FINAL

Central Oahu Non-Potable Water Master Plan – Appraisal of Opportunities Report

Prepared for

Commission on Water Resource Management

Honolulu, Hawaii

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List of Abbreviations

ADC	Agribusiness Development Corporation
AE	Aqua Engineers
BMP	Best Management Practices
C&CH	Castle & Cooke Homes
CORP	Central Oahu Regional Park
CWRM	Commission on Water Resource Management
DOLE	Dole Food Company Hawaii
DOD	Department of Defense
ENV	City and County of Honolulu, Department of Environmental Services
EPA	Environmental Protection Agency
FSMA	Food Safety Modernization Act
HBWS	Honolulu Board of Water Supply
HARC	Hawaii Agriculture Research Center
HDOA	Hawaii Department of Agriculture
HDOH	Hawaii Department of Health
HDOT	Hawaii Department of Transportation
mgd	million gallons per day
PPCP	pharmaceutical and personal care products
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WUP	Water Use Permit
WWRF	Wastewater Reclamation Facility
WWTP	Wastewater Treatment Plant

Executive Summary

There has been a significant shift in land use in Central Oahu over the past 20 years. Monocrop plantation agriculture has declined significantly, leaving vast tracts of agricultural lands lying fallow. Projected future uses of these lands include diversified agriculture, biofuel production, military base expansion, and new urban developments. There is a significant non-potable water demand associated with each of these activities. Use of non-potable water sources to meet the non-potable needs of these planned activities will protect and preserve potable ground water for higher uses.

About twenty-five million gallons per day (mgd) of groundwater from the Central and Pearl Harbor Aquifer Sector Areas are currently permitted for non-potable water use. Twelve mgd are from the Wahiawa Aquifer System and 13 mgd are from the Waipahu-Waiawa Aquifer System. If alternative water sources could serve these non-potable water uses, over 25 mgd of groundwater could be preserved for future potable use.

There are numerous sources of non-potable water in the Central Oahu region, including surface water, agricultural irrigation ditches, recycled wastewater, and stormwater. Infrastructure for the production, conveyance, and distribution of non-potable water is increasing, yet in most cases development of this infrastructure is being done by separate entities and without consideration of integration. The benefits of coordinated planning and integration include optimization of water use, pollution reduction, increased environmental compliance, energy savings, shared costs, and preservation of high quality groundwater.

Recognizing the potential for a regional solution that leverages partnerships among area stakeholders, results in economies in savings and avoided costs, and provides a myriad of environmental benefits, on March 12, 2012, the Commission on Water Resource Management (CWRM) approved funding for the development of a Central Oahu Non-Potable Water Master Plan. This report presents the results of the planning process for an appraisal-level study of opportunities.

Central Oahu Non-Potable Water Master Plan Objectives

There are five key objectives of this planning study.

1. Establish a Central Oahu non-potable water advisory group comprised of key stakeholders and water experts to help guide this study.
2. Inventory current and potential sources of non-potable water in the Central Oahu area, including, but not limited to Lake Wilson, City and County of Honolulu Wahiawa Wastewater Treatment Plant (WWTP), Schofield Barracks Wastewater Reclamation Facility (WWRF), stormwater capture and reuse, Waiahole Ditch water, and existing (and future) urban wastewater systems. The inventory should assess current and potential water quantities, current and potential service areas, water quality characteristics, water service constraints, system storage and conveyance appurtenances, and any other source characteristics important to regional non-potable water master planning.
3. Identify current and future uses for non-potable water generated in the Central Oahu area, including but not limited to agricultural demands in the Kunia, Wahiawa, and North Shore areas, landscape, park, and golf course irrigation demands and other non-potable uses in the residential, military, and commercial sectors within the current and potential service areas from the sources identified above.
4. Explore options for matching the sources of non-potable water outlined in Objective 2 to meet the demands for this water indicated in Objective 3.

5. Develop a Central Oahu non-potable water master plan, which would include preliminary cost estimates of new infrastructure and operational costs.

This appraisal of non-potable water opportunities focused on the first four objectives to determine stakeholder issues, current and past planning efforts, and individual and integrated non-potable water opportunities.

Stakeholder Interviews

Interviews were conducted with key stakeholders who manage, regulate, generate, and/or use non-potable water. Section 3 discusses the interviews and the outcomes. These interviews included individuals from the following organizations:

- Commission on Water Resource Management (CWRM)
- Department of Health (HDOH)
- Department of Agriculture (HDOA)
- Agribusiness Development Corporation (ADC)
- Department of Transportation (HDOT)
- City and County of Honolulu, Department of Environmental Services (ENV)
- Honolulu Board of Water Supply (HBWS)
- Hawaii Agriculture Research Center (HARC)
- Aqua Engineers (AE)
- Castle & Cooke Homes (C&CH)
- Dole Foods Company Hawaii (DOLE)
- Department of Defense (DOD)
- Environmental Protection Agency (EPA)
- United States Geological Survey (USGS)

During the interviews, some common themes and key information emerged among the stakeholders. These outcomes are summarized below and discussed in Section 3.3.

- There is broad support for recycled water and stormwater use.
- There are concerns from potential users about recycled water and stormwater water quality.
- There are concerns about recycled water management requirements.
- Compliance with the Food Safety Modernization Act (FSMA) will be important for users of recycled water.
- Waiahole Ditch could be used to convey recycled water to certain users.
- The non-potable water demand in the Kunia Corridor exceeds current supply.
- There is a need for storage to match supply and demand.

Stakeholder Meeting

A general stakeholder meeting was conducted on October 11, 2012, to present information that was obtained during the interviews, and to solicit additional input. The same organizations outlined in the Stakeholder Interviews, participated in the general meeting. The meeting presentation is located in Appendix A. Eight key issues were identified from this discussion and are listed below. They are discussed further in Section 3.2.

- Regulatory Policy Resolution

- Public Outreach
- Cross-Regional Planning Integration
- Cost-Benefit and Funding
- Partnerships
- Supply and Demand Confirmation
- Timing and Time Constraints
- Long-term Liability

Outcomes

The stakeholder interviews and general meeting helped develop a framework for implementation opportunities by identifying non-potable water sources in Central Oahu, and current and past activities by stakeholders that could work toward integrated opportunities. These are discussed in Section 4.

The non-potable water sources that were identified include the following:

- Lake Wilson
- Schofield Barracks WWRF
- Wahiawa WWTP
- Agricultural Irrigation Ditches
- Ground Water Wells

Non-potable water activities in Central Oahu that have been included in previous planning studies or that are currently being considered are discussed briefly below and are further discussed in Section 4.2.

- **Kamehameha Highway R-1 Water Pipeline**. This pipeline was studied by the HBWS to convey recycled water from the Wahiawa WWTP to Central Oahu Regional Park.
- **Kunia Road R-1 Water Pipeline.** This pipeline is being studied by Aqua Engineers to convey recycled water from the Schofield Barracks WWRF along Kunia Road and to potentially discharge into Waiahole Ditch where the ditch crosses Kunia Road.
- **Koa Ridge Development Scalping Facility.** Castle & Cooke is considering construction of a recycled water facility in Central Oahu for its Koa Ridge Makai Development in lieu of a wastewater conveyance pipeline to the Waipahu Pump Station and eventual treatment at the Honouliuli WWTP. The recycled water would be used for irrigation in Central Oahu.
- **Stormwater**. Three Central Oahu stormwater reclamation and reuse opportunities were identified in a 2008 appraisal by the U.S. Bureau of Reclamation for the CWRM. Two opportunities were in the Mililani area and the third opportunity was at Wheeler Army Airfield.
- **Waiahole Ditch**. Waiahole Ditch traverses all of Central Oahu and is an excellent existing conveyance system for non-potable water integration.
- **Mililani WWTP.** The Mililani WWTP is an abandoned WWTP at the southern end of Mililani, adjacent to the Mililani Agricultural Park. The Mililani WWTP has a significant amount of unused tank volume that could be used for storage, treatment, or other non-potable water infrastructure.
- **Waiahole Ditch Extension.** Supply and demand will not always match, particularly during periods of heavy rainfall. Low demand during these periods will require storage of non-potable water or other type of relief. One option identified during the 2008 stormwater appraisal was to extend Waiahole Ditch via pipeline to the Ewa area, and to recharge the caprock aquifer with any excess water to mitigate saltwater intrusion and high chloride concentrations in the caprock aquifer.

Next Steps

This appraisal level study to support the development of the Central Oahu Non-Potable Water Master Plan accomplished most of the objectives established by CWRM. Based on the stakeholder interviews and stakeholder meeting, three integrated non-potable water opportunities were identified. These opportunities are listed below and described in detail in Section 5.1:

- Kunia Road R-1 Water Pipeline
- Multi-purpose Pipeline from Wahiawa WWTP to Waiahole Ditch
- Waiahole Ditch Improvements and Incentives

Leadership is needed to sustain the momentum achieved by this plan and to motivate stakeholders toward implementation of one or more of the integrated opportunities. CWRM is an obvious leader and facilitator of this process. The next steps of the Central Oahu Non-Potable Water Master Plan include three key elements:

- **Continue to Facilitate Discussion among Stakeholders.** CWRM's facilitation of communication among stakeholders is the most significant outcome of the non-potable water master planning effort to date. Continued support of this communication effort is a key role CWRM can perform throughout the planning effort. CWRM's continued facilitation should focus on the following aspects of stakeholder support and involvement:
  - Develop a process for information exchange
  - Support Outreach to an Expanded Group of Stakeholders
  - Support Regulatory Policy Changes
  - Develop a Demonstration Project for Recycled Water Use
- **Refine Non-Potable Water Supply and Demand Estimates** – Estimates of non-potable water supply and demand need to be refined and the development of these estimates should be coordinated with the HBWS Watershed Management Plans.
- **Identify and Refine Preferred Opportunities for Non-Potable Water Use.** The three opportunities identified in Section 5.1 are preliminary and need additional refinement to determine their feasibility. Refinement should include pipeline size and length, improvements to existing infrastructure, additional infrastructure (e.g., pumping stations and storage), and interconnections among existing non-potable water sources. The following additional evaluations of the opportunities should be performed:
  - Conduct preliminary benefit-cost analysis for selected opportunities
  - Make recommendations for implementation of preferred opportunities

The recommended next steps for the Central Oahu Non-potable Water Master Plan are discussed in Section 5.2.

Section 1

Introduction

There have been significant shifts in land use on Oahu during the past 20 years. Monocrop agriculture of sugar cane and pineapple have disappeared entirely or declined, while residential and commercial developments have increased. The volume of water transferred from the Windward to the Leeward side of Oahu through Waiahole Ditch has decreased dramatically, resulting in a reduction of water for existing agriculture lands and also in a reduction in groundwater recharge. Though there is considerable agricultural land in the Kunia Corridor, most of it lies fallow due to water availability, market conditions, and agricultural practices, such as crop rotation.

Oahu's potable water comes almost exclusively from high quality groundwater. This same groundwater also serves as a source for non-potable water demands. Twenty-five million mgd of groundwater from the Central and Pearl Harbor Aquifer Sector Areas are currently permitted for non-potable water use. Twelve mgd are from the Wahiawa Aquifer System and 13 mgd are from the Waipahu-Waiawa Aquifer System. If alternative water sources could serve these non-potable water uses, over 25 mgd of groundwater could be preserved for future potable use. Alternative non-potable water sources could also reduce costs of pumping and conveyance, and conserve electricity.

Potential non-potable water sources are increasing and have been identified in Central Oahu. The Schofield Barracks WWRF is capable of producing approximately 2.0 mgd of R-1 water, the highest quality of recycled water. The Wahiawa WWWTP is currently being upgraded to provide new technology to produce approximately 2.5 mgd of R-1 water. Both treatment facilities discharge currently either directly or indirectly into the Wahiawa Irrigation System which provides irrigation for agriculture on the North Shore.

Central Oahu's existing non-potable water supply comes from three major sources: Lake Wilson (i.e., Wahiawa Reservoir), Waiahole Ditch, and groundwater wells, some of which do not meet drinking water standards and are not suitable for potable water use. These sources are not integrated and work independently of one another. Integration of these sources could help balance non-potable water supply and demand throughout Central Oahu, and also reduce reliance on high quality groundwater for non-potable water uses.

In 2008, the CWRM, through funding from the U.S. Bureau of Reclamation, conducted a state-wide appraisal of stormwater reclamation and reuse. Opportunities in Central Oahu were identified as part of the appraisal. Reclamation and reuse of stormwater not only provides an alternative non-potable water supply, it also can reduce sediment load to Oahu's near-shore waters. Surface water runoff is the most significant source of pollution to Oahu's coastline. Stormwater regulations are expected to increase in the near future focusing more on reducing runoff and increasing treatment, rather than the best management practices (BMP) approach that is currently used.

Infrastructure for the production, conveyance, and distribution of non-potable water is increasing, yet in most cases development of this infrastructure is being done by separate entities and without consideration of integration. The benefits of coordinated planning and integration include optimization of water use, pollution reduction, increased environmental compliance, energy savings, shared costs, and preservation of high quality groundwater.

Recognizing the need for greater coordination to explore opportunities for the development and integration of alternative non-potable sources, on March 12, 2012, CWRM approved funding for the

development of a Central Oahu Non-Potable Water Master Plan. This report presents the results of the planning process for the initial appraisal level study.

1.1 Plan Objectives

There are five key objectives of this planning study.

1. Establish a Central Oahu non-potable water advisory group comprised of key stakeholders and water experts to help guide this study.
2. Inventory current and potential sources of non-potable water in the Central Oahu area, including, but not limited to Lake Wilson, City and County of Honolulu Wahiawa WWTP, Schofield Barracks WWRF, stormwater capture and reuse, Waiahole Ditch water, and existing (and future) urban wastewater systems. The inventory should assess current and potential water quantities, current and potential service areas, water quality characteristics, water service constraints, system storage and conveyance appurtenances, and any other source characteristics important to regional non-potable water master planning.
3. Identify current and future uses for non-potable water generated in the Central Oahu area, including but not limited to agricultural demands in the Kunia, Wahiawa, and North Shore areas, landscape, park, and golf course irrigation demands and other non-potable uses in the residential, military, and commercial sectors within the current and potential service areas from the sources identified above.
4. Explore options for matching the sources of non-potable water outlined in Objective 2 to meet the demands for this water indicated in Objective 3.
5. Develop a Central Oahu non-potable water master plan which would include preliminary cost estimates of new infrastructure and operational costs.

This appraisal of non-potable water opportunities focused on the first four objectives to determine stakeholder issues, current and past planning efforts, and individual and integrated non-potable water opportunities.

1.2 Stakeholder Involvement

Stakeholder involvement is a key element of developing a non-potable water master plan. It is important to engage potential stakeholders as a means of assessing interest, support, and roles in managing non-potable water in Central Oahu. The following list of stakeholders was developed to interview in the planning effort:

- Commission on Water Resource Management (CWRM)
- Department of Health (HDOH)
- Department of Agriculture (HDOA)
- Agribusiness Development Corporation (ADC)
- Department of Transportation (HDOT)
- City and County of Honolulu, Department of Environmental Services (ENV)
- Honolulu Board of Water Supply (HBWS)
- Hawaii Agriculture Research Center (HARC)
- Aqua Engineers (AE)
- Castle & Cooke Homes (C&CH)
- Dole Food Company Hawaii (DOLE)
- Department of Defense (DOD)
- Environmental Protection Agency (EPA)

- United States Geological Survey (USGS)

Goals of the stakeholder interviews and meeting were to:

- Collect information related to regulatory issues, projects, and potential users to assess non-potable water integration and use.
- Develop planning level non-potable water use project opportunities that can be used to obtain political, administrative, and financial support for implementation.

1.3 Progress

The results of the stakeholder interviews and the general stakeholder meeting provided information and outcomes that met many of the objectives of the non-potable water master plan. The stakeholders clearly provided insight into technical, regulatory, and perception issues that both support and detract from certain non-potable water use. Several stakeholder planning initiatives that pertain to non-potable water were also identified that could lead to early implementation and more effective integration of opportunities.

