1 File: Planning Division, Honolulu Department of Planning and Permitting, January 2002). A typical household size was 3.66. Owner-occupied homes comprised 53.5 percent of all occupied units. In comparison, the 2000 figures are as follows: 20,804 total housing units, 70.0 percent owner-occupied, 9.0 percent vacancy rate and typical household size of 3.61. Nearly three-fourths of the number of residential housing units in Ewa were found in the following three areas: (1) Ewa Gentry/West Loch, Ewa Beach/Iroquois Point and Makakilo/Makaiwa Hills/Kunia.

Changes over the 10-year period may be summarized as follows:

- 77.5% increase in housing units or approximately 6% average annual increase
- Number of owner-occupied housing units more than doubled
- No change in typical household size

Impacts and Mitigation Measures:

Operation and maintenance of the proposed distribution system will have indirect effects on population growth. It will allow planned development of the Ewa Plain to proceed with less of a burden on Oahu’s potable aquifers.
3.3.1.e Economy

Existing Conditions:

The Department of Business, Economic Development and Tourism's (DBEDT) State of the Economy dated March 2004 has reported that investments in the construction and real estate sectors provide strong support for growth in Hawaii's economy. This positive outlook was backed by optimistic projections for the U.S. and Japanese economies.

DBEDT's State of the Economy (March 2004) also reported an increase of the number of wage and salary jobs of 9,000 or 1.6 percent for the fourth quarter of 2003. These jobs occurred in Food Services, Health Care, and Construction. Nominal personal income showed a gain of 4.8 percent in the same quarter of 2003 when compared to the second quarter of 2002. Tax revenues distributed to the State also rose 3.9 percent while the general excise and use tax increased 6.8 percent for the fourth quarter of 2003 compared to the fourth quarter of 2002. The number of visitors arriving by air increased 0.4 percent comparing the fourth quarter of 2003 to the same quarter in 2002.

According to the DBEDT's County Economic Conditions dated March 2004, during the fourth quarter of 2003, the City and County of Honolulu showed an increase of 5,050 wage and salary jobs or 1.2 percent from a year earlier. These jobs occurred in Health Care and Social Assistance; Natural Resources, Mining, and Construction; Food Service and Drinking Places; and Educational Services. Other economic activities, such as tax collections increased 11.9 percent while visitor days decreased 0.5 percent.

Future Conditions:

According to DBEDT's Outlook of the Economy (March 2004), the "forecast of Hawaii's economy continues to anticipate solid growth for tourism, personal income, and wage and salary employment for 2004." This is attributed to several factors, the partial recovery of our visitor sector, increased federal government spending, and ongoing construction spending. An increase of 5.2 percent in Hawaii's total visitor arrivals is anticipated in 2004. Similarly, visitor expenditures are forecasted to climb 6.5 percent. Total wage and salary jobs in Hawaii are likely to rise by 1.5 percent in 2004 and 1.3 percent in 2005.

DBEDT (March 2004) also indicates that "Hawaii's economic growth also depends on the conditions of the mainland U.S. economy as a whole." The 2004 Gross Domestic Product (GDP) is expected to increase 4.7 percent for the U.S. and 2.8 percent for Japan. Although the outlook for Japan's economy has shown definite growth, the uncertainty in non-performing debt held by Japanese banks continues to cloud the country's economic future.
3.3.2 Noise

Existing Conditions:

Current noise sources in the project vicinity include vehicular traffic and equipment. On a long-term basis, there is no noise that will be associated with the underground nonpotable water distribution system.

Environmental Impacts and Mitigation Measures:

The excavation for pipelines will result in unavoidable but temporary impacts during construction operations. The noise sources are vehicles and various construction equipment. These equipment include backhoes, compactors, and pavers, which will raise ambient noise levels along the pipeline route. Noise impacts may have direct and indirect effects on residential units adjacent to the construction areas. Motorists and pedestrians traveling through construction areas will also be exposed to increased noise levels.

Construction equipment and on-site vehicles or devices requiring an exhaust of gas or air will be equipped with mufflers. Within the residential areas, the allowable noise level is 55 dBA at the property line during the day (7 a.m. to 10 p.m.) and 45 dBA at night (10 p.m. to 7 a.m.). The contractor will be required to obtain a Community Noise Permit and comply with Title 11 of HAR, Chapter 46 Community Noise Control. Required permit conditions for construction activities, which the contractor must comply with include the following:

1. No permit shall allow any construction activities creating excessive noise when measured at or beyond the property line of the construction site for the house before 7:00 a.m. and after 6:00 p.m. on weekdays.

2. No permit shall allow construction activities creating noise when measured at or beyond the property line of the construction site for the house before 9:00 a.m. and after 6:00 p.m. on Saturdays.

3. No permit shall allow construction activities, which exceed the allowable noise levels on Sundays and holidays.

Nighttime work in residential areas will not be permitted for this project. The Department of Health will enforce the above conditions and violators will be penalized by the Director. As such, compliance with the proposed measures should not result in significant noise-related impacts.

3.3.3 Public Health and Safety

Existing Conditions:

Protection of the public health is the most important consideration in the distribution and use of recycled water. Human contact with recycled water may take place at
the treatment plant and recycling facility, along the pipelines (in the event of a leak), or at the site of its reuse. This may include residents, commercial/industrial workers, recreational users of golf courses or other facilities where reclaimed water is applied, people transiting areas of reuse, or people consuming crops exposed to recycled water.

In 1993, the DOH drafted guidelines for the treatment and reuse of reclaimed water. These guidelines have recently been revised, entitled Guidelines for the Treatment and Use of Recycled Water (DOH, 2002), also referred to as the “reuse guidelines.” These extensive and comprehensive guidelines were produced by various committees of scientists, engineers, public health specialists, water managers and others, who investigated the experiences, results and regulatory safeguards developed in water reuse projects elsewhere. The resulting guidelines have the following objectives:

- Protect public health and avoid public nuisances;
- Prevent environmental degradation of aquifers and/or surface waters;
- Delineate specific recycled water application with recycled water quality treatment;
- Facilitate the use of recycled water in greater amounts, by more readily available knowledge of the conditions under which DOH can attest to the safety of use of recycled water use; and
- Facilitate acceleration of planning, design, permitting, and implementation of water reclamation projects.

As mentioned in Chapter 2, the proposed project will involve the distribution of two recycled wastewater products: RO and R-1 water. RO water is essentially sterile and does not present a public health risk; however, it is not regulated by the DOH. Whereas R-1 water, the most highly treated class of recycled water, is regulated by the DOH. Wastewater typically undergoes a secondary treatment process where it is oxidized to decompose organics. Secondary treatment is followed by filtration to further remove particles and disinfection to deactivate or destroy potential pathogens in the wastewater. This advanced level of treatment is designed to produce water suitable for the maximum number of R-1 reuse applications approved by the DOH. The DOH’s criteria defining R-1 water are expressed in terms of the concentrations of viruses and bacteria remaining in the product water (refer to Appendix F).

In comparison with drinking water, R-1 water is permitted to have a small number of coliform and viruses. For example, drinking water is not permitted to contain total or fecal coliform, whereas R-1 water can have an average of 2.2 fecal coliform per 100 milliliters. Even this, however, is a relatively small fraction compared to what might be expected in typical stream flows or storm water runoff.
R-1 water is not intended for private yard watering at this time. Instead, it will be used primarily for landscape irrigation in the following applications approved by the DOH (2002):

- Golf courses
- Roadsides and medians
- Parks, school yards and athletic fields
- Residential common areas when managed by an irrigation supervisor
- Ornamental plants for commercial use

While the current DOH reuse guidelines permit the use of R-1 water for toilet flushing, it is currently not common practice. R-1 water, however, may be considered for toilet flushing in new commercial facilities approved by the DOH at such time that the City and County of Honolulu has adopted provisions in the plumbing code pertaining to the use of dual water supply in buildings.

Environmental Impacts and Mitigation Measures:

The complete list of DOH-approved R-1 uses in the reuse guidelines includes irrigation for edible food crops and is contained in Appendix F. It can be seen from these uses that dermal exposure and the ingestion of food crops are safe. Public health and safety should not be compromised with increased usage of R-1 water.

3.3.3.a Best Management Practices

Prior to the construction of a reuse system, the reuse guidelines specify that an Engineering Design Report for a Water Reuse Project must be approved by the DOH for all projects involving areas greater than five acres (refer to Section VIII). The report must incorporate the following Best Management Practices plans:

1. Irrigation Plan
2. Management Reuse Plan
3. Public Education Plan
4. Employee Training Plan
5. Vector Control Plan

Applicants of smaller reuse projects (less than five acres) may submit a simplified application form; however, requirements set forth under Title 11 of HAR, Chapter 62 Wastewater Systems, and the provisions of the reuse guidelines must still be satisfied.

The Irrigation Plan will address methods and controls to be used in the irrigation system that will mitigate runoff or ponding. Specific information will be required by the DOH in order to assure that the distribution and use of the recycled water will not create a health hazard or nuisance:

- Boundaries of the irrigated area
- Amount and type of recycled water to be used for irrigation
- Transmission line from treatment facility to proposed area of use or impoundment

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REVISED FINAL ENVIRONMENTAL ASSESSMENT - EXPANSION OF THE EWA NONPOTABLE WATER SYSTEM
• Storage reservoir or impoundment
• Distribution network
• Method of irrigation (equipment)
• Location of exterior drinking fountains
• Method(s) to mitigate runoff

In addition, a Management Reuse Plan will be prepared as part of the Engineering Design Report, which will establish and delineate the responsibilities of operation and maintenance of the reuse system. The purpose of the plan is to assure prevention of discharge, runoff and overspray. The plan will address the following:

• Procedures, restrictions and other requirements to be followed by the user/distributor.
• Contact information on the User Supervisor appointed by the user, who will have overall operational responsibility for the system, including the prevention of potential hazards and implementation of the reuse guidelines.

In summary, while the proposed irrigation uses will not impact public health, the use of recycled R-1 water will be done in accordance with DOH’s reuse guidelines. The guidelines provide significant safety considerations that must be approved prior to implementation of a reuse project. This will ensure that the use of R-1 water in the Ewa district will not pose serious health threat to the public.

3.3.3.b Public Outreach and Education

Prior to the BWS purchase of the Honolulu (Ewa) Water Recycling Facility, US Filter and the City and County of Honolulu initiated a communications program, which was designed to educate the general public, facility neighbors and businesses about the facility and water reuse in general. The BWS will expand on the initial program through the Water Recycling Program’s Public Outreach Plan Update (BWS, 2003). The plan is a broad-based public outreach program designed to ensure that major issues continue to be addressed and to increase public awareness of recycled water as a viable and necessary supplemental water resource. Acting in the public interest at all times, the BWS will remain committed to maintaining open, two-way communication with its staff, the community, media, policymakers, civic and environmental groups, government agencies, schools, and other organizations.

Messages consisting of facts and declarative statements about the Water Recycling Program were developed through a collaborative process involving residents in focus groups and telephone surveys. The program messages were refined and classified into three tiers listed below, based on what residents felt were the most important issues. The tiers will also be associated with level support as identified through the iterative process.
Tier 1 Messages

- Recycled water is one of many ways that the Board of Water Supply is making sure we have water for the future.
- Recycled water ensures Oahu has water for generation to come.
- Recycled water helps keep Hawaii green without wasting limited drinking water supplies.
- Recycled water meets strict Department of Health requirements.

Tier 2 Messages

- Using recycled water is good for the environment.
- Using recycled water helps conserve good water for drinking.
- Recycled water has been used successfully on Oahu for more than 10 years.
- Recycled water costs less than other new water sources.

Tier 3 Messages

- Recycled water has been used successfully in other states for more than 40 years.

STRATEGIES

The BWS Water Recycling Program will oversee the implementation of the Public Outreach Plan in an organized, methodical way to ensure everyone has an opportunity to learn about water recycling and participate in educational programs. In coordination with its existing water resources management efforts, the BWS has developed and implemented the following strategies through a variety of tactics outlined in the plan:

Research

Completed Tasks
✓ Partnering session
✓ Stakeholder interviews
✓ Focus groups
✓ Telephone survey
✓ Key messages
✓ Members of the public outreach team and their roles
✓ Goals, objectives, and schedules
✓ Mailing list and audience database update
Ongoing Activities
- Develop procedures and methodologies necessary for timely communication and responses.
- Develop evaluation criteria and feedback loops.
- Develop knowledge and understanding of BWS policies and procedures to be incorporated.
- Update elected officials and customer contacts every six months.

Internal Communications

Completed Tasks
- Conduct employee tours
- Distribute information materials
- Employees’ awareness about Water Recycling Program materials
- Team/Staff coordination meetings on regular basis

Ongoing Activities

Staff meetings
- Arrange for members of the Water Recycling Program outreach team to attend various BWS unit staff meetings to show the video and provide updates about the Program, status reports, marketing successes, technical problem resolution and tour opportunities.
- Prepare a memorandum from the BWS manager to inform all BWS supervisors that the water recycling team will attend staff meeting periodically to make presentations and respond to questions.

Materials
- Post information on the InfoNet and bulletin boards at various locations to provide Water Recycling Program updates, etc.
- Develop Water Recycling Program posters for each division within the BWS.
- Provide an article about the Water Recycling Program for each edition of the internal newsletter.

Water Recycling Team Meetings
- Hold quarterly meetings with entire Water Recycling Team and consultants to review progress and goals.
Community Relations

Completed Tasks
✓ Speakers training
✓ Presentations to groups
✓ Facility tours
✓ Community events
✓ Information lines
✓ Newsletter

Ongoing Activities
Speakers Bureau/Presentations
☐ Develop a list of organization – based on target audiences – and arrange an average of two presentations a month.
☐ Determine which organizations require senior level staff to attend.
☐ Determine most appropriate type of presentation for each group and key issues of interest.

Speakers Training
☐ Review key messages with project spokespeople prior to each presentation.

Project and Facility Tours
☐ Develop a list of organization appropriate for tours.
☐ Schedule and conduct an average of three tours a month.

Exhibits and Displays
☐ Identify community events where the BWS could have a booth to distribute and/or display information.

Special Events
☐ Identify opportunities such as co-sponsoring forums with community organizations, participating in already-scheduled events sponsored by other organizations, or participating in special events already hosted by the BWS.
☐ Showcase the progress of the Water Recycling Program and provide information at all events.
☐ Expand BWS participation in already-scheduled events that appeal to environmentally conscious audiences.
Neighborhood Board Meetings
- Provide an update to BWS Neighborhood Board representatives to ensure they are prepared to address questions about the Water Recycling Program.
- Follow up with representatives to ensure they report back any questions or concerns about the Water Recycling Program.

Interested Parties Communication
- Send project information, updates, media coverage and meeting announcements to the interested parties list periodically.

Third Party Spokespeople
- Identify independent, third parties who can speak about their experience with the Water Recycling Program. Independent spokespeople should be sought from academia, business, industry associations, health and safety interests, environmental organizations and others with water recycling project experience.
- Keep third parties updated about the Water Recycling Program or specific project progress.

School Programs
- Determine methods to integrate the Water Recycling Program into school curricula.
- Explore opportunities to make presentations, host tours and profile CD with students.

Customer Relations
 Completed Tasks
- Provided informational posters to golf courses.
- Produced informational brochure for golfers and distributed to golf course customers.
- Provided employee training for customers.
- Follow-up with customers on product satisfaction/questions.
- Extended invitation to all current and prospective customers to tour the Honolulu Water Recycling Facility.

Ongoing Activities
 Testimonials
- Obtain recycled water customer testimonials — both from local customers and long-time users of recycled water on other islands of Hawaii — and post on web site.
- Profile customers in the Water Recycling Program newsletter.
Educational Seminars

- Host educational seminars on a variety of topics, including how landscapers can work with recycled water, health and safety aspects of recycled water use for sports leagues, informational outreach for users of a facility irrigated with recycled water or neighbors who may have concerns about incidental contact with recycled water from the facility, etc.
- Develop specific information materials to address issues and frequently asked questions about recycled water use for these audiences.

Internal Meetings

- Meet with Program staff and consultants regarding status of new customers and needed support materials.

Media Relations

Completed Tasks

- Distributed news release and received coverage of facility purchase.

Governmental Relations

Completed Tasks

- Distributed first newsletter with cover letter to local elected officials.
- Held briefings with select elected officials.

Information Materials

Completed Tasks

- Interim information materials
- Program brochure
- Program information boards
- Program display
- Website content
- PowerPoint presentation
- Program photography
- Complete updated brochure
- Complete Recycled Water Application Study (RWAS) fact sheet
- Update Q&A
- Update web design and content
- Finalize CD and video
Ongoing Activities
- Create and install interpretive signage at plant.
- Create alternate versions of display for different audiences.
- Order additional give-away items for community events.

3.3.4 Traffic

Existing Conditions:
The nonpotable water mains will be constructed in various segments over the next 20 plus years. Projects will be scheduled by the BWS in conjunction with their capital improvement program. The majority of the proposed mains will be located within existing road or highway rights-of-way corridors, which is consistent with accepted practice. Final horizontal alignments will be determined in the design phase of each specific project.

Environmental Impacts and Mitigation Measures:
Construction of the various nonpotable water line projects will cause periodic disruptions to normal traffic flow along major thoroughfares such as Farrington Highway, Fort Weaver Road, Kalaaua Blvd., Renton Road, Kapolei Parkway, and Fort Barrett Road. Construction vehicles will add to the traffic on streets adjacent to the proposed project areas. Construction may also require various lane closures and/or detours on a temporary basis. Depending on number of lanes, lane widths, and existing utility corridor configurations, vehicular and pedestrian traffic is likely to be impacted by the closure of lanes and possible detours around construction areas. In addition, access to and from driveways and to adjoining roadways and usage of road frontage (mail, deliveries, parking, etc.) may be occasionally hampered by trenching, paving and construction materials deliveries.

Traffic control plans (TCP) will be prepared during the construction phase of each project by the contractor to minimize disruptions and inconveniences to the residents and the public. The TCP will be submitted to the Department of Planning and Permitting Traffic Review Branch for review and approval. The TCP will be prepared by a licensed civil engineer qualified to prepare TCP.

In addition, the contractor will be required to obtain a Street Usage Permit from DTS prior to commencement of any work that will temporarily obstruct any portion of the City roadway or sidewalk and comply with its requirements. Continuous access to and from all driveways and public streets shall be maintained. All walkways and intersections will be maintained in passable condition for pedestrian traffic. Appropriate signs and barriers will be required, and generally at least two lanes will remain open during normal working hours (8:30 a.m. to 3:30 p.m.). Construction during peak traffic hours and at night will be avoided. After working hours trenches will be covered with a non-skid bridging material and all lanes will be open to traffic. Off-duty police officers and/or trained construction flagmen will be provided for traffic control to improve traffic flow and to control two-way traffic on streets where only one lane is
opened during construction.

The contractor will be required to coordinate work during construction with the affected community groups, businesses, schools, golf courses, government agencies, and other entities. At least two weeks prior to the start of construction, the contractor will notify all affected residents the waterline route, the school administrations, business establishments, golf courses, neighborhood boards, community association, emergency services (fire, police and ambulance), other property owners, the general public, the State Department of Transportation and the City Department of Transportation Services. The notification shall include the nature of the work, construction schedule, lane and street closures or detours, suggested alternate routes, the expected length of time of inconveniences, of any restrictions which may be imposed to complete the work and the contractor’s phone number to be called to report traffic concerns.

In summary, the proposed mitigative measures will cover both design and construction phases of the proposed project. Early coordination with affected government agencies, community groups, schools, businesses, and golf courses as discussed above should alleviate impacts to traffic in the vicinity of the project area.

3.4 THE BUILT ENVIRONMENT

3.4.1 Archaeological Resources and Historic Sites

Existing Conditions:

An archaeological archival research of the proposed project area was conducted by Archaeological Consultants of the Pacific (ACP) in conjunction with preparation of the draft environmental assessment. A summary the history of archaeological investigations in the Honolulu ahupuaa is provided below (ACP, 2002, pp. 9-11). The entire archaeological report, including figures and appendices, may be found in Appendix G of this environmental assessment.

"Some of the earliest archaeological recordation in the ahupuaa was conducted by McAllister (1933). He listed the whole of the plain as a single site, Site 146, noting the presence of many features, including stone walls, probably dating to the ranching period, as well as coral sinkholes and pils which could have been used for cultivation by the indigenous Hawaiian population. Handy (1940) also mentions the cultivation of crops, particularly sugarcane and bananas, in the Ewa sinkholes. Two fishponds, one at Puuola (Site 142) and one off Laulaulau Island In West Loch (Site 140), a fishing shrine near West Loch (Site 139) and a destroyed heiau on Puu o Kapolei (Site 138) were also mentioned by McAllister as being located on the Ewa Plain.

In the northern portion of the ahupuaa, along the southeastern slopes of the Waianae Range, where much less archaeological work has been..."
conducted, McAllister listed a number of sites. Two destroyed heiau, Sites 133 and 134, were located in gulches below Puu Kanehoa and Mauna Kapu, both peaks in the Waianae Range. Also in a gulch below Mauna Kapu were several leveled off enclosures, the largest measuring 25 meters by 30 meters (Site 135). On the Waianae Ridge separating Honolulu from Waianae, McAllister notes a small coral and basalt platform, probably sacred, near Mauna Kapu (Site 136). He also notes another destroyed heiau on Puu Kuua in the eastern foothills of the Waianae Range (Site 137).

Few archaeological investigations occurred between 1933 and the early 1970's. Those which did occur were summarized by Dunn et al. (1990). These included Emory's examination of a house site and possible heiau constructed of stacked limestone slabs and uprights located on the western part of the Ewa Plain. Kikuchi's disinterment of 12 to 16 incomplete burials of oahu, the standard oil refinery. Soehren's documentation of a sinkhole burial, house sites and modified pits at the Naval Air Station. And finally, Soehren's excavation of a possible fishing shrine at the base harbor which identified a cultural layer containing large amounts of fish scales, dog, fish and seashell remains and a one piece fishing fishhook.

In the 1970's, with increased development of the plain, investigations became more frequent and covered larger areas. The Barbers Point deep draft harbor, West Beach/Ko Olina, the Ewa Marina Community are among the larger of the projects which began around this time. Site types identified included house sites, cairns, ahu, walls, pits, unmodified limestone sinkholes, walled or modified sinkholes, enclosures, C-shaped enclosures as well as human burials. A variety of cultural remains were recovered from the many sites identified including fishhooks, sinkers, fish scales and fish bones providing evidence of a marine based economy. An early assessment of the probable settlement pattern for the area was described as 93 dispersed clusters of residences, surrounded by a relatively open and little inhabited area (Barrera, 1975:18).

As investigations continued through the 1980's and 1990's, more sites were assessed for their age and function. Dating results indicated that most of the occupation likely dated to the latter centuries of the pre-Contact period. However, samples from some rock shelter sites suggested initial use or occupation as early as the period of initial Polynesian settlement on Oahu. The patterns of settlement were found to differ somewhat from the eastern portions of the plain near West Loch to the western portions of the plain.

Data recovery at the West Loch Estates Residential Increment I and Golf Course and Shoreline Park was conducted in 1988 and 1989 (Wolfarth et al. 1998) while investigations of the lower and upper valley of Honolulu Gulch above West Loch was undertaken in 1987 by PHRI (Dunn et al.
1990). Included among the recorded features were the remnants of a once extensive agricultural system which combined aquaculture in fishponds situated on the shores of West Loch, irrigated wet crop agriculture of the plain and dryland cultivation of the surrounding slopes and uplands. Along the shores of West Loch, radiocarbon dating results indicated use of a pondfield (Site 3324) and a habitation deposit (Site 3321) from the 10th to 17th centuries AD. The investigations within Honouliuli Gulch revealed that: (a) permanent occupation had occurred at most habitation features, (b) that upper valley occupation may have occurred as early as the mid-6th to mid-9th centuries and (c) that subsequent occupations appear to have been most intensive between the 1300's and 1600's and between the late 1700's to early 1800's (Dunn et al. 1990).

Investigations conducted in the Barbers Point/Ko Olina area have revealed that the western Ewa Plain had a long initial settlement based on a high degree of marine-oriented task specialization (Dunn et al. 1990). Marine task specialization continued into latter settlements, but it seems that in the latter settlements, terrestrial-oriented activities increased. This shift in activities suggests a concomitant shift from a dispersed temporary occupation to a loosely nucleated one involving extended periods of residence.

In order to assess areas through which the proposed waterlines of the Ewa Nonpotable Water System will pass which may contain potential historically significant properties, ACP has prepared figures depicting the route of the waterlines and the locations of known historic properties. The first of these figures was derived from the City and County of Honolulu's Ewa Development Plan, Exhibit 3.2 and depicts the locations of known archaeological sites, historic and archaeological districts, plantation villages and an historic railway (see Figure 3). The second was derived from a figure prepared by David Tuggle and depicts the locations of known pre-Contact settlement complexes and religious structures (see Figure 4).

An analysis of these overlays shows that there are three areas through which the proposed waterlines will be passing where potentially significant historic properties may be encountered. The first is located along the southeastern coastline of the Ewa Plain in the eastern portion of the Oneula Archaeological District (see Figures 3 & 4). The second is located across the central-eastern portion of the plain running along the route of an historic railway and the southern boundary of a group of plantation villages. The third and final area is located in the northwestern corner of the Ewa Plain. In this location, Figure 3 shows three segments of the waterlines passing through three areas of dispersed archaeological sites while Figure 4 depicts one waterline passing between two areas of pre-Contact settlement complexes.
Environmental Impacts and Mitigation Measures:

"Because it has been determined that the proposed waterlines will pass through three areas in which there is the potential to impact significant historic properties, ACP recommends that an archaeological monitor be on site when construction activities pass through these areas. During the remainder of the project, it is recommended that an archaeological monitor be on call in the event that significant historic properties are encountered during construction activities. The proper authorities with the DLNR-SHPD have been consulted and their comments regarding sites to be avoided and proposed mitigation measures is included in Appendix A (correspondence dated April 12th, 2002; LOG NO: 29552, DOC NO: 0204EJ02)."

Furthermore, if iwi or Native Hawaiian cultural or traditional deposits are found during ground disturbance or excavation, work will cease, and the appropriate agencies will be contacted pursuant to applicable law.

3.4.2 Public Utilities

3.4.2.a Potable Water System

Existing Conditions:

The Board of Water of Water Supply operates and maintains the City and County of Honolulu's municipally-owned water system. The potable system consists of supply wells, storage reservoirs, booster pump stations, and transmission lines that convey water to distribution networks throughout the region. It serves present residential and non-residential customers in Kapolei, Ewa and Makakilo, and will also serve potential developments in the area.

Environmental Impacts and Mitigation Measures:

Contractors will be required to verify water infrastructure locations, especially underground waterlines, valves, and valve boxes prior to the start of construction. Water service should not be disrupted during construction activities, and the relocation or modification of any existing infrastructure is not expected. Access to fire apparatus will be maintained throughout the construction site and any interruption in the existing fire hydrant system during construction will be reported to the Fire Communication Center at 523-4111.

Since the nonpotable water system does and will continue to function as a dual system separate from the potable system, the two water systems must carefully be designed and operated to prevent cross-connections and backflow conditions. Cross-connection of potable and nonpotable water systems will not be normal practice; however, if connection between two water systems is necessary, an air gap approved by the BWS will be provided to protect the potable water system. Backflow prevention will be required for on-site distribution systems when a particular user operates both a
nonpotable and a potable system within the same area. The method of backflow prevention will also require BWS or DOH approval.

In order to prevent a nonpotable main from mistakenly being connected to a potable water main, the proposed system will be appropriately painted and labeled satisfying Section V.A. of the DOH reuse guidelines (2002). Design Parameters for the Distribution of Recycled Water:

- Buried and above ground transmission piping and appurtenances will follow consistent color coding (purple Pantone 522 for buried and 512 for above ground) to differentiate recycled water from potable water or wastewater.

- Service lines, valves and other appurtenances will be embossed or integrally stamped/marked “CAUTION: RECYCLED WATER - DO NOT DRINK,” or be installed with proper identification indicated in the DOH reuse guidelines.

The significant long-term benefit of the proposed project will be the overall increase in water supply for the Ewa district. The 1:1 replacement allowed by substitution of nonpotable water for irrigation and industrial uses will permit direct consumption of potable water for other high priority clean water uses.

3.4.2.b Wastewater

Existing Conditions:

Ewa’s wastewater collection, treatment and disposal systems are under the jurisdiction of the City and County of Honolulu. The collection system is comprised of associated sewer mains, trunk sewers, pump stations and force mains. Parts of the collection system have been identified with inadequate capacity to accommodate existing and projected flows. In addition, there are deficiencies in manholes and sewer lines due to structural deterioration and corrosion (Wilson Okamoto & Associates and Brown and Caldwell, 2001).

Collected wastewater is treated at the Honolulu/Le Wastewater Treatment Plant (WWTP), which is being operated under conditions of the 1991 National Pollutant Discharge Elimination System (NPDES) permit. The permit has been administratively extended pending issuance of a new permit by the U.S. Environmental Protection Agency. The current NPDES permit includes 7-day and 30-day effluent limits for total suspended solids and 5-day biochemical oxygen demand. The WWTP has a design liquid capacity of 38 MGD. The solid capacity is currently 26 to 28 MGD. A project to increase the WWTP’s solids capacity is included in the FY04 and FY05 City Capital Improvement Program (CIP) budgets.

The NPDES permit authorizes the City to discharge treated wastewater to receiving waters of Mamala Bay through the Barbers Point Deep Ocean Outfall. Since the startup of the WWTP, the outfall had been the exclusive means of effluent disposal. The
outfall diffuser is located 1.7 miles offshore at a depth of approximately 200 feet. (Wilson Okamoto and Associates and Brown and Caldwell, 2001).