This report is organized into the following sections:

- Section 2 provides a summary of the interview process and the key outcomes.
- Section 3 provides a summary of the general stakeholder meeting and discussion.
- Section 4 identifies non-potable water sources and implementation opportunities.
- Section 5 summarizes some integrated opportunities and recommends next steps for sustaining the momentum toward implementation of these and other opportunities.

Section 2

Stakeholder Interviews

Interviews with 13 stakeholder organizations were conducted during August and September, 2012. The stakeholder organizations were selected because they manage non-potable water sources, use non-potable water, have regulatory authority over water programs, and/or represent the interests of existing and potential users of non-potable water. The number of potential stakeholders is larger than the organizations interviewed.

2.1 Interview Participants

The stakeholder organizations and the interviewees of the respective organizations are listed in Table 2-1. A summary of the interviews is provided in the Stakeholder Summaries in Appendix B.

2.2 Interview Objectives

The objectives of the interviews were to gain insight on the following:

- How would increased use/integrated use of non-potable water benefit the stakeholder?
- What are the key issues/concerns a stakeholder has about non-potable water use?
- What concerns would users or customers have regarding non-potable water use?
- Does the stakeholder operate/manage/control non-potable water sources? If so, identify them.
- Does the stakeholder own or control infrastructure that could be used for non-potable water use or integration?
- Does the stakeholder have on-going projects that would benefit from expanded use of non-potable water or that could be reduced or eliminated by integration of non-potable water sources?
- What are relative costs for business activities (e.g., cost to develop a new water source; cost to expand treatment, etc.)?
- What resources could the stakeholder offer?
- What role could the stakeholder perform?

2.3 Key Interview Outcomes

As stated previously, summaries of the individual interviews are presented in Appendix B. During the interviews, some common themes and key information emerged among the stakeholders. These outcomes are discussed below.

- **There is broad support for recycled water and stormwater use.** Recycled water is widely recognized as a viable non-potable water source and its use is encouraged and advocated by federal and state agencies. The USEPA, DOH, DOA, and CWRM all support use of non-potable water for irrigation. It is also accepted in principle by users in the agricultural community, but concerns about water quality (discussed below) exist. Stormwater reclamation and reuse opportunities are less widely known, but also accepted in principle as a non-potable water source.
- **There are concerns from potential users about recycled water and stormwater water quality.** Despite the current and potential use of recycled water as a non-potable water source, there are concerns about the use of recycled water for certain applications. The Department of *Health's*

Guidelines for the Treatment and Use of Recycled Water permit the application of R-1 water, the highest quality of recycled water, for all uses, including food crops with edible portions that come in direct contact with the water. Based on the interviews, some potential users are not fully aware of this permitted use. This uncertainty points to a need for more outreach to the agricultural community, and perhaps also to the general public, about recycled water quality, its benefits, and permitted uses. An important consideration and message for the public outreach program is to communicate that much of the mainland grown produce (e.g., lettuce, salad vegetables) sold in "big box" stores in Hawaii is presently irrigated with recycled water in Monterey County, California.

Emerging contaminants of concern also worry potential users of recycled water. The long-term impact of some of these contaminants is unknown. The Department of Health is initiating a monitoring program of groundwater, recycled water, and stormwater to determine the potential for pharmaceutical and personal care products (PPCP).

Though recycled water use can be expanded to include all agriculture, agricultural stakeholders pointed out that potable water is still required for certain agricultural production activities. Even if recycled water is fully accepted for irrigation use, product washing will require potable water.

- **There are concerns about recycled water management requirements.** The HDOH *Guidelines for the Treatment and Use of Recycled Water* includes management requirements such as buffer areas, employee safety, and application rates. These requirements result in additional work for agricultural interests and are of particular concern for small growers. The HDOH has taken efforts to simplify the paperwork associated with these requirements and wants to work with users to facilitate compliance.
- **Compliance with the Food Safety Modernization Act (FSMA) will be important for users of recycled water.** The FSMA was signed into law in January 2011. The Food and Drug Administration (FDA) recently released proposed rules for the implementation of the Act. The focus of the Act is prevention of food-borne illnesses. The Act will require food facilities to assess their operations and take actions to prevent contamination. The draft rules should be reviewed for any specific mention of recycled water use, and any concerns about a potential connection between recycled water quality and food contamination that may arise should be further evaluated. Large-scale Mainland food producers are already anticipating the future rules and are conducting audits to ensure compliance. As stated previously, some of the largest producers use recycled water for irrigation and audits are not resulting in issues.
- **Waiahole Ditch could be used to convey recycled water to certain users.** Since there are some concerns about recycled water quality by the agricultural community, full use of Waiahole Ditch for conveying recycled water is not possible at this time. Waiahole Ditch users downstream of the Kunia Road crossing over the ditch presently grow non-edible food crops (e.g., seed corn). The addition of recycled water into Waiahole Ditch at this point would augment non-potable water supply and allow recycled water use for agricultural irrigation.
- **The non-potable water demand in the Kunia Corridor exceeds current supply.** The Kunia Corridor has an estimated water demand of at least 16 mgd. Waiahole Ditch has a current permitted use of 12.7 mgd and a capacity of about 50 mgd. Approximately 3 mgd of Waiahole Ditch water is permitted for use before it reaches the Kunia Corridor. Both recycled water and stormwater could be used to help meet the additional demand in the Kunia Corridor by conveyance via Waiahole Ditch or by a direct pipeline down Kunia Road.
- **There is a need for storage to match supply and demand**. Recycled water from the Schofield Barracks WWRF and the Wahiawa WWTP are reliable, drought proof sources of non-potable water. In the event of heavy rainfall in Central Oahu, the supply of recycled water and stormwater will exceed demand. When this occurs, alternative means of storage or disposal of recycled water will be needed. Storage is the preferred alternative.

Table 2-1. Stakeholders

Stakeholder	Business Relationship to Planning	Participants	Date of Interview
Agribusiness Development Corporation	Acquires and manages selected high-value lands, water systems for commercial agricultural use and to direct research in partnership with farmers, ranchers, and aquaculture groups.	Jimmy Nakatani Ivan Kawamoto	September 13, 2012
Aqua Engineers	Provides water and wastewater operations and maintenance services to federal and private organizations, including operation of the Schofield Barracks Wastewater Reclamation Facility.	Sheldon Hunt Hugh Strom	September 19, 2012
Castle & Cooke	Castle & Cooke develops residential and commercial property.	Garret Matsunami	September 18, 2012
Dole Food Company Hawaii	Dole Corporation has major agricultural interests in Central Oahu.	Dan Nellis Barbara Awo Gary Paracuelles	September 11, 2012
Hawaii Department of Agriculture	Through its Agricultural Resource Management Division, the department operates the State's Agricultural Park Program. The major objective of this program is to assist people who are interested in leasing land for farming ventures by providing irrigation water, reasonably priced farmland with infrastructure and facilities to encourage competition within the industry.	Scott Enright Brian Kau	September 21, 2012
Hawaii Department of Health	State regulatory authority for promulgating and enforcing regulations pertaining to drinking water, wastewater treatment, stormwater, and water quality compliance.	Gary Gill Joanna Seto Dan Chang Sina Pruder Marshall Lum	September 11, 2012
Hawaii Department of Transportation	HDOT administers and maintains Hawaii's highway system.	Alvin Takeshita Kelly Sato	September 13, 2012
City and County of Honolulu Department of Environmental Services	ENV programs can benefit from potential non-potable water reuse opportunities that will reduce stormwater discharges to near-shore waters. ENV operates the Wahiawa and Honouliuli Wastewater Treatment Plants that are located in Central Oahu.	Tim Steinberger	September 28, 2012
U.S. Environmental Protection Agency	Federal agency responsible for promulgation and enforcement of environmental regulations.	Susan Polanco Cheryl McGovern	September 14, 2012
Hawaii Agriculture Research Center	Researches and applies science and technology to achieve solutions and to identify new agricultural opportunities to support a viable agricultural sector in Hawaii.	Stephanie Whalen	August 28, 2012
Honolulu Board of Water Supply	Manages Oahu's municipal water resources and distribution system to comply with state and federal safe drinking water regulations. HBWS also owns the Honouliuli Water Recycling Facility that provides R-1 quality recycled water for irrigation, and reverse osmosis water for industrial uses.	Barry Usagawa	September 17, 2012
U.S. Army Garrison Department of Public Works	Administers public works activities at Wheeler Army Airfield and Schofield Barracks in Central Oahu.	Trey Maddox	September 19, 2012
U.S. Geological Survey	A scientific organization that provides impartial information on the health of ecosystems and the environment, the natural hazards that threaten them, natural resources, the impacts of climate and land-use change, and the core science systems that help provide timely, relevant, and useable information.	Stephen Anthony	September 17, 2012

Section 3

General Stakeholder Meeting

A general stakeholder meeting was conducted on October 11, 2012, to present information that was obtained during the interviews, and to solicit additional input.

3.1 Meeting Participants

The stakeholder organizations and meeting participants are listed in Table 3-1. The organizations that participated in the meeting included many of same parties interviewed as part of the initial stakeholder meetings. In several cases, the meeting attendees differed from the interview participants.

Table 3-1. Stakeholder Meeting Attendees

Stakeholder	Participants
Agribusiness Development Corporation	Ivan Kawamoto
Aqua Engineers	Sheldon Hunt Hugh Strom
Castle & Cooke	Garret Matsunami
Dole Food Company Hawaii	Dan Nellis
Hawaii Department of Agriculture	Scott Enright
Hawaii Department of Health	Dan Chang Sina Pruder Joanna Seto Alec Wong
Hawaii Department of Transportation	Rodney Gerard
City and County of Honolulu Department of Environmental Services	Jack Pobuk
Hawaii Agriculture Research Center	Stephanie Whalen
Honolulu Board of Water Supply	Barry Usagawa
U.S. Army Garrison Department of Public Works	Shane Bourke Tessa Burge Alvin Chan Trey Maddox
U.S. Geological Survey	Stephen Anthony

3.2 Meeting Presentation and Discussion

A presentation was provided to stakeholders during the meeting. The presentation provided background information on non-potable water use in Hawaii and on the Mainland, regulatory considerations, a summary of the stakeholder interviews, and conceptual non-potable water scenarios. The presentation slides are provided in Appendix A

Stakeholder discussion was documented and is summarized in Appendix C. Eight key issues were identified from this discussion and are summarized below.

Regulatory Policy Resolution. Stakeholders expressed concern about several regulatory policy issues. The HDOH is beginning a monitoring program of groundwater, wastewater, and stormwater water sources. The purpose of this monitoring is to establish a baseline of certain contaminants of concern including PPCP and pesticides. Some stakeholders expressed concern about the purpose of the monitoring and the implications of the results, particularly since the HBWS 2005 assessment of recycled water showed the aquifers would not be affected by R-1 recycled water irrigation.

A need to update the reuse guidelines was also discussed. A key consideration for the update is the significant change in technology that has evolved since the guidelines were written. Membrane bioreactor (MBR) technology that is being used at the Schofield Barracks WWRF and the Wahiawa WWTP is more advanced than the technology used at the Honouliuli WWRF. The Honouliuli WWRF was the largest producer and conveyor of recycled water at the time the guidelines were written. Though the Honouliuli WWRF meets the requirements for R-1 quality recycled water quality, the gravity filtration system used does not present the same bacterial barrier that membranes used in the MBR technology offer. The MBR systems have a pore size that prevent bacteria and many viruses from passing into the recycled water. Revising and updating the recycled water guidelines to recognize this protective barrier, particularly with regard to disinfection, could help reduce capital and operating costs while maintaining the same recycled water quality.

Public Outreach. A progression of outreach from user to customer (e.g., wholesaler, retailer, and public) is needed to educate all parties about the use of recycled water. Though HDOH approves the use of R-1 recycled water on all crops, including edible portions, there is a general lack of information, and perhaps misinformation about its successful use and acceptability on the Mainland. Much of the produce grown on the Mainland and sold in "big box" stores on Oahu was irrigated with recycled water in the Salinas Valley of California, where a food safety study for recycled water was conducted by Monterey County Water Resources Agency and the Monterey Regional Water Quality Control Plant.

Cross-Regional Planning Integration. The HBWS is currently developing a North Shore Watershed Management Plan and will soon initiate development of a Central Oahu Watershed Management Plan that will consider both potable and non-potable water use in the respective regions. Coordination of this non-potable water master plan, the watershed management plans, and stakeholder project planning is necessary and could result in systems integration, public acceptance, and leveraged funding. The general stakeholder meeting identified opportunities suitable for integrated planning and coordination. These opportunities are discussed individually in Section 4.

Cost-Benefit and Funding. Funding for non-potable water resources and integration of these sources is required for successful implementation and expansion. Funding must cover capital costs of infrastructure and operating costs of treating and purveying the non-potable water. Funding will depend on the benefit the opportunity provides. Benefits can take many forms: additional water for agricultural irrigation; reduced energy use associated with pumping of groundwater; and reduced costs associated with reusing stormwater as opposed to treating prior to discharge to Oahu's inland and near-shore marine waters. Economic and non-economic benefits need to be weighed against the cost of implementation. Historically costs have been borne by single organizations. Thorough assessment of the full range of benefits to stakeholders can justify cost-sharing either through direct funding or in-kind services.

Partnerships. Different organizations and agencies produce, use, and regulate non-potable water. Successful development and integration of opportunities can more readily be accomplished and optimized by coordination of activities among these organizations. Partnerships that could share in the

development, capital and operating costs, and support services could leverage limited resources of a single organization to achieve sufficient resources among several organizations.

Supply and Demand Confirmation. Some concern was expressed about the demand for increased non-potable water use in Central Oahu. Preliminary estimates (see Table 4-2) suggest supply might exceed demand. These estimates however do not consider the long-term potential for increased non-potable water demand for expansion of existing agriculture and for new uses such as biofuel production. Further determinations of non-potable water supply and demand need to be made for Central Oahu as well as for the North Shore region, which currently receives the discharges from the Wahiawa and Schofield treatment facilities.

Timing and Time Constraints. Some stakeholders have planning efforts underway that do not consider the potential integration of non-potable water sources and use. As they progress with their plans and projects, opportunities for integration and optimal use of non-potable water might be lost. As an example, the Castle & Cooke's decision to convey wastewater to the Honouliuli WWTP or to construct a scalping facility will depend to some extent on regulatory policy resolution, possible use of the Mililani WWTP as a scalping facility site, and potential partnerships to convey and use recycled water in the future.

Long-term Liability. Since there are unknowns about recycled water and stormwater quality, concern was expressed about the liability (e.g., responsible party) if contamination of land or groundwater is determined at some point in the future. It was stated that historically some parties have followed the regulations in place at the time, and then become liable for environmental issues associated with new regulations.

Section 4

Outcomes

The key outcomes of the non-potable water master planning process are discussed in this section. They include non-potable water sources, non-potable water implementation opportunities, and non-potable water supply and demand.

4.1 Non-Potable Water Sources

There are several existing and potential sources of non-potable water in the Wahiawa-Mililani-Kunia region. These sources are discussed below.

Lake Wilson. Lake Wilson (also known as Wahiawa Reservoir) is fed from the North and South Forks of Kaukonahua Stream that descend from the Koolau Mountains. Urban stormwater from municipal drainage systems and runoff from surrounding agricultural, military, and urban lands also feed into the lake. The City and County of Honolulu's Wahiawa WWTP also discharges into the lake. Since the Wahiawa WWTP currently produces only R-2 recycled water, the entire lake, its discharge into Kaukonahoa Stream, and the water conveyed by the Wahiawa Irrigation System are designated R-2 water.

Lake Wilson has a current capacity of 2.5 billion gallons. The daily pass through flow is estimated to be about 36 mgd. Currently, a portion of the outflow from the lake is combined with R-1 water from the Schofield Wastewater Treatment Plan to feed Dole's Wahiawa Irrigation System. This system supplies water for agricultural activity in the Mokuleia-Wailua-Haleiwa region. Water not used for irrigation is discharged to Kaukonahua Stream.