As described in Chapter 2, the Honolulu Water Recycling Facility now takes treated wastewater effluent from the wastewater plant and further treats it to produce R-1 and RO water for specific reuse. This will also relieve the outfall during peak conditions.

Environmental Impacts and Mitigation Measures:

Prior to the start of construction, contractors will be required to verify wastewater and sewer infrastructure locations, especially underground sewer lines and manholes. In general, the relocation or modification of any existing wastewater infrastructure is not expected. During construction, contractors will also be required to protect existing infrastructure and ensure that services are not interrupted within the project area.

The new nonpotable water distribution system, itself, will not generate additional wastewater flows to the Honolulu WWTP.

3.4.2.c Drainage

Existing Conditions:

Although Ewa is known for its warm and arid climate most of the year, low-lying areas are subject to flooding during intense rainstorms. Flood control has been accomplished through various urban development projects consisting primarily of concrete-lined channels to convey stormwaters to the ocean. The drainage systems in the Ewa region is comprised of five sub-regional systems identified below.

- The Kaloi Gulch encompasses approximately 11 square miles extending from the crest of the Koolau Range to the shoreline. Developments in this watershed have included Ewa Villages and Laulani by the City and County of Honolulu, Ewa by Gentry, Ocean Pointe by Haseko, as well as others by the State of Hawaii and the Estate of James Campbell. Peak design flow is approximately 11,500 CFS which will run through Haseko’s Ewa Marina (Ocean Pointe) property and ultimately discharge into the proposed marina.

- A major new system will drain Makaiwa Hills, Kapolei Business Park, and the industrial areas in the vicinity of the Kualoa Barbers Point Harbor.

- Drainage improvements in the West Loch Drainage Basin are serving the City’s West Loch residential project, Phase I of Ewa by Gentry, and the East Kapolei community project.

- The Villages of Kapolei’s drainage system will consist of golf course retention and disposal of stormwater into injection wells and a large ditch near the Barbers Point Naval Air Station boundary (BPNAS).
• Expansion of the channel at the western edge of the BPNAS will provide additional capacity to serve the City of Kapolei.

Environmental Impacts and Mitigation Measures:

Prior to the start of construction, contractors will be required to verify drainage infrastructure locations, especially underground drain lines, catch basins, and manholes prior to the start of construction. In general, the relocation or modification of any existing drainage infrastructure is not expected. During construction, contractors will also be required to protect existing drainage infrastructure and ensure that services are not interrupted within the project area.

The proposed construction of the nonpotable water distribution system will not alter existing or future drainage improvements in the Ewa region. Subsequently, drainage systems along the proposed alignments should not be impacted.

3.4.2.d Electricity

Existing Conditions:

The Hawaiian Electric Company (HECO) owns and operates three power plants on Oahu, which have a combined generating capability of 1,263 MW. This supplies the majority of Oahu’s 275,000 customers. HECO’s Kahe Power Plant is the largest of the three plants and is located approximately 6 miles from the Kapolei Business Park, mauka of Farrington Highway outside of Ko Olina Resort. The primary transmission line from Kahe is a 138 KV overhead line to the Waiwa substation in Pearl City.

Independent power producers in the Campbell Industrial Park include: (1) HPOWER; (2) Kalaekoa Partners, L.P.; and (3) AES Hawaii. These independent producers are capable of generating approximately 400 MW.

Environmental Impacts and Mitigation Measures:

Contractors will be required to verify existing infrastructure locations prior to the start of construction. In general, the relocation or modification of any existing infrastructure is not expected. During construction, contractors will also be required to protect existing infrastructure and ensure against interruption of services within the project area.

Electrical demands during construction and operation of the proposed nonpotable water distribution system are not expected to exceed existing power generating capability. Essentially, the long-term operation of the nonpotable system will require the same power demand that would otherwise have been used in the potable water distribution system. There will be no significant impact on HECO or the other independent power producers.
3.4.2.e Gas

Existing Conditions:
The Gas Company maintains underground utility gas mains in the project vicinity, which serves commercial and residential customers in the area. This system is interconnected with the utility network in the Ewa District.

Environmental Impacts and Mitigation Measures:
Additional services will not be required for the proposed project. Contractors will be required to verify existing utilities prior to the start of construction. In general, the relocation or modification of any existing infrastructure is not expected. During construction, contractors will also be required to protect existing infrastructure and ensure against interruption of services within the project area. Overall, there are no anticipated impacts to the gas system.

3.4.2.f Communications

Existing Conditions:
Verizon Hawaii maintains land line telephone service in the Ewa region. Existing overhead lines are shared under the joint pole agreement established with other utility users. Oceanic Cable provides cable TV service in the region. The more recent installations of telephone and cable TV services have been exclusively underground.

Environmental Impacts and Mitigation Measures:
Additional services will not be required for the proposed project. Contractors will be required to verify existing utilities prior to the start of construction. In general, the relocation or modification of any existing infrastructure is not expected. During construction, contractors will also be required to protect existing infrastructure and ensure against interruption of services within the project area.

3.4.2.g Roads and Highways Rights-of-Ways

Existing Conditions:
Ewa’s existing road and highway network consists of two major east-west arterials, Farrington Highway and the H-1 Freeway, connecting several roads in the north-south direction that distribute traffic on and off the arterials. The H-1 Freeway also connects Ewa with the Honolulu Primary Urban Center, and Farrington Highway connects Waipahu, Ewa and the Wai‘anae Coast. The north-south distributor roads include: Fort Weaver Road, Kunia Road, Fort Barrette Road, Makakilo Drive and Kalaelea Boulevard.

The Secondary Urban Center in Ewa is expected to remain a focal point of significant economic growth and major housing development on Oahu. Traffic congestion has been a mounting concern strongly voiced by numerous community and business groups in the area. Various studies, including ongoing planning efforts by the Oahu Metropolitan Planning Organization (OMPO), have identified and prioritized the necessary improvement projects required to support growth in this region. The 2020
Oahu Regional Transportation Plan (2020 ORTP) was adopted by OMPO in 1995. Subsequently, the Transportation for Oahu Plan 2025 (TOP 2025) updates the 2020 ORTP. Undoubtedly, the changing transportation needs of Oahu will require constant update of the ORTP and TOP throughout the multi-phased expansion of the Ewa Nonpotable Water System.

The TOP 2025 (Carter & Burgess, 2001), approved by the OMPO Policy Committee on April 6, 2001, has recommended high priority consideration for 14 transportation projects in Ewa. These projects have been categorized on a need basis to provide congestion relief, support of community planning goals and improve operations and safety (refer to Table 3-2). It should be noted that this list will continue to be modified with future updates of the ORTP and TOP.

TABLE 3-2. HIGH PRIORITY TRANSPORTATION PROJECTS FOR THE EWA AREA

<table>
<thead>
<tr>
<th>Project No.</th>
<th>Project Description</th>
<th>Estimated Cost ($M 2000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-1</td>
<td>H-1 Makakilo Interchange new WB on-ramp</td>
<td>$10.9</td>
</tr>
<tr>
<td>E-2</td>
<td>H-1 Kapolei Interchange new interchange</td>
<td>$44.3</td>
</tr>
<tr>
<td>E-3</td>
<td>H-1 Palailai Interchange improvements</td>
<td>$8.5</td>
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<tr>
<td>E-5</td>
<td>Farrington Hwy. widening Kalaeloa to Kamokila</td>
<td>$4.9</td>
</tr>
<tr>
<td>E-6</td>
<td>Farrington Hwy. widening Kapolei Golf Course to Fort Weaver Rd.</td>
<td>$31.6</td>
</tr>
<tr>
<td>E-8</td>
<td>Fort Barrettle Rd. widening Farrington Hwy. to F.D. Roosevelt Blvd.</td>
<td>$21.5</td>
</tr>
<tr>
<td>E-9</td>
<td>Fort Weaver Rd. widening Farrington Hwy. to Geiger Rd.</td>
<td>$38.6</td>
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<tr>
<td>E-10</td>
<td>Hanua St. new roadway Makakole St. to Farrington Hwy.</td>
<td>$13.1</td>
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<tr>
<td>E-11</td>
<td>Kalaeloa roadway improvements</td>
<td>$26.9</td>
</tr>
<tr>
<td>E-12</td>
<td>Kalaeloa Blvd. corridor improvements</td>
<td>$13.1</td>
</tr>
<tr>
<td>E-13</td>
<td>Kapolei Pkwy. completion (Kapolei to Ewa Beach)</td>
<td>$28.5</td>
</tr>
<tr>
<td>E-14</td>
<td>Makakilo Dr. extension (second access)</td>
<td>$8.5</td>
</tr>
<tr>
<td>E-15</td>
<td>Mauka Frontage Rd. Makakilo Dr. to Kalaeloa Blvd.</td>
<td>$6.4</td>
</tr>
<tr>
<td>E-17</td>
<td>North-South Road Kapolei Parkway to H-1 (includes new interchange with H-1)</td>
<td>$90.0</td>
</tr>
</tbody>
</table>

Source: Transportation for Oahu Plan TOP 2025 (Carter & Burgess, 2001).

Environmental Impacts and Mitigation Measures:

As mentioned throughout this environmental assessment, every attempt will be made to locate proposed nonpotable distribution lines along existing or future road, street and highway rights-of-ways to prevent or minimize construction activities through undisturbed lands. This approach is being taken so as to mitigate potential impacts on the following environments:

- Archaeological
- Flora and Fauna
- Threatened and Endangered Species
- Open space (parks and golf courses)

In light of the various transportation projects that are planned for Ewa, appropriate coordination with the State Department of Transportation Highways Division and the City's Department of Transportation Services will not be overlooked. The following procedures will be observed during planning and design of the proposed distribution system:

- Early coordination with government agencies to discuss and evaluate appropriate alignment and construction methods
- Coordination with ongoing and proposed projects in Kapolei, Ewa, Makakilo and Barbers Point (Kalaeloa)
- Submittal and approval of construction plans for all work done within State and City rights-of-ways

In summary, the proposed mitigative measures will cover both planning and design phases of the proposed project. Timely coordination with affected government agencies, community groups, schools, businesses, and golf courses as discussed above should alleviate significant impacts to overall transportation in the Ewa region.

3.4.3 Land Use and Zoning

Existing Conditions:

Oahu's Ewa district has undergone unprecedented growth via residential, commercial, and industrial developments throughout the past decade. Based on the City and County of Honolulu's General Plan (CCH, 1992) and the Ewa Development Plan (CCH, 1997), forecasts of continued growth in the district are expected through the year 2020 and beyond.

The State Land Use Map classifies the project site within the Urban and Agricultural districts. City and County of Honolulu Land Use Zoning designations along the proposed waterline alignments and reservoir sites are shown on Figure 1-3 and include the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A-1</td>
<td>Apartment, Low-density</td>
</tr>
<tr>
<td>A-2</td>
<td>Apartment, Medium-density</td>
</tr>
<tr>
<td>AG-1</td>
<td>Agricultural, Restricted</td>
</tr>
<tr>
<td>AG-2</td>
<td>Agricultural, General</td>
</tr>
<tr>
<td>B-1</td>
<td>Business, Neighborhood</td>
</tr>
<tr>
<td>B-2</td>
<td>Business, Community</td>
</tr>
<tr>
<td>I-2</td>
<td>Industrial, Intensive</td>
</tr>
<tr>
<td>P-2</td>
<td>Preservation, General</td>
</tr>
<tr>
<td>R-5</td>
<td>Residential</td>
</tr>
</tbody>
</table>
Environmental Impacts and Mitigation Measures:

The proposed nonpotable waterline and reservoir projects will not require zoning changes from the City and County of Honolulu nor land use changes from the State of Hawaii. Easements in favor of the Board of Water Supply will need to be created for new waterlines constructed in private properties.

Land acquisition for reservoir and booster pumping station sites may be necessary once final locations are identified. Separate site-specific environmental assessments will be prepared for reservoirs and booster pumping station projects. At such time more detailed issues surrounding land ownership will be disclosed.

3.4.4 Commercial and Industrial Areas

Existing Conditions:

The major industrial and commercial areas in the Ewa Plain are the James Campbell Industrial Park and the Kapolei Business Park (refer to Figure 3-7). Both property developments are privately managed.

3.4.4.a Campbell Industrial Park

Since its opening in the early 1960s, the Campbell Industrial Park has been creating job opportunities in the Ewa and Leeward areas of Oahu, which previously had been dominated by the sugar plantations. The Campbell Industrial Park remains one of Kapolei’s largest job centers accounting for more than 4,500 jobs (Estate of James Campbell website, 2004). It is Hawaii’s largest industrial park (1,367 acres zoned I-2), with national and international companies like Ameron International, Chevron, Citizens Electric, Coca Cola, Reynolds Aluminum, Tesoro Petroleum and Ziegler Steel, representing various industries: manufacturing, recycling, import/export, power generation, construction, warehouse and distribution. The Campbell Industrial Park is also served by the adjacent deep-draft Kalaeloa Barbers Point Harbor.

3.4.4.b Kapolei Business Park

Kapolei Business Park is located just south of the City of Kapolei and is adjacent to Campbell Industrial Park and Kalaeloa Barbers Point Harbor. It includes 91 acres zoned I-2 with lots available for lease or sale. Uses include light industrial, processing, suppliers, wholesalers, warehousing and distribution centers, data processing, technology research and development, integrated systems networks, Internet exchanges, data centers, switching stations and telecom companies.

Environmental Impacts and Mitigation Measures:

Tesoro Refinery and AES Hawaii at the Campbell Industrial Park are already using RO water from the Honouliuli WRF. The activation of the existing 16-inch R-1 waterline and proposed nonpotable waterlines in the City of Kapolei, Kapolei Business Park, and the Campbell Industrial Park will facillitate delivery to potential new business and industrial customers. Future industrial users such as Island Ready Mix will benefit from the availability of nonpotable water in their manufacturing operations. Other entities in
the Kapolei Business Park are also expected to use R-1 water for landscape irrigation. Overall, the proposed expansion of the nonpotable water system could indirectly benefit businesses and industries in the region by allowing potential growth of both sectors whereby water supply would not be a limiting factor.

3.4.5 Recreational and Open Spaces

3.4.5.a Golf Courses

Existing Conditions:
Presently there are eight private and public golf courses in the Ewa area (refer to Figure 3-8). The municipal courses include West Loch and Ewa Villages. According to the Ewa Development Plan (CCH, 1997) the Ewa Villages Golf Course also provides flood protection and storm water detention for Ewa Villages. Existing private courses include: Ko Olina, Hawaii Prince, Kapolei, and Coral Creek. The military operates the Barbers Point Golf Course. Additional private courses are planned for Ewa Marina/Ocean Pointe and Makakilo.

Environmental Impacts and Mitigation Measures:
In addition to their recreational value, golf courses also provide open space and help prevent flooding and reduce non-point pollution by retaining storm waters. As such, golf courses can offer positive social, environmental, and economic benefits to the community. As indicated in the DOH reuse guidelines (2002), R-1 water is a permissible use for golf course irrigation. Thus, the expansion of the R-1 nonpotable water system should serve to promote and facilitate golf development in the Ewa district.

3.4.5.b Resort Areas

Ko Olina Resort - The Ko Olina Resort property includes 640 acres located between Kahal Point Beach Park and the Kalaeloa Barbers Point Harbor. The fully developed resort will be a water-oriented residential and resort community with visitor units, resort condominiums, two golf courses, a small boat marina and four man-made swimming lagoons. The first phase of the resort development included the first hotel, swimming lagoons, the first golf course, roads and utilities.

Ewa Marina/Ocean Pointe - The Ocean Pointe development in Ewa will encompass 1,100 acres of 4,850 residential units, a golf course, a major commercial area, 1,000 hotel rooms and a 70-acre regional recreational marina with a capacity of 1,400 wet slips.

3.4.5.c Parks

There are numerous park and beach facilities located throughout Ewa. The City and County of Honolulu Department of Parks and Recreation Services maintains 14 neighborhood and community parks and nine beach and shoreline parks along the coast and Pearl Harbor. In addition, there are three regional or district parks - Kapolei, Kalaeloa (Barbers Point) and Ewa.
The beach parks are well used by the public for diving, fishing, surfing, swimming, snorkeling, trapping, and netting. Because they are situated in residential areas, the community, neighborhood and regional/district parks are also well used for athletic activities, including baseball, soccer, and basketball.

Environmental Impacts and Mitigation Measures:

The primary benefit to existing and future parks in this region will be the availability of additional nonpotable water for irrigation of fields and landscaping. As indicated in Section 3.3.3, human contact is permitted for R-1 water. The use of R-1 water should not pose a health risk to park and beach users.

3.4.6 Residential Communities

Existing Conditions:

The Ewa Development Plan (CCH, 1997) envisions a network of master planned residential communities that will provide a wide variety of housing opportunities. Census 2000 reported 20,804 housing units in the Ewa DP area (2000 Census ST1 File; Planning Division, Honolulu Department of Planning and Permitting, January 2002). New developments are slated for the City of Kapolei, East Kapolei, Ewa by Gentry, Ewa Marina, Ko Olina, Lualani, Makaiwa Hills, Ewa Villages, and the Villages of Kapolei (refer to Figure 3-9). The projected number of housing units and phases of development as indicated in the Ewa Development Plan (CCH, 1997) is provided in Table 3-3.

Environmental Impacts and Mitigation Measures:

While the BWS does not intend on promoting the use of nonpotable water for private yard irrigation at the present time, the proposed system expansion will nevertheless enable delivery of nonpotable water to more areas in the Ewa district. This would free up potable water currently being used where nonpotable water is suitable, largely for non-residential uses. The potable water would then be available for residential housing projects such as those indicated in Table 3-3, consistent with the City’s vision for Ewa.

<table>
<thead>
<tr>
<th>Project Area</th>
<th>Housing Units</th>
<th>Residential</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Phase I (1997-2005)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CITY OF KAPOLEI</td>
<td>2,000</td>
<td>118</td>
</tr>
<tr>
<td>EWA BY GENTRY</td>
<td>5,387</td>
<td>554</td>
</tr>
<tr>
<td>EWA MARINA</td>
<td>4,850</td>
<td>500</td>
</tr>
<tr>
<td>EWA VILLAGES</td>
<td>1,760</td>
<td>182</td>
</tr>
<tr>
<td>KAPOLEI KNOOLS</td>
<td>418</td>
<td>72</td>
</tr>
<tr>
<td>KAPOLEI MAUKA</td>
<td>750</td>
<td>50</td>
</tr>
<tr>
<td>KO’OLINA</td>
<td>8,700</td>
<td>354</td>
</tr>
<tr>
<td>MAKAIWA HILLS</td>
<td>1,066</td>
<td>354</td>
</tr>
<tr>
<td>MAKAELEI</td>
<td>2,706</td>
<td>808</td>
</tr>
<tr>
<td>VILLAGES OF KAPOLEI</td>
<td>4,020</td>
<td>283</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>31,657</td>
<td>3,275</td>
</tr>
</tbody>
</table>

TABLE 3-3. PHASING OF MASTER PLANNED RESIDENTIAL DEVELOPMENT

REVISED FINAL ENVIRONMENTAL ASSESSMENT - EXPANSION OF THE EWA NONPOTABLE WATER SYSTEM
<table>
<thead>
<tr>
<th>TABLE 3-3. (Continued)</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROPOSED PROJECTS</strong></td>
<td>1,600</td>
<td>200</td>
</tr>
<tr>
<td>DHHIL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EAST KAPOLEI (SCHULER)</td>
<td>4,000</td>
<td>350</td>
</tr>
<tr>
<td>FAIRWAYS RESIDENTIAL</td>
<td>900</td>
<td>100</td>
</tr>
<tr>
<td>HFDC (STATE LAND BANK)</td>
<td>4,000</td>
<td>750</td>
</tr>
<tr>
<td>LAULANI RESIDENTIAL</td>
<td>1,100</td>
<td>150</td>
</tr>
<tr>
<td>MAKAKILO EXTENSION</td>
<td>200</td>
<td>100</td>
</tr>
<tr>
<td><strong>CUMULATIVE TOTAL</strong></td>
<td>43,400</td>
<td>4,900</td>
</tr>
</tbody>
</table>

| **PHASE II (2006 - 2015)**     |       |      |
| EAST KAPOLEI (SCHULER)         | 4,000  | 350  |
| HFDC (STATE LAND BANK)         | 3,700  | 300  |
| KAPOLEI EAST (CAMPBELL)        | 2,000  | 500  |
| KAPOLEI LDA                    | 500    | 50   |
| KAPOLEI NORTH                  | 1,200  | 150  |
| MAKAIWA HILLS                  | 2,000  | 1,300|
| **CUMULATIVE TOTAL**           | 56,700 | 7,550|

| **PHASE III (2016 AND BEYOND)**|       |      |
| KAPOLEI EAST (CAMPBELL)        | 6,300  | 300  |
| KAPOLEI LDA                    | 1,300  | 50   |
| **CUMULATIVE TOTAL**           | 64,300 | 7,950|

**NOTES:**

1. For proposed projects in all phases, housing units are rounded to the nearest 100; residential and total acreage to the nearest 10; all other acreage to the nearest 10. Parts may not sum to totals shown due to rounding.

2. Lands included in the first phase of development (1997-2005) would be eligible for processing zoning changes and other development applications starting with adoption of the Plan.

3. Lands in the second phase of development (2006-2015) would be eligible for processing zoning changes and other development applications far enough in advance so that housing construction could begin in 2006.

4. Lands in the third phase of development (2016 and beyond) would be eligible for processing zoning changes and other development applications far enough in advance so that housing construction could begin in 2016.

**Source:** Ewa Development Plan (CCH, 1997).
CHAPTER FOUR

SUMMARY OF IMPACTS & MITIGATION MEASURES

Beneficial and detrimental effects related to the proposed project include short-term, long-term, and cumulative impacts. As defined by the Environmental Impact Statement Law (Hawaii Revised Statues, Chapter 343), primary impacts or effects are directly caused by the action and occur at the same time and place. Secondary impacts or effects are indirectly caused by the action and occur later in time or are farther removed in distance, but are still reasonably foreseeable. A cumulative impact may arise when an incremental impact of the action is added to other past, present, and reasonably foreseeable future actions regardless of what agency or person undertakes such actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Due to the intended siting of nonpotable infrastructure primarily within previously disturbed areas, environmental impacts are generally expected to be short-term in nature related to construction activities. The following is a summary of the anticipated environmental effects and proposed mitigation measures for the proposed Expansion of the Ewa Nonpotable Water System.

4.1 SHORT-TERM (DIRECT) IMPACTS

4.1.1 Air Quality

**Impacts.** During construction, fugitive dust and exhaust emissions from construction equipment may degrade the air quality in the project vicinity. This will result from vehicles traveling to and from the project site, as well as on-site construction equipment. Due to the prevailing tradewinds and the region's history of meeting air quality standards, increased emissions and dust are not expected to have a significant impact on existing air quality.

**Mitigation Measures.** Contractors will be required to minimize dust within the project site and surrounding areas by water sprinkling whenever feasible, wet cutting of existing asphaltic concrete pavement, and limiting the area being worked on at any one time. The work shall be in conformance with Title 11 of the Hawaii Administrative Rules (HAR), Chapter 60.1 Air Pollution Control. Contractors will also be required to provide proper tuning and maintenance of all construction equipment and vehicles to minimize pollutants from exhaust emissions.

4.1.2 Flora and Fauna/Threatened and Endangered Species

**Impacts.** Short-term impacts on vegetation along the waterline route are expected during the construction period. Since the nonpotable water system is being proposed primarily within areas that are already developed, the impacts on endangered species are expected to be minimal, if any.
Mitigation Measures. The proposed infrastructure will be located primarily within existing and future rights-of-ways (ROWs), so as to confine the affected areas to those which are not known to sustain any habitats of threatened or endangered species. Any existing plants, grassed areas and surface improvements damaged by construction will be restored by contractors to original or better condition. Prior to the design of new waterline alignments in undeveloped areas, an on-site reconnaissance survey by a trained botanist will be conducted to determine whether endangered plants are present.

4.1.3 Economic Resources

Impacts. The proposed project will have a direct impact on the construction industry. Construction of the nonpotable system will add to the amount and number of government contract awards, as well as the number of construction and construction-related jobs. While these workers will not necessarily be from the Ewa area, they are likely to be Oahu residents.

4.1.4 Noise

Impacts. Periodic noise from construction equipment such as backhoes, trucks, compactors, and pavers will impact motorists and pedestrians traveling through construction areas, as well as residents living near the project vicinity.

Mitigation Measures. Noise impacts will be mitigated during construction by requiring contractors to apply current techniques and methods of sound attenuation and abatement such as noise reducing mufflers. Each contractor will be required to obtain a Community Noise Control Permit from the State of Hawaii Department of Health (DOH) and observe and comply with Title 11 of HAR, Chapter 46 Community Noise Control to protect the public from the effects of noise from vehicular and construction activities. Restrictions on noise levels and operational hours of the noisiest equipment will minimize the impacts on the adjoining community. Conditions of the Noise Permit shall be enforced and violators penalized by the Director of DOH. Nighttime work will not be permitted.

4.1.5 Traffic and Transportation

Impacts. Short-term effects include relatively minor visual distractions and changes to traffic patterns due to the close proximity of proposed waterline routes to road and highway ROWs. This is expected to result in periodic disruptions to normal traffic flow along major thoroughfares such as Farrington Highway, Fort Weaver Road, Kalaeloa Blvd., Renton Road, Kapolei Parkway, and Fort Barrett Road. Construction vehicles will add to the traffic on streets adjacent to the proposed project areas. Construction may also require various lane closures and/or detours on a temporary basis. Depending on number of lanes, lane widths, and existing utility corridor configurations, vehicular and pedestrian traffic is likely to impacted by the closure of lanes and possible detours around construction areas.
Mitigation Measures. Mitigation measures will include: (1) preparing traffic control plans (TCP) during the construction phase of each project by the contractor to minimize disruptions and inconveniences to the residents and the public; (2) securing a Street Usage Permit prior to commencement of any work that will temporarily obstruct any portion of the City roadway or sidewalk; (3) avoiding construction during peak traffic hours and at night; and (4) requiring advance coordination of construction work with affected community groups, businesses, schools, golf courses, government agencies, and other entities. The various project contractors will be responsible for day-to-day construction operations and phasing of the work in order to satisfy the proposed mitigation measures.

4.1.6 Archaeological, Historical or Cultural Sites

Impacts. The majority of the site is fully developed and no significant natural or cultural resources are expected to be encountered within construction sites. However, there are three areas through which the proposed nonpotable waterlines will be passing where potentially significant historic properties may be encountered (Archaeological Consultants of the Pacific, 2002). The first is located along the southeastern coastline of the Ewa Plain in the eastern portion of the Oneula Archaeological District. The second is located across the central-eastern portion of the plain running along the route of the OR&L Railroad right-of-way and the southern boundary of a group of plantation villages. The third and final area is located in the northwestern corner of the Ewa Plain.

Mitigation Measures. To mitigate potential loss or destruction of resources, an archaeological monitor will be on site when construction activities pass through these areas. During the remainder of the project, archaeological monitor will be on call in the event that significant historic properties are encountered during construction activities. The proper authorities with the State of Hawaii Department of Land and Natural Resources State Historic Preservation Division have been consulted and their comments regarding sites to be avoided. Furthermore, if iwi or Native Hawaiian cultural or traditional deposits are found during ground disturbance or excavation, work will cease, and the appropriate agencies will be contacted pursuant to applicable law.

4.1.7 Utilities

Impacts. Various utilities are located throughout the project area, including sewer, potable water, drainage, gas, cable TV, telephone, and electrical. Utility infrastructure should not be impacted, except for relocation and/or modification only under extenuating circumstances. In general, utility services should not be disrupted during construction activities.

Mitigation Measures. Contractors will be required to verify utility locations prior to the start of construction. Access to fire apparatus will be maintained throughout the construction site and any interruption in the existing fire hydrant system during construction will be reported to the Fire Communication Center at 523-4411 by the contractor. During construction, contractors will also be required to protect existing
utilities and ensure that services are not interrupted or that interruptions are kept to a minimum.

4.2 LONG-TERM (INDIRECT) IMPACTS

The long-term (indirect) impacts of this project are all positive. Long-term benefits anticipated with the implementation of this project include the following:

4.2.1 Commercial and Industrial Areas

Overall, the proposed expansion of the Ewa nonpotable water system could indirectly benefit potential new business ventures, particularly in the Kapolei Business Park, the Campbell Industrial Park, and the City of Kapolei. The expansion will provide a much larger service area enabling delivery of R-1 water to more commercial and industrial customers.

4.2.2 Recreational and Open Spaces

The primary benefit to existing and future recreational and open spaces in the Ewa region will be the availability of additional nonpotable water for irrigation of fields and landscaping. The Department of Health reuse guidelines specify that human contact is permitted for R-1 quality (nonpotable) water, thus the use of R-1 water should not pose a health risk to park and beach users.

4.2.3 Residential Areas

The proposed expansion of the nonpotable water distribution system does allow for other development such as residential communities. Potable water demand will increase in the Ewa Plain as more homes are constructed consistent with the City's vision for Ewa. The indirect benefit will be the availability of potable water for residential housing that will become available when more nonpotable water can be used for non-residential (park, golf course, etc.) irrigation.

4.2.4 Social and Economic Resources

There will be indirect economic and social impacts of significant benefit as a result of the proposed project. As mentioned above, the system will facilitate the use of nonpotable water in greater amounts, allowing for irrigation of landscaped recreational areas such as neighborhood/district parks, golf courses, beach parks, and other open spaces, as well as commercial and business users throughout the area. By this, the proposed project may indirectly serve to enhance the lifestyle of those in the area.

The availability of an alternate water source will allow for overall growth and development that is envisioned for the Ewa area, providing more diverse job opportunities for present and potential Ewa residents. Living and working in Ewa will be an attractive option for these residents as they will be able to avoid a long daily commute.
Indirectly, the proposed project will also allow for continued economic activity and development on the Ewa Plain by reducing the demand for potable water. Overall, the project is consistent with the City and County of Honolulu’s (CCH) vision per the Ewa Development Plan (CCH, 1997) and the General Plan (CCH, 1992).