Schofield Barracks WWRF. Aqua Engineers operates the Schofield WWRF under a lease with the U.S. Army. The MBR facility is designed to be a 4.2 mgd facility. Current flows are approximately 2.2 mgd, but are expected to increase to about 3 mgd due to base expansion and returning troops. The recycled water is currently designated as R-2 water pending validation of its ultraviolent disinfection system. The R-2 water is discharged into the Wahiawa Irrigation System. The current discharge into the Wahiawa Irrigation System has a regulatory impact of designating all water in the Wahiawa Irrigation System as R-2, including compliance with the requirements associated with that designation.

Funding was recently granted through a congressional appropriation to construct a pipeline to the Leilehua Golf Course. There are plans to increase the use of R-1 water on base. However, after satisfying the Army's commitment of 1 mgd, there will still be about 2 mgd of R-1 water available for other uses. Figure 4-1 shows the location of the Schofield Barracks WWRF.

Wahiawa WWTP. The City & County of Honolulu's Wahiawa WWTP discharges R-2 water into Lake Wilson. Although the effluent is being treated to the highest tertiary level, the water is considered R-2 due to the lack of storage or alternative disposal of treated effluent that does not meet R-1 quality. Under current plans, the Wahiawa WWTP will be modified to an MBR system and will be capable of producing consistent high quality recycled water. The plant has a design capacity of 2.49 mgd. The average flow is approximately 2 mgd. The current use of Lake Wilson water in the Wahiawa Irrigation System has a regulatory impact of designating all water in the Wahiawa Irrigation System as R-2, including compliance with the requirements associated with that designation. Figure 4-1 shows the location of the Wahiawa WWTP.

Agricultural Irrigation Ditches. There are two major irrigation ditches that are located in the Central Oahu area. The Waiahole Ditch has a capacity of 50 mgd and currently transports about 13 mgd from windward Oahu high-level tunnels to serve agriculture and other uses along its alignment in Mililani and the Kunia Road corridor. The ditch system terminates in Kunia. The Wahiawa Irrigation System (sometimes referred to as the Dole Ditch) receives its water from Lake Wilson and the indirect discharge of the Wahiawa WWTP. The Dole Ditch currently receives approximately 20 mgd, but has historically conveyed up to 40 mgd. The ditch system also receives the direct discharge of recycled water from the Schofield Barracks WWRF. Figure 4-1 shows the location of both the Dole and Waiahole Ditches.

Ground Water Wells. Several non-potable water wells provide water for irrigation in Central Oahu. These include Waipio Heights Wells II that irrigates the Central Oahu Regional Park (CORP), and Kunia Well 1 that irrigates land in the Kunia area. Both of these wells are contaminated with chemicals from historical agricultural practices and are not presently suitable for potable use, but could be with proper treatment. Increased use of non-potable water from other alternative sources could possibly eliminate the use of these wells and other higher quality ground water sources.

4.2 Non-Potable Water Implementation Opportunities

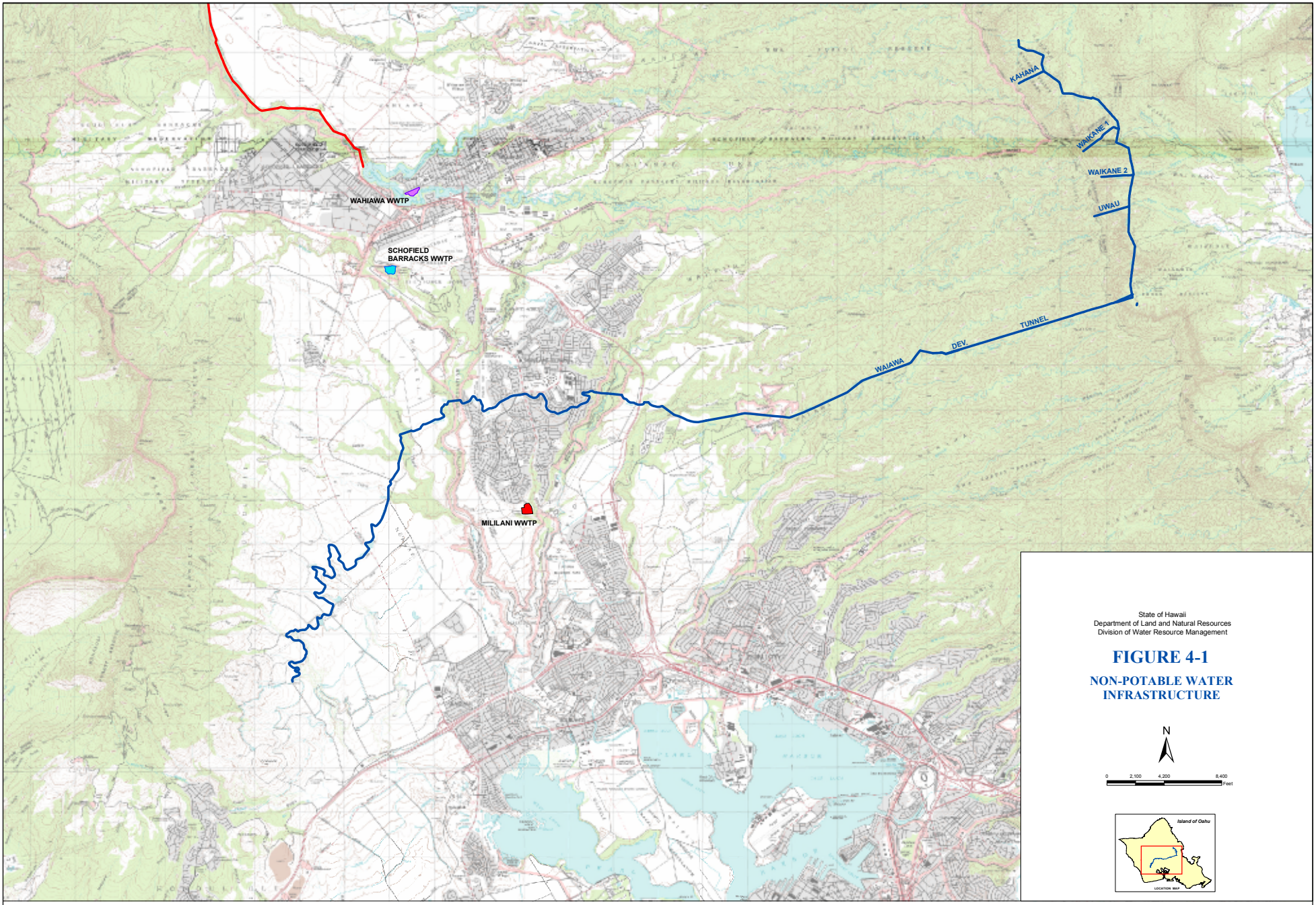
During the interviews and general stakeholder meeting, several potential implementation and/or integration opportunities were identified. Some of these opportunities were identified in previous planning efforts or are under current consideration for implementation.

Kamehameha Highway R-1 Water Pipeline. The Honolulu Board of Water Supply conducted a recycled water application study at Central Oahu Regional Park (CORP) to assess the potential impact of recycled water on the potable water aquifer. The study showed that treatment through the soil removed trace organics, nutrients, and other constituents of concern. As a result, HBWS conducted a preliminary engineering study for a recycled water pipeline from the Wahiawa WWTP to CORP. The pipeline could have also served Mililani Golf Course, Mililani Agricultural Park, and Mililani District Park, as well as other greenspace in the area. The pipeline would have had to cross Waiahole Ditch and could have provided recycled water for users of that system also. The estimated cost of the pipeline was $19 million, and was not deemed cost effective to construct. Figure 4-2 shows the Kamehameha Highway R-1 Water Pipeline concept schematically. Figure 4-3 shows the proposed route.

Kunia Road R-1 Water Pipeline. There are approximately 12,000 irrigable acres with a demand of approximately 16 mgd in the Kunia Corridor that extends on both sides of Kunia Road running south. Some of this land is served by Waiahole Ditch and some by wells. The Schofield Barracks WWRF is located near the northern end of Kunia Road. Aqua Engineers is considering building an R-1 water pipeline that would extend from the Schofield Barracks WWRF to the point where Waiahole Ditch crosses Kunia Road. This pipeline would provide recycled water for irrigation of lands in the Kunia Corridor that currently do not have water use permits. Figure 4-2 shows the Kunia Road R-1 Water Pipeline concept schematically. Figure 4-3 shows the proposed route. This pipeline also has other potential advantages including:

- Conveyance for stormwater from Wheeler Army Airfield for irrigation use in the Kunia Corridor;
- Conveyance of Wahiawa WWTP R-1 water to users in the Kunia Corridor; and
- Providing excess recycled water into Waiahole Ditch for use by current crop growers southwest of Kunia Road.

Similar to the Kamehameha Highway R-1 Water Pipeline discussed above, it might not be cost effective to build a pipeline that would only convey recycled water from the Schofield Barracks WWRF. Combining the Schofield Barracks WWRF with Wahiawa WWTP R-1 water and possibly supplementing the flow with Lake Wilson water increases the cost-effectiveness of the pipeline.


KAHANA
WAIKANE 1
WAIKANE 2
UWAU
WAHIAWA WWTP
SCHOFIELD BARRACKS WWTP
WAIAWA DEV. TUNNEL
MILILANI WWTP
State of Hawaii
Department of Land and Natural Resources
Division of Water Resource Management
FIGURE 4-1
NON-POTABLE WATER INFRASTRUCTURE
N
0 2,100 4,200 8,400 Feet
Island of Oahu
LOCATION MAP
LEGEND
WAIAHOLE DITCH
WAHIAWA IRRIGATION DITCH

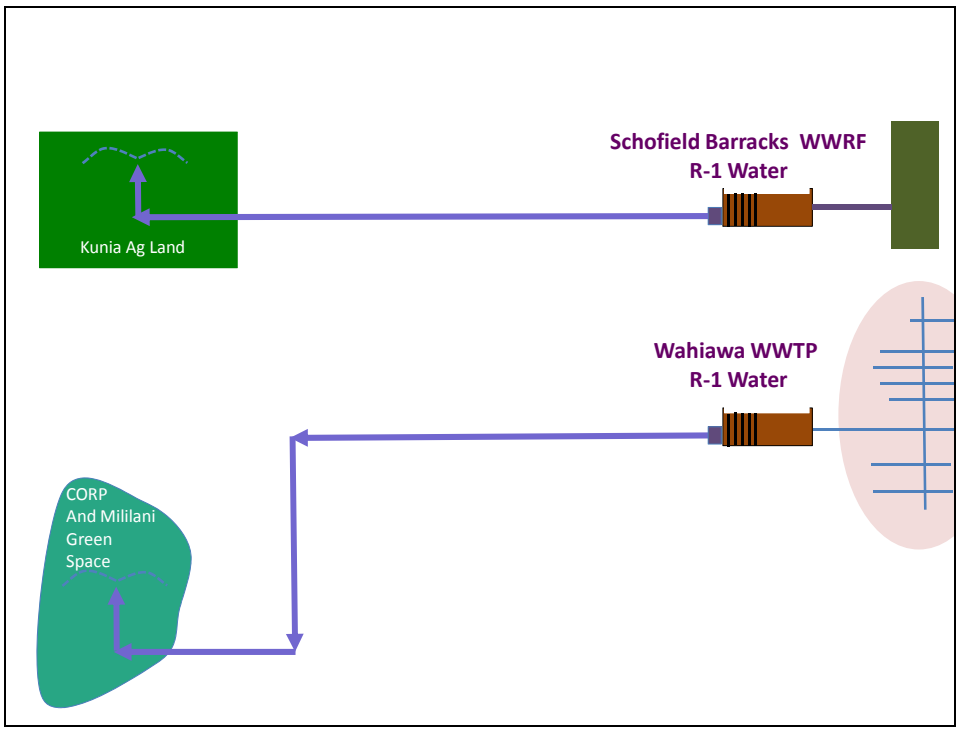
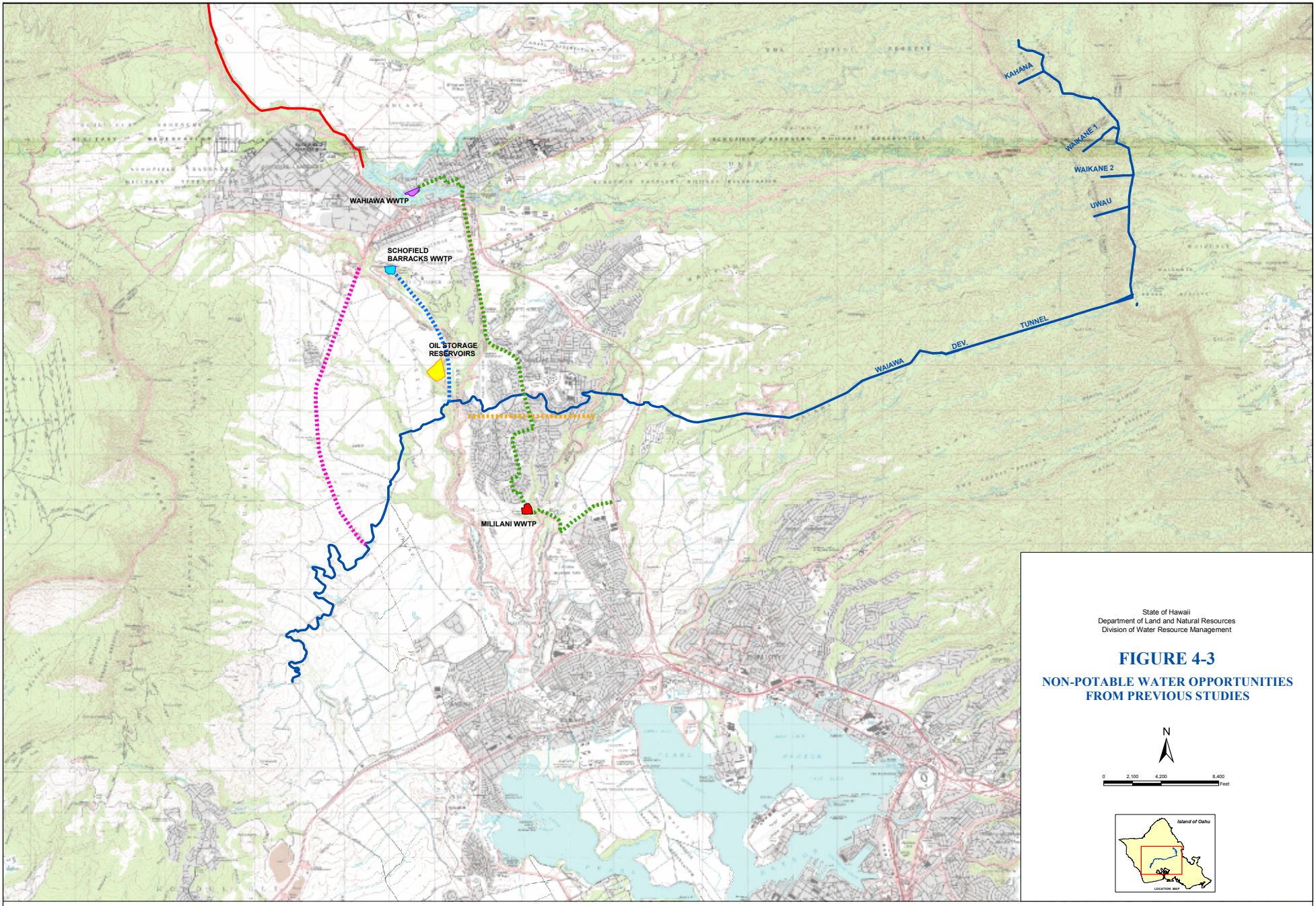


Figure 4-2. Conceptual Schematic of Kunia Road and Kamehameha Highway R-1 Water Pipelines

Koa Ridge Development Scalping Facility. Castle & Cooke Homes is seeking approval to build a 5,000 home residential and commercial development known as Koa Ridge Makai. This development is located in Central Oahu along the H-2 corridor. Construction of a new wastewater conveyance pipeline from the development to a pump station for ultimate treatment at the Honouliuli WWTP would cost approximately $40 million. Alternatively, Castle & Cooke is considering construction of a "scalping facility" that would treat wastewater to R-1 quality for use in the Central Oahu area, particularly CORP. The recycled water could also serve Mililani Golf Course, Mililani District Park, and Waikele Golf Course. The abandoned Mililani WWTP would be considered as a location for the scalping facility, with any solids removed or generated during the treatment process to be discharged to the existing wastewater collection system for treatment at the Honouliuli WWTP. Since this facility would provide recycled water to the same users, it would supplant the previously proposed Kamehameha Highway R-1 Water Pipeline and open the potential of combining Wahiawa WWTP recycled water as part of the Kunia Road R-1 Water Pipeline, thereby making the latter pipeline more cost-effective. There are two phases of the Koa Ridge development: Koa Ridge Makai and Koa Ridge Mauka. Each phase is estimated to generate approximately 3 mgd of wastewater, which could be treated to R-1 quality recycled water. Figure 4-4 shows the Koa Ridge scalping facility concept schematically, and how R-1 water from the Wahiawa WWTP could be used in the Kunia area in conjunction with the Schofield Barracks WWRF R-1 water. Figure 4-5 shows the possible location of the facility at the abandoned Mililani WWTP, and the area it could serve.