4.3 CUMULATIVE IMPACTS

Cumulative impacts are likely to arise due to concurrent construction activity throughout the Ewa region. These projects will include various private developments (Schuler Homes, Haseko, Gentry Homes, etc.) and the construction of highways, streets, and bikeways by the State of Hawaii and City and County of Honolulu.

In order to mitigate potential conflicts during construction, the following procedures will be observed during planning and design of the proposed distribution system:

1. Early coordination with government agencies to discuss and evaluate appropriate alignment and construction methods

2. Coordination with ongoing and proposed projects in Kapolei, Ewa, Makakilo and Barbers Point (Kalaehoa)

3. Submittal and approval of construction plans for all work done within State and City right-of-ways
CHAPTER FIVE

ALTERNATIVES TO THE PROPOSED ACTION

The City and County of Honolulu Board of Water Supply (BWS) presently owns and maintains the nonpotable (or non-drinking) water system in the Ewa district. This system is supplied by two major nonpotable water sources – recycled water from the Board of Water Supply (BWS) Honolulu Water Recycling Facility (WRF) and brackish water from the Ewa Caprock Aquifer. The storage and distribution system currently has the capacity to provide 12.0 million gallons per day (MGD) of nonpotable RO and R-1 water that is used for irrigation of golf courses, parks, and greenbelts, as well as industrial facilities in the region.

5.1 SUMMARY OF PROPOSED ACTION

Because of projected increasing demand for drinking water and the limited basal groundwater supply on Oahu, the BWS plans to expand the nonpotable storage and transmission system, which will facilitate the use of nonpotable water in greater amounts. The proposed system expansion is focused on increasing the delivery of nonpotable water known as R-1 water. Nonpotable R-1 water is not intended for private individual yard watering at this time. Instead, it will be used primarily for landscape irrigation in the following applications, which are approved by the Department of Health’s Guidelines for the Treatment and Use of Recycled Water (2002):

- Golf courses
- Roadsides, medians and other common areas
- Parks, school yards and athletic fields
- Ornamental plants for commercial use

Specifically, the Ewa Non-Potable Water Master Plan (R.M. Towill Corporation, 2004) projects an ultimate nonpotable water demand of approximately 26.3 MGD for the Ewa district. The master plan provides discussion and analysis of the proposed expansion that is intended to relieve some of the island’s potable supply. The project will entail the following infrastructure developments to be constructed in three phases over the next 15-plus years:

- 44 miles of distribution and transmission mains, 4 to 36 inches in diameter, located primarily within existing state and county rights-of-ways (roads, streets, and highways)
- 15 MG in additional reservoir capacity.
5.2 ALTERNATIVES TO THE PROPOSED ACTION

5.2.1 Distribution and Transmission System Alternatives

The various alignments being proposed by the BWS have been analyzed in the regional master plan prepared by R.M. Towill Corporation (2004). Booster pump stations may be located along the system to effectively transport water to various storage sites and meet system pressure requirements. The proposed alignments were established based on the existing nonpotable network and present RO, R-1, and nonpotable users, as well as the location and demand of future users. Construction phasing of the proposed system has also been developed on the basis of anticipated future user demand schedules.

It should be noted, however, that the proposed nonpotable waterline alignments and sizes, as well as reservoir sites and capacities, are subject to change during the preliminary engineering and design stages. The complexity of the multiple dependent factors involved (timing, quantity, location, actual user development schedules, etc.) may call for adjustments to the proposed master planned nonpotable system. Though, the overall conceptual plan is not likely to change significantly because of the intent to: (1) construct new lines within existing rights-of-ways and (2) connect to the nonpotable system that is already in place.

5.2.2 Reservoir Alternatives

Storage requirements and potential reservoir sites have been identified in the Ewa Non-Potable Water Master Plan (R.M. Towill Corporation, 2004). As mentioned previously, separate site-specific environmental assessments will be prepared for each reservoir site. The sites will be finalized by the BWS following appropriate site location and feasibility studies. At such time, various storage alternatives will be evaluated, including but not limited to the following: elevated reservoirs, underground reservoirs, and ground level reservoirs.

5.2.3 Expansion of Additional Nonpotable Water Uses

As the distribution system is expanded and greater supplies of nonpotable water supply become available, other DOH approved uses of R-1 water would be worth exploring. For example, the use of recycled water for the irrigation of private residential yards has been safely and successfully implemented elsewhere in the U.S., such as the Irvine Ranch Water District in California.

R-1 water should also be considered for toilet flushing in new commercial facilities approved by the DOH at such time that the City and County of Honolulu has adopted provisions in the plumbing code pertaining to the use of dual water supply in buildings. This practice has been demonstrated in California’s Ventura County, City of San Jose, and the Irvine Ranch Water District, as well as the State of Washington Department of Health and Ecology.
5.3 NO ACTION ALTERNATIVE

The No Action Alternative preserves the status quo. In this scenario, development of the nonpotable water system will essentially be left to the discretion of developers. There would be no planned and coordinated effort to expand the existing nonpotable watersystem, further depleting the potable water resource. This would also result in the possibility of some users waiting indefinitely for nonpotable water to become available.

In the long run, the No Action Alternative would severely impact the Secondary Urban Center development plans as described in the City and County of Honolulu’s General Plan (CCH, 1992) and the Ewa Development Plan (CCH, 1997). Forecasts of continued growth in the district through the year 2020 and beyond will be impacted and will continue to impact available water resources in terms of both reduced recharge of the existing caprock aquifer due to curtailing agricultural activity and increased demand for potable water.

The Secondary Urban Center is expected to be the focus of significant economic activity and major housing development, as well as a core location for government services. It will entail a myriad of developments: master planned residential developments, heavy and light industrial areas in the vicinity of the Barbers Point Harbor, offices and commercial/retail centers in the City of Kapolei, resort developments at Ko Olina and Ewa Marina, recreational facilities such as golf courses and park complexes, and the University of Hawaii West Oahu campus. The proposed expansion of the Ewa nonpotable water distribution network will continue to support ongoing development through increased water supply and service to various users in the Ewa district.
CHAPTER SIX

DETERMINATION

6.1 FINDING OF NO SIGNIFICANT IMPACT

It is anticipated that the proposed project will not significantly impact the environment, and therefore a Finding of No Significant Impact (FONSI) is issued. The preparation and processing of an Environmental Impact Statement will not be required for this project. This statement of findings is based on an evaluation of the significance criteria listed in Title 11 of the Hawaii Administrative Rules (HAR), Chapter 200 Environmental Impact Statement Rules, as described below:

1. The project will not involve an irrevocable commitment to loss or destruction of any natural or cultural resources.

   The majority of the site is already fully developed and no significant natural or cultural resources are expected to be encountered. However, there are three areas through which the proposed waterlines will be passing where potentially significant historic properties may be encountered (Archaeological Consultants of the Pacific, 2002). The first is located along the southeastern coastline of the Ewa Plain in the eastern portion of the Oneula Archaeological District. The second is located across the central-eastern portion of the plain running along the route of an historic railway and the southern boundary of a group of plantation villages. The third and final area is located in the northwestern corner of the Ewa Plain. To mitigate potential loss or destruction of resources, an archaeological monitor will be on site when construction activities pass through these areas. The archaeological monitor will remain on call in the event that significant historic properties are encountered during construction activities. Proper authorities of the State of Hawaii Department of Land and Natural Resources, State Historic Preservation Division (SHPD) have been consulted and their comments regarding sites to be avoided (refer to correspondence in Appendix A).

   In terms of natural resources, the proposed project will rely on reuse of treated wastewater. It is solely intended to supplement the existing supply of potable water from the limited basal aquifers.

2. The project will not curtail the range of beneficial uses of the environment.

   To the extent possible, the proposed nonpotable infrastructure will be constructed in existing or future rights-of-ways, so as to preserve beneficial uses of the surrounding areas. A major benefit will be the availability of irrigation water for existing and future open spaces (parks, golf courses, etc.) in this region.
In addition to their recreational value, golf courses also provide open space and help prevent flooding and reduce non-point pollution by retaining storm waters. As such, golf courses can offer positive social, environmental, and economic benefits to the community.

3. The project will not conflict with the State’s long-term environmental policies or goals and guidelines as expressed in Chapter 344, Hawaii Revised Statutes, and any revisions thereof and amendments thereto, court decisions or executive orders.

The project will not conflict with the environmental policies as set forth in the State Plan and Chapter 344 of the Hawaii Revised Statutes (HRS) in that the project will not damage sensitive natural resources nor emit contaminants.

4. The project will not substantially affect the economic or social welfare of the community or State.

During the short-term, construction of the nonpotable system will add to the amount and number of government contract awards, as well as the number of construction and construction-related jobs. However, the construction workers, themselves, may not necessarily reside in the area. Lifestyle is not expected to be significantly altered during the short-term phase.

Instead, long-term social and economic benefits may be realized through the expansion of nonpotable storage and transmission. The proposed system will facilitate the use of nonpotable water in greater amounts, allowing for recreational areas such as neighborhood/district parks, golf courses, beach parks, and other open spaces. In turn, this will relieve some of the potable supply that may be preserved for development of the Secondary Urban Center. The proposed project may indirectly serve to enhance the lifestyle of those in the area. Overall, the project is consistent with the City and County of Honolulu’s (CCH) vision per the Ewa Development Plan (CCH, 1997) and the General Plan (CCH, 1992).

5. The project will not substantially affect public health.

There will be some negative short-term impacts as related to construction (traffic congestion, dust, blockage of street frontage and noise, etc.). However, construction will take place during normal working hours on weekdays.

The use of R-1 water for irrigation is not expected to cause any long-term or cumulative negative impacts to public health. R-1 water undergoes a typical secondary treatment process, designed to produce water
suitable for the maximum number of reuse applications approved by the State of Hawaii Department of Health (DOH). Best Management Practices (BMPs), including irrigation Plans and Management Reuse Plans will be subject to review and approval by the DOH. Furthermore, human contact is permitted for R-1 water, thus the use of R-1 water should not pose a health risk.

In order to allay public fears, prior to the Board of Water Supply (BWS) purchase of the Honaunau (Ewa) Water Recycling Facility, US Filter and the City and County of Honolulu initiated a comprehensive public outreach program. This ongoing effort is designed to educate the general public, facility neighbors and businesses about the facility and water reuse in general.

6. The project will not involve substantial secondary impacts, such as population change or effects on public facilities.

The proposed nonpotable water system will have somewhat of an indirect effect on population growth by allowing planned development of the Ewa Plain to proceed with far less of a burden on Oahu's potable aquifers and system infrastructure. However, this is viewed as a positive benefit in which growth will be appropriately managed and controlled and in a manner that is consistent with the City's long-term vision for Ewa.

7. The project will not involve a substantial degradation of environmental quality.

Environmental quality will be essentially the same as that which exists prior to project implementation. The proposed infrastructure will be designed for construction within existing and future right-of-ways (ROWs) so as to confine the affected areas to the extent possible. It should be noted, however, that anticipated short-term impacts to air quality, noise, and traffic are anticipated resulting from construction activities are unavoidable.

8. The project is individually limited and will not cumulatively have a considerable effect upon the environment nor involves a commitment for larger actions.

The proposed action is generally limited in terms of short- and long-term impacts. However, numerous other construction efforts are expected to occur concurrently due to growth of the region. Coordination with various existing business and commercial entities, government agencies and private developers will help mitigate short-term effects related to construction. Long-term or cumulative impacts are not anticipated.
9. The project will not substantially affect a rare, threatened or endangered species, or its habitat.

The proposed infrastructure will be designed within existing and future ROWs to the extent possible, so as to confine the affected areas to those which are not known to sustain any habitats of threatened or endangered species. Any new waterline alignment in undeveloped areas will include on-site reconnaissance survey by a trained botanist to determine whether endangered plants are present. Since the nonpotable water system is being proposed primarily within areas that are already developed, primarily existing ROWs, the impacts on endangered species are expected to be minimal, if any.

10. The project will not detrimentally affect air quality, water quality or ambient noise levels.

Short-term direct impacts on air, noise, and water quality will occur during the construction period. These will be mitigated by appropriate construction BMPs. Contractors will also be required to adhere to City and State rules, regulations and permit requirements, as well as project construction plans, specifications and BWS inspectors. There are no anticipated long-term impacts to these resources.

11. The project will not affect an environmentally sensitive area such as a flood plain, tsunami zone, erosion-prone area, geologically hazardous land, estuary, fresh water, or coastal waters.

The majority proposed waterlines will be buried, and thus is not be subject to tsunami, erosion, seismic or flood hazards. There may be a few above ground alignments that may be subject to inundation, requiring special design consideration in conditions (e.g. waterline constructed along a bridge). In addition, site-specific environmental assessments will subsequently be prepared for reservoirs and booster pump stations.

12. The project will not substantially affect scenic vistas or view lanes as identified in County or State plans or studies.

Visual quality in construction areas will be impacted on a short-term basis. In general, however, the proposed infrastructure will be constructed on or under the ground, limiting any visual impacts. As mentioned previously, aboveground infrastructure such as reservoirs and booster pump stations will undergo separate site-specific environmental review process, including an evaluation of scenic vistas and public view planes.
13. The proposed project will not require substantial energy consumption.

The only energy consumption involved with this project is that related to construction activities. Essentially, the long-term operation of the nonpotable system will require the same power demand that would otherwise have been used in the potable water distribution system. There will be no significant burden on power producers such as Hawaiian Electric Company.

6.2 COMPLIANCE WITH STATE OF HAWAII’S CLEAN WATER REVOLVING FUND

This project may be funded by Federal Funds through the State of Hawaii’s Clean Water State Revolving Fund (SRF) Program, which would constitute a federal action, and will require the project to meet all National Environmental Policy Act (NEPA) and Hawaii SRF program requirements. The following sub-sections address the proposed project’s relationship to Federal “Cross-Cutting” authorities.

1. Archaeological and Historic Preservation Act (16 USC 469a-1) and National Historic Preservation Act (16 USC 470(f))

The Department of Land and Natural Resources (DLNR) was consulted to ensure compliance with these statutes. DLNR’s State Historic Preservation Division provided comments (refer to Appendix A) indicating that in general, the proposed alignments within existing roadways, streets, golf courses and parks where terrigeneous soils are not underlain by Jurassic sand substrates will have “no effect” on historic sites. However, a segment of the OR&L Railroad may be present within portions of the project area and should be avoided by all construction activities, including equipment and materials storage, and vehicle turnarounds. In addition, the project’s archaeological consultant, Archaeological Consultants of the Pacific (2002), identified three potentially significant historic properties, including the Onelua Archaeological District, which may be encountered. An archaeologist will be on-site to monitor construction activities in such areas. Work will cease and the appropriate agencies will be contacted pursuant to applicable law if cultural or traditional deposits are found during ground disturbance or excavation.

2. Coastal Barrier Resources Act (16 USC 3501)

Located at the interface of land and sea, coastal barriers provide protection for diverse aquatic habitats and serve as the first line of defense against the impacts of severe coastal storms and erosion. The enactment of the Coastal Barrier Resources Act (1982) and the Coastal Barrier Improvement Act (1990) establishes the Coastal Barrier Resources System restricting the development of coastal barriers.
The proposed project’s waterline alignments are not located on current maps of the Coastal Barrier Resources System. Therefore, the project would not be subject to provisions of the Coastal Barrier Resources Act and the Coastal Barrier Improvement Act.

3. **Clean Air Act (42 USC 7506(c))**

Air quality is generally good due to the effects of the tradewinds and lack of stationary source of pollutants. According to the Department of Health’s Annual Summary of Hawaii Air Quality Data (2003), the State of Hawaii, Oahu was in attainment for all federal ambient air quality standards.

Construction activities associated with the project will produce emissions primarily from two sources: (1) fugitive dust from trenching operations and (2) exhaust from construction vehicles and equipment. These emissions are temporary or short-term and will cease upon completion of construction. Key human receptors are the construction workers and residents along the pipeline routes. Pedestrians and motorists temporarily using or commuting through the project area and immediate surroundings may also be exposed to short-term construction related emissions and dust. The contractor will be required to comply with Title 11 of the Hawaii Administrative Rules, Chapter 60.1 Air Pollution Control.

4. **Coastal Zone Management Act (16 USC 1456(c) (1))**

The Hawaii Coastal Zone Management (CZM) Program, enacted as Chapter 205A of the Hawaii Revised Statues, was promulgated in 1977 in response to the Federal Coastal Zone Management Act of 1972. It is administered by the Office of Planning at the State of Hawaii Department of Business, Economic Development & Tourism (DBEDT). The program’s ten policy areas are as follows (DBEDT website, 2004):

- **Recreational Resources**
  To provide coastal recreational opportunities accessible to the public and protect coastal resources uniquely suited for recreational activities that cannot be provided elsewhere.

- **Historic Resources**
  To 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.

- **Scenic and Open Space Resources**
  To protect, preserve, and where desirable, restore or improve the quality of coastal scenic and open space resources.
• Coastal Ecosystems
To protect valuable coastal ecosystems, including reefs, from disruption and minimize adverse impacts on all coastal ecosystems.

• Economic Uses
To provide public or private facilities and improvements important to the state's economy in suitable locations; and ensure that coastal dependent development such as harbors and ports, energy facilities, and visitor facilities, are located, designed, and constructed to minimize adverse impacts in the coastal zone area.

• Coastal Hazards
To reduce hazard to life and property from tsunami, storm waves, stream flooding, erosion, subsidence, and pollution.

• Managing Development
To improve the development review process, communication, and public participation in the management of coastal resources and hazards.

• Public Participation
To stimulate public awareness, education, and participation in coastal management; and maintain a public advisory body to identify coastal management problems and provide policy advice and assistance to the CZM program.

• Beach Protection
To protect beaches for public use and recreation; locate new structures inland from the shoreline setback to conserve open space and to minimize loss of improvements due to erosion.

• Marine Resources
To implement the state's ocean resources management plan.

The proposed waterline alignments are not located in the City and County of Honolulu's Special Management Area (SMA). In addition, waterline construction will not involve the placement, erection, or removal of materials near the coastline. A copy of the Draft Environmental Assessment was sent to the DBEDT Office of Planning as part of the environmental review process; however, comments were not furnished.
5. **Endangered Species Act (16 USC 1536 (a) (2) and (4))**

The Final Environmental Assessment for the Honolulu Wastewater Reclamation Plant (Analytical Planning consultants, 1999) provided a discussion on threatened and endangered plans and wildlife in the Ewa Plain, including Campbell Industrial Park and Naval Air Station Barbers Point. Subsequently, an update of the data was obtained from the Hawaii Natural Heritage Program (HINHP) database in the preparation of the environmental assessment for the proposed nonpotable water system expansion. More recently, a Habitat Conservation Plan for Aбуition menziesi was approved by the State of Hawaii Board of Land and Natural Resources on April 8, 2004.

While there has been a history of endangered species in the Kapolei-Ewa area, the proposed infrastructure will be designed within existing and future right-of-ways (ROWS) to the extent practicable, so as to confine the affected areas to whose which are not known to sustain any habitats of threatened or endangered species. Since the nonpotable water system is being proposed primarily within areas that are already disturbed, primarily existing ROWs, the impacts on threatened or endangered species are expected to be minimal, if any. In addition, as waterline routes are more clearly defined in the preliminary engineering phase, any alignment in an undeveloped area will include an on-site reconnaissance survey by a trained botanist to determine whether threatened or endangered plants are present.

6. **Farmland Protection Policy Act (7 USC 4202 (B))**

The Farmland Protection Act (FPPA) is administered by the U.S. Department of Agriculture. The FPPA's stated purpose is to minimize the extent to which Federal programs contribute to the unnecessary and irreversible conversion of farmland to nonagricultural uses, and assure that Federal programs are administered in a manner that, to the extent practicable, will be compatible with State, unit of local government, and private programs and policies to protect farmland. FPPA's definition of farmland is inclusive of prime farmland, unique farmland, and land of statewide or local importance. Furthermore, farmlands subject to FPPA requirements do not have to be currently used for crop land.

Although some of the proposed waterline alignments are located in agricultural land use districts, the project will not require that these lands be taken out of production. The nonpotable water mains will be underground, generally within existing road and highway ROWs. Moreover, the expansion of the nonpotable water distribution system will enhance opportunities for irrigation of existing agricultural lands.
7. Fish and Wildlife Coordination Act (16 USC 662(a))

The proposed project will not result in the diversion of any water body and is not expected to significantly impact fish or wildlife resources. The U.S. Army Corps of Engineers and the State Department of Land and Natural Resources were consulted and/or sent copies of the Draft EA. DLNR Commission of Water Resources Management has acknowledged that the watercourses at the crossings do not have sufficient flows to support instream uses. The U.S. Army Corps of Engineers has responded that based on the current information, they are unable to determine whether the dry gulches which traverse the proposed water system are waters of the United States. The Corps of Engineers recommends that future site visits should be considered when more detailed plans become available.

8. Floodplain Management (42 USC 4321)

The alignments of the proposed nonpotable water distribution system are located in the following Federal Emergency Management Agency Flood Insurance Rate Maps (FIRM) for the City and County of Honolulu (Effective Date November 20, 2000): 15003C0220 E, 15003C0305 E, 15003C0310 E, 15003C0315 E, 15003C0320 E, and 15003C0330 E. The majority of the proposed nonpotable system is located in Zone D (areas in which flood hazards are undetermined) or Zone X (areas determined outside of the 500-year flood plain). There are two exceptions in Zones A and AE described below:

1) Fort Weaver Road at the bend towards Ewa Beach Community Park and New Ewa Beach Golf Course. The proposed 12-inch nonpotable waterline will be located in a Zone A area which would be inundated by the 100-year flood, though base flood elevations have not been determined.

2) Two short segments in the vicinity of Kalo Gulch situated in Zone AE where base flood elevations have been determined for areas inundated by the 100-year flood. The first is a 12-inch nonpotable line that is planned for Renton Road at the existing Kalo Gulch bridge crossing. The base flood elevation at this location is 42 feet. The second location is about 0.9 mile upstream of the first location, where the base flood elevation is reported at 65 feet. A proposed 16-inch nonpotable line will be connected to an existing 20-inch US Filter R-1 line.

The proposed distribution system is likely to be constructed underground in its entirety, with the possible exception of a bridge crossing at Renton Road over Kalo Gulch. The nonpotable water main would be strapped under the bridge deck, mitigating potential damage to the main in the event of a flood. While negative impacts to the system related to...
flooding are improbable. All nonpotable water main project sites located in Zones A and AE will comply with applicable rules and regulations of the National Flood Insurance Program (NFIP) and the City and County of Honolulu (CCH).

9. Safe Drinking Water Act (42 USC 300h-3(e))

The Pearl Harbor Aquifer is one of three aquifer sectors in the Southern Oahu Aquifer as designated under the U.S. Environmental Protection Agency’s Sole Source Aquifer Program (U.S. EPA Web site, 2004 and Analytical Planning Consultants, 1999). The proposed project area is located in the lower coastal portion of the Waipahu-Walawa and Ewa-Kunia systems in the western half of the Pearl Harbor Aquifer. The two types of groundwater have been identified in the two systems as basal and caprock aquifers. The majority of the distribution areas of the proposed nonpotable system will be located over the Ewa Caprock Aquifer.

The protection of the state’s underground sources of drinking water and coastal waters is regulated via Title 11 of the Hawaii Administrative Rules (HAR). Groundwater recharge criteria and requirements provided in the Guidelines for the Treatment and Use of Recycled Water (Department of Health, 2002) are based on different classifications of recharge.

Since the Department of Health (DOH) does not consider the Ewa Caprock as a designated public drinking water aquifer, groundwater monitoring requirements of the reuse guidelines will not will not be applicable, provided the monthly application rate does not exceed 1.2 times the vegetative consumption rate (non-recharge projects). However, the DOH will evaluate all proposed recharge projects (new and expansion) in which the 1.2:1 ratio is exceeded. The groundwater recharge criteria would also apply to those systems overlying public drinking water aquifers, such as the Pearl Harbor Aquifer, in which the monthly application is expected to exceed the consumptive rate (1:1 ratio). Evaluation of recharge project would be based on relevant aspects, including the following factors: treatment provided, effluent quality and quantity, effluent or application spreading area operation, soil characteristics, hydrogeology, resident time, and distance to withdrawal.

The DOH regulations and reuse guidelines provide significant safety considerations that must be approved prior to implementation of a recharge or a underground disposal project. This will ensure that the use of R-1 water in the Ewa district will not pose serious threat to the potable basal aquifer.
10. Protection of Wetlands (42 USC 4321)

The proposed nonpotable waterline alignments are not located in existing wetland areas. In addition, there are no known food resources in the vicinity of the proposed alignments that are important to wildlife using wetlands elsewhere on Oahu. Both the U.S. Army Corps of Engineers and the State Department of Land and Natural Resources participated in the pre-assessment consultation and received copies of the Draft Environmental Assessment to ensure adequate consideration during various stages of the environmental review process.

11. Wild and Scenic Rivers Act (16 USC 271)

The proposed nonpotable water line projects do not involve streams or rivers which are presently designated under the Wild and Scenic Rivers System or have been listed by the U.S. National Park Service for designation as candidates. The project is therefore not subject to the provisions of the Wild and Scenic Rivers Act.

12. Wilderness Act (16 USC 1131)

The proposed nonpotable water line projects do not involve wilderness areas which are presently designated under the National Wilderness Preservation System. The project is therefore not subject to the provisions of the Wilderness Act.
SUMMARY OF UNRESOLVED ISSUES

There are no known unresolved issues at this time. To the extent possible, the Board of Water Supply will respond to comment letters received after the 30-day public review period for the Revised Draft Environmental Assessment.

As mentioned previously, the proposed nonpotable waterline alignments and sizes and future reservoir sites and capacities were based on projected user location and demand. These are subject to change by the Board of Water Supply during preliminary engineering and design changes due to unforeseen circumstances and events.
LIST OF PREPARERS

The following list identifies the government agency, firms and individuals involved with the preparation of the environmental assessment for the Expansion of the Ewa Nonpotable Water System:

Board of Water Supply
Scot Muraoka, P.E. (BWS Point of Contact and Project Coordinator)

Gray, Hong, Nojima & Associates, Inc.
Sheryl E. Nojima, Ph.D., P.E. (Project Manager)

Archaeological Consultants of the Pacific, Inc.
James Moore, B.S. (Archaeologist)
Joseph Kennedy, M.A. (Archaeologist)
REFERENCES


City and County of Honolulu, Department of Planning, General Plan, 1992.

City and County of Honolulu, Department of Planning and Permitting, 1990 and 2000 Census STF File, January 2002.

City and County of Honolulu, Department of Planning and Permitting, Ewa Development Plan, 1997.

City and County of Honolulu, Department of Wastewater Management, Honolulu Effluent Reclamation and Reuse Preliminary Report, 1995.

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Hawaii Revised Statutes, Environmental Review Law on Environmental Impact Statements, Chapter 343.

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http://www2.hawaii.gov/dbedt/qser/03q4/index.html, March 2004

State of Hawaii, Department of Health.

U.S. Environmental Protection Agency.
APPENDIX A

Pre-Assessment Consultation
Public Comments
Mr. David B. Bills  
April 10, 2002

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c. Discharge of treated effluent from leaking underground storage tank remedial activities;
d. Discharge of waste from cooling water less than one million gallons per year;
e. Discharge of hydro-testing water;
f. Discharge of construction dewatering effluent;
g. Discharge of treated effluent from petroleum bulk stations and terminals; and
h. Discharge of treated effluent from well drilling activities.

Any person requesting to be covered by a NPDES general permit for any of the above activities should file a Notice of Intent with the Department of Health, Clean Water Branch (CWB) at least thirty (30) days prior to commencement of any discharges to State waters.

3. If construction activities involve the disturbance of one acre or greater, including clearing, grading, and excavation, and will take place or extend after March 10, 2003, an NPDES general permit coverage is required for discharge of storm water runoff into State waters.

4. The applicant may be required to apply for an individual NPDES permit if there is any type of activity in which wastewater is discharged from the project into State waters.

If you have any questions, please contact the Clean Water Branch at (808) 586-6309.

Safe Drinking Water Branch (SDWB)

Drinking Water

1. It is not clear if the planned expansion of the Honolulu Board of Water Supply non-potable water system will involve the development of new sources. The Ewa Non-potable Water Master Plan shows two non-potable wells or test fields in Kapolei and the existing U.S. Filter R1 and R2 wells from the Honolulu Wastewater Treatment Plant. The water quality of the various non-potable sources should be discussed in the draft environmental assessment and as well as readily performed field tests (e.g., conductivity, etc.) that can be used to monitor possible cross connections.

2. The potable and non-potable water systems must be carefully designed and operated to prevent cross-connections and backflow conditions. The two systems must be clearly labeled and physically separated by air gaps or reduced pressure principle backflow preventers to avoid contaminating the potable water supply. In addition, all non-potable igloos and irrigated areas should be clearly labeled with warning signs to prevent the inadvertent consumption of non-potable water.
Groundwater Pollution Control

As minimum, proposals to recharge the groundwater should be described in the following aspects:

1. The objective of groundwater recharge;
2. The specific locations and their corresponding area of recharge;
3. The methodology of recharge, i.e., direct application via injection wells or infiltration trenches, or indirect application via irrigation;
4. The amount and chemical characteristics of the effluent (treated wastewater);
5. The projected impact on harbor and shoreline waters; and
6. The approach and related method of control to assess mitigate occurrences of overflow application or misuse of the recharge system.

If you have any questions, please contact the Safe Drinking Water Branch at (808) 586-4258.

Clean Air Branch (CAB)

The Honolulu Board of Water Supply (BWS) presently owns and maintains the non-potable (or non-drinking) water system in the Ewa District. This storage has the capacity to provide 10.5 million gallons per day (MGD) of non-potable water that is being used for irrigation of golf courses, parks, and greenbelts, as well as industrial processing and cooling at nearby refineries and power plants. Due to the increased demand, CAB plans to expand the non-potable storage and transmission system, which will facilitate the use of non-potable water in greater amounts. The BWS estimates an ultimate flow of 28 MGD of non-potable water use in the Ewa District. This expansion will consist of construction over the next 20+ years. Proposed actions that would affect air quality include removing vegetation, grading, trenching, excavation, and other construction activities.

Control of Fugitive Dust:

Due to the nature of the project, there is a significant potential for fugitive dust to be generated during the removal of debris, and during the grading, trenching, and construction activities that would impact the air quality and visibility. It is recommended that a dust control management plan be developed which identifies and addresses those activities that have a potential to generate fugitive dust. Implementation of adequate dust control measures during all phases of the project is warranted.

Construction activities must comply with provisions of Hawaii Administrative Rules, §11-601-33, on Fugitive Dust. The contractor must provide adequate means to control dust from all construction activities including but not limited to:

a. Planning the different phases of construction, focusing on minimizing the amount of dust-generating materials and activities, centralizing material transfer points and on-site vehicular traffic routes, and locating potentially dusty equipment in areas of the least impact;

b. Providing an adequate water source at the site prior to start-up of construction activities;

c. Landscaping and road seeding of bare areas, including slopes, starting from the initial grading phase;

d. Controlling dust from shoulders, project entrances, and access roads;

e. Providing adequate dust control measures during weekends, after hours, and prior to start-up of construction activities; and

f. Controlling dust from debris being hauled away from the project site.

Proper Disposal of Construction Waste:

Wastes generated by grading of the site and all wastes generated during construction must be properly disposed. No burning of waste is permitted.

If you have any questions please contact the Clean Air Branch at (808) 586-4200.

Noise, Radiation and Indoor Air Quality (NRIAQ) Branch

All project activities shall comply with the Administrative Rules of the Department of Health, Chapter 11-46, on Community Noise Control.

If you have any questions, please contact the Noise, Radiation and Indoor Air Quality Branch at (808) 586-4701.

Sincerely,

GARY BILL
Deputy Director
Environmental Health Administration

CWIB
SDWIB
CAB
NRIAQ
Mr. Gary Gill, Deputy Director  
Environmental Health Administration  
State of Hawaii, Department of Health  
June 5, 2002  

2. The BWS will be responsible for the design and operation of cross-connections and backflow prevention in both potable and nonpotable systems, as they presently see. The DEA will also disclose conditions that must be satisfied, including appropriate signs labeling and physical separation of systems to avoid contamination of the potable water supply.

3. The DEA will disclose that groundwater recharge is not expected to occur in any substantial amount. The major use of nonpotable water in this area will be for landscaping and golf course irrigation. According to the BWS, unlike the large return irrigation component of furrow irrigated sugar cane, it is expected that water reuse on landscaped areas including golf courses would be at significantly reduced levels. Moreover, there would not be any economic advantage to over irrigate in any application. The irrigation or application rate is expected to be maintained at a level less than or equal to the vegetation’s evapotranspiration rate. In addition, because of the Ewa Plains’ predominately arid climate, it would be unusual for to find gains from precipitation on a continuous basis.

4. The DEA will also address the concern of impacts on harbor and shoreline waters. The BWS asserts that in order to have a material impact on the harbor and shoreline areas, the input of expected return flow must be significantly larger than the tidal input that is needed to keep the marina flushed. The size of the tidal prism is expected to overwhelm the return flow, unless the harbor and/or marina stagnant. Studies have also shown that irrigated vegetation effectively reduces nutrient levels.

Clean Air Branch

1. The DEA will recommend that a dust control management plan be developed during the pre-design phase of the project to identify and address activities that will potentially generate dust during construction of the water mains. The management plan will also ensure compliance with the Hawaii Administrative Rules (HAR) Chapter 11-60.1-33.

2. Construction activities will comply with provisions of HAR Chapter 11-69 on Air Pollution Control. The construction plans will indicate applicable mitigative measures for dust control from listed items a-e.
3. The DEA will state that burning of construction waste will not be permitted. Furthermore, the contractor will be responsible for proper disposal of all waste generated during construction of the proposed water main.

Noise, Radiation, & Indoor Air Quality Branch

1. Construction activities will comply with provisions of HAR Chapter 11-46, on Community Noise Control.

Please feel free to contact us should there be any questions. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, BILLS, NOHMA & ASSOCIATES, INC.

[Signature]

David B. Bills

cc: SH-DBB-Ex
M. Scott Munnska, Board of Water Supply
2008
STATE OF HAWAII
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

March 12, 2002

Mr. David B. Bills
Gray, Hong, Bills, Ngiihi & Associates, Inc.
841 Bishop St., Ste. 1100
Honolulu, HI 96813

Dear Mr. Bills:

SUBJECT: Preparation of Draft Environmental Assessment, Ewa Nonpotable Water System, Ewa, Oahu, Hawaii, Tax Map Kpr: 9-1, 9-2-02, and 9-2-03

Thank you for the opportunity to review the subject document. Our comments related to water resources are marked below.

In general, the CWRM strongly promotes the efficient use of our water resources through conservation measures and use of alternative non-potable water resources whenever available, feasible, and there are no harmful effects to the ecosystem. Also, the CWRM encourages the protection of water recharge areas, which are important for the maintenance of streams and the replenishment of aquifers.

We recommend consideration of the following:

1. The proposed project includes construction of a pump intake, the project may require a stream diversion permit and related to the incursion flow standard for the affected stream(s).

2. If the proposed project alters the bed and bank of a stream channel, the project may require a stream channel alteration permit.

The Commission supports the viable and appropriate reuse of reclaimed water, particularly over the Ewa Kapolei Aquifer that has been declared a non-potable water resource by the Commission, in so far as it does not compromise beneficial uses of existing water resources.

The CWRM strongly recommends that the county update their Water Use and Development Plan (WUDP), last adopted in 1993, to reflect the use of reclaimed water in the Ewa area. The update should provide projections of the potable supply (by aquifer) now being used to meet existing potable needs, which will become available as a result of the proposed expansion. The WUDP should also describe plans for municipal and private nonpotable wells and allocations that will no longer be needed as a result of the proposed conversion to reclaimed water as a primary supply source.

The Data should disclose the results of baseline data collection and analyses that have been ongoing in the vicinity of the Kapolei Wastewater Treatment Plant and project the impact of the expanded use of reclaimed water on the quality of the Ewa Kapolei Aquifer and nearshore waters.

Lastly, a stream channel alteration permit will be required should the proposed expansion in the vicinity of Honolulu Stream be required to the stream channel.

If there are any questions, please contact the Commission at 587-0225.

Sincerely,

LINNEL T. NISHIOKA
Deputy Director

Uns

Mr. David B. Bills
Page 2
March 12, 2002
Ms. Dieder S. Mamiya, Administrator
Land Division
Department of Land and Natural Resources
P.O. Box 621
Honolulu, Hawaii 96820

Attn: Ms. Linnei T. Nishioka, Deputy Director
Commission on Water Resources Management

Subject: Pre-Assessment Consultation
Ewa Nonpotable Water System
THK 9-1 and 9-2, Ewa, Oahu, Hawaii

Dear Ms. Mamiya:

Thank you for your correspondence of March 12, 2002 regarding the subject project. We applaud the Commission’s support of water reuse and acknowledge your comments which will assist us in preparing the Draft Environmental Assessment (DEA).

1. The DEA will disclose that proposed project be incorporated into the City and County of Honolulu’s Water Use and Development Plan (WUDP). The WUDP was adopted in 1990 and should reflect the use of reclaimed water in the Ewa area.

2. The DEA will disclose that groundwater recharge is not expected to occur in any substantial amount. The major use of nonpotable water in this area will be for landscaping and golf course irrigation. There would not be any economic advantage to over irrigate in any application. It is expected that the irrigation or application rate would be maintained at a level less than or equal to the vegetation’s evapotranspiration rate. In addition, because of the Ewa Plain’s predominately arid climate, it would be unusual for to find gains from precipitation on a continuous basis. According to the BWS, unlike the large return irrigation component of furrow irrigated sugar cane, it is expected that water reuse on landscaped areas including golf courses would be at significantly reduced levels.

3. The DEA will identify relevant demonstration or pilot studies, if any, that have been conducted in the vicinity of the Honolulu Wastewater Treatment Plant relating to effluent recharge of the Ewa Caprock Aquifer. Available baseline data will be presented which may be used to evaluate the impact of effluent recharge on water quality of the aquifer.

4. At this time, the Board of Water Supply does not anticipate proposed nonpotable water lines within stream banks or channels; however, we understand that a stream channel alteration permit (SCAP) may be required if alignments were modified such that the construction resulted in an alteration.

Please feel free to contact our office should there be any questions. Again, thank you for your interest in the environmental review process.

Very truly yours,

GRAY, HONG, BILLS, NOE & ASSOCIATES, INC.

David B. Bills

cc: Mr. Scott Murakata, Board of Water Supply

June 5, 2002
STATE OF HAWAI'I
DEPARTMENT OF LAND AND NATURAL RESOURCES
COMMISSION ON WATER RESOURCE MANAGEMENT

May 21, 2003

Ms. Sheryl E. Nojima, P.E.
Gray, Hong, Bills, Nojima & Associates, Inc.
841 Bishop Street, Suite 1100
Honolulu, Hawaii 96813

Dear Ms. Nojima:

Subject: Waipahu Water Environmental Assessment

This is regarding whether a stream channel alteration permit (Hawaii Revised Statutes §174C-71) would be required for a non-potable waterline shown on your map entitled “Kapolei Area Long Range Master Plan” dated May 2003.

We reviewed each intersection of the blue watercourse lines and the green proposed waterline, and we conclude that none of the crossings will require a stream channel alteration permit. These watercourses are not considered to be “streams” at the location of the proposed crossings, either because they are not natural watercourses or because they do not have sufficient flows to support in-stream uses.

We appreciate your coordination on our permit requirements. If you have any questions regarding this letter, please call David Higa at 587-8249.

Sincerely,

ERNEST Y.W. LAU
Deputy Director

Dated

Kapolei

May 28, 2003

Mr. Ernest Y.W. Lau
Deputy Director
Commission on Water Resource Management
Department of Land and Natural Resources
P.O. Box 631
Honolulu, Hawaii 96809

To: Mr. David Higa

Subject: Draft Environmental Assessment (DEA) for Proposed Expansion of the Ewa Nonpotable Water System

Dear Mr. Lau:

Thank you for your correspondence of May 21, 2003 regarding the subject project. We acknowledge that stream channel alteration permits will not be required at the various blue watercourse crossings due to insufficient flows to support in-stream uses.

We will continue to place your agency on the mailing list for the draft environmental assessment to follow. Should you have any questions, please contact me at 521-0306. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, BILLS, NOJIMA & ASSOCIATES, INC.

David Bills

cc: Mr. Scott Matsuda, Board of Water Supply
MEMORANDUM

TO: Nick Vaccaro, Land Agent
   Land Division

THRU: Harry Yada, Acting Administrator
   Land Division

FROM: Michael G. Back, Administrator
   Division of Forestry and Wildlife

SUBJECT: Pre-consultation for Draft Environmental Assessment of Ewa Non-Potable Water System, by Honolulu Board of Water Supply, Ewa, Oahu, Hawaii.

March 14, 2002

DOFAW has reviewed this subject document and we provide the following comments for your consideration. There is evidence of the endangered plants: 1) Chamaesyce skatbergei var. skatbergei, and 2) Achyranthes splendens var. rotundata in the Kapolei-Ewa region. The on-going North-South Road project in Ewa Beach is currently undertaking mitigation actions for the protection of the Abutilon suavissimum. The likelihood of the North-South Road Project going through a Habitat Conservation Plan is imminent.

To prevent similar N-S Road Project mitigation, we recommend for your consideration that an on-site reconnaissance plant survey for each new water-line transect be conducted by a trained botanist to identify whether these or other endangered plants are present within these alignments. It is prudent by HBWS to address endangered plants in the master planning phase of the proposed Ewa non-potable expansion and accompanying infrastructure developments over the next 20 years. An on-site plant reconnaissance survey will prevent needless mitigation later during the construction phase of all new HBWS project alignments. We appreciate the opportunity to comment on this project.

C: Oahu DOFAW Branch
   Vickie Caraway, State Botanist
May 30, 2002

Mr. Daniel S. Mamiya, Administrator
Land Division
Department of Land and Natural Resources
P.O. Box 631
Honolulu, Hawaii 96809

Attn: Mr. Nicholas A. Vareno

Subject: Pre-Assessment Consultation
Forestry and Wildlife Division
Waipio Nonpoint Water System
PPP, P-1 and 2-h, Ewa, Oahu, Hawaii

Dear Mr. Mamiya:

Thank you for your correspondence of March 22, 2002 regarding comments for the subject project from the Division of Forestry and Wildlife. As you have mentioned, there is evidence of two endangered plants in the Kapaau-Ewa region: (1) Chamerion angustifolium var. flabelliforme and (2) Achyrocline sylvestris var. tendracantha.

We understand that prudent planning practices can prevent unnecessary mitigation later during construction. As such, any new waterline alignment in undeveloped areas will include on-site reconnaissance survey by a trained botanist to determine whether endangered plants are present. Since the proposed water system is being proposed within areas that are already developed, primarily existing right-of-ways, the impacts on endangered species is expected to be minimal, if any.

Should there be any questions, please feel free to contact us at 511-0305. Again, thank you for your interest in the proposed project.

Very truly yours,

GRAY, HONG, BILLS, NOJIMA & ASSOCIATES, INC.

David B. Bills

cc:
Mr. Joe Munakata, Board of Water Supply
Ms. Vickie Caraway, State Economist
Forestry and Wildlife Division, Ewa Branch
April 12, 2002

Dear Mr. Bills:

SUBJECT: Chapter 62-8 Historic Preservation Review - Comments on Preparation of Draft Environmental Assessment Ewa Non-Potable Water System
Honolulu, O'ahu
THSR, 01-01-02

Thank you for the opportunity to provide comments for the draft EA for the Ewa Non-Potable Water System. The proposed expansion of the non-potable water system is planned to facilitate the use of non-potable water and relieve the potable water supply. The expansion includes development of new distribution and transmission mains (located primarily within existing state and county right-of-ways), reservoirs and booster pumping stations.

Gray Hong, Bills & Nijima Associates have provided a general map showing the proposed infrastructure developments. Consequently we can only provide general comments on the effect that this project may have on historic sites. A review of our records indicates that there are no known historic sites within the existing right of ways. In general, all proposed development of transmission mains within existing roadways, streets, golf courses and parks where terrigenous soils are not underlain by Jurassic sand substrates, will have "no effect" on historic sites. These areas include those land parcels that were formerly cultivated in sugar cane, and areas where the historic preservation review process has been completed (i.e. Ewa by Century Residential area, Coral Creek and Hawaii Prince Golf Course).

A segment of the OR&L Railroad is present within portions of the project area extending from the Ko Olina resort area to West Loch. The OR&L Railroad is a significant historic site listed on the National Register of Historic Places, and should be completely avoided by all water mains construction activities, including equipment and materials storage, and vehicle turnarounds.

David Bills
Page Two

Construction, including transmission mains, may have the potential for an "adverse effect" on historic sites in areas that are underlain with Jurassic sand deposits (along beach parks and coastal roads). In these cases, we may recommend measures to identify historic sites and mitigate any "adverse effects" on them. Such measures may include survey with subsurface testing or having a qualified archaeologist conduct on-site monitoring during all ground disturbance. In order to better advise you on what historic preservation measures, if any, will be required, we request that we be provided with copies of detailed plans as they are finalized. Our review of the plans will focus on the effects, if any, the proposed water system improvements will have on significant historic sites.

Should you have any questions about archaeology, please feel free to call Sara Collins at 052-8025 or Elaine Joudatre at 052-8027. Should you have any questions regarding the OR&L, please feel free to contact Nathan Napaka at 587-0040. Should you have any questions about burial matters, please feel free to contact Ka'i Markell at 587-0008.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

E&jk

C: Mr. A. Van Horn Diamond, Chair, O'ahu Island Burial Council
Mr. Kai Markell, Burial Sites Program
Nathan Napaka

Deepest & Coldest Ocean Research 
Nearest Land: buses 
Compassion for the Beasts 
Expertise in Marine Science 

Gray & Horngren & Associates, Inc.
CONSULTING ENGINEERS

May 20, 2002

Mr. Don Hibbard, Administrator
State Historic Preservation Division
Department of Land and Natural Resources
601 Kamakeha Blvd, Room 555
Kapolei, Hawaii 96707

Subject: Pre-Assessment Consultation

Ewa Nonpoint Source Water System
TKR-3-1 and 3-2, Ewa, Oahu, Hawaii

Dear Mr. Hibbard:

Thank you for your correspondence of April 12, 2002 (LOG NO. 29512/DOC NO. 023440) regarding the subject project. We acknowledge that the following concerns have been provided to assist in our preparation of the Draft Environmental Assessment (DEA):

1. There are no known historic sites within the existing right-of-ways, and in general, the construction of facilities in terrigenous soils that are not underlain by loess or sand substrates will not have an effect on historic sites.

2. The ORAI Railroad is a significant historic site listed on the National Register of Historic Places and should be completely avoided by all construction activities, including equipment and materials storage and vehicle turnaround.

3. The DEA will state that the Historic Preservation Division be consulted during the design phase to allow for more definitive preservation measures, such as onsite archaeological monitoring during ground disturbance, if required.

Please feel free to contact our office should there be any questions. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY HONG BILLS NOJIMA & ASSOCIATES, INC.

David B. Bills

cc: Mr. Scott Moraska, Board of Water Supply
    Mr. A. Van Ham Dierden, Chair, Oahu Island Burial Council
    Mr. Kai Markell, Burial Sites Program
    Mr. Joseph Kennedy, Archaeological Consultants of the Pacific
    Mr. Nolan Napeutic
Mr. David B. Bills
Gray, Hong, Bills, Nogima & Associates, Inc.
841 Bishop Street, Suite 1100
Honolulu, Hawaii 96813

Dear Mr. Bills:

Subject: Preparation of Draft Environmental Assessment, Ewa Non-potable Water System, Ewa, Oahu, Hawaii, TMK: 9-1, 9-2-02, and 9-2-03

Thank you for your letter of March 7, 2002, requesting our comments regarding the proposed Ewa Non-potable Water System. We have the following comments:

1. We require early coordination with our staff to discuss/evaluate appropriate alignment and installation methods for the transmission water mains along our facilities.
2. We require submittal and approval of construction plans for all work done within our highway right-of-way.
3. Planning of this project must be coordinated with ongoing and proposed projects in the Kapolei Area.

If you have any questions, please contact Ronald Tsuzuki, Head Planning Engineer, Highways Division, at 587-1830.

Very truly yours,

[Signature]
Director of Transportation

May 30, 2002

Mr. Brian K. Minnai, Director
Department of Transportation
869 Punchbowl Street
Honolulu, Hawaii 96813-5007

Subject: Pre-Assessment Consultation
Ewa Non-potable Water System
TMK: 9-1 and 9-2, Ewa, Oahu, Hawaii

Dear Mr. Minnai:

Thank you for your correspondence of April 3, 2002 regarding the subject project. We acknowledge the Department of Transportation’s (DOT) response indicating coordination and approval requirements within state highway right-of-ways and along DOT facilities:

1. Early coordination with staff to discuss/evaluate appropriate alignment and installation methods for the transmission water mains along DOT facilities.
2. Submittal and approval of construction plans for all work done within DOT highway right-of-way.
3. Planning coordination with ongoing and proposed projects in the Kapolei Area.

Please feel free to contact me at 581-0306 should there be any questions. Again, thank you for your participation in the environmental review process.

Very truly yours,

[Signature]
Gray, Hong, Bills, Nogima & Associates, Inc.

[Stamp]
David B. Bills

To: [Stamp]
Cc: Mr. Scott Murakami, Board of Water Supply
March 27, 2002

Mr. David Bills  
Gray Hong Bills Mojima & Associates, Inc.  
841 Bishop Street, Suite 1100  
Honolulu, HI 96813

Subject: Preparation of Draft Environmental Assessment  
Ewa Nonpotable Water System, Ewa, Oahu, Hawaii  
Tax Map Key: 9-1,9-2-32 and 9-2-03

Dear Mr. Bills,

We have received the description of the subject project provided by your letter dated March 7, 2002. We have no comments to offer at this time, but will reserve further comments when the documents are submitted.

Thank you for the opportunity to review your request and should you have any questions, please feel free to call our office at 586-4185.

Sincerely,

Genevieve Salmonson  
Director

Ms. Genevieve Salmonson, Director  
State of Hawaii  
Office of Environmental Quality Control  
215 South Beretania Street, Suite 702  
Honolulu, Hawaii 96813

Subject: Pre-Assessment Consultation  
Ewa Nonpotable Water System  
TMK 9-1 and 9-2; Ewa, Oahu, Hawaii

Dear Ms. Salmonson:

Thank you for your correspondence of March 7, 2002 regarding the subject project. We acknowledge that the Office of Environmental Quality Control has no comments at this time; however, we will continue to seek your input throughout the environmental review process. Should there be any questions, please feel free to contact us at 581-6306. Again, thank you for your interest in the proposed project.

Very truly yours,

GRAY, HONG, BILLS, NOJIMA & ASSOCIATES, INC.

David B. Bills

cc: Mr. Scott Murase, Board of Water Supply  
2010
March 28, 2002

David Bills
Gray, Hong, Bills, Nojima & Associates, Inc.
841 Bishop Street
Honolulu, HI 96813-3905

Subject: Preparation of Draft Environmental Assessment
Ewa Nonpoint Water System
Ewa, O‘ahu, Hawai‘i
Tax Map Key: 9-1, 9-2-02, and 9-2-03

Dear Mr. Bills:

Thank you for the opportunity to comment on the above referenced project.

The Office of Hawaiian Affairs requests that the EA assess cultural resources in the project area. The EA should include ethnographic, historical, anthropological and other culturally-related documentary research on the site. The document should examine if the project would interfere with any known traditional trails or access ways. Procedures for handling inadvertent discoveries of human burials and cultural artifacts should also be included.

The EA should also include a substantive cultural impact statement based upon consultation with the Hawaiian community, as required by Act 50, Session Laws of 2000. The cultural impact statement must identify and describe the cultural practices located within the potentially affected area; assess the impact on these practices; examine alternatives to the proposed action; and propose mitigation measures. You should consult with Native Hawaiian individuals and organizations to determine the impact of the proposed structures and activities on cultural practices. The EA should include a discussion of the methods used to identify and select persons with knowledge of cultural practices and the results of consultation with them. At a minimum, the draft EA should identify individuals and organizations with expertise on cultural practices with whom consultation has occurred.

If you have questions, please contact Shari Manley, Policy Analyst at 594-1944 or email her at sharim@oha.org.

Sincerely,

Jana S. Keala
Acting Director, Hawaiian Rights Division

CC: sm
cc: Board of Trustees
Clyde W. Nama‘u, Administrator
June 5, 2002

John S. Keala, Acting Director
Office of Hawaiian Affairs
ATTN: Ms. Shara Manley
711 Kapolei Blvd., Suite 500
Honolulu, Hawaii 96813

Subject: Pre-Assessment Consultation
Ewa Nonpotable Water System
TMK 3-1 and 2-2, Ewa, Oahu, Hawaii

Dear Ms. Keala:

Thank you for your correspondence of March 28, 2002 regarding the subject project. We acknowledge your comments regarding the assessment of cultural impacts with respect to preparation of the Draft Environmental Assessment (DEA).

Since the majority of the proposed nonpotable system will be underground and within already disturbed areas, such as existing right-of-ways, the impacts on cultural practices and resources are to be minimal, if any. The State Historic Preservation Division has confirmed in writing (refer to enclosed correspondence dated April 12, 2002) that there are no known historic sites within the existing right-of-ways, and in general, the construction will have "no effect" on historic sites. Nevertheless, acknowledging the pre- and post-contact history of the Ewa Plain, the Board of Water Supply recognizes that potentially significant archaeological or historic sites may be encountered.

As a minimum, an archaeological monitor will be on call during construction activities in the event that a significant historic property is encountered.

However, please be assured that the following issues identified by the Office of Hawaiian Affairs will be appropriately addressed should there be changes in the proposed alignment such that any nonpotable facilities are located within undisturbed areas:

1. An assessment of cultural resources should include ethnographic, historical, anthropological, and other culture-related documentary research on the site. The assessment should also examine traditional trails or access ways, as well as disclose procedures for handling inadvertent discoveries of human burials and cultural artifacts.

2. The Draft Environmental Assessment should include a cultural impact statement based on consultation with the community that: (a) identifies and describes the cultural practices located within the affected area, (b) assesses the impacts on these practices, (c) examines alternatives to the proposed action, and (d) proposes mitigation measures.

Please feel free to contact our office should there be any questions. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, BILLS, NOESSA & ASSOCIATES, INC.

David B. Bills

Enclosure

cc: Mr. Scott Murakata, Board of Water Supply
April 15, 2002

Mr. David B. Bills
Gray Hong Bills Nogima & Associates, Inc.
841 Bishop Street, Suite 1100
Honolulu, Hawaii 96813

Dear Mr. Bills:

Subject: Pre-Consultation for Preparation of Draft Environmental Assessment

For the Ewa Non-Potable Water System, Oahu
Tax Map Section 21, and Tax Map Plans 9-2-02 and 9-3-03

We have reviewed the above request for pre-consultation information and have the following comments:

1. Kalaeloa Redevelopment Plan (Kalaeloa Special Area Plan)

The scope of the draft environmental assessment (DEA) should include a consistency review with the Kalaeloa Special Area Plan (K SAP).

2. Master Plan Base Map

The base map used in your request letter is derived from Campbell Estate's Kapolei Master Plan map. It may be more appropriate if the base map for the Ewa Development Plan Map were used instead since proposed land uses would be those adopted under the area's development plan.

3. Selected Technology Background

The DEA should include some background information as to capacity limits of existing water sources relevant to projected water needs. The DEA could include a summary of the Board of Water Supply's overall plan on managing capacity of existing water supplies and what lead to the selection of the proposed technology as one means of addressing future water needs. Also, what alternate technologies and water system plans were considered in providing for Oahu's future water needs?

Thank you for the opportunity to comment. If you have any questions, please contact Raymond Young 527-8839.

Sincerely yours,

[Signature]

RANDALL K. YUIKI, AIA
Director of Planning and Permitting

RKFil
Dec 148257
Gray, Hong, Bills, Momoa & Associates, Inc.  
CORPORATE ENGEOLOGY  
May 30, 2002

Mr. Randall K. Fujiki, AIA  
Director  
Department of Planning and Permitting  
650 South King Street, 7th Floor  
Honolulu, Hawaii  96813  

Attn: Mr. Raymond Young  

Subject: Pre-Assessment Consultation  
Ewa Nonpotable Water System  
TDK-3 and 9-2; Ewa Plain, Hawaii

Dear Mr. Fujiki:

Thank you for your correspondence of April 15, 2002 regarding the subject project. Your department's comments will assist us in preparing the Draft Environmental Assessment (DEA) as follows:

1. The Kalihi Special Area Plan will be reviewed for consistency with the proposed expansion of the nonpotable water system and addressed as needed in the DEA.

2. The City's geographic information system (GIS) files will be used to generate maps for the upcoming documents.

3. The DEA will clarify source/supply issues with respect to projected water needs in the Ewa Plain.

Please feel free to contact our office should there be any questions. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, BILLS, MOMOA & ASSOCIATES, INC.

[Signature]

David B. Bills

cc: Mr. Scott Morisaka, Board of Water Supply  
2010
March 21, 2002

Mr. David B. Bills, P.E.
Gray, Hong, Bills, Nohima & Associates, Inc.
841 Bishop Street, Suite 1400
Honolulu, Hawaii 96813

Dear Mr. Bills:

Subject: Preparation for Draft Environmental Assessment
Ewa Nonpotable Water System
Ewa, Oahu, Hawaii
Tax Map Key: 9-1, 9-2-6, and 9-2-63

We received your letter dated March 7, 2002, regarding the above-mentioned project. The Honolulu Fire Department requests that the following be complied with:

1. Maintain fire apparatus access throughout the construction site for the duration of the project.
2. Notify the Fire Communication Center at 523-4411 regarding any interruption in the existing fire hydrant system during the project.

Should you have any questions, please call Battalion Chief Kenneth Silva of our Fire Prevention Bureau at 831-7772.

Sincerely,

ATTILIO K. LEONARDI
Fire Chief

May 30, 2002

Mr. Attilio K. Leonardi, Fire Chief
Fire Department
ATTN: Mr. Kenneth Silva
2375 Kapiolani Street, Suite H-245
Honolulu, Hawaii 96818-1869

Subject: Pre-Assessment Consultation
Ewa Nonpotable Water System
TMK: 9-1 and 9-2-2, Ewa, Oahu, Hawaii

Dear Mr. Leonardi:

Thank you for your correspondence of March 21, 2002 regarding the subject project. The Draft Environmental Assessment will address your concerns as follows:

1. The contractor will be required to maintain fire apparatus access throughout the construction period.
2. The Fire Communication Center at 523-4411 will be notified in the event of any interruption in the existing fire hydrant system.

Please feel free to contact our office should there be any questions. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, BILLS, NOHIMA & ASSOCIATES, INC.

David B. Bills

SN: DBB:Fs
cor: Mr. Scott Munoka, Board of Water Supply
2001
March 19, 2002

Mr. David B. Bills
Gray, Hong, Bills, Nojima & Associates, Inc.
841 Bishop Street, Suite 1100
Honolulu, Hawaii 96813

Dear Mr. Bills:

Thank you for the opportunity to review and respond to the preparation of a Draft Environmental Assessment for the Ewa Nonpotable Water System Project.