State of Hawaii
Department of Land and Natural Resources
Division of Water Resource Management

FIGURE 4-3

NON-POTABLE WATER OPPORTUNITIES FROM PREVIOUS STUDIES

LEGEND

- WAIAHOLE DITCH
- WAHIAWA IRRIGATION DITCH
- KUNIA ROAD R-1 WATER PIPELINE
- WHEELER ARMY AIR FORCE BASE STORMWATER PIPELINE
- MILILANI STORMWATER COLLECTION SYSTEM
- KAMEHAMEHA HIGHWAY R-1 PIPELINE

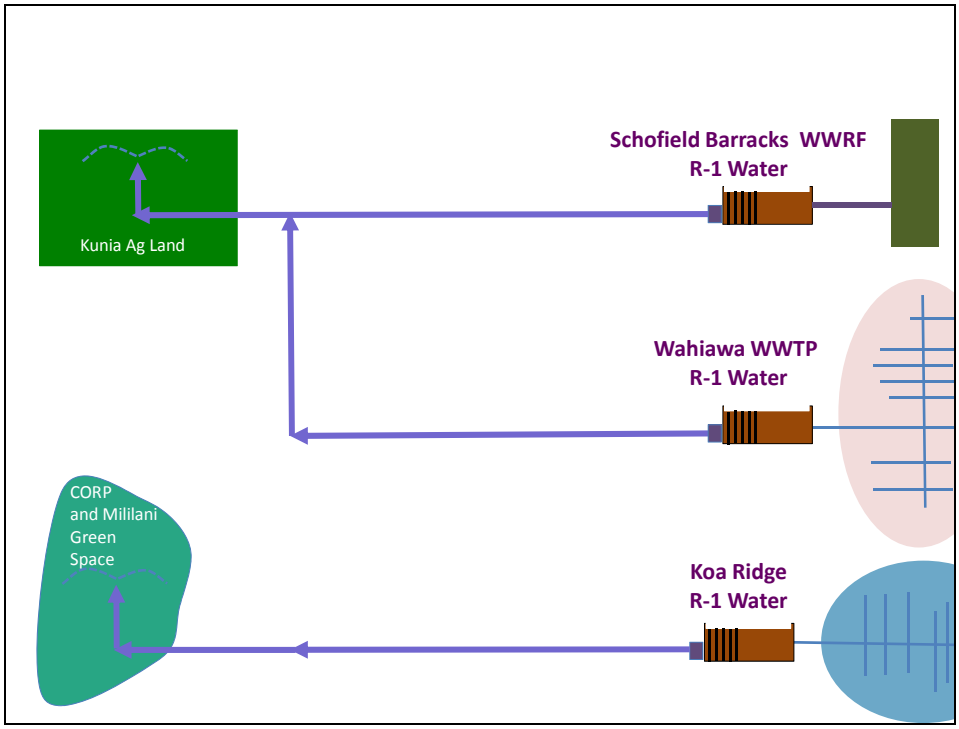


Figure 4-4. Integration of R-1 Water from a Koa Ridge Scalping Facility

Stormwater. In 2008, the Commission completed an appraisal-level study of large-scale stormwater reclamation and reuse opportunities statewide. Three opportunities were identified in Central Oahu. Two of the opportunities involve collection and reuse from the residential/commercial areas of Mililani, and one involves collecting stormwater from the Wheeler Army Air Force Base. Two of these opportunities included provisions for collecting and conveying stormwater to end users via the Waiahole Ditch. The third opportunity included converting the abandoned Mililani WWTP into a treatment and storage facility, and use of the stormwater in the area of Mililani Agricultural Park. The study found a significant amount of existing infrastructure already in place for collection, treatment, storage, and conveyance of stormwater.

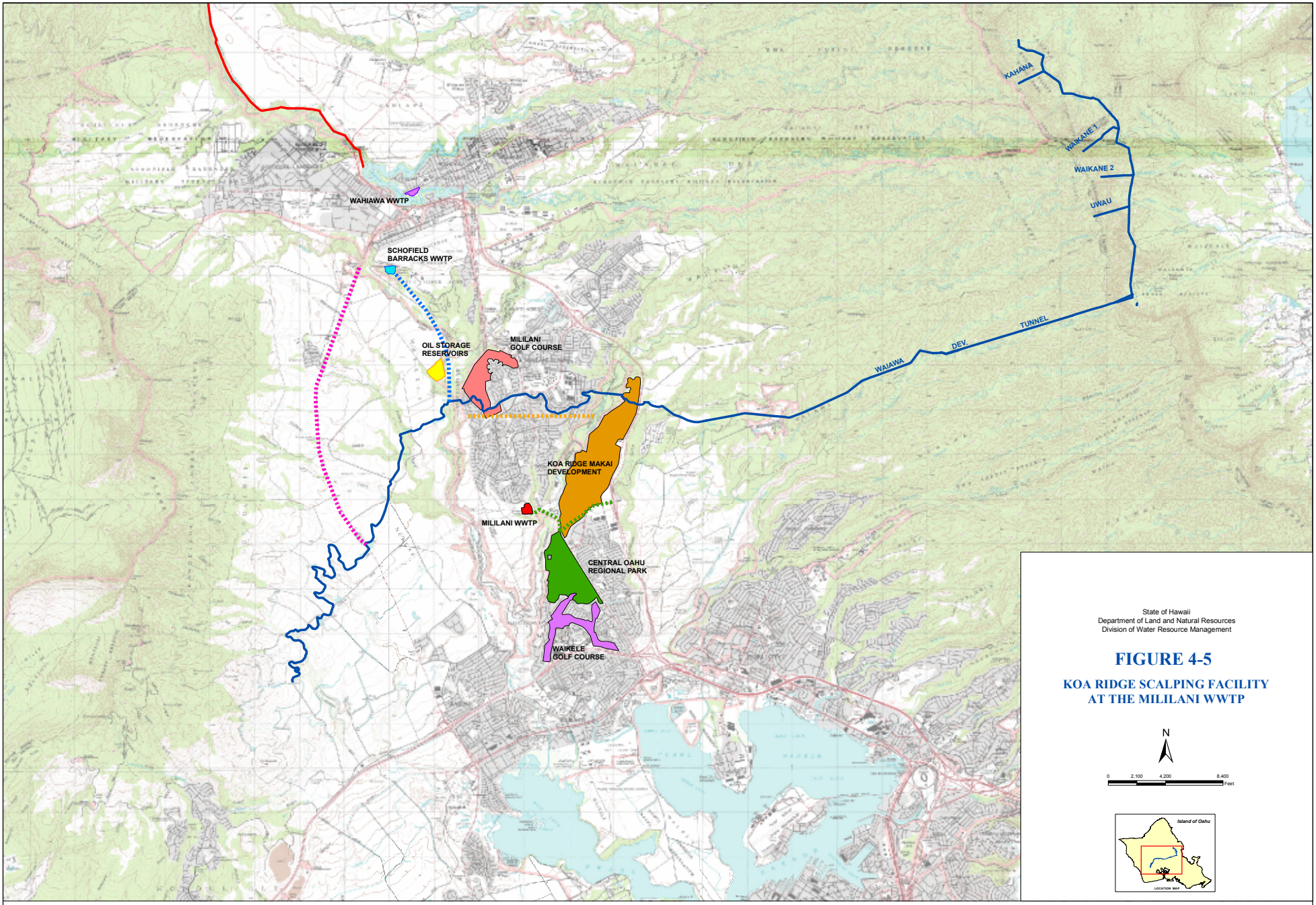
The study recognized that it is not possible to capture, treat, and store all stormwater generated in these areas. Estimates of potential volume were based on a 0.5-inch rainfall. During 2006 and 2007, an average of 50, 0.5-inch rainfall events occurred per year. Table 4-1 shows the potential stormwater that could be collected and reused from the three opportunities in Central Oahu.

Table 4-1. Stormwater Reclamation and Reuse Potential from Central Oahu

Opportunity	Impervious Acreage	Stormwater Volume, mgd[1]	Total Annual Volume, MG[2]
Wheeler Army Air Base	190	2.6	130
North Mililani	325	4.4	220
South Mililani	320	4.4	220

[1] *Per 0.5-inch rainfall event*

[2] *Total for 50 events*



State of Hawaii
Department of Land and Natural Resources
Division of Water Resource Management

FIGURE 4-5

KOA RIDGE SCALPING FACILITY AT THE MILILANI WWTP

N

0 2,100 4,200 8,400 Feet

Island of Oahu

The three potential projects can be briefly described as follows:

- Wheeler Army Air Base – Collection of stormwater runoff from the Wheeler Army Air Base runway, treatment to meet specific water quality requirements, conveyance to storage in abandoned underground oil storage tanks, and discharge to Waiahole Ditch.
- North Mililani Drainage – Use of a flood control channel in northern Mililani to collect and possibly store stormwater prior to treatment and discharge to Waiahole Ditch.
- South Mililani Drainage – Use of a flood control channel running between a Mililani residential area and Mililani Agricultural Park, treatment and storage at the abandoned Mililani WWTP, and agricultural irrigation at Mililani Agricultural Park.

Waiahole Ditch. The ADC is considering pipe installation in some areas rather than open channel conveyance. If this occurs, there is an opportunity to also install recycled water pipes along the same stretch of ditch that would allow recycled water to be conveyed to the same areas of use without discharging recycled water directly into the Ditch.

Mililani Wastewater Treatment Plant. The Mililani WWTP was originally constructed to serve the Mililani development. In the 1990s, a pipeline was constructed to convey the wastewater from this area to the Honouliuli WWTP, and most of the Mililani WWTP was abandoned. It still provides preliminary wastewater treatment and is also used for dewatering stormwater debris. Much of the structural infrastructure (e.g., concrete tanks) is still intact. Though some improvement to the infrastructure would be required for effective use, several opportunities have been identified for this site:

- Koa Ridge Scalping facility that was discussed previously;
- Stormwater treatment and storage for the southern end of the Mililani area. The stormwater could be used to irrigate the Mililani Agricultural Park and other green space in the area to reduce some of the reliance on Waiahole Ditch water; and
- Offline storage for Waiahole Ditch water during rain events. This opportunity would take advantage of the incentive that ADC is proposing for storing water for free from the Ditch during rain events.

The location of the abandoned Mililani WWTP is shown on Figure 4-1.

Waiahole Ditch Extension. Periods of available supply and demand do not necessarily match for stormwater reclamation and reuse, and high or prolonged rainfall periods can additionally reduce demand for Waiahole Ditch water and recycled water. When demand is low for Waiahole Ditch water, the terminal reservoir in the system overflows to a gulch. The non-potable aquifer known as the Ewa Caprock is down-gradient of the terminal reservoir and chloride concentrations are increasing in the aquifer. An extension of Waiahole Ditch by pipeline to the Ewa Caprock could allow excess ditch water to recharge the non-potable aquifer to help mitigate the high chloride concentrations.

4.3 Non-Potable Water Supply and Demand

Some preliminary information about non-potable water supply and demand was determined as a result of the stakeholder interviews and meetings. This information is presented in Table 4-2. These estimates are based on information provided by stakeholders during interviews and the general meeting.

Table 4-2. Preliminary Estimates of Current Non-Potable Water Supply and Demand			
Supply Source[1]	Volume	User Demand	Volume
Schofield Barracks WWRF	2.0 mgd [2]	Army Garrison Reserve	1.0 mgd
Wahiawa WWTP	2.0 mgd	Mililani Golf Course	0.5 mgd
Lake Wilson	30.0 mgd	Central Oahu Regional Park	0.75 mgd
Waiahole Ditch[3]	15.0 mgd	Kunia Corridor[4]	16.0 mgd
		Dole Food Company Hawaii[5]	20.0 mgd
Total Estimate	49.0 mgd		38.25 mgd

[1] Does not include stormwater, which could amount to 11.4 mgd per 0.5-inch rain event.

[2] Current; future production could be 3 mgd with military expansion at the base.

[3] Subject to water use permitting.

[4] Some of the user demand along the Kunia Corridor is currently being met by Waiahole Ditch and groundwater wells.

[5] Dole Food Company Hawaii's demand is met by Lake Wilson, some groundwater wells, and recycled wastewater.

Section 5

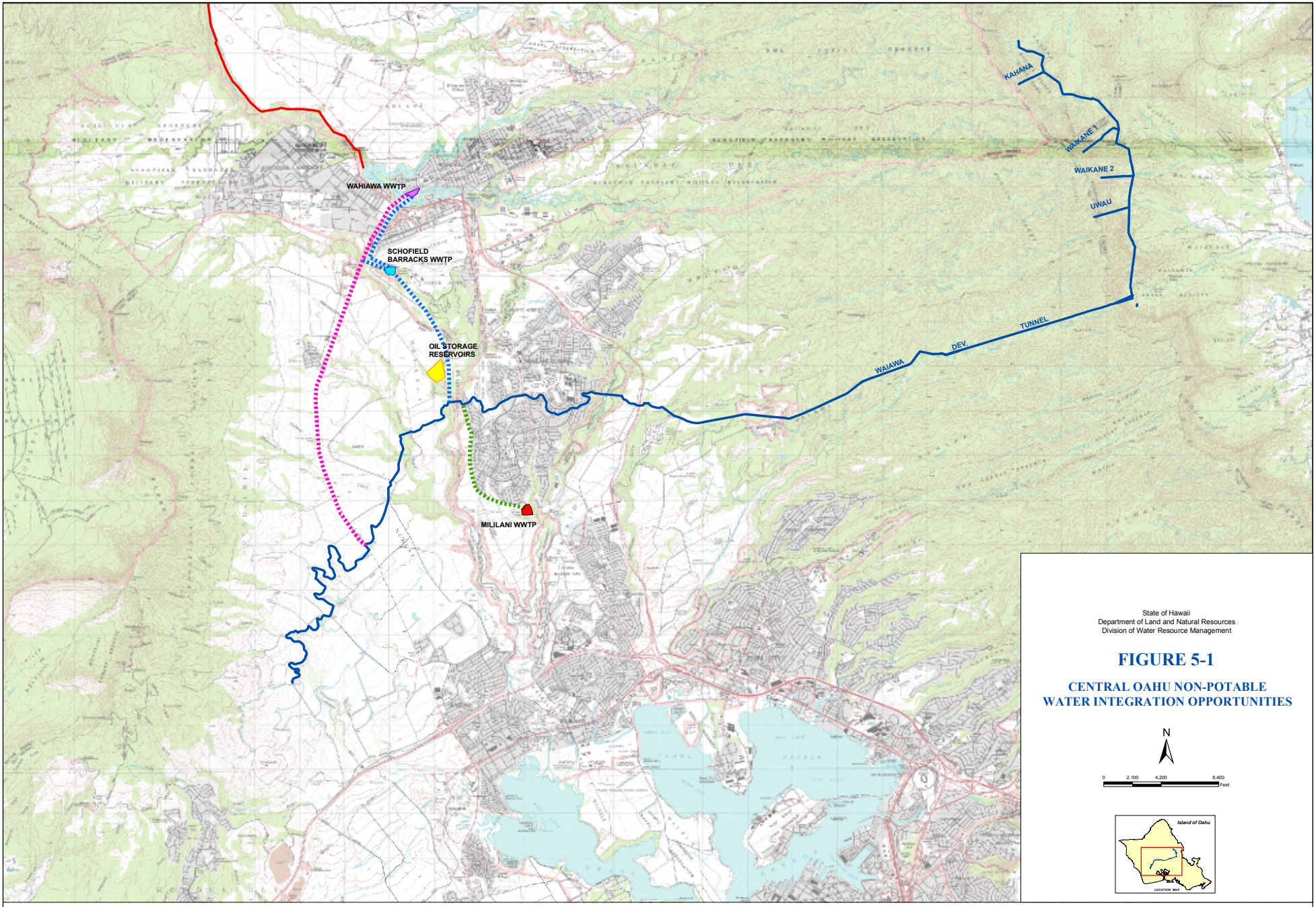
Recommended Next Steps

5.1 Integration of Opportunities

The non-potable water opportunities identified in Section 4.2 illustrate the interest that stakeholders have in non-potable water production and use. They also illustrate opportunities for leveraging resources for integration to achieve a more robust non-potable water system in Central Oahu. The relationships among some of the opportunities were discussed in Section 4.2. They are re-emphasized here since the next steps for non-potable water planning in Central Oahu include focusing on sustaining communication and coordination, and also developing partnerships for integrating non-potable water opportunities. The three opportunities discussed below are shown in Figure 5-1.