This area will be patrolled and served by officers of the Kapolei Police Station (District 8).

There may be construction-related complaints due to dust, noise, and slow-moving construction vehicles which may have an impact on calls for police service.

In addition, if there are delays in traffic flow, especially during peak traffic hours, there may be further impact on calls for police service to the area. Therefore, it is advisable for the contractor to notify Captain George Yamamoto of District 8 at 692-4833 of the construction schedule and any changes to that schedule before any need to close for construction-related activity.

If there are any questions, please call Ms. Carol Sudtani of the Support Services Bureau at 529-3658.

Sincerely,

LEE D. DONOHUE
Chief of Police

By

KARL GOSSEY
Acting Assistant Chief of Police
Support Services Bureau

May 30, 2002

Mr. Lee D. Dowahue
Chief of Police
Honolulu Police Department
841 South Beretania Street
Honolulu, Hawaii 96813

Attn: Ms. Carol Sudtani, Support Services Bureau

Subject: Pre-Assessment Consultation
Ewa Nonpotable Water System
TMK 9-1 and 9-2, Ewa, Oahu, Hawaii

Dear Chief Dowahue:

Thank you for your correspondence of March 19, 2002 regarding the subject project. We acknowledge your concerns regarding impacts on traffic flow during construction of the water facilities. The Draft Environmental Assessment will state that the contractor shall provide Police District 8 with a construction schedule and notify Captain George Yamamoto at 692-4833 prior to the start of any construction activities.

Please feel free to contact our office should there be any questions. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, BILLS, NOJIMA & ASSOCIATES, INC.

David B. Bills

cc: Mr. Scott Busch, Board of Water Supply
March 31, 2002

Mr. David B. Bills, P.E.
Gregory, Morey, Bills, Nishina & Associates, Inc.
841 Bishop Street, Suite 1100
Honolulu, Hawaii 96813

Re: Preparation of Draft Environmental Assessment
Ewa Non-Potable Water System

Dear Mr. Bills:

Thank you for the opportunity to provide comment on the draft Environmental Assessment ("EA") provided to us on March 7, 2002. We commend the Board of Water Supply ("BWS") on their efforts to expand the non-potable water system in the Ewa District. Like the BWS, Haseko (Ewa), Inc. ("Haseko"), is committed to responsible management of the area's resources and looks forward to working with the BWS to utilize non-potable water when available and practical for use in our development.

Haseko has two perspectives on this matter. First, Haseko is the developer of Ocean Pointe, a master planned community located in the Ewa District. Ocean Pointe consists of 1,100 acres and ultimately will have 4,550 residential units, a major commercial area with business and industrial components, 1,200 hotel rooms, and a 70-acre regional recreational marina with a capacity of 1,400 wet slips. Haseko understands that their development will increase the demand for potable and non-potable water in the area. Second, Haseko recognizes and anticipates that current and prospective homeowners at Ocean Pointe may have concerns regarding the safety and aesthetics of using non-potable water in their neighborhoods.

In recognition of the concerns that will be raised from both perspectives, Haseko believes that the EA should consider the impact of the non-potable system and use of non-potable water in the region with regard to 1) safety and identification of areas that would be appropriate for the use of non-potable water, 2) the impact on the water quality in the Ocean Pointe marina, and 3) the nature of the infrastructure required to implement the program and maintenance duties that will be imposed on the infrastructure owners.

Safety of Using Non-Potable Water and Identification of Appropriate Locations for Use

Initially, Haseko recognizes and anticipates that its present and prospective homeowners may have concerns as to the safety of using non-potable water in their neighborhoods. Under the current plan, non-potable water will be used for the irrigation of our golf course, open space, parks, and major common area landscaping. Presently, it is understood that single family homeowners will not be required to use non-potable water for irrigation of their yards and plantings. However, under current city codes, multi-family residences will be required to irrigate common area landscaping with a non-potable water supply system. Haseko understands that residential homeowners may be concerned that the use of non-potable water may result in potential health problems for themselves and their families. Haseko further recognizes that non-potable water must be used only in accordance with rules and guidelines established by the State Department of Health. While Haseko understands that irrigation supervisors and golf course superintendents will be better equipped to comply with application guidelines and conditions, we remain concerned that homeowners and their families may not always follow restrictions imposed on the use of the non-potable water.

Based upon the above, Haseko requests that the EA address the safety and health concerns that non-residents may have with regard to the use of non-potable water. Haseko further requests that the EA address the locations and areas where non-potable use would be practicable.

Impact on Water Quality in the Marina

In the development and design of the proposed recreational marina, extensive investigative work was performed in connection with our application for and subsequent issuance of a Water Use Permit from the State Commission on Water Resources Management (CWMA). In the Contested Case held in this proceeding, it was shown that a thin non-potable brackish water system, sometimes referred to as a cyanobacterial bloom, flows across the Ewa Plain to the ocean. Ocean Pointe's proposed marina will be excavated from flat land and consequently intercept ground water flows from this brackish water system. The marina was designed to accommodate migration of groundwater to the ocean while maintaining the quality and clarity of the water in the marina. Haseko is concerned that the non-potable water that may be transmitted and used in the area of the marina, may contain nutrients and contaminants that were not considered in ground water models and other assumptions used in designing the marina. If the use of non-potable water in the region could result in increased growth of algae in the marina, the safety and aesthetic quality of the marina would be affected. If such occurs, Haseko would face increased maintenance costs and/or be forced to redesign its facility.

Based on these concerns, Haseko requests that the EA determine the quantity and quality of nutrients and contaminants that the non-potable system would introduce into the mariner, and address its impact on the water quality in the proposed marina. Furthermore, it is requested that the EA determine the locations where this non-potable water could be applied so as to minimize any possible adverse effects on the marina.
Impact on the Ewa Caprock Aquifer

As noted in the Contested Case proceeding, the caprock aquifer was created in large part due to the use of high volumes of imported, low chloride water for sugar cane cultivation. Since the closure of the sugar plantations on Oahu and the corresponding reduction in irrigation, the size and quality of the caprock aquifer has diminished. Since that time, the caprock aquifer has been the subject of monitoring by governmental agencies and water use permits on the Ewa Plain.

At present, the sustainable yield of the aquifer has fallen and the chloride levels of the water pumped have risen to levels that render the caprock water pumped from certain areas, unsuitable for many purposes. Non-potable water in the quantities anticipated, imported for use over the caprock aquifer although not intended, could certainly have the effect of recharging this aquifer. The quantity and quality of the water that could be safely taken from the aquifer should be evaluated along with its impact on existing and proposed wells drawing water from the caprock aquifer.

Based thereon, Haseko requests that the EA determine the effect that the use of non-potable water would have on the underlying caprock aquifer and to what extent the sustainable yield of the aquifer would be affected. Furthermore, if it is concluded that the behavior of the caprock will be significantly changed, Haseko requests that the EA address the quality and quantity of groundwater that can be pumped from the recharged caprock aquifer.

Non-Potable Infrastructure Requirements

As noted above, Haseko is committed to the efficient use of non-potable water in its development. It is further observed that the City and County of Honolulu, as part of its zoning process, requires the use of alternative non-potable water for irrigation where appropriate and that the State, through its water use permit process has required such use when and where non-potable water is acceptable. It is further noted that a determination of acceptability may in large part be based on the EA’s findings regarding the concerns listed above.

Based on these practical concerns, Haseko requests that the EA address the concerns listed above with recommendations as to the location(s) where non-potable water use would be acceptable. These determinations will provide Haseko with guidance on areas where non-potable water supply infrastructure should be placed in order to serve the appropriate locations of use. As with the potable water supply infrastructure, Haseko believes that it will construct and eventually dedicate its non-potable water supply infrastructure to the BWS. Haseko observes that the design, engineering, and construction costs of installing the non-potable and potable water supply infrastructure will be borne by the developer, but that the subsequent maintenance, inspection, and repair will most likely be performed by the BWS.
June 10, 2002

Mr. Nelson W.G. Lee
Executive Vice President
Haeco (Ewa), Inc.
820 Millikan Street, Suite 820
Honolulu, Hawaii 96813-2938

Dear Mr. Lee:

Thank you for your correspondence of March 31, 2002 regarding the subject project. We acknowledge and appreciate the comments you have provided representing the two important perspectives, that of a developer who has already invested in the installation of nonpotable water lines and that of a current or prospective homeowner in the Ewa area. This will facilitate our preparation of the Draft Environmental Assessment (DEA) as follows:

**Safety of Using Nonpotable Water and Identification of Appropriate Locations for Use**

You have already recognized that the City and County of Honolulu (City) has embraced the concept of water reuse. This has been advocated throughout the Ewa Development Plan (1987) in which the Conservation of Natural Resources is identified as one of the key elements in the implementation of the vision for Ewa's future. Undoubtedly, the proposed expansion of the nonpotable water system is fundamental to the implementation, particularly with the limited supply of potable water supply on Oahu.

The City is fortunate to have tried-and-true models to follow in this arena, such as the highly acclaimed Irvine Ranch Water District in California (IRWD). IRWD has successfully produced over 20 mgd of high quality reclaimed (recycled) water for unrestricted use, including irrigation of residential yards. As you have indicated, the City does not intend to require the use of nonpotable water for irrigation of single-family residential yards. However, the Board of Water Supply (BWS) proposes to develop additional nonpotable water exclusively in the form of R-1 water which will receive advanced or tertiary treatment at the Honolulu Water Recycling Facility (WRF). Honolulu's R-1 water will meet stringent requirements established by the Hawaii Department of Health, allowing for application where human exposure is likely.

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Mr. Nelson W.G. Lee
June 10, 2002

Page 2

We recognize the concerns of current and prospective homeowners regarding the use of nonpotable water for common area landscaping. There may be questions and uncertainty regarding health-related issues associated with human contact. As such, the BWS has embarked on a public outreach and education program, which will be enhanced concurrently with the expansion of the nonpotable system. The DEA will disclose the framework of future BWS programs that will reach and educate various groups of users, including interested residential homeowners and homeowner associations.

**Impact of the Ewa Kapolei Aquifer**

Impacts on the Ewa Kapolei Aquifer may be considered in terms of outflows (pumping from wells) and returns (recharge). As for outflows, the DEA will disclose that the BWS does not foresee the development of new breakwater wells or well fields in the Ewa-Kapolei area. The BWS recognizes that the Ewa Kapolei Aquifer cannot be regarded as a significant future source of nonpotable water, as all three sectors (Poulea, Mahaloa, and Kapolei) are already committed for other uses. Thus, as mentioned previously, any additional nonpotable water supply will be developed in the form of R-1 water and is contingent on expansion of both the R-1 process at Honolulu WRF and the secondary treatment process at Honolulu Wastewater Treatment Plant (HWTP). Funding for expansion of both these facilities is still being programmed in the City's 6-year capital improvement projects (CIP) budget and separate environmental assessments will be prepared for each of these projects.

Recharge of the Kapolei aquifer is not expected to occur in any substantial amount, nevertheless, it will be examined in the DEA. The major use of nonpotable water in this area will be for landscaping and golf course irrigation. According to the BWS, unlike the large return irrigation component of imported irrigated sugar cane, it is expected that water reuse on landscaped areas, including golf courses, will be at significantly reduced levels. Moreover, there would not be any economic advantage to over irrigate in any application. The irrigation or application rate is expected to be maintained at a level less than or equal to the vegetation's evapotranspiration rate. In addition, because of the Manoa Plateau's predominately and climate, it would be unusual to find gains from precipitation on a continuous basis.

**Impact on Water Quality in the Manoa**

We recognize and applaud the extensive investigations that Haeco has conducted in conjunction with the planning of the proposed marina. We understand your concern regarding potential nutrient and contaminant levels that were not considered in the groundwater modeling results.
Mr. Nelson W.G. Lee  
June 19, 2004  
Page 3

The DEA will address the concerns of impacts on harbor and shoreline waters, particularly with respect to nutrients. The BWS asserts that in order to have a material impact on the harbor and shoreline areas, the input of expected return flow must be significantly larger to the tidal input that is needed to keep the marina flushed. The size of the tidal prism is expected to overwhelm the return flow. Studies have shown that irrigated vegetation effectively reduces nutrient levels; however, the DEA will also review available effluent data from the Honolulu WWTP and Honolulu WRP in order to describe and characterize any potential nutrient source.

Nonpotable Infrastructure Requirements

The BWS Eva Nonpotable Water Master Plan is now being finalized by R.M. Towill Corporation. The master plan will indicate proposed waterline alignments and pipe sizes based principally on the following criteria: (1) location of potential users, (2) projected water demands, (3) location of existing right-of-ways, and (4) duration and time of application by major users. Essentially, the BWS envisions an R-1 nonpotable water system which will serve for the greatest flexibility in terms of the broad range of anticipated users. In the long run, this will be cost-effective to all parties involved. Clearly, we recognize that the DEA must disclose such planning information in substantive detail which will facilitate decision-making by developers like Haapa who are vital partners in the City's overall efforts.

Please feel free to contact us should there be any questions. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, BILLS, NOIIMA & ASSOCIATES, INC.

[Signature]

David B. Bills

cc: Mr. Scott Murakina, Board of Water Supply

2838
APPENDIX B1

Original Draft Environmental Assessment (DEA)
Public Comments
(Original DEA Publication Date: July 23, 2004)
Attention: Mr. Scott Murakami
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96814

Dear Mr. Murakami:

Subject: Draft Environmental Assessment, Expansion of the Ewa Nonpotable Water System

Thank you for the opportunity to review and comment on the preliminary environmental assessment for Expansion of the Ewa Nonpotable Water System project.

Verizon Hawaii does not foresee any conflicts with the existing telecommunication facilities in the area. However, Verizon Hawaii requires further review during the design stages of the project.

If you have any questions or require assistance in the future on this project, please call Gary Sumida at 845-1442.

Sincerely,

[Signature]

Jill Z. Lee
Section Manager
Outside Plant Engineering

Co: Office of Environmental Quality Control
Sheryl Nojima (Gray, Hong, Nojima & Associates, Inc.)

---

Ms. Jill Z. Lee
Section Manager
Outside Plant Engineering
Verizon Hawaii, Inc.
P.O. Box 2200
Honolulu, Hawaii 96814

Attention: Gary Sumida

Dear Ms. Lee:


Thank you for your letter regarding the Draft Environmental Assessment for the Expansion of the Ewa Nonpotable Water System.

We acknowledge that Verizon Hawaii has no comments at this time. We will continue to consult with your staff during the design stages of the project.

If you have any questions, please contact Scott Murakami at 748-5942.

Very truly yours,

[Signature]

BARRY U.SAGAWA
Principal Executive
Water Resources Operating Unit

cc: Office of Environmental Quality Control
Sheryl Nojima (Gray, Hong, Nojima and Associates, Inc.)
Ms. Sheryl E. Nofima  
Gray, Hong, Nofima & Associates, Inc.  
Consulting Engineers  
811 Bishop Street Suite 1100  
Honolulu, Hawaii  96813

Dear Ms. Nofima:

Subject: Draft Environmental Assessment  
Examination of the Ewa Nonpotable Water System  
Ewa, Oahu, Hawaii  
TMC (1) R-1, R-2-002, and R-2-003

Thank you for the opportunity to comment on the July 2004 Draft Environmental Assessment for the Examination of the Ewa Nonpotable Water System. We have reviewed the document and offer the following comments and recommendations:

1. The Department of Health (DOH) has long been an advocate for wastewater reuse and fully supports this project.

2. There is no RO (Reverse Osmosis) water level classification for recycled water in the state guidelines. The effluent quality for the microfiltration RO system was based on the R-2 classification due to the absence of a distinction unit. All references to RO water in the document not being regulated by the Department of Health should be revised accordingly.

3. The report indicates that existing nonpotable (brackish) water distribution system will be converted to R-1 system. However, existing brackish water supplies may serve as backup sources, which can be blended with R-1 water during periods of high demand. Please be informed that it is the Department's policy that waters blended with recycled water will be regulated as recycled water. Thus, brackish well water blended with R-1 water will be classified as R-1 water.

All wastewater plans must conform to applicable provisions of the Department of Health's Administrative Rules, Chapter 11-62, Wastewater Systems and the Guidelines for the Treatment and Use of Recycled Water dated May 16, 2000. We do reserve the right to review the detailed wastewater plans for conformance to applicable rules.

Should you have any questions, please contact the Planning & Design Section of the Wastewater Branch at telephone (808)586-4294.

Sincerely,

Harold K. Yee, P.E., Chief  
Wastewater Branch

BOARD OF WATER SUPPLY  
CITY AND COUNTY OF HONOLULU  
650 SOUTH KITAHARA STREET  
HONOLULU, HI 96813

August 31, 2004

Mr. Harold K. Yee, P.E., Chief  
Wastewater Branch  
Environmental Management Division  
Department of Health  
State of Hawaii  
P.O. Box 2378  
Honolulu, Hawaii  96801

Attention: Planning & Design Section

Dear Mr. Yee:

Subject: Your Letter of August 11, 2004 Regarding the Draft Environmental Assessment for the Examination of the Ewa Nonpotable Water System, Ewa, Oahu, Hawaii, TMC: R-1, R-2-002 and R-2-003

Thank you for your letter to Sheryl Nofima of Gray, Hong, Nofima & Associates in support of expanding the Ewa Nonpotable Water System.

The following issues will be addressed accordingly in the Final Environmental Assessment (FEA):

1. The Department of Health's (DOH) present "Guidelines for the Treatment and Use of Recycled Water" (2002) do not include a water quality designation for recycled wastewater produced through reverse osmosis (RO). As such, the following sections will be revised to include further exploration and discussion regarding R-1 and R-O water with respect to the reuse guidelines:
   - Section 1.1 – Proposed Project Summary
   - Section 2.2.1 – Existing Average Daily Demand
   - Section 2.3.1 – Existing System Infrastructure
   - Section 3.3.3 – Public Health and Safety

Sincerely,

Ewa Water – our present name is a misnomer.
2. The FEA will disclose that at such time breakwater is blended with R-1 water, the blended product will be regulated as R-1 water. This will be mentioned in Chapter 2 as follows:
   - Table 2-1 – Existing Nonpotable Demand
   - Section 2.3.2 – Proposed Expansion of the Distribution System

3. We acknowledge DOH’s position requiring approval of reuse projects under Chapter 11-62, “Wastewater Systems” and the 2002 Reuse Guidelines. These requirements have been identified and are discussed as measures of mitigation in Section 3.3.3.a – Best Management Practices.

If you have any questions, please contact Scott Murakata at 748-5942.

Very truly yours,

[Signature]

BARRY USAGAWA
Principal Executive
Water Resources Operating Unit

cc: Office of Environmental Quality Control
Sheryl Nojima (Gray, Hung, Nojima and Associates, Inc.)
August 12, 2004

TO: CLIFFORD S. JAMEL, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTENTION: SCOT MURAGAKI, SECTION HEAD
LONG-RANGE PLANNING SECTION
WATER RESOURCES OPERATING UNIT

FROM: JOHN CLARK, ACTING FIRE CHIEF

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (DEA)
EXPANSION OF THE EWA NON-POTABLE WATER SYSTEM
EWA, OAHU, HAWAII
TAX MAP KEY: 9-1, 9-2-002, AND 9-2-003

We received a letter dated July 23, 2004, from Ms. Sheryl N. Nijima of Gray, Hong, Nijima & Associates, Inc. requesting our review and comments on the above-mentioned DEA.

The Honolulu Fire Department requires that the following be complied with for the duration of the project:

1. Maintain fire apparatus access throughout the construction site.
2. Notify the Fire Communication Center at 323-4411 regarding any interruption of the existing fire hydrant system.

Should you have any questions, please call Battalion Chief Lloyd Rogers of our Fire Prevention Bureau at 831-7778.

JOHN CLARK
Acting Fire Chief

cc: Department of Environmental Quality Control
Sheryl Nijima (Gray, Hong, Nijima & Associates, Inc.)
Regulatory Branch

Mr. Scott Munozka
Board of Water Supply
City and County of Honolulu
630 South Beresford Street
Honolulu, HI 96813

Dear Mr. Munozka:

This letter is written in response to the Draft Environmental Assessment (EEA) dated July 26, 2004, regarding the City and County of Honolulu, Board of Water Supply’s proposal to expand the non-potable water storage and transmission system in the Ewa District, Oahu, Hawaii, which currently provides approximately 12 million gallons per day (MGD). To meet the anticipated demand of 26 MGD, the proposed infrastructure will include approximately 44 miles of distribution mains, located primarily within state and county road rights-of-way, to be installed in three phases over a 15-year period. Increased storage facilities are also under consideration.

According to Page 5-3 of the Draft EAA, seven gullies traverse the proposed non-potable water system. It is unclear, based on the information provided in the Draft EAA, if the aforementioned gullies would be determined to be waters of the United States. Section 106 of the Clean Water Act requires that a DA permit be obtained prior to the placement or discharge of dredged and/or fill material into waters of the U.S., including wetlands (33 U.S.C. 1324). Future site visits, once specific plans identifying the extent of work in these areas are submitted, should be conducted to determine the presence of any waters of the U.S.

Should you have questions, please contact Ms. Connie Rasmussen of my Regulatory staff at 438-9118 or by facsimile at 438-4040, or by email at connie.l.pedersen@water.ohi. Please reference File No. 200309049 on all future correspondence for this project.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

Copy for:
- General Counsel, Office of Environmental Quality Control, 235 South Beresford St 701, Honolulu, HI 96813
- John Sugis, State Department of Transportation, Highways Division, 400 Punchbowl St, Honolulu, HI 96813

BOARD OF WATER SUPPLY

Mr. George F. Young, P.E.
Chief, Regulatory Branch
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96856

Attn: Connie Rasmussen

Dear Mr. Young:

Subject: Your Letter of August 16, 2004 Regarding the Draft Environmental Assessment for the Expansion of the Ewa Non-Potable Water System, File No. 200309049, Ewa, Oahu, Hawaii

Thank you for your letter regarding the Draft Environmental Assessment for the Expansion of the Ewa Non-Potable Water System.

We note that it is unclear whether the gullies traversed by the proposed water system expansion are waters of the United States (U.S.). In the event the gullies are determined to be waters of the U.S., we acknowledge that a Department of the Army permit is required prior to the placement of discharge of dredged and/or fill material into its waters.

Future site visits will be coordinated with your department as the planning and design of the non-potable water system expansion progresses.

If you have any questions, please contact Scott Munozka at 348-1942.

Very truly yours,

CLIFFORD J. MANN
Manager and Chief Engineer

cc: Office of Environmental Quality Control
Meryl Nishida (Gray, Hong, Nishida and Associates, Inc.)

Page 7 of 9... your names and info are correct.
DEPARTMENT OF LAND AND NATURAL RESOURCES
ENGINEERING DIVISION

LANAV

Ref: BWREWAPWSJEA.COM2

COMMENTS

(X) We confirm that the project sites, according to the Flood Insurance Rate Maps (FIRM), are located in Zone D, A, and AR. The National Flood Insurance Program does not have any regulations for development within Zone D and X areas. However, for Zone A and AR, please see comments marked with X and bolded below.

(1) Please note that the project site, according to the Flood Insurance Rate Map (FIRM), is located in Zone ___________.

(2) Please note that the correct Flood Zone Designation for the project site according to the Flood Insurance Rate Map (FIRM) is ___________.

(3) Please note that project sites located in Zones A and AR must comply with the rules and regulations of the National Flood Insurance Program (NFIP) presented in Title 44 of the Code of Federal Regulations (44CFR), wherever development within a Special Flood Hazard Area is undertaken. If there are any questions, please contact the State NFIP Coordinator, Ms. Carol Tysen-Brown, of the Department of Land and Natural Resources, Engineering Division at (808) 587-0167.

Please be advised that 44CFR and 44CFR indicates the minimum standards set forth by the NFIP. Your Community’s local flood ordinance may provide for more restrictive requirements that take precedence over the minimum NFIP Standards. If there are questions regarding the local flood ordinance, please contact the applicable County NFIP Coordinator as follows:

(1) Mr. Robert Simmack at (808) 514-4254 or Mr. Mario Sia Li at (808) 513-4217 of the City and County of Honolulu, Department of Planning and Permitting.

(2) Ms. Kelly Guiney at (808) 521-8327 (Honolulu) or Mr. Ken Endo at (808) 323-3336 (Kauai) of the County of Hawaii, Department of Planning

(3) Ms. Francine Chan at (808) 570-7721 of the County of Maui, Department of Planning

(4) Mr. Mario Antonio at (808) 341-4000 of the County of Kauai, Department of Public Works

(1) The applicant should include project water demands and infrastructure required to meet water demands. Please note that the implementation of any State-sponsored projects requiring water service from the Honolulu Board of Water Supply System must first obtain water allocations from the Engineering Division before it can receive a building permit and/or water meter.

(1) The applicant should provide the water demands and calculations to the Engineering Division so that it can be included in the State Water Projects Plan Update.

(1) Additional Comments:

(1) Other:

Should you have any questions, please call Mr. Andrew Munder of the Planning Branch at 587-0229.

Signed: 
ERIC T. HIKAGO, CHIEF ENGINEER

Date: 8/10/04
BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
1770 SOUTH STREET
HONOLULU, HI 96826

September 1, 2004

Ms. Diena S. Mamiya, Administrator
Land Division
Department of Land and Natural Resources
State of Hawaii
P. O. Box 621
Honolulu, Hawaii 96808

Attention: Andrew M. Meader, Engineering Division
Nicholas A. Vacaro, Land Division Support Services

Dear Ms. Mamiya:

Subject: Your Letter of August 16, 2004 Regarding the Draft Environmental Assessment for the Expansion of the Ewa Nonpotable Water System, Ewa, Oahu, Hawaii

Thank you for your letter to Sheryl Nijima of Gray, Hong, Nijima & Associates regarding the subject project.

We understand the various divisions of the Department of Land and Natural Resources were given the opportunity to review the Draft Environmental Assessment (EA) for the subject project. Comments pertaining to flood zones furnished by the Engineering Division will be addressed in the Final EA as follows:

1. The Engineering Division has confirmed that the project sites are located in Flood Zones, D, X, A and ALR based on current Flood Insurance Rate Maps (FIRM).

2. Section 3.1.4.a will indicate that the various nonpotable water main projects located in FIRM Zones A and ALR will comply with applicable rules and regulations of the National Flood Insurance Program and City and County of Honolulu flood ordinances.

If you have any questions, please contact Scott Musoaka at 748-5942.

Very truly yours,

CLIFFORD S. JAMIESON
Manager and Chief Engineer

cc: Office of Environmental Quality Control
Sheryl Nijima (Gray, Hong, Nijima and Associates, Inc.)
TO: CLIFFORD S. JANIE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTENTION: SCOT MURAKA, CIVIL ENGINEER
FROM: GLEN R. KULUYAMA, ACTING CHIEF OF POLICE
HONOLULU POLICE DEPARTMENT

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT, EXPANSION OF THE EWA NONPOTABLE WATER SYSTEM, TMCs 9-1, 9-2, 10-1, 10-2, AND 1-2-0

Thank you for the opportunity to review and comment on the subject project.

We have noted that there will be major roadwork through the already overly congested thoroughfares in Ewa. We have also noted that nighttime work in residential areas will not be permitted. However, we would like to recommend that, as much as possible, work on Fort Weaver Road, Kawaiwaewae Boulevard, and Fort Barnes Road be conducted at night to alleviate the situation.

The mitigation measures cited on pages 4.1, 4.2, and 4.3 may help to minimize some of the problems. However, in spite of these measures, calls for police service regarding construction-related dust, noise, odor, and traffic are inevitable.

If there are any questions, please call Captain Greg Lefcourt at District 8 at 692-4253 or Ms. Carol Sodek at the Support Services Bureau at 628-3051.

GLEN R. KULUYAMA
Acting Chief of Police

By KARL GODBY
Assistant Chief of Police
Support Services Bureau

cc: Vlă, Sheryl Nujima
Gray, Hong, Nujima and Associates, Inc.
DOGC

boarding and planning with Aloha

BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
850 SOUTH BEREUNEE STREET
HONOLULU, HI 96813

August 31, 2004

TO: BOISSE CORREA, CHIEF OF POLICE
POLICE DEPARTMENT

ATTN: CAPT. GREGORY LEFCOURT, DISTRICT 8
CAROL SODEK, SUPPORT SERVICES BUREAU

FROM: CLIFFORD S. JANIE, MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF AUGUST 16, 2004 REGARDING THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE EXPANSION OF THE EWA NONPOTABLE WATER SYSTEM, EWA, OAHU, HAWAI'I, TMCs 9-1, 9-2, 10-1, AND 1-2-0

Thank you for your memorandum regarding the subject project.

We share in your concern regarding impacts on traffic flow during construction. The Final Environmental Assessment will indicate that the Board of Water Supply will consider night work to alleviate construction in major thoroughfares that are already congested, such as Fort Weaver Road, Kawaiwaewae Boulevard and Fort Barnes Road.

If you have any questions, please contact Scott Murakawa at 748-5942.

cc: Office of Environmental Quality Control
   Sheryl Nujima (Grey, Hong, Nujima and Associates, Inc.)
August 18, 2004

Mr. Sheets McRae

Board of Water Supply
City and County of Honolulu
650 South Beretania Street
Honolulu, Hawaii 96814

Dear Mr. McRae:

Subject: Draft Environmental Assessment (DEA) for Expansion of the Ewa Nonpervious Water System

The Department of Education (DOE) has reviewed the Draft Environmental Assessment for the expansion of the non-pervious water system in the Ewa district for increased reservoir capacity and 44 miles of distribution and transmission mains. When completed, the expanded system will serve the Navy Pilot Zone on the West Loch of Pearl Harbor, the Koa China and Niu lower Makaha and Farrington Highway down to the Ewa coastlines.