Kunia Road R-1 Water Pipeline. The main purpose of an R-1 water pipeline along Kunia Road is to convey recycled water to users in the Kunia Corridor. The opportunity includes five potential stakeholders as discussed below:

- **Aqua Engineers** – Aqua Engineers is the key stakeholder for this opportunity. They want to convey recycled water from the Schofield Barracks WWRF to users along Kunia Road and also discharge recycled water into Waiahole Ditch at Kunia Road to provide irrigation water for non-food crop agriculture downstream of the discharge point. This could result in 2.0 mgd that is currently being used on the North Shore to be directed toward the Kunia area. The pipeline is not cost-effective for conveying only 2.0 mgd of recycled water.
- **City and County of Honolulu Department of Environmental Services (ENV)** – ENV operates the Wahiawa WWTP, which discharges approximately 2.0 mgd of its effluent to Lake Wilson. The WWTP is being upgraded to the same type of technology that is used at Schofield Barracks WWRF. An approximate 1-mile pipeline could convey recycled water from the Wahiawa WWTP to a point of connection with the Schofield Barracks WWRF recycled water for distribution through this pipeline.
- **Dole Food Company Hawaii** – Dole currently accepts recycled water into the Wahiawa Irrigation System. Dole also uses Lake Wilson water that includes the discharge from the Wahiawa WWTP. The integration of recycled water into Dole's supply of irrigation water requires that all irrigation water be regulated as recycled water, which increases the management requirements for use. Dole has said that redirecting the recycled water from both the Schofield Barracks WWRF and the Wahiawa WWTP would remove the management requirements for Dole and other users.
- **Agribusiness Development Corporation** – ADC operates Waiahole Ditch and has said that discharge of recycled water into the Ditch at Kunia Road is the best location until the agricultural community that grows food crops is willing to use recycled water.
- **U.S Army Garrison Hawaii** – Stormwater runoff from Wheeler Army Airfield was an option identified in the 2008 appraisal of stormwater reclamation and reuse. The proximity of the main drainage from the runway to the Schofield Barracks WWRF provides an opportunity to integrate stormwater into the Kunia Road pipeline.


KAHANA
WAIKANE 1
WAIKANE 2
UWAU
WAHIAWA WWTP
SCHOFIELD BARRACKS WWTP
OIL STORAGE RESERVOIRS
MILILANI WWTP
WAIAWA DEV. TUNNEL
LEGEND
WAIAHOLE DITCH
WAHIAWA IRRIGATION DITCH
KUNIA ROAD R-1 WATER PIPELINE
MULTI-PURPOSE PIPELINE
WAIHOLE DITCH IMPROVEMENTS AND INCENTIVES
State of Hawaii
Department of Land and Natural Resources
Division of Water Resource Management
FIGURE 5-1
CENTRAL OAHU NON-POTABLE WATER INTEGRATION OPPORTUNITIES
N
0 2,100 4,200 8,400 Feet
Island of Oahu
LOCATION MAP

The Kunia Road R-1 water pipeline could potentially integrate three sources of non-potable water for use in the Kunia Corridor. If Lake Wilson water were also used to supplement the flow, more water could be provided based on demand, and the pipeline would be more cost-effective due to the volume it could potentially convey. The discharge into Waiahole Ditch could provide relief for some of the recycled water if demand is low in areas up-gradient of the Ditch, but high in areas down-gradient.

Multi-purpose Pipeline from Wahiawa WWTP to Waiahole Ditch. This pipeline would extend from the Wahiawa WWTP to the point where Waiahole Ditch surfaces in the Kunia Area. The pipeline would be capable of conveying R-1 water from the Wahiawa WWTP and Schofield Barracks WWRF, stormwater from Wheeler Army Airfield, and Lake Wilson Water. A key benefit of this pipeline would be for emergency water supply in the event the Waiahole Ditch siphon fails between the Mililani and Kunia areas. The pipeline would preclude the need for emergency wells by growers in the Kunia area. There are also approximately 9 million gallons of abandoned fuel storage reservoirs along the route that could potentially be rehabilitated for storage. The opportunity includes four potential stakeholders:

- **Agribusiness Development Corporation** – ADC is the key stakeholder for this opportunity. ADC operates Waiahole Ditch and manages the right-of-way where the pipeline would be connected. Though multiple water sources could be used in the pipeline, acceptance of recycled water would be critical to consistent use in non-emergency situations.
- **Aqua Engineers** – Aqua Engineers is a purveyor of recycled water and would benefit from increased flexibility of a recycled water pipeline. If recycled water is approved for use in Waiahole Ditch, this pipeline would benefit the largest number of users. However, acceptance of R-1 water by some of the users of the Waiahole Ditch may be an issue.
- **City and County of Honolulu Department of Environmental Services (ENV) –** ENV operates the Wahiawa WWTP, and will need to "dispose" of its R-1 water. ENV's charter does not currently allow them to purvey water. They would benefit from increased flexibility in the conveyance of recycled water. Their issue with tying into a recycled water pipeline along Waiahole Ditch are the same as those for Aqua Engineers.
- **U.S. Army Garrison Hawaii** – Wheeler Army Airfield generates significant quantities of stormwater that currently runoff into the gulch and eventually reach West Loch. The stormwater causes erosion in the gulch and contributes to the sediment load of West Loch. Diverting some or all of the stormwater for beneficial use would reduce the sediment load.

Waiahole Ditch Improvements and Incentives. ADC is considering replacing the open ditch through the Mililani area with a pipe. Integration of recycled water with Ditch water is currently not acceptable and future acceptability is unknown. An alternative to discharging recycled water into the Ditch would be to extend a recycled water pipeline along the Ditch right-of-way and to maintain segregated recycled water and Waiahole Ditch water systems. If the open ditch is replaced with a pipe, installation of a recycled water pipeline at the same time would reduce cost of future installation and provide flexibility for non-potable water systems. Whereas Waiahole Ditch conveys water in one direction, a pressurized recycled water pipeline would allow conveyance in two directions. The opportunity includes three potential stakeholders:

- **Agribusiness Development Corporation** – ADC is the key stakeholder for this opportunity. ADC operates Waiahole Ditch and manages the right-of-way where the recycled pipeline would be installed. Installation would need to be carefully coordinated with replacement of the open ditch with a pipe. The ADC has suggested an incentive to construct off-line storage for users of Waiahole Ditch water. The incentive would be to divert water to storage from the Ditch at a reduced cost during periods of rainfall when supply exceeds demand. A simplified schematic of this incentive is shown in Figure 5-2.

- **Aqua Engineers** – Aqua Engineers is a purveyor of recycled water and would benefit from increased flexibility of a recycled water pipeline. The drawback to their use of the pipeline is that the Schofield Barracks WWRF is across a gulch from the Mililani section of Waiahole Ditch. If a recycled water pipeline were also installed along the western portion of the Ditch, recycled water from the Schofield Barracks WWRF could tie in closer to the facility and still convey recycled water eastward.
- **City and County of Honolulu Department of Environmental Services (ENV)** – ENV operates the Wahiawa WWTP, and will need to "dispose" of its R-1 water. ENV's charter does not currently allow them to purvey water. They would benefit from increased flexibility in the conveyance of recycled water. ENV issues with tying into a recycled water pipeline along Waiahole Ditch include complexities of design and economic costs.

ADC is also considering an incentive to users that would allow withdrawal and storage of Waiahole Ditch water during periods when it is raining and demand is down. The user would need to build off-line storage to take advantage of this incentive. The abandoned Mililani WWTP has empty tanks that could also be used for off-line storage of Waiahole Ditch water. There is also a 12-inch pipeline from Waiahole Ditch to the Mililani Agricultural Park that is approximately 2,000 feet from the WWTP. This opportunity includes two potential stakeholders:

- **Agribusiness Development Corporation** – ADC is proposing the incentive and has an interest in storing water during low demand periods and using it when demand returns.
- **City and County of Honolulu Department of Environmental Services (ENV)** –ENV owns the Mililani WWTP and would need to approve its use for storage.

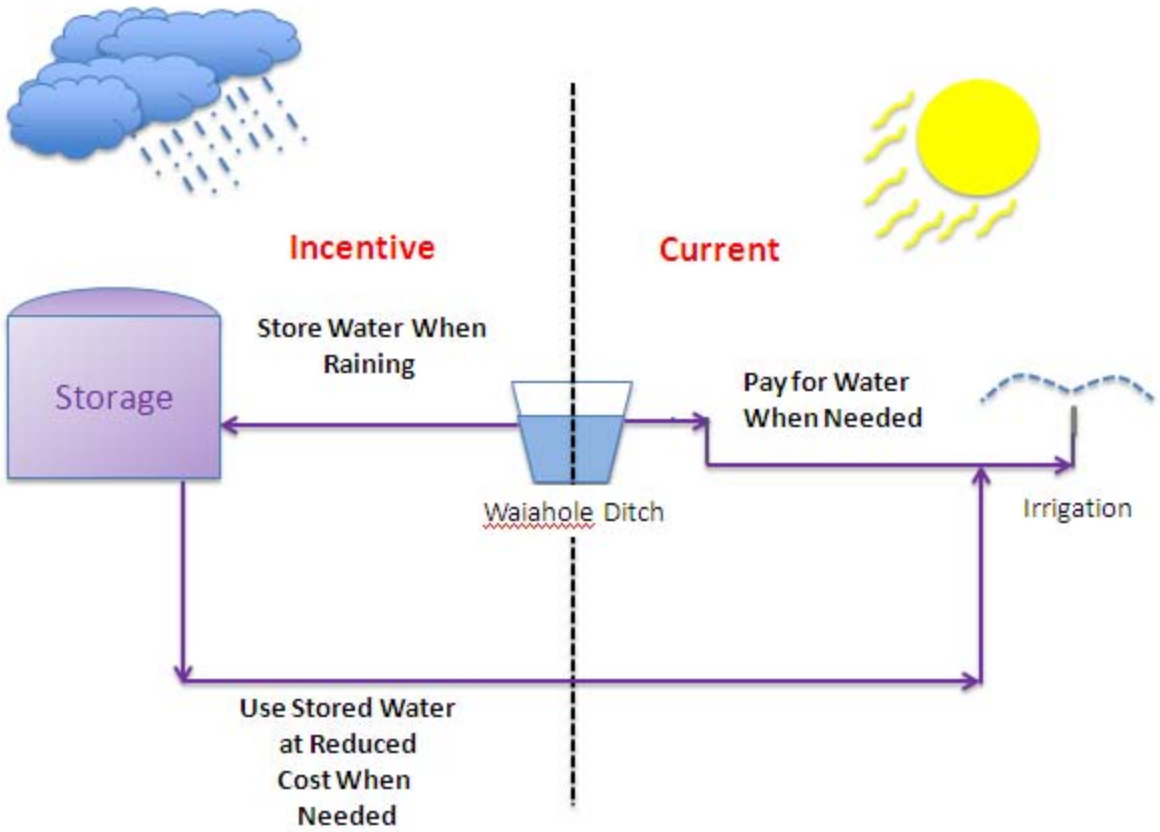


Figure 5-2. Agribusiness Development Corporation Incentive for Storage

5.2 Next Steps

The appraisal of opportunities discussed in this report, and particularly the opportunities in Section 5.1, help frame the needs for final development of a non-potable water master plan. The next steps for the Central Oahu Non-potable Water Master Plan include further facilitation of stakeholder involvement and refinement of the opportunities identified in Section 5.1. Specific actions are discussed below.

Continue to Facilitate Discussion among Stakeholders. CWRM's facilitation of communication among stakeholders is the most significant outcome of the non-potable water master planning effort to date. Continued support of this communication effort is a key role CWRM can perform throughout the planning effort. CWRM's continued facilitation should focus on the following aspect of stakeholder support and involvement:

- **Develop a process for information exchange** - Communication can be promoted by routine face-to-face meetings and information exchange through e-mail or other electronic means. Quarterly face-to-face meetings are recommended.
- **Support Outreach to an Expanded Group of Stakeholders** – The initial group of stakeholders in the planning process was identified due to their broad view of issues associated with non-potable water sources and use. The Hawaii Department of Agriculture has expressed an interest in expanding outreach pertaining to recycled water to the purchasers and users of produce grown with recycled water. The HBWS Watershed Management Plans will also include significant outreach to stakeholders in Central Oahu. CWRM's support of these outreach efforts is important to provide additional credibility to the efforts, and also to help others understand the State of Hawaii's interest in and importance of expanded use of non-potable water resources.
- **Support Regulatory Policy Changes** – The HDOH indicated it could support increased use of non-potable water through regulatory policy. Stakeholders identified some regulatory issues that they think are important to address to increase and sustain the use of non-potable water. It is not certain that the desired changes to regulatory policy will be supported by HDOH, but the discussion should be supported and possibly facilitated by CWRM in the context of continued dialogue among stakeholders.
- **Develop a Demonstration Project for Recycled Water Use** – The objective of this demonstration project is to work with a grower(s) to irrigate a small parcel (e.g., one acre) of leafy crops with recycled water and to analyze the recycled water, crops, and soil to determine the impact, if any. This could be a joint venture by several stakeholders to share costs of land use, monitoring, and other aspects associated with the demonstration project.

Refine Non-Potable Water Supply and Demand Estimates – Estimates of non-potable water supply and demand need to be refined and development of these estimates should be coordinated with the HBWS Watershed Management Plans.

Identify and refine preferred opportunities to recycle non-potable water. The three opportunities identified in Section 5.1 are preliminary and need additional refinement to determine the feasibility. These opportunities should be refined based on the supply and demand estimates presented previously, to determine the appropriate infrastructure needed for implementation. Refinement should include pipeline size and length, improvements to existing infrastructure, additional infrastructure (e.g., pumping stations and storage), and interconnections among existing non-potable water sources. Other factors in the refinement are outlined below:

- **Conduct preliminary benefit-cost analysis for preferred opportunities** – Once the infrastructure associated with the opportunities are refined, a benefit-cost analysis should be performed to determine whether the opportunity is cost effective. Planning level cost estimates for selected

opportunities should be developed and economic (including avoided costs) and non-economic benefits determined.

- **Make recommendations for implementation of preferred opportunities** – A ranking process should be developed that considers economic and non-economic costs and benefits. The benefit- cost analysis should result in a prioritized ranking of up to three opportunities. This ranking will be used to determine which opportunities, if any, rise to the top or fall out of further consideration. This ranking can provide guidance to all stakeholders for determining how each can participate in an implementation process.

Section 6

Limitations

This document was prepared solely for the Commission on Water Resource Management in accordance with professional standards at the time the services were performed and in accordance with the contract between CWRM and Brown and Caldwell dated May 24, 2012. This document is governed by the specific scope of work authorized by CWRM; it is not intended to be relied upon by any other party except for regulatory authorities contemplated by the scope of work. We have relied on information or instructions provided by CWRM and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

Further, Brown and Caldwell makes no warranties, express or implied, with respect to this document, except for those, if any, contained in the agreement pursuant to which the document was prepared. All data, drawings, documents, or information contained this report have been prepared exclusively for the person or entity to whom it was addressed and may not be relied upon by any other person or entity without the prior written consent of Brown and Caldwell unless otherwise provided by the Agreement pursuant to which these services were provided.

Section 7

References

Brown and Caldwell, Assessment of Recycled Water Irrigation in Central Oahu, Honolulu Board of Water Supply, Volumes I and II, March 2005.

Brown and Caldwell, An Appraisal of Stormwater Reclamation and Reuse in Hawaii, Volumes I, II, and III, U.S. Bureau of Reclamation for the Hawaii Commission on Water Resource Management, 2008.

Brown, Seth, At a cross roads: The evolution of U.S. stormwater regulations. Water Environment & Technology, June 2012.

Monterey County Water Resource Agency and Monterey Regional Water Pollution Control Agency, Recycled Water Food Safety Study for Monterey County Water Recycling Projects, August 1998.

R.M. Towill, Island-wide Non-Potable Water Master Plan, Oahu, Hawaii, Honolulu Board of Water Supply, February 2007.

Appendix A: Stakeholder Meeting Presentation

Non-Potable Water Master Plan Stakeholder Meeting

October 11, 2012

Meeting Agenda

- Introductions, Background, Project Objectives
- Regulatory Guidelines and Policies
- Summary of Stakeholder Interviews
- Discussion
- Mapping Exercise
- Recap of Exercise and Discussion

CWRM Objectives for Non-Potable Water Master Plan

- Establish a non-potable water advisory group
- Inventory current and potential sources of non-potable water in Central Oahu
- Identify current and future use for non-potable water
- Explore options for matching non-potable water sources with demand
- Develop a Central Oahu non-potable water master plan

Non-Potable Water Master Plan Phases

Phase I – Stakeholder Involvement

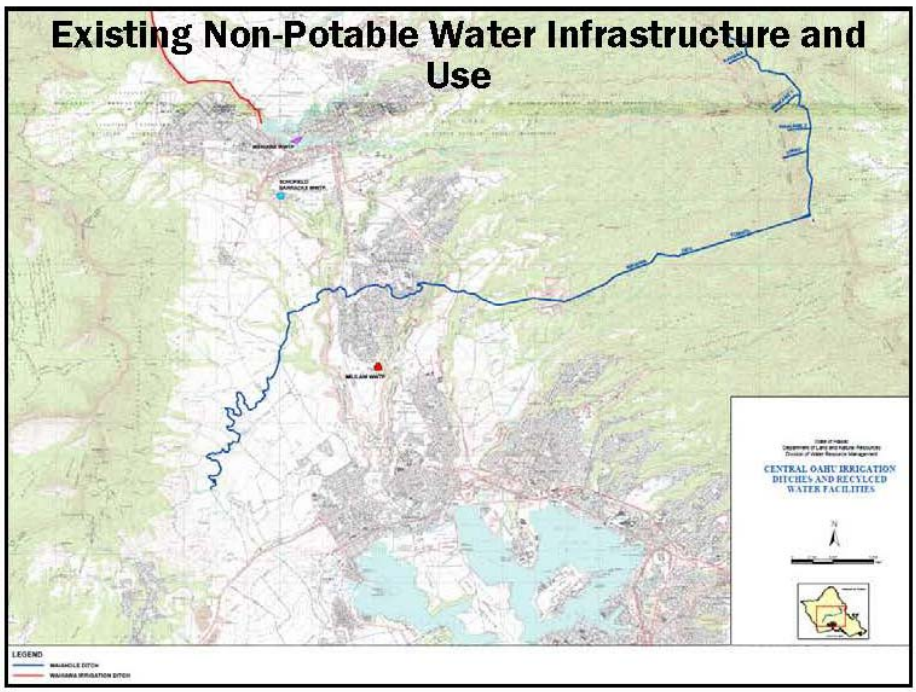
- Identify and interview key stakeholders

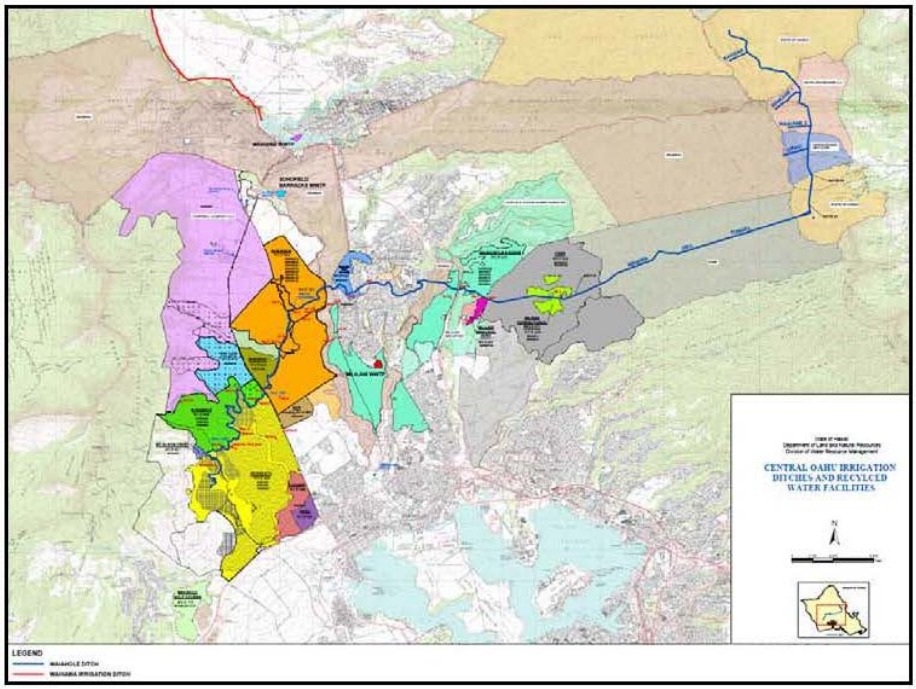
Phase II – Technical Planning Research

- Conduct regulatory review of barriers and enablers
- Review current and planned water-related projects
- Identify end uses and water supply/demand

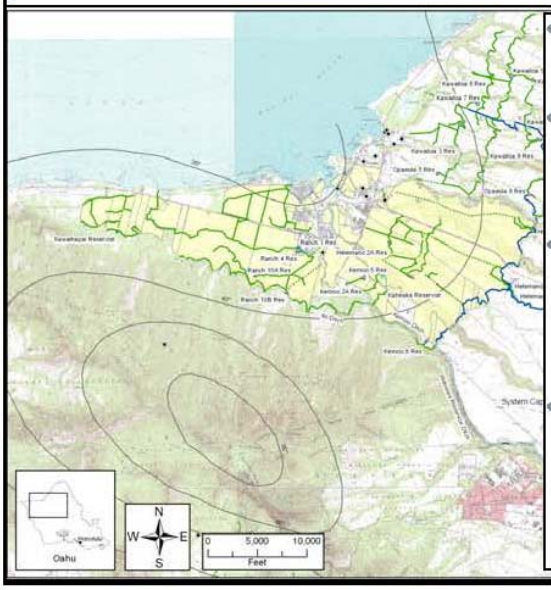
Phase III – Develop Non-Potable Water Use Opportunities

- Develop opportunities
- Prepare layouts of integration strategies
- Conduct cost-benefit analysis to include economic and non-economic factors


Existing Non-Potable Water Infrastructure and Use
CENTRAL OAHU IRRIGATION DITCHES AND RECYLCED WATER FACILITIES
LEGEND


CENTRAL OAHU IRRIGATION DITCHES AND RECYLCED WATER FACILITIES
LEGEND

Wahiawa Irrigation System



- Expansive irrigation system
- Potential increase in demand from other owners
- Schofield and Wahiawa recycled water are used on North Shore
- Redirecting these recycled water flows would broaden irrigation opportunities

Previous Non-Potable Water Studies, Plans, and Projects

Recycled Water

- Monterey Regional Water Pollution Control Agency - Recycled Water Pilot Study
- BWS Recycled Water Application Study
- Schofield Barracks WWRF R-1 Facility – U.S. Army/Aqua Engineers
- Wahiawa R-1 Pipeline to Central Oahu Regional Park - BWS
- Upgrade of Wahiawa WWTP to MBR – ENV
- Koa Ridge Development – Castle & Cooke

Other Non-Potable Water Sources

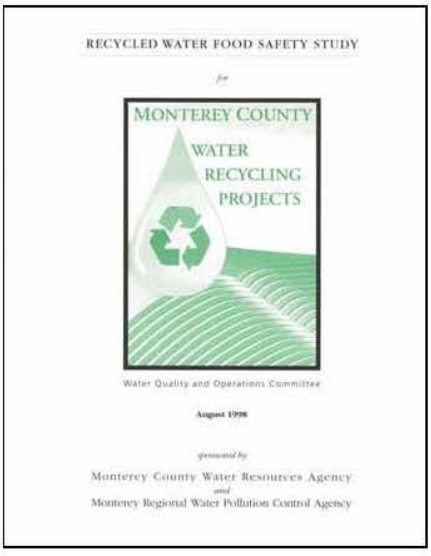
- CWRM Stormwater Reclamation and Reuse
- Wahiawa Irrigation System Assessment

Recycled Water

Recycled Water Use in America's "Salad Bowl"

Sea Mist Farms (Monterey)
- Artichokes
- Lettuce
- Spinach
- 80% recycled water use on 11,000 acres

- California (2007)
  - 540 million gallons per day of recycled water
  - 46% used on agricultural crops


RECYCLED WATER FOOD SAFETY STUDY

for

MONTEREY COUNTY WATER RECYCLING PROJECTS

Water Quality and Operations Committee

August 1998

sponsored by

Monterey County Water Resources Agency

and

Monterey Regional Water Pollution Control Agency

Hawaii DOH – HAR 11-62-26 and Recycled Water Guidelines

- Advanced treatment requirements
- Specific bacteriological limits
- Specific turbidity (low solids) limits
- Water management plan requirement
- No restrictions on use of R-1 water

TABLE 3-1 SUMMARY OF SUITABLE USES FOR RECYCLED WATER

SUITABLE USES OF RECYCLED WATER	R1	R2	R3
IRRIGATION: (S)pray, (D)rip & Surface, (U)bsurface, (A)LL [illegible] D & U, Spray with (B)uffer, (N)ot allowed, [illegible]			
Golf course landscapes	A	U/B	N
Freeway and cemetery landscapes	A	A	N
Food crops where recycled water contacts the edible portion of the crop, including all root crops	A'	N	N
Parks, elementary schoolyards, athletic fields and landscapes around some residential property	A	U	N
Roadside and median landscapes	A	U/B	N
Non-edible vegetation in areas with limited public exposure	A	AB	U
Sod farms	A	AB	N
Ornamental plants for commercial use	A	AB	N
Food crops above ground & not contacted by irrigation	A	U	N
Pastures for milking and other animals	A	U	N
Fodder, fiber, and seed crops not eaten by humans	A	AB	DU
Orchards and vineyards bearing food crops	A	D/U	DU
Orchards and vineyards not bearing food crops during irrigation	A	AB	DU
Timber and trees not bearing food crops	A	AB	DU
Food crops undergoing commercial pathogen destroying process before consumption	A	AB	DU
SUPPLY TO IMPOUNDMENTS: (A)llowed (N)ot allowed			
Restricted recreational impoundments	A	N	N
Basins at fish hatcheries	A	N	N
Landscape impoundments without decorative fountain	A	A	N
Landscape impoundments with decorative fountain	A	N	N
SUPPLY TO OTHER USES: (A)llowed (N)ot allowed			

Guidelines for the Treatment and Use of Recycled Water 5/15/02

Page 25

BWS Recycled Water Application Study

Recycled Water Application Study Summary of Results

- Treatment through the soil removes trace organics
- NDMA removed by 94 percent
- Percolate quality between control and recycled water are statistically equal
- Nutrients removed to equal levels
- No pesticides found in the percolates

Recycled Water Application Study Summary of Results

- Hormones were at or below detection limits
- TDS and chloride in the Honouliuli R-1 water were good tracers
- Schofield Barracks WWRF and Wahiawa WWTP do not have high TDS and chloride values

Schofield Barracks WWRF – R-1 Facility

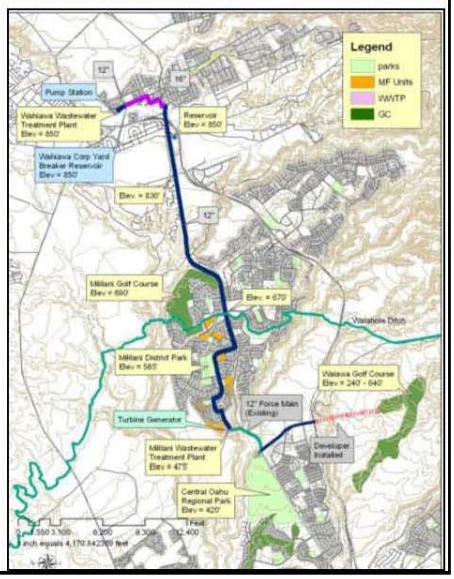
- Membrane bio-reactor
- Ultraviolet disinfection
- Produces 2 mgd of R-1 water (but lacking off-spec water storage)
- Military build-up could increase production to 3 mgd
- 1 mgd is reserved for Leilehua GC and other base needs

Wahiawa Wastewater Treatment Facility

- Produces R-2 recycled water
- Current discharge to Lake Wilson *(Wahiawa Reservoir)*
- Currently being upgraded to membrane-bioreactor for R-1 quality water (lacks off-spec water storage)
- Approximately 2.0 mgd capacity

Wahiawa Pipeline to CORP

- Convey R-1 water from Wahiawa WWTP
- Possible Service:
  - Mililani Golf Course
  - Mililani District Park
  - Mililani Ag Park
  - CORP
- Crosses Waiahole Ditch
- Turbine for electrical generation
- Approximate cost - $19 million



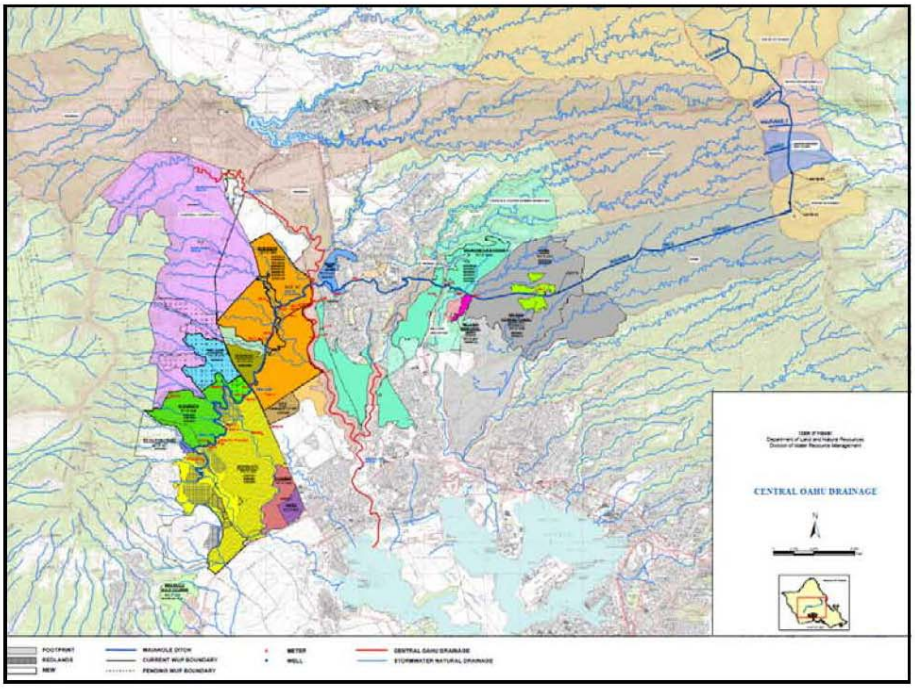
Stormwater

Stormwater Reclamation and Reuse Benefits

- Sustainable
- Uses a wasted water resource
- Augments limited groundwater supplies
- Supports existing agricultural practices
- Promotes recharge rather than runoff
- Reduces pollutant load to streams and coastal waters – Future TMDLs