The DOE hopes that the completed system will correct the difficulties encountered by Kapolei High and Kapolei Middle schools that are using the current brackish water system. Both schools were required to replace the valves on their school grounds watering systems because of the clogging caused by the brackish water. The valves at Kapolei Middle that are exposed to the brackish water have been permanently retouched. Finally, the system is often erratic in its supply and water pressure.

The DOE has no other comment at this time. If you have any questions, please call Rae M. Loui, Assistant Superintendent of the Office of Business Services, at 586-3444 or Holis Maker of the Facilities and Support Services Branch at 733-4462.

Very truly yours,

Patricia Haranawa
Superintendent

cc: Rae M. Loui, OBS

Main Campus, CAS, Campbell/Kapolei/Waiawa Complex Area
Office of Environmental Quality Control
August 23, 2004

Mr. Clifford Jamile
Board of Water Supply – City and County of Honolulu
620 South Beretania Street
Honolulu, Hawaii 96813

Ms. Cheryl Najera
Gray, Hing, Najera & Associates, Inc.
841 Bishop Street, Suite 1100
Honolulu, Hawaii 96813

Dear Mr. Jamile and Ms. Najera:

The Office of Environmental Quality Control (OEQC) has reviewed the draft environmental assessment (DEA) entitled “Expansion of the ‘One House-One Water System’,” Tax Map Keys No. 9-1, 9-2-31, and 9-2-43, located in the judicial district of ‘Ewa. OEQC offers the following comments for your consideration and response:

1. R-1 water use plan: The DEA notes that R-1 water is not intended for private yard watering at this time. While we understand the concern of possible conflicts and viole comforts, does the City plan to allow R-1 water use for yard watering at a time when human encroachment is minimal, say, at night using drip irrigation lines when the majority of homes are asleep? We support any dialogue with the community and appropriate agency on this subject.

Thank you for the opportunity to comment. If there are any questions, please call Ms. Leslie Segundo, Environmental Health Specialist, at (808) 586-4183.

Sincerely,

[Signature]

GEORGE S. SALMONSON
Director

---

BOARD OF WATER SUPPLY

August 31, 2004

Ms. Georfinie Salomonson, Director
Office of Environmental Quality Control
State of Hawaii
420 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Attention: Leslie Segundo

Dear Ms. Salomonson:


Thank you for your letter regarding the subject project.

The Draft Environmental Assessment (DEA) indicates that R-1 water is not intended for private yard watering at this time. However, we are hopeful that with the open discussion with the community, the OEQC will allow R-1 water use for yard watering at a time when human encroachment is minimal, say, at night using drip irrigation lines when the majority of homes are asleep. We support any dialogue with the community and appropriate agency on this subject.

If you have any questions, please contact Scott Markeska at 748-9407.

Very truly yours,

[Signature]

CLIFFORD S. JAMILE
Manager and Chief Engineer

OEO: Cheryl Najera (Gray, Hing, Najera and Associates, Inc.)
August 13, 2004

via Fed-Ex 331-4118

Gray, Hong, Nojima & Associates, Inc.
841 Bishop St., Suite 1100
Honolulu, Hawaii 96813

Attention: Ms. Sheryl Nojima

SUBJECT: Draft Environmental Assessment (EA)
Expanson of the Ewa Nonpotable Water System
TMR 9-3-1; 9-2-02; and 9-3-03, Ewa, Oahu, Hawaii

We reviewed the subject Draft EA for the Board of Water Supply’s project, Expansion of the Ewa Nonpotable Water System, as requested in your letter of July 22, 2004, and have the following comments:

1. Page 1-1, 1.1 Proposed Project Summary: The Secondary Treatment Plant was originally called the Ewa Water Reclamation Facility (EWRF). The secondary treatment plant was specifically constructed for effluent reuse.

2. Page 1-4, 1.4.1 Concept Design: The current information on the concept design is as follows: The 1593 enforcement actions were for spills and pretreatment program deficiencies. It was not specific to Honolulu WWTF, but applied to the City’s Oahu operations. One of the Supplemental Environmental Provisions in the consent decree is for wastewater effluent reuse.

3. Figure 2-1: Relating and Potential Water Use Areas: The figure does not show all the existing landscaped areas currently being irrigated with recycled water. Include the various landscaped areas in the exhibits, along Ft. Weaver Rd. and Havana Rd., and Ewa Maliko Park.

4. Page 3-3, 3.4.2.b Wastewater, Existing Condition: Regarding the existing capacity of the Honolulu Wastewater Treatment Plant, the liquid capacity is currently 24 mgd. The solids capacity is currently 24 to 28 mgd. A project to increase the solids handling capacity is currently FY94 and FY95 City CIP budgets. Describe what "near" means in terms of numbers, e.g., "it (EFWTF) is already near its peak wet weather flow capacity."

Should you have any questions, please call me at 692-5159, or Jack Pobed, Program Coordinator, at 692-5727.

Sincerely,

FRANK D. DOYLE, DIRECTOR
DEPARTMENT OF ENVIRONMENTAL SERVICES

FROM:
FRANK D. DOYLE, DIRECTOR
BOARD OF WATER SUPPLY
CITY AND COUNTY OF HONOLULU
913 SOUTH KING STREET
HONOLULU, HI 96813

TO:
FRANK D. DOYLE, DIRECTOR
DEPARTMENT OF ENVIRONMENTAL SERVICES

ATTN:
JACK PÓBE, PROGRAM COORDINATOR

SUBJECT: YOUR FACSIMILE OF AUGUST 23, 2004 TO GRAY, HONG, NOJIMA AND ASSOCIATES REGARDING THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE EXPANSION OF THE EWA NONPOTABLE WATER SYSTEM, TMR 9-3-1, 9-2-02 AND 9-3-03, EWA, OAHU, HAWAII

Thank you for your facsimile to Ms. Sheryl Nojima of Gray, Hong, Nojima & Associates regarding the subject project. The Final Environmental Assessment (EA) will address your concerns as follows:

1. The project summary will be revised stating that the facility was formerly known as the Ewa Water Reclamation Facility.

2. Section 1.4.1 will be revised stating that the enforcement actions resulted from alleged violations.

3. Figure 2-1 will be revised to show additional common irrigation areas and parks being served via the following golf course nonpotable water systems:

- Ewa Villages Golf Course - Fernandez Village, Lincoln Village, Tenney Village, Lokahi Greens, and Ewa Maliko District Park.
- West Loch Golf Course - West Loch Estate Homes, West Loch Fairway Homes, West Loch Fairways Town Homes, West Loch Elderly Housing, West Loch Shoreside Park, and Avon Community Park.

Park Water ... not your normal - use it wisely.
4. The existing conditions of the wastewater system described in Section 3.4.2.b will be updated with the liquid and solids capacities you have furnished. The statement regarding the Barbers Point Deep Ocean Outfall capacity was based on the results assessment discussed in the Department of Design and Construction’s West Maui Roy Facilities Plan (December 2001); however, it will be updated from the Final EA.

If there are any questions, please contact Scot Menea at 748-5942.

cc: Office of Environmental Quality Control
    Sheryl Nijima (Grey, Hung Nijima & Associates)
Thank you for the opportunity to comment. If you have further questions or concerns, please contact Dr. Jonathan Likoike Scherer at 594-1945 or e-mail him at jonathan.shoa@hawaii.edu.

Sincerely,

Clyde W. Haniu
Administrator

CC: Office of Environmental Quality Control
State Office Tower
255 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Gray, Hong, Nojima & Associates, Inc.
801 Bishop Street Suite 1100
Honolulu, Hawaii 96813
Attn: Sheryl Nojima Phone: (808) 521-0306

August 23, 2004

Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96813
Attn: Scott Munoka Phone: (808) 748-5942

RE: Request for review and comment on the Draft Environmental Assessment, Expansion of the Ewa Nonpotable Water System, TMR: 9-1; 9-2-02; and 9-2-03

Aloha,

The Office of Hawaiian Affairs (OHA) is in receipt of your July 22, 2004 letter and appreciates the opportunity to again offer comments on the above project. OHA is supportive of efforts to reuse water and thereby make water available for other uses, including the fulfillment of Native Hawaiian Water Rights.

Besides offering general support for the project, we would like to reiterate a comment we made in our letter of March 28, 2002: “Procedures for handling inadvertent discoveries of human burials and cultural artifacts should also be included.”

Your reply letter of June 5, 2002 indicated that you believe there is only a significant likelihood of finding iwi or other cultural materials in areas that are “undisturbed.” We would like to note that recent redevelopment of the long “disturbed” urban core of Honolulu has resulted in repeated discovery of remains, as in the well-publicized Wal-Mart case. Therefore, we repeat our request that the document be amended to indicate that if iwi or Native Hawaiian cultural or traditional deposits be found during ground disturbance or excavation, work will cease, and the appropriate agencies will be contacted pursuant to applicable law.
September 10, 2004

Mr. Clyde W. Namuo, Administrator
Office of Hawaiian Affairs
State of Hawaii
711 Kapiolani Blvd., Suite 500
Honolulu, Hawaii 96813

Attn: Jonathan Libeke Scheir, M.D.

Dear Mr. Namuo:


Thank you for your letter regarding the subject project.

The Final Environmental Assessment will be revised to include the following statement in Sections 3.4.1 and 4.1.6:

"If hui or Native Hawaiian cultural or traditional deposits are found during ground disturbance or excavation, work will cease, and the appropriate agency will be contacted pursuant to applicable law."

If there are any questions, please contact Scott Moraska at 748-5942.

Very truly yours,

Darryl Usagia
Water Resources Principal Executive

cc: Office of Environmental Quality Control
Sheryl Nojima (Gray, Houg, Nojima & Associates)
MEMORANDUM

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTENTION: SCOTT MURAOKA

FROM: LARRY LEOPARDI, P.E., DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF FACILITY MAINTENANCE

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (DEA)
EXPANSION OF THE EWA NONPOTABLE WATER SYSTEM

August 24, 2004

TO: LARRY LEOPARDI, P.E., DIRECTOR AND CHIEF ENGINEER
DEPARTMENT OF FACILITY MAINTENANCE

ATTN: CHARLES PIGNATARI, DIVISION OF ROAD MAINTENANCE

FROM: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF AUGUST 24, 2004 REGARDING
THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE EXPANSION
OF THE EWA NONPOTABLE WATER SYSTEM, EWA, OAHU, HAWAII

Thank you for your memorandum of August 24, 2004 regarding the subject project.

We acknowledge that your department has no comments to add at this time.

If you have any questions, please contact Scott Murakata at 748-5942.

cc: Office of Environmental Quality Control
Jeryl Nojima (Gray, Hong, Nojima and Associates, Inc.)
Office of Environmental Quality Control

Larry A. Leopardi
Manager and Chief Engineer
September 1, 2004

Sheryl E. Noyama
Gray, Wong, Noyama & Associates, Inc.
Consulting Engineers
841 Bishop Street, Suite 1100
Honolulu, Hawaii 96813

Dear Ms. Noyama:

SUBJECT: Draft Environmental Assessment for Ewa Non-Potable Water System
Ewa, Island of Oahu, Hawaii

This is a follow-up to our letter to you dated August 16, 2004, pertaining to the subject matter.

Enclosed please find a copy of the Division of Forestry and Wildlife comment.

The Department of Land and Natural Resources has no other comment to offer on the subject matter.

Should you have any questions, please contact Nicholas A. Veccearo of the Land Division Support Services Branch at 587-5934.

Very truly yours,

DEIRDRE S. MANIYA
Administrator

C: DOLO

Division of Forestry & Wildlife
1151 Punchbowl Street, Honolulu, HI 96813

August 11, 2004

MEMORANDUM

TO: Nick Veccearo, Land Agent
Land Division

THRU: Deirdre S. Maniya, Administrator
Land Division

FROM: Paul J. Coors, Administrator
Division of Forestry and Wildlife

SUBJECT: Draft EA by Honolulu Board of Water Supply for the Ewa Non-potable Water System Improvements in Ewa, Oahu, Hawaii.

The Division of Forestry & Wildlife (DOFAW) has reviewed the subject document regarding impacts the project may have on DOFAW management programs and provide the following recommendations for your consideration. DOFAW is concerned with three endangered plants that are present in the Kapolei-Kalihiwa-Ewa plains area. The endangered plants are: 1) Chamaesyce skatesbergii var. skatesbergii, 2) Achyranthes splendens var. retundata, and 3) Abutilon merasii. A Habitat Conservation Plan (HCP) is currently being completed for the NorthSouth Road Construction aimed at mitigating endangered plants along the planned road alignment. Because the history of endangered plants in this area is overwhelming, we recommend that trained personnel i.e. botanist do an on-site plant survey for these three plants and include its findings in the final Environmental Assessment. The completion of the plant survey along all of the corridors of the non-potable water system will enable DOFAW to provide appropriate recommendations to mitigate the impacts the project may have on endangered plants found in the area. Thank you for the opportunity to comment on this project.

C: DOFAW, Oahu Branch
Vickie Caraway, State Botanist
December 13, 2004

Ms. Diane S. Mamiya
Administrator
Land Division
Department of Land and Natural Resources
State of Hawai‘i
P. O. Box 651
Honolulu, Hawaii 96809

Attn: Paul J. Coney, Administrator, Division of Forestry and Wildlife

Dear Ms. Mamiya:


Thank you for your comments from the Division of Forestry and Wildlife to Gray, Hong, Nijima & Associates regarding the subject project.

We note that there is evidence of three endangered plants in the Kapolei Kahuku-Ewa region: (1) Chamaesyce skottsbergii var. skottsbergii, (2) Aechmea splendens var. rotundata, and (3) Abutilon menziesii. We encourage prudent planning practices can prevent unnecessary mitigation later during construction. Please be assured that any new waterline alignment in undeveloped or undisturbed areas will include an onsite survey by a trained botanist to determine whether endangered plants are present. However, the majority of the proposed alignments will be located within existing right-of-ways.

If you have any questions, please contact Scot Murakata at 748-5942.

Very truly yours,

[Signature]

CLIFFORD K. JAMES
Manager and Chief Engineer

CC: Office of Environmental Quality Control
    Sheryl Nijima (Gray, Hong, Nijima & Associates, Inc.)
MEMORANDUM

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
    BOARD OF WATER SUPPLY

ATTN: SCOT MURAOKA

FROM: CHERYL D. SOON, DIRECTOR

SUBJECT: EXPANSION OF IWA NONPOTABLE WATER SYSTEM

In response to the July 23, 2004 letter from Gray, Hong, Nojima & Associates, Inc., we reviewed the draft environmental assessment (EA) for the subject project. The following comments are the result of this review:

1. On Page 1-10, Section 1.6 APPROVALS AND PERMITS should be revised to indicate that Traffic Control Plans (TCPs) should be submitted to the Department of Planning and Permitting, not the Department of Transportation Services. Also, on Page 3-28, the second paragraph should be revised to state that the TCPs would be submitted to the Department of Planning and Permitting, not the Department of Transportation Services, for review and approval.

2. The third paragraph on Page 3-12 discusses the possible requirement of a Habitat Conservation Plan for Abalonae metropolita at Kapolei. The Habitat Conservation Plan was approved by the State of Hawaii Board of Land and Natural Resources on April 8, 2004.

3. On Page 3-36, the second paragraph in 3.4.2.g Roads and Highways Rights-of-Ways does not appear to be correct. This paragraph should be updated to discuss the 2005 ORTP, dated April 2001.

4. On Page 4-3, the mitigation measures discussed in 4.1.5 Traffic and Transportation should include a commitment to phase construction only to the extent that it can be completed in a day.

Clifford S. Jamile
Page 2
September 3, 2004

Should you have any questions regarding these comments, please contact Faith Miyamoto of the Transportation Planning Division at Local 6976.

cc: Ms. Genevieve Salamonson, Office of Environmental Quality Control
   Ms. Sheryl Nojima, Gray, Hong, Nojima & Associates, Inc.

CHERYL D. SOON
TO:      GEORGE "KEOKI" MIYAMOTO, DIRECTOR
         DEPARTMENT OF TRANSPORTATION SERVICES

FROM:    CLIFFORD E. JAMILE, MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR MEMORANDUM OF SEPTEMBER 3, 2004
         REGARDING THE DRAFT ENVIRONMENTAL
         ASSESSMENT FOR THE EXPANSION OF THE EWA
         NONPICTABLE WATER SYSTEM, EWA, OAHU, HAWAII

December 30, 2004

Thank you for your memorandum of September 3, 2004, regarding the subject project. The Final
Environmental Assessment will be revised as follows:

1. Section 1.6 APPROVALS AND PERMITS and Section 3.3.4 Traffic have been revised to
   indicate that traffic control plans will be reviewed and approved by the Department of Planning
   and Permitting, not the Department of Transportation Services.

2. Section 3.2.2.a Terrestrial Plants has been updated to indicate that the Habitat Conservation Plan
   for elbow mangrove was approved by the Board of Land and Natural Resources.

3. We acknowledge the various ongoing transportation studies and planning efforts by the Oahu
   Metropolitan Planning Organization, especially in light of the numerous transportation projects
   planned for Ewa. Thus, Section 3.4.3.g Roads and Highways Right-of-Ways emphasizes the
   importance of coordination with your department as well as the State Department of
   Transportation.

4. Section 4.1.5 Traffic and Transportation has been revised to state that the various project
   contractors will be responsible for day-to-day construction operations and phasing of the work in
   order to satisfy proposed mitigation measures.

If there are any questions, please contact Scot Munaka at 748-5542.

cc:   Office of Environmental Quality Control
       (Gray) Nijima, (Gray, Ring, Nijima & Associates, Inc.)
TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTN: SCOT MURAOKA

FROM: ERIC G. CRISFEN, AIA, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT FOR EXPANSION OF THE
EWA NONPOTABLE WATER SYSTEM

The Department of Planning and Permitting has reviewed the subject draft environmental
assessment dated July 2004. We're pleased with the Board's commitment to expand the non-
potable water system in Ewa. Our comments on the draft assessment are as follows:

1. Figure 1-1 does not include existing or planned non-potable water system
improvements for the Makaiho and Kaholos communities and there is no discussion
in the text on whether any improvements are being considered for these areas. Please
clarify whether and when non-potable water system improvements would be extended
to these communities.

2. Based on preliminary plans for Mahana at Kapolei provided by developer D. R.
Horton – Schuler Division, the roadway network in the makai portion of the City of
Kapolei, is somewhat different than the proposed non-potable waterline network for
the same area (as shown on Figure 1-1). The proposed roadway layout for that area is
attached for your information. We suggest the non-potable water system for this area
be coordinated with the developer.

In addition, roadways for all areas that are yet to be subdivided, may be subject to
change.

Mr. Mike Jones, President
D. R. Horton, Schuler Division
Page 2

If you have any questions, please contact Raymond Young on our staff at 527-5839.

E.O.C.:
Dec 2004

Attachment

cc: OBOC
TO: ERIC CRISPI, AIA, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

ATTN: RAYMOND YOUNG

FROM: CLIFFORD J. AMILE, MANAGER AND CHIEF ENGINEER

SUBJECT: YOUR LETTER OF SEPTEMBER 7, 2004 REGARDING THE DRAFT ENVIRONMENTAL ASSESSMENT FOR THE EXPANSION OF THE EWA NONPOTABLE WATER SYSTEM, EWA, DAHU, HAWAII

Thank you for your letter regarding the subject project.

We have the following responses to your comments:

1. The nonpotable water system may be extended to the Barbers Point Naval Air Station community in the future. However, at this time, we have not received any requests from potential users in this area. The Makakilo area is beyond the service elevation limits for the nonpotable system. As such, the nonpotable water master plan has not included system expansion into these communities.

2. Thank you for providing the updated roadway network for D.R. Horton's Mahana at Kapolei. The potential nonpotable water system for this area will be coordinated with the developer.

If there are any questions, please contact Scot Munro at 748-5942.

cc: Office of Environmental Quality Control
Sheryl Nojima (Gray, Hong, Nojima & Associates, Inc.)
MEMORANDUM

TO: Dierdre S. Manihea, Administrator
   Land Division

FROM: Robert M. McG, Land Agent
      Oahu District Land Office (ODLO)

SUBJECT: Draft Environmental Assessment

Applicant: Board of Water Supply
Project: Ewa Non-Potable Water System
Locations: Ewa, Island of Oahu, Hawaii
Year: 2004

Thank you for allowing me to comment on the proposed Expansion of the Ewa Non-Potable Water System. As shown on the Draft EA map, labeled “Figure 4-1”, the area involved in Phase II of the project (outlined in blue) involves Hanaps Point Road, which is managed by the State Department of Transportation-Highways Division. Please inquire with their Highways Division regarding this road prior to conducting any work in that area.

With respect to Construction Phases I and II on the map, ODLO cannot adequately provide comments regarding the presence of State lands, or possible land dispositions required for the proposed work because it spans over an area that is too large. Therefore, we would like to request the Applicant to provide maps showing the locations of each project phase on a smaller scale and with tax map key numbers for easier identification.

Very truly yours,

Dierdre S. Manihea
Administrator

C: Oahu District Land Office
Dear Ms. Manly:


Thank you for your correspondence of September 24, 2004 from the Oahu District Land Office to Gray, Hing, Nujima & Associates regarding the subject project.

We acknowledge that various phases of the project may involve lands within state jurisdiction. At this time, exact alignments have not been established; however, we envision and will indicate in the Final Environmental Assessment that appropriate state agencies will be consulted during the design stages as follows:

1. Early coordination with government agencies will be conducted to discuss and evaluate appropriate alignment and installation methods.
2. Construction plans for all work done within State rights-of-way will be submitted for review and approval.

If you have any questions, please contact Scott Morishita at 348-3942.

Very truly yours,

CLIFFORD K. JAMBLE
Manager and Chief Engineer

cc: Office of Environmental Quality Control
Jeryl Nujima (Gray, Hing, Nujima & Associates, Inc.)
Board of Water Supply  
City and County of Honolulu  
620 South Beretania Street  
Honolulu, Hawaii 96813-3097  

OCT 14 2004  

Attention: Scott Muraka  

Gentlemen:  

Subject: Draft Environmental Assessment, Expansion of the Ewa Nonportable Water System, TMD: 9-1; 9-2-02; and 9-2-03, Ewa, Oahu, Hawaii  

We have the following comments:  

1. We require early coordination with our staff to evaluate appropriate alignment and installation methods.  
2. Planning of this project must be coordinated with on-going and proposed projects within the highway right-of-way.  
3. Use and occupancy agreements will be required for all proposed utilities within the highway right-of-way.  
4. Work within the interstate right-of-way will require the approval of the Federal Highway Administration.  
5. Work within the railroad right-of-way will require the approval of the Railroad Society and the Historic Preservation Division of the Department of Natural Resources.  
6. We require the submission and approval of construction plans for all work within the highway right-of-way.  

If you have any questions, please contact the Traffic Branch at 692-7670.  

Very truly yours,  

RODNEY K. HARAGA  
Director of Transportation  

Office of Environmental Quality Control  
Gray, Hong, Nijima & Associates, Inc.
6. Construction plans for all work within the State highway right-of-way will be submitted for your department's review and approval.

If you have any questions, please contact Scot Muraska at 748-3942.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Office of Environmental Quality Control
    Syfyi Nijima (Grey, Hong, Nijima & Associates, Inc.)
MEMORANDUM

TO: CLIFFORD S. JAMILE, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTN: MR. SCOTT MURAOKA

FROM: TIMOTHY E. STEINBERGER, P.E., DIRECTOR
DEPARTMENT OF DESIGN AND CONSTRUCTION

SUBJECT: DRAFT ENVIRONMENTAL ASSESSMENT (EA)
EXPANSION OF THE EWA NONPOTABLE WATER SYSTEM
TMs: 2-1; 5-2; 20; AND 9-2.0

October 14, 2004

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

The Draft EA for the Ewa Nonpotable Water System is comprehensive and well done for the major portion of the area to be served. With a current distribution potential of approximately 30 million gallons per day of nonpotable water, the question arises as to why the Kalaeloa (the former Barbers Point Naval Air Station) distribution system is not included from an overall planning standoff. Will leaving it out handicap later efforts for development of the area?

If there are any questions, please contact Donald Griffin at extension 6324.

GS:dk

cc: ORQC
Gray, Hong, Nijima and Associates, Inc.
November 15, 2004

Regulatory Branch

Mr. Scot Muracka
Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, HI 96813

Dear Mr. Muracka:

This letter is written in response to the November 5, 2004 letter from Gray, Hong, Nojima and Associates, Inc. announcing a revised Draft Environmental Assessment (DEA) for the Board of Water Supply’s proposal to expand the nonpotable water storage and transmission system in the Ewa district, Oahu, Hawaii. The letter states that the findings of the Environmental Assessment have been revised to disclose that portions of the project may be funded by federal funds, therefore requiring that the project comply with the National Environmental Policy Act (NEPA) requirements. The letter also states that there are no substantive technical changes in the revised EA.

The Corps acknowledges receipt of the consultant’s November 8th letter, and would like to request a copy of the revised DEA for this project. In addition, the Corps would like to state that the comments provided by this office on August 16, 2004 remain applicable to the project, and we encourage your agency to coordinate with our regulatory staff for final jurisdictional determinations for stream crossings, as more specific project plans become available.

Should you have questions, please contact Ms. Connie Ramsay of my Regulatory staff at 438-2039 or by facsimile at 438-4060, or by email at connie.l.ramsay@usace.army.mil.

Sincerely,

George P. Young, P.E.
Chief, Regulatory Branch

Copy furnish:
Genoveve Salmonson, Director, Office of Environmental Quality Control, 235 South Beretania St., Suite 705, Honolulu, HI 96813
Sheryl Nojima, Gray, Hong, Nojima & Associates, Inc., 841 Bishop Street, Suite 100, Honolulu, HI 96813
November 24, 2004

Mr. George P. Young, P.E.
Chief, Regulatory Branch
Department of the Army
U.S. Army Engineer District, Honolulu
Fort Shafter, Hawaii 96858-5440

Attn: Ms. Connie Ramsey

Dear Mr. Young:

Subject: Revised Draft Environmental Assessment
Expanding the Ewa Nonpotable Water System
File No. 2003000419
TMK 9-1 and 9-2; Ewa, Oahu, Hawaii

Thank you for your correspondence of November 19, 2004 to Mr. Scot Murakpa of the Board of Water Supply regarding the Revised Draft Environmental Assessment (DEA) for the Expansion of the Ewa Nonpotable Water System. As you have indicated, there have been no substantive changes; however, the DEA discloses that portions of the overall project may be federally funded.

Per your request, enclosed is a copy of the Revised DEA for the subject project. Should there be any questions, please feel free to contact me at 521-6306. Again, thank you for your participation in the environmental review process.

Sincerely,

Sheryl E. Nojima
Principal

Enclosure

cc: Office of Environmental Quality Control
Scot Murakpa, Board of Water Supply

SN: tk
2838
TO: CLIFFORD S. JAMEL, MANAGER AND CHIEF ENGINEER
BOARD OF WATER SUPPLY

ATTN: SCOTT MURAKA

FROM: ERIC CRISPIN, AIA, DIRECTOR
DEPARTMENT OF PLANNING AND PERMITTING

SUBJECT: REVISED DRAFT ENVIRONMENTAL ASSESSMENT FOR EXPANSION OF EWA NONPOTABLE WATER SYSTEM

The Department of Planning and Permitting has reviewed the subject Revised Draft Environmental Assessment and have the following comments to offer:

1. The installation of the non-potable water line beneath the Raimoak Road Bridge shall be done in accordance with the Department of Design and Construction’s “Design Guidelines for Installation of Utilities on City Bridges” dated September 1, 2004. For further information, contact Mr. Kenneth Li of the Department of Design and Construction’s Civil Division at 327-5317.

2. We have not received a response to our Draft EA comment letter dated September 7, 2004 (copy attached) nor were there any responses to this letter incorporated in the Revised EA. We would appreciate that responses to this letter be addressed and incorporated in the Revised EA.

If you have any questions, please contact Raymond Young of our staff at 327-3839.

EGC:th
Dec. 24594
Attachment

cc: OEQC
Gray, Hong, Nogima & Associates, Inc.
December 8, 2004

Board of Water Supply
City and County of Honolulu
630 South Beretania Street
Honolulu, Hawaii 96813
Attn: Son Maraska

SUBJECT: REVISED DRAFT ENVIRONMENTAL ASSESSMENT
EXPANSION OF THE EWA NONPOTABLE WATER SYSTEM
TMK 9-1; 9-1-02 AND 9-2-03
EWA, OAHU, HAWAII

Gentlemen:

Ko Olina Resort believes it important to be and strives to be a responsible member of the community. We have been a pioneer of the dual water system and believe in its goals and objectives. Ko Olina also believes that it needs to balance this sense of community responsibility with appropriate and responsible management of the Ko Olina Resort. It is within this context that we are providing the following comments:

1. Page 2-5 indicates that an R-1 pipeline will be connected to the Barbers Point 215 Reservoir during Phase 1. However, Page 2-6 indicates that conversion of Ko Olina's breakwater non-potable system to R-1 water is not expected to occur until Phase 2. It is unclear to us how the connection to the tank without conversion of the system to R-1 could occur, and would appreciate clarification of same.

2. The wording on Page 2-6 and the mapping in Figure 2-1 appear inconsistent.

3. It is important that all possible impacts be identified and considered regarding the planned conversion of an area that has been on breakwater water to R-1. These possible impacts may include, but may not be limited to:
   a. Potential increased cost of fees.
   b. Potential impact on resort and tourist related development and activities.
   c. Potential health and safety concerns of using R-1.
   d. Need to identify appropriate areas of where R-1 should be utilized.
   e. Necessity of Department of Health oversight and related permit processing.

We thank you for the opportunity to comment and look forward to working with you to effect efficient application of the dual water system in Ewa. Should there be any questions regarding the foregoing, please do not hesitate to call us.