Stormwater Reclamation and Reuse

- Stormwater is not a consistent water resource
- Supply and demand do not match
- Storage is important
- New infrastructure might be required
- Existing infrastructure is available to reduce costs and facilitate implementation


CENTRAL OAHU DRAINAGE


Mililani Wastewater Treatment Plant
Figure O-5:
Mililani South Stormwater Channel
Collect stormwater in a stormwater drainage channel in south Mililani and convey to the abandoned Mililani WWTP for treatment and storage, prior to use at Mililani Agricultural Park.
Legend
Proposed Stormwater Treatment
Proposed Dam
Mililani South Stormwater Channel
Proposed Pipeline
0
500
1,000
Feet

Stakeholder Interviews

- Agribusiness Development Corporation
- Aqua Engineers
- Castle & Cooke
- Dole Corporation
- Hawaii Department of Agriculture
- Hawaii Department of Health
- Hawaii Department of Transportation
- City and County of Honolulu Department of Environmental Services
- Environmental Protection Agency
- Hawaii Agriculture Research Center
- Honolulu Board of Water Supply
- U.S. Army Garrison Department of Public Works
- U.S. Geological Survey

Key Interview Outcomes

- Broad support for recycled water and stormwater use
- Water Quality Issues
  - Some agricultural-related activities need potable water
  - Need more outreach about recycled water
  - Uncertainty about stormwater quality
  - Impact of PPCP on groundwater
- Mainland produce that is sold locally is irrigated with recycled water
- Large-scale Mainland users of recycled water are passing audits that anticipate the Food Safety Modernization Act

Key Interview Outcomes

- Recycled water suitable for existing crops irrigated from Waiahole Ditch downstream from Kunia Road
- Agriculture is concerned about recycled water management requirements
- CWRM, EPA, DOH, and DOA support use of non-potable water sources
- The non-potable water demand in the Kunia corridor exceeds supply
- There is a need for storage to match supply and demand

Potential Non-Potable Water Supply and Demand

Supply[1]

- Schofield Barracks WWTP
  - 2 mgd current
  - 3 mgd future
- Wahiawa WWTP
  - 2 mgd current
- Lake Wilson
  - *30 mgd*
- Waiahole Ditch[2]
  - *15 mgd*

Demand

- Army Garrison Reserve
  - 1.0 mgd
- Mililani Golf Course
  - 0.5 mgd short (0.75 mgd total)
- CORP
  - 0.75 mgd
- Kunia Corridor
  - 16 mgd
- Dole Properties
  - 20 mgd

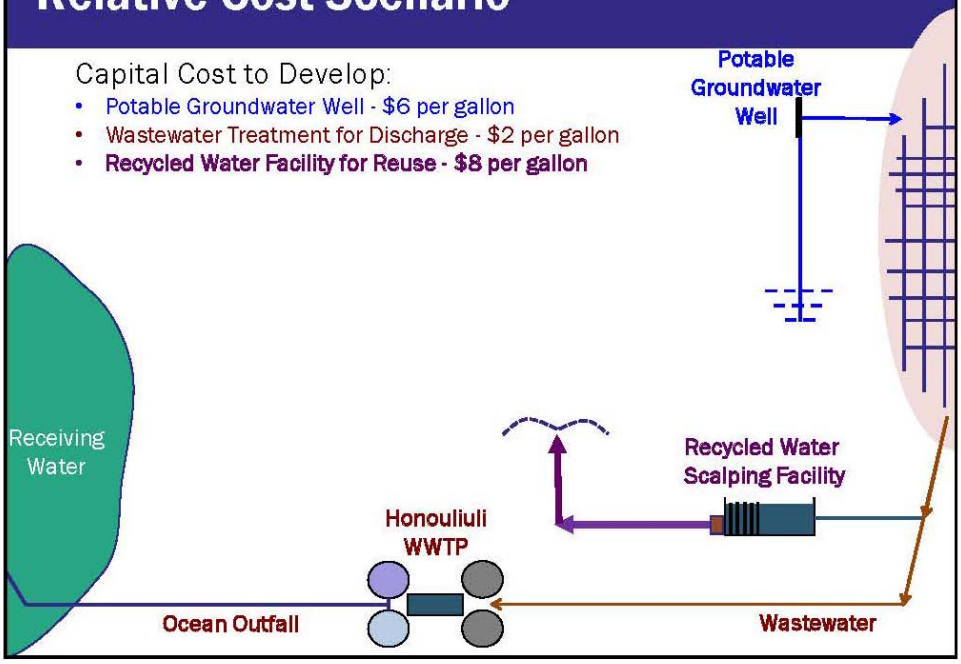
[1] *Excluding Stormwater*
[2] *Subject to Water Use Permitting*

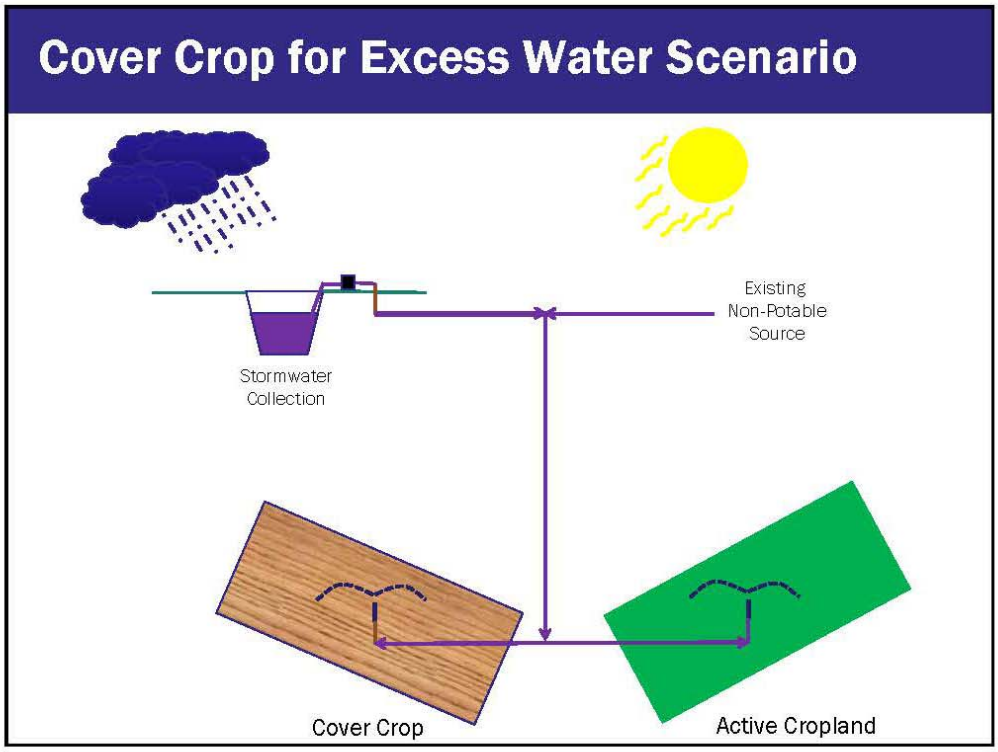
Non-Potable Water Scenarios

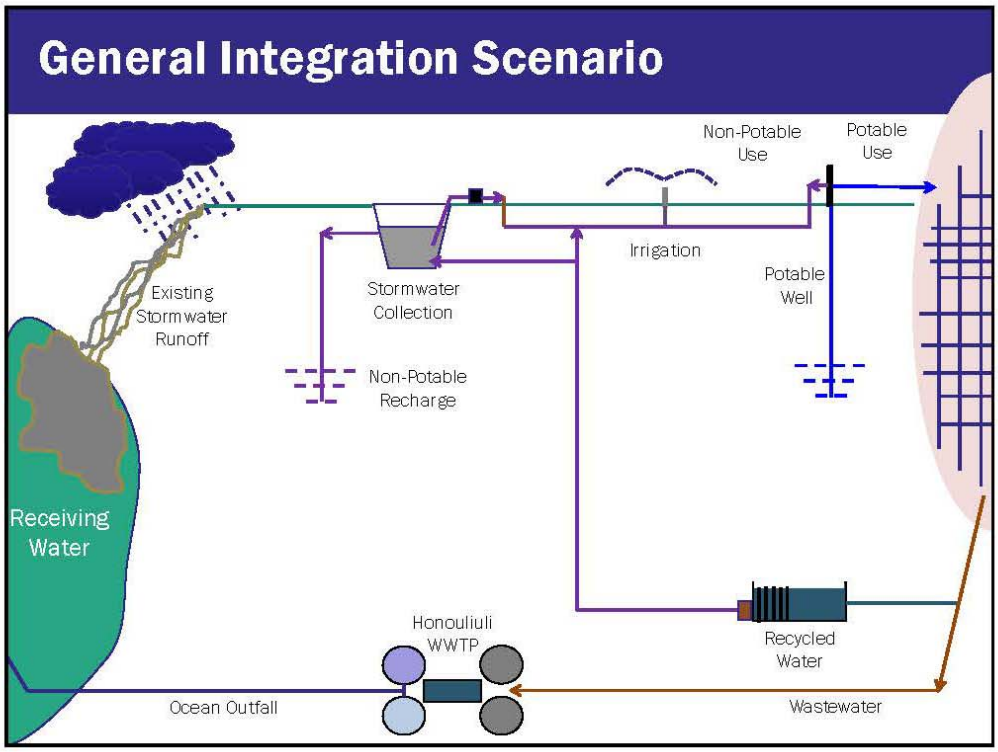
Relative Cost Scenario

Capital Cost to Develop:

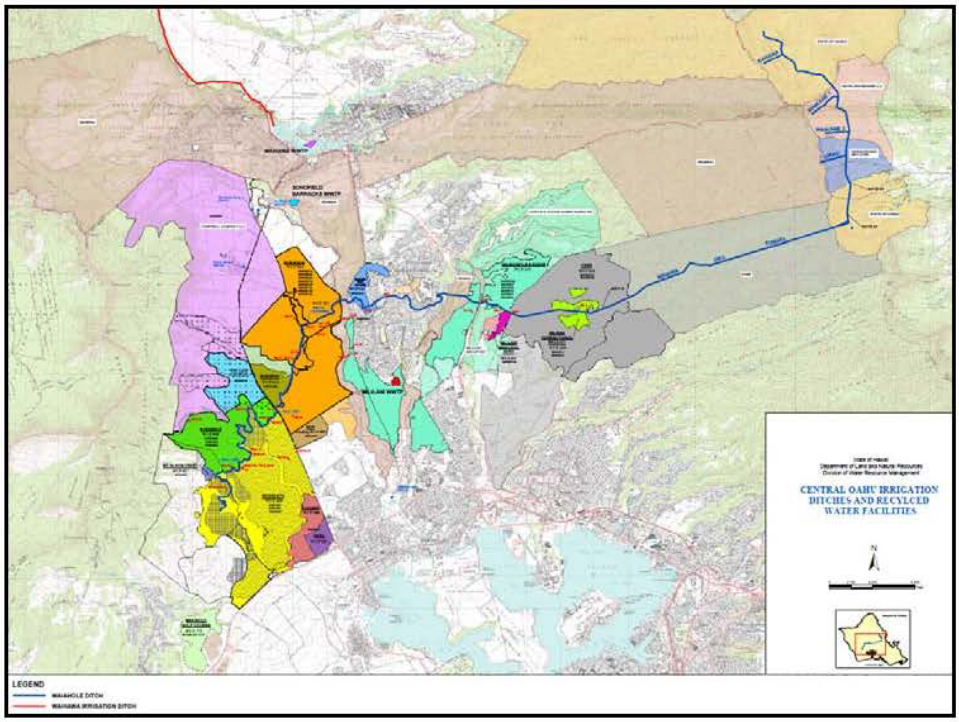
- Potable Groundwater Well - $6 per gallon
- Wastewater Treatment for Discharge - $2 per gallon
- **Recycled Water Facility for Reuse - $8 per gallon**

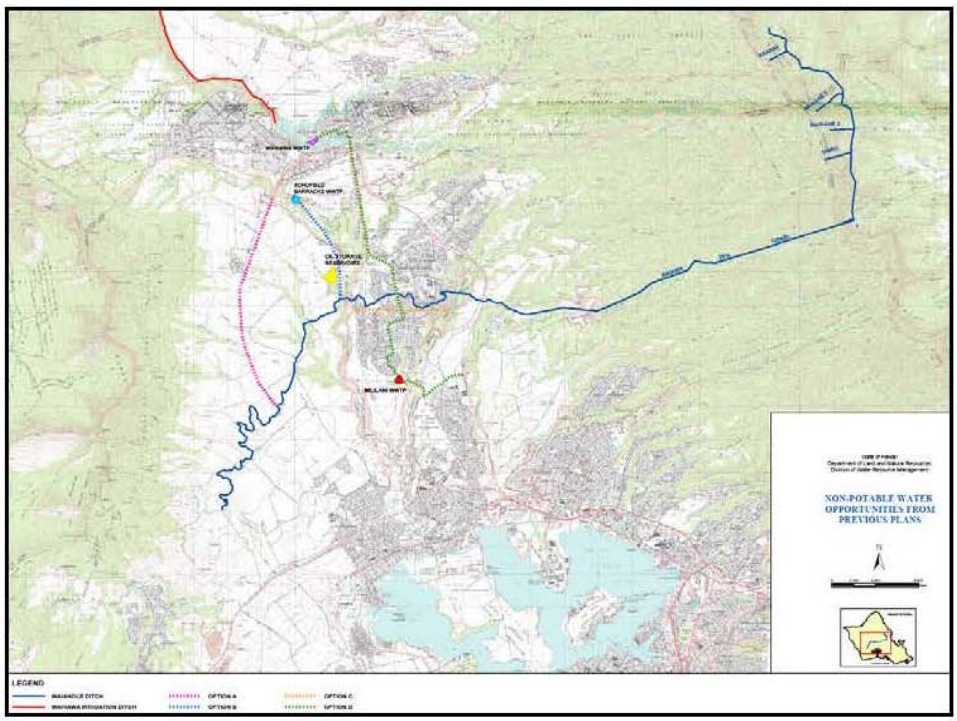


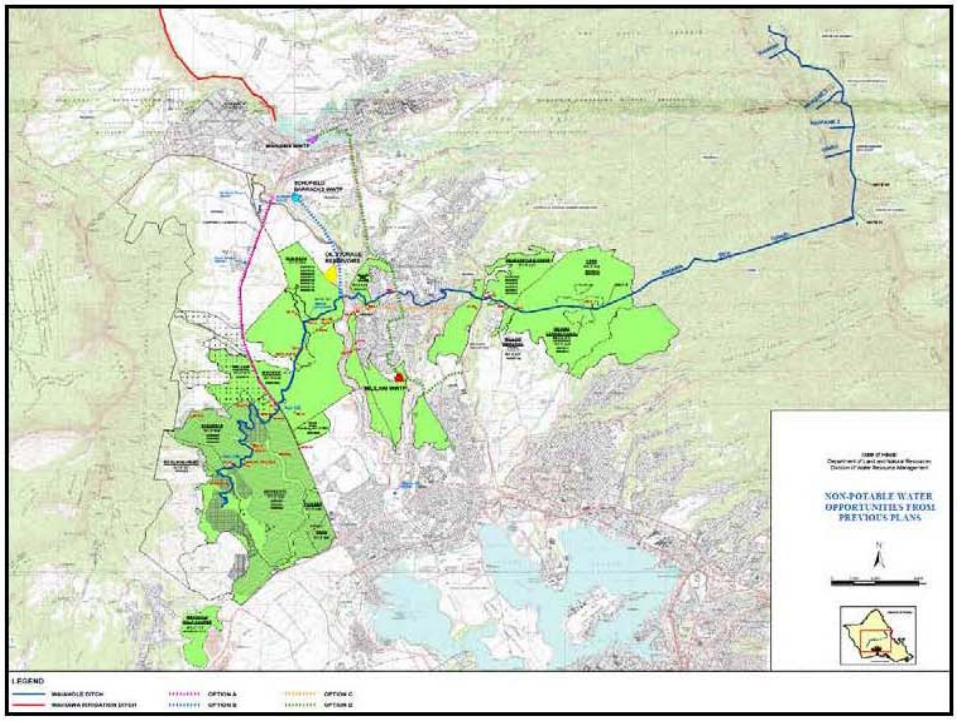

Cover Crop for Excess Water Scenario
Existing
Non-Potable
Source
Stormwater
Collection
Cover Crop
Active Cropland