Sincerely,

Ko Olina Intangibles, LLC
By Ko Olina Company, LLC, Its sole member
By Ko Olina Partners, LLC, Its sole manager

Jeffrey H. Siline, Manager

CC:
Office of Environmental Quality Control
State Office Tower
235 South Beretania Street, Suite 702
Honolulu, Hawaii 96813

Gray, Hong, Nogina & Associates
841 Bishop Street, Suite 1100
Honolulu, Hawaii 96813
Attn: Sheryl Nogina
Mr. Jeffrey R. Stone
February 8, 2005
Page 2

b. Potential impact on resort and tourist-related development and activities:
   Recycled water irrigation should not impact resort and tourist-related development and
   activities since R-1 water by State Department of Health (DOH) Reuse
   Guidelines is approved for all irrigation uses. Best management practices (BMP)
   as described in the guidelines will apply. Irrigation schedules will be developed
   based on the recycled water system operation plan. The Reuse Guidelines can be
   viewed at:
   The use of R-1 recycled water will benefit the Ko Olina resort by providing
   additional irrigation supply to supplement the current brackish water system,
   which has a limited capacity. The nutrients in the recycled water will reduce
   fertilizer costs while maintaining the aesthetics of the resort's landscaping.

c. Potential health and safety concerns of using R-1:
   The application of R-1 water will require approval from DOH and must be in
   compliance with the Reuse Guidelines. R-1 recycled water irrigation should not
   impact public health and safety as the DOH Reuse Guidelines provide a significant
   mulled approach including regulations for treatment, delivery, use and
   reporting.

d. Need to identify appropriate areas of where R-1 should be utilized:
   As part of the Reuse Plan requiring approval from DOH, boundaries of the areas to
   irrigate and the amount of R-1 water to be used for irrigation will need to be
   specified. Signage, community information and education will be implemented.
   We will coordinate the preparation of the reuse plan with the Ko Olina Resort.

e. Necessity of Department of Health oversight and related permitting processing:
   Prior to the construction of a recycled water reuse system, the DOH Reuse
   Guidelines specify that an Engineering Design Report for a Water Reuse Project
   must be approved by DOH for all projects involving areas greater than five acres.
The report must incorporate various BMP plans. Smaller reuse projects less than five acres require a simplified application form; however, the provisions of the reuse guidelines must still be met.

If you have any questions, please contact Scot Murakami at 748-5942.

Very truly yours,

CLIFFORD S. JAMILE
Manager and Chief Engineer

cc: Office of Environmental Quality Control
Sheryl Nojima (Gray, Hong, Nojima and Associates)
APPENDIX C

DLNR CWRM Well Listing
# APPENDIX C - Well Permits Issued by Department of Land and Natural Resources

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<th>WELL NAME</th>
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<th>LONGITUDE</th>
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**LEGEND**

CASING DIA = Casing diameter in inches
WELL DEPTH = Total depth of well in feet
USE = Major use of well

Symbols listed:
- MUN = Municipal
- IRR = Industrial
- IND = Industrial
- OBS = Observation
- SLD = Sealed
- UNU = Unused
- LOST = Lost
- DOM = Domestic
- OTHER = Other

SOURCE: Department of Land and Natural Resources (2002).
APPENDIX D

Preliminary Construction Cost Estimates
# Expansion of the EWA Nonpotable Water System

## Preliminary Construction Cost Estimate

**Phase 1**

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</tr>
<tr>
<td>24&quot;</td>
<td>5,451</td>
</tr>
<tr>
<td>30&quot;</td>
<td>1,237</td>
</tr>
<tr>
<td>Additional Reservoir Capacity (MG)</td>
<td>10.0</td>
</tr>
<tr>
<td><strong>Subtotal Phase 2:</strong></td>
<td><strong>$78,815,975</strong></td>
</tr>
</tbody>
</table>

**Phase 3**

<table>
<thead>
<tr>
<th>Waterlines (LF)</th>
<th>Estimated Waterline Cost (LF)</th>
</tr>
</thead>
<tbody>
<tr>
<td>16&quot;</td>
<td>8,190</td>
</tr>
<tr>
<td>18&quot;</td>
<td>4,674</td>
</tr>
<tr>
<td>Reservoir Capacity (MG)</td>
<td>5.0</td>
</tr>
<tr>
<td><strong>Subtotal Phase 3:</strong></td>
<td><strong>$21,391,380</strong></td>
</tr>
</tbody>
</table>

**Total Phases 1-3:** $110,062,543

- Waterlines (miles) | 44 | $55,062,543
- Reservoirs (MG) | 15.0 | $54,000,000

### Assumptions:

1. Estimated pipe cost/lf includes PVC pipe, fittings, valves, trenching, cushion, backfill, and pavement restoration.
2. Assumed reservoir cost of $3.8 M/MG capacity.
3. 'System' reservoir storage requirements in Phase 1 to be fulfilled by existing 'project' storage at golf courses.
APPENDIX E

Recorded Rare Species
### APPENDIX E - Recorded Rare Species

<table>
<thead>
<tr>
<th>SCIENTIFIC NAME</th>
<th>COMMON NAME</th>
<th>FEDERAL STATUS</th>
<th>ID NUMBER</th>
<th>ACCURACY</th>
<th>DATE LAST OBSERVED</th>
<th>DIRECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gallinula chloropus sandwichensis</td>
<td>Hawaiian Gallinule, &quot;Alae&quot; Ula</td>
<td>LE</td>
<td>1039</td>
<td>G</td>
<td>1970-08-07</td>
<td>Barber's Point</td>
</tr>
<tr>
<td>Fuca alai</td>
<td>&quot;Alae Ke'e&quot; O, Hawaiian Coot</td>
<td>LE</td>
<td>1117</td>
<td>G</td>
<td>1975-01-23</td>
<td>Barber's Point</td>
</tr>
<tr>
<td>Himatione mexicanus khudeni</td>
<td>Hawaiian Stilt, Alt'O</td>
<td>LE</td>
<td>1370</td>
<td>G</td>
<td>1948-07-24</td>
<td>Barber's Point</td>
</tr>
<tr>
<td>Chasquiopsis sandwichensis birdis</td>
<td>Oahu Elepaio</td>
<td>LE</td>
<td>1796</td>
<td>G</td>
<td>1984-09-29</td>
<td>Ewa Coral Plain</td>
</tr>
<tr>
<td>Monachus schauinslandi</td>
<td>Hawaiian Monk Seal</td>
<td>LE</td>
<td>3912</td>
<td>S</td>
<td>1990-04-24</td>
<td>Ewa Beach, Oneawa Park (Onesian Beach Park)</td>
</tr>
<tr>
<td>Monachus schauinslandi</td>
<td>Hawaiian Monk Seal</td>
<td>LE</td>
<td>3914</td>
<td>M</td>
<td>1993-01-18</td>
<td>Ewa Beach</td>
</tr>
<tr>
<td>Monachus schauinslandi</td>
<td>Hawaiian Monk Seal</td>
<td>LE</td>
<td>3928</td>
<td>S</td>
<td>1990-03-07</td>
<td>Campbell (Barber's Point) Beach Park</td>
</tr>
<tr>
<td>Monachus schauinslandi</td>
<td>Hawaiian Monk Seal</td>
<td>LE</td>
<td>3930</td>
<td>S</td>
<td>1995-01-02</td>
<td>West Beach Estates, Ko Olina Resort, lagoon 1 &amp; 2</td>
</tr>
<tr>
<td>Monachus schauinslandi</td>
<td>Hawaiian Monk Seal</td>
<td>LE</td>
<td>3931</td>
<td>S</td>
<td>1990-03-09</td>
<td>West Beach Estates, Ko Olina condominiums (resort), lagoon 4</td>
</tr>
<tr>
<td>Monachus schauinslandi</td>
<td>Hawaiian Monk Seal</td>
<td>LE</td>
<td>3954</td>
<td>M</td>
<td>1996-09-21</td>
<td>West Beach Estates, Ko Olina Resort</td>
</tr>
<tr>
<td>Monachus schauinslandi</td>
<td>Hawaiian Monk Seal</td>
<td>LE</td>
<td>3956</td>
<td>S</td>
<td>1998-04-24</td>
<td>Paradise Cove</td>
</tr>
<tr>
<td>Chelonia mydas</td>
<td>Honu, Green Turtle</td>
<td>LELT</td>
<td>3918</td>
<td>S</td>
<td>1992-12-22</td>
<td>Kane Point to Deep Draft Harbor</td>
</tr>
<tr>
<td>Low Salinity Limestone Anchialine Pool</td>
<td>Low Salinity Limestone Anchialine Pool</td>
<td>LE</td>
<td>4095</td>
<td>S</td>
<td>1987</td>
<td>Ewa Plain, CA, 1.2 mi north of Barber's Point Beach Park, CA 15 ft</td>
</tr>
<tr>
<td>Low Salinity Limestone Anchialine Pool</td>
<td>Low Salinity Limestone Anchialine Pool</td>
<td>LE</td>
<td>4096</td>
<td>S</td>
<td>1986</td>
<td>Ewa Plain, CA 0.4 mi west of Oneawa Beach Park, CA 2 ft</td>
</tr>
<tr>
<td>Low Salinity Limestone Anchialine Pool</td>
<td>Low Salinity Limestone Anchialine Pool</td>
<td>LE</td>
<td>4097</td>
<td>S</td>
<td>1975-12-17</td>
<td>Ewa Plain, CA 0.25 mi north east of Camp Mokulea NII, RES, CA 30 ft</td>
</tr>
<tr>
<td>Myodesmicus sandwichensis</td>
<td>Hawaiian Coastal Dry Shrubland</td>
<td>4415</td>
<td>SC</td>
<td></td>
<td>1977-07-02</td>
<td>Koko Lagoon, Barber's Point, ca 10 ft</td>
</tr>
<tr>
<td>Metaptenillus lohena</td>
<td>Anchialine Pool Shrimp</td>
<td>C</td>
<td>4767</td>
<td>S</td>
<td>1992-06-22</td>
<td>Ewa Plain, CA 0.4 mi west of Oneawa Beach Park</td>
</tr>
<tr>
<td>Pentarthrum obscurum</td>
<td>Obscure Pentarthrum Weevil</td>
<td>SOC</td>
<td>4604</td>
<td>G</td>
<td>1974-09-19</td>
<td>Ewa Cone Field</td>
</tr>
<tr>
<td>Lyropopa perlona</td>
<td>Pupu Lulu Land Snail</td>
<td>SOC</td>
<td>5867</td>
<td>SC</td>
<td>1980-04-07</td>
<td>Honolulu, Barber's Point, HI Mokalaile Rd</td>
</tr>
<tr>
<td>Achyranthias splendens var rotundata</td>
<td>Barber's Point Naval Air Station, west end of Ewa air strip, 10-15 ft</td>
<td>LE</td>
<td>5945</td>
<td>SC</td>
<td>1971-05-02</td>
<td>Barber's Point, behind lighthouse, 3-5 feet</td>
</tr>
<tr>
<td>Achyranthias splendens var rotundata</td>
<td>Barber's Point</td>
<td>LE</td>
<td>5946</td>
<td>S</td>
<td>1974-02-15</td>
<td>Barber's Point, behind lighthouse, 3-5 feet</td>
</tr>
<tr>
<td>Achyranthias splendens var rotundata</td>
<td>Barber's Point</td>
<td>LE</td>
<td>5947</td>
<td>SC</td>
<td>1973-05-19</td>
<td>Barber's Point, Campbell Industrial Park between C.Brewer Chemical Plant &amp; HI Cement Corp. Plant, near sea level</td>
</tr>
<tr>
<td>Achyranthias splendens var rotundata</td>
<td>Barber's Point</td>
<td>LE</td>
<td>5948</td>
<td>SC</td>
<td>1973-05-19</td>
<td>Barber's Point, Prep Mokulea Military Reserve</td>
</tr>
<tr>
<td>Lipochaetia lobata var lobata</td>
<td>Nene</td>
<td>LE</td>
<td>6594</td>
<td>G</td>
<td>1936-04-10</td>
<td>Ewa Coral Plain</td>
</tr>
<tr>
<td>Capparis sandwichiana</td>
<td>Puu Po, Mala Po</td>
<td>SOC</td>
<td>8146</td>
<td>S</td>
<td>1981-01-27</td>
<td>Barber's Point</td>
</tr>
<tr>
<td>Capparis sandwichiana</td>
<td>Puu Po, Mala Po</td>
<td>SOC</td>
<td>12100</td>
<td>G</td>
<td>1956-07-04</td>
<td>Ewa Plain</td>
</tr>
</tbody>
</table>
## APPENDIX E - Recorded Rare Species

<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Federal Status</th>
<th>ID Number</th>
<th>Accuracy</th>
<th>Date Last Observed</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chamaesyce scotsbergii var. scotsbergii</td>
<td>&quot;Akoko, Koko, Kokoalei&quot;</td>
<td>LE</td>
<td>8324</td>
<td>SC</td>
<td>1989-11-11</td>
<td>Ewa plain, area on south, east, &amp; north sides of deep draft harbor, 10-40 ft</td>
</tr>
<tr>
<td>Chamaesyce scotsbergii var. scotsbergii</td>
<td>&quot;Akoko, Koko, Kokoalei&quot;</td>
<td>LE</td>
<td>8326</td>
<td>SC</td>
<td>1984-02-29</td>
<td>Ewa plain, west side of Hanua St, next to Standard Oil Refinery, 10-20 ft</td>
</tr>
<tr>
<td>Chamaesyce scotsbergii var. scotsbergii</td>
<td>&quot;Akoko, Koko, Kokoalei&quot;</td>
<td>LE</td>
<td>8337</td>
<td>SC</td>
<td>1993-07-09</td>
<td>Barber Point Naval Air Station, northwest corner, vicinity of Alii Street, 40 feet</td>
</tr>
<tr>
<td>Chamaesyce scotsbergii var. scotsbergii</td>
<td>&quot;Akoko, Koko, Kokoalei&quot;</td>
<td>LE</td>
<td>8338</td>
<td>SC</td>
<td>1993-11-26</td>
<td>Barber Point Naval Air Station, area bounded by Coral Sea Rd, S Herson Rd, Lamonte St &amp; Long Island St, 30 ft</td>
</tr>
<tr>
<td>Chamaesyce scotsbergii var. scotsbergii</td>
<td>&quot;Akoko, Koko, Kokoalei&quot;</td>
<td>LE</td>
<td>8339</td>
<td>SC</td>
<td>1990-08-19</td>
<td>Ewa Plain, east side of Saratoga St, about midway between intersections W</td>
</tr>
<tr>
<td>Centaurium sebaeoides</td>
<td>&quot;Alohi&quot;</td>
<td>LE</td>
<td>8613</td>
<td>G</td>
<td>1940-05-14</td>
<td>Ewa Plain &amp; Pearl Harbor</td>
</tr>
<tr>
<td>Scabiosa coriaea</td>
<td>Nasipaka</td>
<td>LE</td>
<td>8668</td>
<td>M</td>
<td>1919-11-22</td>
<td>Barber Point</td>
</tr>
<tr>
<td>Portulacca villosa</td>
<td>&quot;He&quot;</td>
<td>LE</td>
<td>9476</td>
<td>G</td>
<td>1916-03-14</td>
<td>Coral Plain below Ewa Aiea &amp; Island (Slsh)</td>
</tr>
<tr>
<td>Marilea velosa</td>
<td>&quot;He, Hi, 'Ili, 'Ahu&quot;</td>
<td>LE</td>
<td>12070</td>
<td>M</td>
<td>1932-04-22</td>
<td>Ewa, below Ewa plantation</td>
</tr>
<tr>
<td>Ophioglossum concinnum</td>
<td>Pololei</td>
<td>LE</td>
<td>12101</td>
<td>M</td>
<td>1912-02-16</td>
<td>Ewa near Slsh</td>
</tr>
</tbody>
</table>

### Federal Status
- **LE**: Listed Endangered
- **SOC**: Species of Concern
- **C**: Candidate

### Accuracy
- **SC**: Specific with exact location confirmed by source.
- **S**: Specific - reported within a 1.5 mile radius of mapped symbol
- **G**: General - reported within approximately 5 mile radius of mapped symbol
- **M**: Medium - reported within a 1.5 mile radius of mapped symbol

Source: Hawai'i Natural Heritage Program Database (2002)
APPENDIX F

DOH Definitions of RO and R-1/Approved Uses
GUIDELINES
FOR THE TREATMENT AND
USE OF RECYCLED WATER

Prepared by
Hawaii State Department of Health
Wastewater Branch

May 15, 2002
(Replaces November 22, 1993 Version)
the recycled water who is responsible for operation and maintenance of the
treatment and distribution facilities of recycled water, prevention of cross-
connection, and surveillance of all recycled water users.

"Recycled water" means treated wastewater that by design is intended or
used for a beneficial purpose."

"Recycled water system" means a facility which conveys to users or
applies or otherwise uses recycled water. Recycled water systems are
subdivided into distribution and use systems. Recycled water systems include
all piping, storage, and repressurization facilities to deliver recycled water
to users, but exclude treatment works.

"R-1 Water (Significant reduction in viral and bacterial pathogens)"
means recycled water that is at all times oxidized, then filtered, and then
exposed, after the filtration process, to:

A. A disinfection process that, when combined with the filtration
   process, has been demonstrated to inactivate and/or remove 99.999
   percent of the plaque-forming units of F-specific bacteriophage
   MS2, or polio virus in the wastewater. A virus that is at least
   resistant to disinfection as polio virus may be used for purposes
   of demonstration; and

B. A disinfection process that limits the concentration of fecal
   coliform bacteria to the following criteria:

   (1) The median density measure in the disinfected effluent does
       not exceed 2.2 per 100 milliliters utilizing the
       bacteriological results of the last seven days for which
       analyses have been completed; and

   (2) The density does exceed 23 per 100 milliliters in more than
       one sample in any 30-day period; and

   (3) No sample shall exceed 200 per 100 milliliters.

"R-2 Water (Disinfected Secondary-23 Recycled Water)" means recycled
water that has been oxidized, and disinfected to meet the following criteria:

A. Fecal coliform bacteria densities as follows:

   (1) The median density measured in the disinfected effluent does
       not exceed 23 per 100 milliliters utilizing the
       bacteriological results of the last seven days for which
       analyses have been completed; and

   (2) The density does not exceed 200 per 100 milliliters in more
       than one sample in any 30-day period.
State of Hawaii
Department of Health
Wastewater Branch
919 Ala Moana Blvd.
Honolulu, HI 96814

"Water Reuse" means the treatment of wastewater to a quality that makes it suitable for one or more beneficial uses and the subsequent use of the treated water.

III USES AND SPECIFIC REQUIREMENTS FOR RECYCLED WATER

There are three categories of recycled water:

R-1 Water (significant reduction in viral and bacterial pathogens);

R-2 Water (disinfected secondary-23 recycled water, which means secondary treatment with disinfection to achieve a median fecal coliform limit of 23 per 100 ml based on the last seven days for which analyses have been completed); and

R-3 Water (undisinfected secondary recycled water).

A. USES FOR R-3 WATER

1. Recycled water used for the purposes cited below in paragraph 2 of this section shall be at all times R-3 Water or recycled water with concentrations of potentially pathogenic organisms lower than those of R-3, such as R-2 and R-1 Waters.

2. R-3 Water is suitable for, from a public health standpoint, and shall be restricted to, the following purposes:

   a. Surface, drip, subsurface irrigation of feed, fodder and fiber crops, and pasture for animals not producing milk for human consumption;

   b. Surface, drip or subsurface irrigation of non-food bearing tree, provided no irrigation with recycled water occurs for a period of

Guidelines for the Treatment and Use of Recycled Water 5/15/02

Page 15
14 days prior to harvesting or allowing access by the general public;

c. Surface, drip or subsurface irrigation of seed crops that are not eaten by humans;

d. Surface, drip or subsurface irrigation of orchards and vineyards where the recycled water does not come into contact with the edible portion of the crop;

e. Surface irrigation or drip irrigation of ornamental nursery stock and sod farms provided no irrigation with recycled water occurs for a period of 14 days prior to harvesting, retail sale, or allowing access by the general public;

f. Surface, drip or subsurface irrigation of a food crop which must undergo extensive commercial, physical or chemical processing determined by DOH to be sufficient to destroy pathogens, before it is suitable for human consumption. This is allowed no later than 30 days before harvest;

g. Application within a reclamation facility for the following:
   (1) Non-spray irrigation of landscape not contacted by the general public;
   (2) Polymer dilution water;
   (3) Mechanical seal water for gas compressors;
   (4) Cooling water for gas compressors and internal combustion engines;
   (5) Dilution water for chlorination;
   (6) Mechanical seal water and cooling water for sludge pumps;
   (7) Heat exchangers: air, water and oil cooling;
   (8) Odor and gas absorption;
   (9) Centrifuge flushing; and
   (10) Flushing grit and sludge pipes; or

h. Such other uses as approved by DOH.
for water purposes cited in the following items "a" through "c" of this paragraph:

a. It may be used until no later than 10 days before harvest for any form of irrigation to ornamental plants to be sold potted;

b. It may be used until no later than 10 days before harvest for surface drip irrigation of a food crop. This is allowed if the edible portion is never eaten raw without peeling, and is at least two feet above the height reached by drip irrigation and at least two feet above the ground surface, and no food crop is harvested that has contacted irrigation water or the ground; and

c. It may be used until no later than 10 days before harvest for surface or drip irrigation of a food crop. This is allowed if the crop will only be cooked at a commercial canny or subjected to chemicals that kill microorganisms (e.g., canned pineapple, and roasted coffee beans).

C. USES FOR R-1 WATER

1. Recycled water used for the purposes cited below in paragraph "2" of this section shall be at all times R-1 Water.

2. R-1 Water is suitable for, from a public health standpoint, the purposes cited under R-2 Water, and R-3 Water in these guidelines and shall be restricted to the following purposes:

a. Any form of irrigation for food crops, including all edible root crops, where the recycled water comes into contact with the edible portion of the crop;

b. Any form of irrigation served by fixed irrigation system supplied by buried piping for turf and landscape irrigation of:

   (1) Golf courses;

   (2) Parks, playgrounds, school yards, athletic fields;

   (3) Residential property where managed by an irrigation supervisor; and

   (4) Roads sides and medians;

   c. Any form of irrigation for pasture where milking animals, and other
animals graze;

d. Any form of fire fighting from outdoor hydrants, fire trucks, or aircraft;

e. Cooling saws while cutting pavement;

f. Spray washing of electric insulators on utility poles;

g. High pressure water blasting to clean surfaces;

h. Drinking water for animals may be accepted if it will not be given to dairy animals, and the applicant demonstrates to the satisfaction of DOH there will be no unreasonable risk of occurrence of adverse effects on the animal related to chemical constituents or radioactivity;

i. Supply for commercial and public laundries for clothing and other linens;

j. Industrial cooling in a system that does not have a cooling tower, evaporative condenser, or other feature that emits vapor or droplets to the open atmosphere or to air to be passed into a building or other enclosure occupied by person;

k. Supply for addition to a cooling system or air conditioning system with a cooling tower, evaporative condenser, or other feature that emits vapor or droplets to the open atmosphere or to air to be passed into a building or other enclosure occupied by a person, when all of the following shall occur:

1. A high efficiency drift reducer is used and the system is maintained to avoid greater rate of generation of drift than that with which a high efficiency drift reducer is associated;

2. A continuous biocide residual, sufficient to prevent bacterial population from exceeding 10,000 per milliliter, is maintained in circulating water; and

3. The system is inspected by an operator, capable of determining compliance with this subdivision, at least once per day;

l. In the absence of one or more of the three conditions in paragraph "k" above, it is suitable for addition to such a cooling or air conditioning system when the purveyor of R-2 Water uses has demonstrated to the satisfaction of DOH that the probability of intestinal infection with virus will not exceed 1 in 10,000 under
the specific conditions of use and that growth of Legionella will be controlled to avoid a concentration that could pose a significant hazard to health;

m. Industrial process that does not generate mist or facial contact with recycled water unless personal protective equipment is worn;

n. Water jetting for consolidation of backfill material around potable pipelines and for compaction of soil backfill above such pipelines. When there is a shortage of potable water and such use had been approved for a specific project by the public water system agency that owns the pipeline, and by DOH and conforms with the following conditions:

(1) The public water system that owns the pipeline shall have access and opportunity to have its inspector on the job site while recycled water is being used;

(2) Recycled water shall be used in the pipeline trench only when the pipeline is filled with the highly chlorinated water for new main disinfection and is used under pressure;

(3) The new main disinfection procedure, including checking chlorine residual and collecting bacteriological samples, shall be completed after the use of recycled water in the pipeline trench has ceased;

(4) Precautions shall be taken to minimize opportunities for any recycled water to enter a pipeline under construction (e.g., keeping ends of pipe lengths covered, etc.); and

(5) For other than "hot taps," an appropriate buffer zone of at least 50-foot radius, shall be established to reduce the risk of contamination to the existing water supply line;

o. Flushing toilets and urinals in types of buildings and institutions approved by DOH and where counties have adopted a provision in their plumbing code pertaining to the use of a dual water supply within a building;

p. A source of supply for a decorative fountain if the recirculating water does not support growth of microorganisms from the surrounding environment that could infect either the respiratory or digestive system of mammals;

q. A source of supply for:

(1) A restricted recreation impoundment; and
(2) Basins at fish hatcheries;

x. Washing of hard surfaces e.g., parking lots and sidewalks; or

s. A use other than those cited in this section may be accepted if DOH is satisfied that there will be no unreasonable risk of occurrence of events wherein humans would not take appropriate sanitary precaution when coming in contact with recycled water.

3. There may be recycled water uses where additional level of pathogen reduction is warranted.

D. PRECAUTIONS FOR ALL USES OF RECYCLED WATER

1. The provisions of this section shall be complied with when any recycled water is used on an approved use area. Use of recycled water without an approval from DOH is prohibited;

2. The purveyor of recycled water shall provide a copy of these guidelines to the users (i.e. property managers) to whom it provides recycled water, and shall obtain their agreement in writing to comply with all applicable provisions of these guidelines;

3. Signs shall be posted where recycled water is used pursuant to the PUBLIC EDUCATION and EMPLOYEE TRAINING PLAN specified in Chapter VIII;

4. Best Management Practices shall be taken to prevent ponding of recycled water;

5. Recycled water shall always be managed to avoid conditions conducive to proliferation of mosquitoes and other vectors, and to avoid creation of a public nuisance or health hazard;

6. Best Management Practices shall be used to mitigate discharge, runoff, or overspray beyond the approved use area boundaries;

7. Spray of recycled water shall not be allowed to contact an external drinking water fountain;

8. The following precautions pertain to the use of R-1 Water only:

a. There shall be no irrigation within a minimum of 50 feet of any drinking water supply well;

b. The outer edge of an impoundment shall be located at least 100 feet
APPENDIX G

Archaeological Archival Research Report
AN ARCHAEOLOGICAL ARCHIVAL RESEARCH REPORT
FOR THE 'EWA NONPOTABLE WATER SYSTEM,
HONOLIULI AHUPUA'A, 'EWA DISTRICT,
ISLAND OF O'AHU
MAY 2002

Prepared for: Ms. Sheryl Nojima
Gray, Hong, Bills, Nojima and Associates, Inc.
841 Bishop Street, Suite 1100
Honolulu, Hawaii 96813

Prepared by: Archaeological Consultants of the Pacific, Inc.
James R. Moore, B.S.
Joseph Kennedy, M.A.
59-624 Pupu'uea Road
Haleiwa, Hawaii 96712

Inventory Reports Data Recovery Reports Research Design Documents Monitoring Due
diligence Work Historical Studies Cultural Studies Burial Treatment Plans Preservation
Plans Interpretive Reconstructions Restorations Qualified Expert Witness Testimony

59-624 Pupu'uea Road  Haleiwa, Hawaii  96712  Phone: 638-7442  Fax: 638-0703
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An Archaeological Archival Research Report
for the 'Ewa Nonpotable Water System,
Honouliuli Ahupua'a, 'Ewa District,
Island of O'ahu

Section 1: Introduction

At the request of Ms. Sheryl Nojima of Gray, Hong, Bills, Nojima and Associates, Inc., Archaeological Consultants of the Pacific, Inc. (ACP) has conducted archaeological archival research concerning the ahupua'a of Honouliuli in 'Ewa District on the Island of O'ahu (see Figure 1). The current investigations were conducted in association with the preparation of an environmental assessment for the distribution/transmission mains of the 'Ewa Nonpotable Water System. Prior to the preparation of the environmental assessment the proper authorities with the Department of Land and Natural Resources, State Historic Preservation Office (DLNR-SHPD) were consulted and have provided comments regarding their concerns (correspondence dated April 12th, 2002; LOG NO: 29552, DOC NO: 0204EJ02; refer to Appendix B).

The purpose of the current investigations was to collect sufficient information through an archival and archaeological literature search to determine the locations of known significant historic properties and to assess the likelihood of those potential resources being impacted by the proposed project. These investigations also allow for the making of recommendations concerning the mitigation of the potential impact of proposed developments upon significant historic resources.

The current research has identified three areas through which the proposed waterlines will pass which have the potential to impact significant historic properties. Therefore, ACP recommends that an archaeological monitor be on site when construction activities pass through these areas. During the remainder of the project, it is recommended that an archaeological monitor be on call in the event that significant historic properties are encountered during construction activities.
Figure 1: Project Location on a Map of O'ahu
Section 2: Physical Setting

The area in which the ‘Ewa Nonpotable Water System is to be installed is limited to the ‘Ewa Plain and extreme lower slopes of the southeastern end of the Waianae Range in Honoluluhi Ahupua’a, ‘Ewa District, Island of O‘ahu (see Figure 2). Therefore, the discussion in this section will be limited to the ‘Ewa Plain.

The ‘Ewa Plain consists of an emergent coral limestone reef partially covered with alluvium eroded from the nearby mountains. The terrain gradually rises from the coastline until reaching the base of the mountains at an elevation of between 120 and 160 feet (ft) above mean sea level (AMSL). One significant physical landmark breaks the gently sloping landscape, Pu‘u o Kapekeli located along the mauka (inland) edge of the plain standing 166ft AMSL.

Rainfall on the plain averages approximately 19 inches per year, although wide fluctuations are known to occur from year to year (Tuggle & Tomonari-Tuggle 1997:13). Temperatures range between 60° and 90°F with the highest occurring in August and September (Armstrong 1973).

As mentioned above, alluvial soils only partially cover the emergent coral reef forming a relatively thin mantle of soils over the inland portions of the plain. Soil classifications identified on the ‘Ewa Plain include a variety of soil series and land form categories including the ‘Ewa Series, Haleiwa Series, Helemano Series, Honoluluhi Series, Kaloko Series, Kuna Series, Mamala Series, Molokai Series, Waialua Series, Waipahu Series, Coral Outcrop, Fill Land and Beach Sands (Foote, Hill, Nakamura & Stevens 1972). Coral Outcrop is the dominant land form classification in areas closer to the coast with Beach Sands found at the shoreline. As one travels north (inland) from the southern coast, areas of Honoluluhi, Ewa and Mamala Series soils are most common on the flat, gently sloping plain. Along stream channels and in gulches smaller areas are present which contain soils of the less common soil Series found on the plain and listed above. As the slope increases at the southeastern foot of the Waianae Range, soils increase in diversity.

The vegetation of this area prior to Western contact would probably have been an arid scrub dominated by such species as wiliwili (Erythina sandwicensis), lama (Diospyros ferrea), sandalwood (Santalum sp.), ‘a‘ali‘i (Dodonaea eriocarpa) scrub ohia (Metrosideros collina) and pill grass (Heteropogon contortus). Since the time of Western contact, however, vegetation on the ‘Ewa Plain has been extensively altered through the introduction of exotic species.

The present vegetation can be characterized as a low open kawe (Prosopis pallida) forest. Haole koa (Leucaena leucocephala) is also common as a sub-dominant member of the floral community. Ground cover is dominated by a number of introduced grasses, with ‘ilima ku kula (Sida cordifolia), cayenne vervain (Stachytarpheta urticaefolia), Koko‘olau (Bidens pilosa) and morning glory (Ipomoea indica) present. It should be noted that IARI reports the presence of one relatively large stand and several smaller stands of healthy wiliwili within the grounds of the former Barbers Point Naval Air Station which are believed to represent remnants of the native dryland forest which formerly covered much of the plain (Tuggle & Tomonari-Tuggle 1997).
Section 3: Historic Background

Section 3.1: Traditional Accounts of the 'Ewa Plain

The 'Ewa Plain is known to have been the home to a well established population in the pre-Contact period. A number of the traditions of those who resided there were recorded by early ethnographers. In the past few years, several researchers (including but not limited to: Tuggle 1997; Tuggle & Tomonari-Tuggle 1997; and McIntosh & Cleghorn 1999) have prepared documents providing information concerning the 'Ewa Plain and reviewing some of the traditional accounts of the area. The reader is referred to those documents for additional information.

Concerning the entire district, a legend associated with the naming of 'Ewa recounts:

When Kane and Kanaloa were surveying the islands they came to Oahu and when they reached Red Hill saw below them the broad plains of what is now Ewa. To mark boundaries of land they would throw a stone and where the stone fell would be the boundary line. When they saw the beautiful land lying below them, it was their thought to include as much of the flat level land as possible. They hurled the stone as far as the Waianae range and it landed somewhere in the Waimanalo section. When they went to find it, they could not locate the spot where it fell. So Ewa (strayed) became known by that name. The stone that strayed (Sterling & Summers 1978:1).

Several locations on the 'Ewa Plain are related to significant traditional legendary accounts; Kalaeloa, Kualaka'i, the Plain of Kaupe'a, Pu'uloa and Pu'u o Kapolei. Traditional accounts associated with each of these areas will be summarized below.

The arrival of breadfruit in Hawaii is said to have taken place at 'Ewa. Both Kalaeloa and Pu'uloa are traditionally associated with this event. Tuggle and Tomonari-Tuggle (1997) state that the most commonly quoted version of breadfruit’s arrival in Hawaii comes from Kamakau who describes Ka'a'i-ho'okamali'i as bringing the plant from Kahiki following a round trip originating at Kalaeloa and returning to Pu'uloa where it was planted. A second story comes from Fornander (1916-20). In it, a pair of fisherman from Pu'uloa are blown to Kanehunamoku, one of the hidden lands of the gods, where they find breadfruit. They then return to Pu'uloa with the breadfruit and plant it in what is described as a “large excavation”.

Breadfruit is also associated with Kualaka'i in the story of Namakaokapao'o (Fornander 1916-20). Namakaokapao'o was a son of Ka'uluakaha'i, a chief/god from Kahiki. Ka'uluakaha'i abandons Namakaokapao'o at Ho'ae'a, just to the east of Hono'ouliuli. Ka'uluakaha'i, however, leaves royal garments for his son in a gourd which Namakaokapao'o finds at Kualaka'i beneath a breadfruit tree said to represent his father.

Kualaka'i is also the location of a spring named Hoaka-lei (lei reflection). The spring received its name because Hi'iaka stopped there to pick lehua flowers to make a lei and saw her reflection in the waters. Tuggle and Tomonari-Tuggle report that the 1928 USGS map depicts a “waterhole” at Kualaka'i suggesting that it may in fact be Hoaka-lei.
Another locale associated with traditional accounts of the region is the Plain of Kaupe’a. The Plain of Kaupe’a was the ao hanua of Oahu, a place of homeless, wandering souls or ghosts (Kamakau 1964). According to Sterling and Summers, "the plain of Kaupea on the plain of Puuloa was where ghosts wandered to catch night moths and spiders for food. It extended from the wiliwili trees of Kaupea to Kanehili" (1978:44). The exact location and extent of the Plain of Kaupe’a is unclear. Tuggle and Tomonari-Tuggle (1997), however, have assessed the location of the area. They cite Kamakau as describing Kaupe’a as a wiliwili grove next to Pu’uloa. They go on to note that:

Kaupe’a has been taken to refer to a rather restricted location on the ‘Ewa Plain (Kelly 1991) or as the traditional term for the Ewa Plain as a whole (Johnson 1988). Kamakau uses the name, Plain of Pu’u-o-Kapolei, in a manner that indicates it is synonymous to Kaupe’a, by implication supporting Johnson’s position (Tuggle & Tomonari-Tuggle 1997:20).

Perhaps the most culturally significant locale on the ‘Ewa Plain is Pu’u o Kapolei, a hill formed by a volcanic cinder cone located at the foot of the Wai’anae Range. Pu’u o Kapolei has been described as “the spiritual vortex of the ‘Ewa Plain” (Tuggle 1997). It has also been called “one of the most famous hills in the olden days. The chant composed for games in the olden days began with the name of this hill and went on [with the place names] all around the island” (Sterling & Summers 1978:33).

Pu’u o Kapolei is listed in the Hawaii Register of Historic Places as Site 138. McAllister reported that a heiau once stood on Pu’u o Kapolei but was destroyed when the stones were used to supply a rock crusher in the 1890’s (1933:108). McAllister also indicated that there had previously been a large rock shelter on the “sea side” of the hill which was the traditional home of the pig god Kamapua’a and his grandmother, Kamaunuanio.

Pu’u o Kapolei had a special significance for Hawaiians as evidenced in the legends and traditional accounts associated with the hill. Legends relate that, following his conquest of O’ahu, Kamapua’a made his grandmother queen and installed her court at Pu’u o Kapolei. This was to compel those who were to pay tribute to bring all the necessities of life from a distance; evidence of Kamapua’a’s absolute power over all (Nakuina 1904). Nakuina relates that Pu’u o Kapolei was as desolate a place as any on the island and was equally distant from the nearest productive areas: the taro and sweet potato patches of ‘Ewa, the coastal fishing areas and the banana and sugar cane plantations of the mountain ravines. Nakuina also states that until “a very short time” before 1904, the foundations of Kamaunuanio’s house and a stone wall surrounding it could still be seen and that it was said that her grave could at one time be identified. The only explanation for the disappearance of these structures was that the rocks were removed and used for other purposes.

The Ka Loa Kalaiana newspaper in 1900 also mentions the legend of Kamapua’a and refers to the road to Wai’anae passing Pu’u o Kapolei (Sterling and Summers 1978: 33-34). I’i (1959) describes the trail via Pu’u o Kapolei as one of three ways to get to Wai’anae.

Another significant aspect of Pu’u o Kapolei is its association with astronomical observations. One of the earliest references to its association with astronomical events comes from Kamakau who discusses the use of Pu’u o Kapolei as a reference point for the setting sun.
The people of O‘ahu were said to determine the changing of the seasons based upon the point on the horizon at which the sun set in relation to the location of the pu‘u (Kamakau 1976:14). Tuggle has prepared an in depth analysis of the pu‘u’s role in astronomical observations in an unpublished paper entitled “Search for the Observation Point of O‘ahu’s Po‘e Kilo Hoku (Astronomers)” (Tuggle 1996). He summarized his own work for the journal Hawaiian Archaeology:

The association of the hill with solar movement immediately illuminates the meaning of the hill’s name and the possible significance of its temple. The name Pu‘ukapolei refers to the hill of “beloved Kapo” (Pukui et al. 1974), or to the wreath of Kapo created by the setting sun (Johnson 1988). Kapo (particularly as Kapo‘ulikina‘u) can be interpreted as the female element of the sun, a counterpart of Kāne. Kapo is directly referenced in the chants and hulas that celebrate the rising sun (e.g., Barrere et al. 1980:8; Emerson 1978:41, 45). Thus, it is proposed that Pu‘ukapolei was a temple and place of the sun, dedicated to the deity Kapo, and that it was a sacred setting for ceremonies and hula dedicated to solar events (Tuggle 1997).

Tuggle goes on to summarize the cultural order of the ‘Ewa Plain in pre-Contact times well:

For the common people who struggled for survival in this land, the ‘Ewa Plain was a place of small villages, One‘ula and Kuualakai‘i and Kalalua, and their deities were Kūlua and Lono. For the royalty of Ewa, their priests and priest-astronomers, this was the plain of Kūpe‘a and of Pu‘ukapolei; this was the plain of the sun, and their gods were Kāne and Kapo‘ulikina‘u (Tuggle 1997:21).

Section 3.2: The ‘Ewa Plain in the Early Post-Contact Period

Early ethnographic accounts (e.g. Nakuina 1904) concerning Honouliuli generally depict the ‘Ewa Plain as being a marginal area of minimal value to the Hawaiian population. The plain was reported to be sparsely populated, with no villages west of Pu‘ula and little agricultural use of the inland portions. The coast was known to contain abundant marine resources but the inland area of the plain supported only minimal plantings of banana, taro, sweet potato and ti in scattered depressions and sinkholes.

Vancouver (quoted in Handy 1940 Vol. 1, p. 83) described the ‘Ewa Plain in the 1790’s as follows:

...from the commencement of the high land to the westward of Opoorow [Pu‘ula] was ... one barren rocky waste, nearly destitute of verdure, cultivation or inhabitants, with little variation all the way to the west point of the island. Not far from the southwest point is a small grove of shabby coconuts trees, and along those shores are a few straggling fishermen’s huts...

He goes on to say that there were no villages between Pu‘ula and Wa’anal. Ellis (1969:11) gives a similar account of the ‘Ewa Plain: “Though capable of a high state of improvement, only a small portion is enclosed, or under any kind of culture; and in traveling across it, scarce a habitation is to be seen.”
In early historic times, like much of Hawai‘i, Honoluluili appears to have suffered a major population decline due to the introduction of new infectious diseases following Western Contact. The missionary census in 1831-32 recorded 1026 people in the ahupua‘a while the 1835-36 census showed only 870 inhabitants (Welch 1987). There has been speculation that during these times the lowland forests on the foothills of the Wa‘anae Range were decimated by logging and burning linked to the sandalwood trade.

The first historic land records place the lands of Honoluluili under the control of Kekau‘ono‘ilihi, a granddaughter of Kamehameha I. With the exception of the ‘ili of Pu‘uloa (which was sold to Isaac Montgomery in 1849) Kekau‘ono‘ilihi’s widower, Levi Ha‘alele‘a, inherited the lands of Honoluluili in 1851 and they were passed to his second wife, Anadelia Amoe, when he died in 1864. She deeded the lands to John Coney, her sister’s husband, who sold them to James Campbell in 1877 (Welch 1987). Campbell turned the lower portion of these lands, the ‘Ewa coral plain, into a large cattle ranch. At this stage, kiawe, which has since become the dominant plant species in the area, was planted as cattle forage.

In 1889, Campbell leased Honoluluili to Benjamin Dillingham for 50 years. Much of the area was subsequently planted in sugar cane. A railway line was built and used for hauling cane and cattle. Areas to the east of Pu‘u o Kapolei were planted in sisal, while cattle were raised in the area closer to the coast where there is little soil (Welch 1987).

A search of a representative sample of the tax maps covering all the ecological zones of the ahupua‘a showed no Land Commission Awards. However, a 1910 map of the lower portions of the Honoluluili Stream show rice lands and numerous kuleana extending over a mile inland in a belt up to a mile wide on both sides of the stream (State Survey Office Map, unnumbered) (Kennedy 1991). The 1917 USGS map of O‘ahu shows large terrace areas bordering West Loch, indicating that taro was still being grown there. These were evidently what was referred to by McAllister as the “Ewa taro lands” (Sterling & Summers 1978). A 1928 map of the same area shows the same kuleana as in the 1910 map but refers to the area as “taro land” (State Survey Office Map CS. 16-34).

In the twentieth century, the coastal areas of the ahupua‘a, which had been used to raise cattle, were taken over by several military bases and an industrial estate. The areas of the plain further inland have continued to be used for raising sugar cane. The upper slopes of the Wa‘anae Range within the ahupua‘a which had previously been used for cattle grazing are now reserved as the Honoluluili Forest Reserve. In the northern portion of the ahupua‘a, the lower slopes are used for growing pineapple.

Section 3.3: Previous Archaeological Research

Numerous archaeological investigations have been conducted in Honoluluili Ahupua‘a. Rather than individually reviewing all of these investigations in this text, ACP has compiled a complete list of all archaeological reports and plans on file at the DLNR-SHPD library, a total of 141 documents (refer to Table 1 in Appendix A). A thorough summary of many of these works may be found in PHRI’s report “Archaeological Data Recovery at West Loch Estates Residential
Increment I, and Golf Course and Shoreline Park" (Wolforth et al. 1998). Following is a brief summary of the history of archaeological investigations in the ahupua'a.

Some of the earliest archaeological recordation in the ahupua'a was conducted by McAllister (1933). He listed the whole of the plain as a single site, Site 146, noting the presence of many features, including stone walls, probably dating to the ranching period, as well as coral sinkholes and pits which could have been used for cultivation by the indigenous Hawaiian population. Handy (1940) also mentions the cultivation of crops, particularly sugar cane and bananas, in the ‘Ewa sinkholes. Two fishponds, one at Pu‘uolea (Site 142) and one off Lauaulani Island in West Loch (Site 140), a fishing shrine near West Loch (Site 139) and a destroyed heiau on Pu‘u o Kapolei (Site 138) were also mentioned by McAllister as being located on the ‘Ewa Plain.

In the northern portion of the ahupua'a, along the southeastern slopes of the Wai'anae Range, where much less archaeological work has been conducted, McAllister listed a number of sites. Two destroyed heiau, Sites 133 and 134, were located in gulches below Pu‘u Kanehoa and Mauna Kapu, both peaks in the Wai'anae Range. Also in a gulch below Mauna Kapu were several leveled off enclosures, the largest measuring 25 meters by 30 meters (Site 135). On the Wai'anae Ridge separating Honolulu from Wai'anae, McAllister notes a small coral and basalt platform, probably sacred, near Mauna Kapu (Site 136). He also notes another destroyed heiau on Pu‘u Ku‘ua in the eastern foothills of the Wai'anae Range (Site 137).

Few archaeological investigations occurred between 1933 and the early 1970's. Those which did occur were summarized by Dunn et al. (1990). These included Emory's examination of a house site and possible heiau constructed of stacked limestone slabs and uprights located on the western part of the ‘Ewa Plain. Kikuchi’s disinterment of 12 to 16 incomplete burials from a limestone sinkhole on the southwestern portion of the plain prior to the construction of the Standard oil refinery. Soehren's documentation of a sinkhole burial, house sites and modified pits at the Naval Air Station. And finally, Soehren's excavation of a possible fishing shrine at the barge harbor which identified a cultural layer containing large amounts of fish scales, dog, fish and seashell remains and a one piece rotating fishhook.

In the 1970's, with increased development of the plain, investigations became more frequent and covered larger areas. The Barbers Point deep draft harbor, West Beach/Ko Olina, the Ewa Marina Community are among the larger of the projects which began around this time. Site types included house sites, cairns, ahu, walls, pits, unmodified limestone sinkholes, walled or modified sinkholes, enclosures, C-shaped enclosures as well as human burials. A variety of cultural remains were recovered from the many sites identified including fishhooks, sinkers, fish scales and fish bones providing evidence of a marine based economy. An early assessment of the probable settlement pattern for the area was described as “dispersed clusters of residences, surrounded by a relatively open and little inhabited area” (Barrera 1975:18).

As investigations continued through the 1980's and 1990's, more sites were assessed for their age and function. Dating results indicated that most of the occupation likely dated to the latter centuries of the pre-Contact period. However, samples from some rock shelter sites
suggested initial use or occupation as early as the period of initial Polynesian settlement on O‘ahu. The patterns of settlement were found to differ somewhat from the eastern portions of the plain near West Loch to the western portions of the plain.

Data Recovery at the West Loch Estates Residential Increment I and Golf Course and Shoreline Park was conducted in 1988 and 1989 (Wolforth et al. 1998) while investigations of the lower and upper valley of Honouliuli Gulch above West Loch was undertaken in 1987 by PHRI (Dunn et al. 1990). Included among the recorded features were the remnants of a once extensive agricultural system which combined aquaculture in fishponds situated on the shores of West Loch, irrigated wet crop agriculture of the plain and dryland cultivation of the surrounding slopes and uplands. Along the shores of West Loch, radiocarbon dating results indicated use of a pondfield (Site 3324) and a habitation deposit (Site 3321) from the 10th to 17th centuries AD. The investigations within Honouliuli Gulch revealed that: (a) permanent occupation had occurred at most habitation features, (b) that upper valley occupation may have occurred as early as the mid-6th to mid-9th centuries and (c) that subsequent occupations appear to have been most intensive between the 1300’s and 1600’s and between the late 1700’s to early 1800’s (Dunn et al. 1990).

Investigations conducted in the Barbers Point/Ko Olina area have revealed that the western ‘Ewa Plain had a long initial settlement based on a high degree of marine-oriented task specialization (Dunn et al. 1990). Marine task specialization continued into latter settlements, but it seems that in the latter settlements, terrestrially oriented activities increased. This shift in activities suggests a concomitant shift from a dispersed temporary occupation to a loosely nucleated one involving extended periods of residence.
Section 4: An Assessment of Archaeological Resources 
Along the Proposed Waterline

In order to assess areas through which the proposed waterlines of the 'Ewa Nonpotable Water System will pass which may contain potential historically significant properties, ACP has prepared figures depicting the route of the waterlines and the locations of known historic properties. The first of these figures was derived from the City and County of Honolulu’s ‘Ewa Development Plan, Exhibit 3.2 and depicts the locations of known archaeological sites, historic and archaeological districts, plantation villages and an historic railway (see Figure 3). The second was derived from a figure prepared by David Tuggle and depicts the locations of known pre-Contact settlement complexes and religious structures (see Figure 4).

An analysis of these overlays shows that there are three areas through which the proposed waterlines will be passing where potentially significant historic properties may be encountered. The first is located along the southeastern coastline of the ‘Ewa Plain in the eastern portion of the One'ula Archaeological District (see Figures 3 & 4). The second is located across the central-eastern portion of the plain running along the route of an historic railway and the southern boundary of a group of plantation villages. The third and final area is located in the northwestern corner of the ‘Ewa Plain. In this location, Figure 3 shows three segments of the waterlines passing through three areas of dispersed archaeological sites while Figure 4 depicts one waterline passing between two areas of pre-Contact settlement complexes.

Because it has been determined that the proposed waterlines will pass through three areas in which there is the potential to impact significant historic properties, ACP recommends that an archaeological monitor be on site when construction activities pass through these areas. During the remainder of the project, it is recommended that an archaeological monitor be on call in the event that significant historic properties are encountered during construction activities. The proper authorities with the DLNR-SHPD have been consulted and their comments regarding sites to be avoided and proposed mitigation measures is included in Appendix B (correspondence dated April 12th, 2002; LOG NO: 29552, DOC NO: 0204EJ02).
Figure 4: Archaeological Resources on the 'Ewa Plain

From Gray, Hong, Bills, Nojima & Associates, Inc. 1997:
- Proposed Nonpotable Waterline

From Tuggle 1997: Figure 5:
- Pre-contact Hawaiian settlement complex
- Religious structure

Source: U.S.G.S. 7.5-Minute Series (Topographic) Map of the Ewa Quadrangle 1998 and Pearl Harbor Quadrangle 1999
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Appendix A

Table 1: Previous Archaeology in Honouliuli Ahupua'a
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<td>0-1744</td>
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Appendix B

Correspondence
April 12, 2002

David Bills
Gray, Hong, Bills, Nojima & Associates, Inc.
841 Bishop Street, Suite 1100
Honolulu, HI 96813-3998

Dear Mr. Bills:

SUBJECT: Chapter 6E-8 Historic Preservation Review – Comments on Preparation of Draft Environmental Assessment Ewa Non-potable Water System
Honolulu, 'Ewa, O'ahu
TME: 9.1, 9.2 various

Thank you for the opportunity to provide comment for the draft EA on the Ewa Non-potable water system. The proposed expansion of the non-potable water system is planned to facilitate the use of non-potable water and relieve the potable water supply. The expansion includes development of new distribution and transmission mains (located primarily within existing state and county right-of-ways), reservoirs and booster pumping stations.

Gray Hong, Bills Nojima & Associates have provided a general map showing the proposed infrastructure developments. Consequently we can only provide general comments on the effect that this project may have on historic sites. A review of our records indicates that there are no known historic sites within the existing right-of-ways. In general, all proposed development of transmission mains within existing roadways, streets, golf courses and parks where terrigenous soils are not underlain by Jaucus sand substrates, will have "no effect" on historic sites. These areas include those land parcels that were formerly cultivated in sugar cane, and areas where the historic preservation review process has been completed (i.e. Ewa by Gentry Residential areas, Coral Creek and Hawaii Prince Golf Course).

A segment of the ORL Railroad is present within portions of the project area extending from the Kanoa resort area to West Loch. The ORL Railroad is a significant historic site listed on the National Register of Historic Places, and should be completely avoided by all water main construction activities, including equipment and materials storage, and vehicle turnarounds.
Construction, including transmission mains, may have the potential for an "adverse effect" on historic sites in areas that are underlain with Jaukus sand deposits (along beach parks and coastal roads). In these cases, we may recommend measures to identify historic sites and mitigate any "adverse effects" on them. Such measures may include survey with subsurface testing or having a qualified archaeologist conduct on-site monitoring during all ground disturbance. In order to better advise you on what historic preservation measures, if any, will be required, we request that we be provided with copies of detailed plans as they are finalized. Our review of the plans will focus on the effects, if any, the proposed water system improvements will have on significant historic sites.

Should you have any questions about archaeology, please feel free to call Sara Collins at 692-8026 or Elaine Jourdan at 692-8027. Should you have any questions regarding the ORL, please feel free to contact Nathan Napoka at 587-0040. Should you have any questions about burial matters, please feel free to contact Kai Markell at 587-0008.

Aloha,

Don Hibbard, Administrator
State Historic Preservation Division

cc: Mr. A. Van Horn Diamond, Chair, O'ahu Island Burial Council
Mr. Kai Markell, Burial Sites Program
Nathan Napoka
May 30, 2002

Mr. Don Hibbard, Administrator
State Historic Preservation Division
Department of Land and Natural Resources
601 Kamokila Blvd, Room 553
Kapolei, Hawai'i 96707

Subject: Pre-Assessment Consultation
Ewa Nonpotable Water System
TMK 9-1 and 9-2: Ewa, Oahu, Hawai'i

Dear Mr. Hibbard:

Thank you for your correspondence of April 12, 2002 (LOG NO. 29552/DOC NO. 0204E102) regarding the subject project. We acknowledge that the following comments that have been provided to assist in our preparation of the Draft Environmental Assessment (DEA):

1. There are no known historic sites within the existing right-of-ways, and in general, the construction of facilities in terrigenous soils that are not underlain by fluvial sand substrates will not "no effect" on historic sites.

2. The OR&L Railroad is a significant historic site listed on the National Register of Historic Places and should be completely avoided by all construction activities, including equipment and materials storage and vehicle turnarounds.

3. The DEA will state that the Historic Preservation Division be consulted during the design phase to allow for more definitive preservation measures, such as onsite archaeological monitoring during ground disturbance, if required.

Please feel free to contact our office should there be any questions. Again, thank you for your participation in the environmental review process.

Very truly yours,

GRAY, HONG, BILLS, NOJIMA & ASSOCIATES, INC.

[Signature]

David B. Bills

cc: Mr. Scot Muraoaka, Board of Water Supply
    Mr. A. Van Horn Diamond, Chair, Oahu Island Burial Council
    Mr. Kai Markell, Burial Sites Program
    Mr. Joseph Kennedy, Archaeological Consultants of the Pacific
    Mr. Nathan Napoka

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B3
REDUCED IN FILE
FIGURE 1-2

NOTES:
- PROPOSED NONPOTABLE WATERLINE ALIGNMENTS AND SIZES AND FUTURE RESERVOIR SITES AND CAPACITIES ARE BASED ON PROJECTED USER LOCATION AND DEMAND, SUBJECT TO CHANGE BY BWS DURING PRELIMINARY ENGINEERING AND DESIGN STAGES.

SOURCE: CITY AND COUNTY OF HONOLULU GEOGRAPHIC INFORMATION SYSTEM (2002)
NOTES:
1. PROPOSED NONPOTABLE WATERLINE ALIGNMENTS AND SIZES AND FUTURE RESERVOIR SITES AND CAPACITIES ARE BASED ON PROJECTED USER LOCATION AND DEMAND, SUBJECT TO CHANGE BY BWS DURING PRELIMINARY ENGINEERING AND DESIGN STAGES.
2. PHASE NUMBER INDICATES START OF SERVICE.

LE WATER SYSTEM ENVIRONMENTAL ASSESSMENT
ASSIFICATION MAP

FIGURE 3-1

Gray-Hong-Nojima & Associates, Inc
CONSULTING ENGINEERS
841 Bishop Street
Suite 1100

Legend:
- KU XA
- LUELLA LEI STONY CLAY, 2-6% SLOPES
- LUELLA LEI STONY CLAY, 2-6% SLOPES
- MOLOKAI SILTY CLAY LOAM, 12-25% SLOPES, ERODED
- STONY STEEP LAND
- WAIKU SILTY CLAY, 2-6% SLOPES
- WAIKU SILTY CLAY, 0-2% SLOPES
- WAIKU SILTY CLAY, 0-2% SLOPES

Description:
- CORAL OUTCROP
- EWA SILTY CLAY LOAM, 3-6% SLOPES
- EWA SILTY CLAY LOAM, MODERATELY SHALLOW, 3-6% SLOPES
- EWA STONY SILTY CLAY, 0-2% SLOPES
- EWA STONY SILTY CLAY, 2-6% SLOPES
- HONOLU CLAY, 0-2% SLOPES
- HONOLU CLAY, 2-6% SLOPES
- KAWAHAPA CLAY LOAM, 2-6% SLOPES
- KAWAHAPA STONY CLAY LOAM, 2-6% SLOPES

True North
PEARL HARBOR
NAVY BLAST ZONE

Legend:
- KU XA
- LUELLA LEI STONY CLAY, 2-6% SLOPES
- LUELLA LEI STONY CLAY, 2-6% SLOPES
- MOLOKAI SILTY CLAY LOAM, 12-25% SLOPES, ERODED
- STONY STEEP LAND
- WAIKU SILTY CLAY, 2-6% SLOPES
- WAIKU SILTY CLAY, 0-2% SLOPES
- WAIKU SILTY CLAY, 0-2% SLOPES

Description:
- CORAL OUTCROP
- EWA SILTY CLAY LOAM, 3-6% SLOPES
- EWA SILTY CLAY LOAM, MODERATELY SHALLOW, 3-6% SLOPES
- EWA STONY SILTY CLAY, 0-2% SLOPES
- EWA STONY SILTY CLAY, 2-6% SLOPES
- HONOLU CLAY, 0-2% SLOPES
- HONOLU CLAY, 2-6% SLOPES
- KAWAHAPA CLAY LOAM, 2-6% SLOPES
- KAWAHAPA STONY CLAY LOAM, 2-6% SLOPES
NOTE:
PROPOSED NONPOTABLE WATERLINE ALIGNMENTS AND SIZES AND FUTURE RESERVOIR SITES AND CAPACITIES ARE BASED ON PROJECTED USER LOCATION AND DEMAND, SUBJECT TO CHANGE BY BWS DURING PRELIMINARY ENGINEERING AND DESIGN STAGES.

SOURCE: CITY AND COUNTY OF HONOLULU GEOGRAPHIC INFORMATION SYSTEM (2002)
FIGURE 3-8

NOTE:
PROPOSED NONPOTABLE WATERLINE ALIGNMENTS AND SIZES AND FUTURE RESERVOIR SITES AND CAPACITIES ARE BASED ON PROJECTED USER LOCATION AND DEMAND, SUBJECT TO CHANGE BY BWS DURING PRELIMINARY ENGINEERING AND DESIGN STAGES.