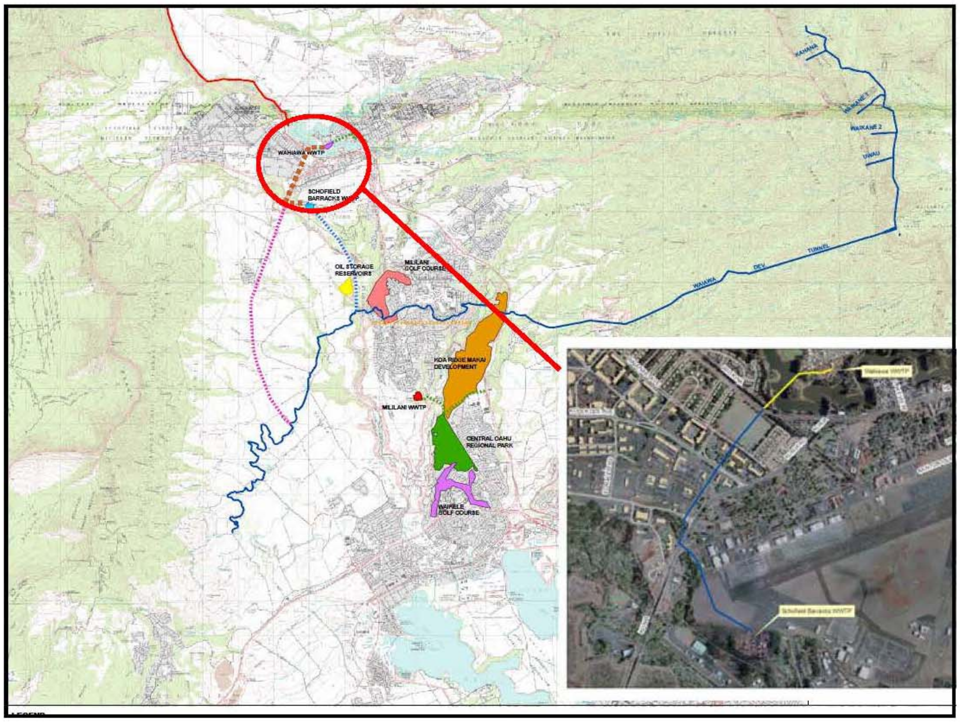

General Integration Scenario
Non-Potable
Use
Potable
Use
Irrigation
Potable
Well
Existing
Stormwater
Runoff
Stormwater
Collection
Non-Potable
Recharge
Receiving
Water
Honouliuli
WWTP
Recycled
Water
Ocean Outfall
Wastewater

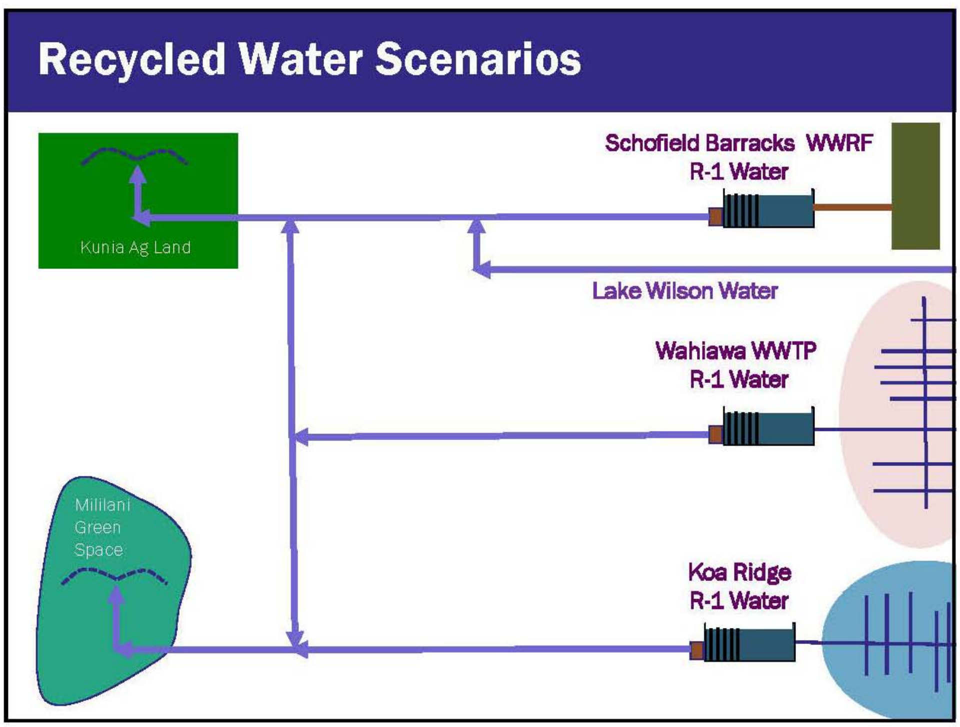
Potential Opportunities




NON-POTABLE WATER
OPPORTUNITIES FROM
PREVIOUS PLANS
LEGEND

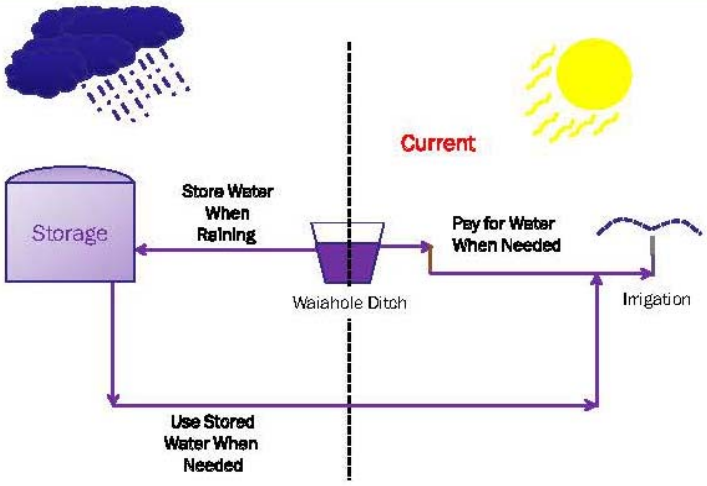

NON-POTABLE WATER
OPPORTUNITIES FROM
PREVIOUS PLANS
LEGEND


WAHIAWA WWTP
SCHOFIELD BARRACKS WWTP
OIL STORAGE RESERVOIRS
MILILANI GOLF COURSE
KOA RIDGE MAKAI DEVELOPMENT
MILILANI WWTP
CENTRAL OAHU REGIONAL PARK
WAIKELE GOLF COURSE

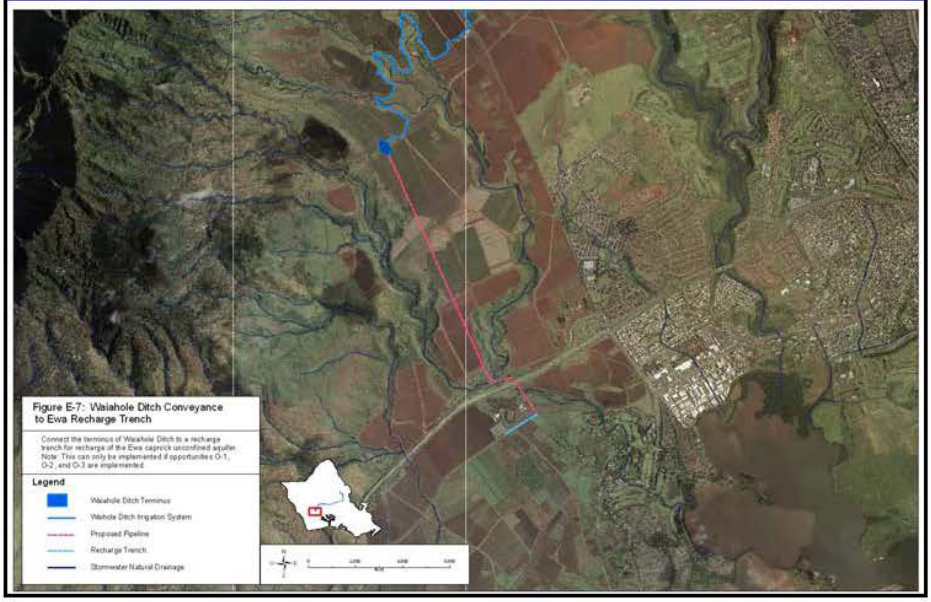

Recycled Water Scenarios
Schofield Barracks WWRF
R-1 Water
Kunia Ag Land
Lake Wilson Water
Wahiawa WWTP
R-1 Water
Mililani Green Space
Koa Ridge
R-1 Water

When Supply Exceeds Demand

Benefits of Additional Storage



Caprock Recharge



CWRM Objectives for Non-Potable Water Master Plan

- Establish a non-potable water advisory group
- Inventory current and potential sources of non-potable water in Central Oahu
- Identify current and future use for non-potable water
- Explore options for matching non-potable water sources with demand
- Develop a Central Oahu non-potable water master plan

Appendix B: Stakeholder Summaries

Stakeholder	**Dole Food Company Hawaii (Dole)**
Contact Person	Dan Nellis – Operations Director
Contact Information	1116 Whitmore Ave Wahiawa, Hawaii 96786 Phone – (808) 621-3200 Fax – (808) 621-7410 E-mail – dan.nellis@dole.com
Primary Business	Dole Corporation has major agricultural interests in Central Oahu.
Relationship to Plan	Manages Lake Wilson (Wahiawa Reservoir) and the Dole Irrigation Ditch.
Interview Summary	Dole – Dan Nellis, Barbara Awo, Gary Paracuelles September 11. 2012 • Agriculture cannot rely solely on non-potable water; there are some needs (e.g., food processing washwater) that require high quality water and potable water is used. • All crops Dole grows are suitable for non-potable water irrigation; but tenants have needs for higher quality water. • Dole uses HBWS water for chemical mixing and food process washing. • There may be a need to better educate and inform the agricultural community that R-1 water can be used to irrigate all food crops. • There are no plans to expand the Dole irrigation system. • Dole's non-potable water (irrigation?) system could be expanded or improved. Removing Wahiawa WWTP and Schofield WWRF discharges from Lake Wilson and Dole Ditch would permit a broader use of the water from Lake Wilson; however, the income from Schofield WWRF's discharge to Dole Ditch helps subsidize the cost of water (now at $0.40/kgal, and will go up). • Dole cultivates 3,000 acres with about 1,000 acres fallow at any time (on a rotational basis). • Dole manages about 16,000 total acres which includes the adjacent mountains and other non-irrigated lands. Of the 16,000 acres, 6,000 acres are leased to about 50 farmers, much of which is used for ranching. Roughly 10,000 acres are available for expanded agricultural operations. • They prioritize Lake Wilson water usage over groundwater due to the high electrical cost with pumping groundwater. • Dole currently uses approximately 20 mgd from Lake Wilson. Past usage was as high as 40 mgd. Water supply is adequate to meet current demands. Should biofuel (e.g., energy cane) production occur, present consumption will increase. • Best inventory and mapping of the North Shore area can be found in ADC's Wahiawa Irrigation System Report. • Spillway modification would increase safe storage capacity in Lake Wilson thereby increasing available irrigation water supply. The cost of these modifications is $16-20 million. • The estimated storage capacity of Lake Wilson is 3 billion gallons.
Benefits to Stakeholder	Expanded distribution system network for Lake Wilson stored water. Potential TMDLs for downstream discharge into Kaiaka Bay. Recycled water is a drought-proof supply.
Stakeholder Issues	Kaukonahua Stream minimum flow. Cost of water. Dole currently receives payment from U.S. Army for Schofield WWRF discharge. If recycled water is diverted elsewhere, it might result in pricing increases for existing users. The cost to bring the Wahiawa Dam spillway into compliance is estimated to be $20 million.
Incentives	Increased revenue for conveyance of non-potable water.

Stakeholder	Agribusiness Development Corporation (ADC)
Contact Person	James Nakatani, Executive Director
Contact Information	235 South Beretania Street, Room 205 Honolulu, Hawaii 96813 P – 808-586-0186 F – 808-586-0189 E-mail: james.nakatani@hawaii.gov
Primary Business	Acquires and manages selected high-value lands, water systems for commercial agricultural use and to direct research in partnership with farmers, ranchers, and aquaculture groups.
Relationship to Plan	Manages Waiahole Ditch irrigation system.
Interview Summary	Agribusiness Development Corporation – Jimmy Nakatani and Ivan Kawamoto September 13, 2012 • Waiahole Ditch is a $150 million business. • The ditch has a 50 mgd capacity; (average flow before closure of Oahu Sugar Company was 30 mgd.) • Approximately $3.0 million is being spent to upgrade the Siphon D (from Mililani to Larry Jefts farming area). $750K for design and the balance for construction. • Current charges for Ditch water range from $0.55/kgal for Ag to $1.20/kgal for non-Ag (e.g., Mililani Golf Course). • ADC would like to enclose portions of the Ditch (particularly through Mililani) for safety (and other benefits). • Storage is key to better use of Waiahole Ditch water. • ADC has (informally) offered free water from Waiahole Ditch when it is raining if users will build storage. • There are not many state land parcels along the Ditch for ADC to build storage. • Mililani Golf Course is about 0.5 mgd short of water needs; they have an allocation of 0.25 mgd. • Mililani Golf Course is about to expand their ponds to about 3 times the existing capacity. • ADC has concerns about the perception and/or liability of using recycled water in the ditch; wants DOH sign-off. • Recycled water could be introduced into Waiahole Ditch at Kunia Road because downstream users grow crops (e.g. seed corn) suitable for recycled water. • ADC needs help with the regulatory side, particularly sign-off of acceptability by DOH. • The Ditch right-of-way could be used to run a separate recycled water pipeline; only need to overcome legal issues associated with it. • The terminal reservoir for Waiahole Ditch overflows to a gulch when full. • State is about to purchase the Galbraith property (3 parcels to the State and 2 parcels to OHA) which would be operated by ADC; would like to get water from Lake Wilson to irrigate; would require one pump. • ADC is not interested in using R-1 water on the Galbraith property unless quality issues are addressed. • Desire to purchase land along Lake Wilson surrounding Whitmore Village (TMK 7-1-02-4) to have access to the lake for water use. • Barriers and Incentives to use recycled water would be regulatory issues and cost. • ADC has more flexible rules than Department of Ag; can enter into agreements with private industry and float bonds. • ADC prefers not to go to Legislature for funding; prefers loans.
Benefits to Stakeholder	More water resources available for agricultural irrigation. Expanded distribution network to serve more agricultural land. Larger potential revenue stream for ditch maintenance. More stakeholders will have an interest in the sustainability of the ditch for conveyance.
Stakeholder Issues	Cost of water. Users might be concerned about quality of some water sources. Though the water resources might be integrated, some types of water might not be desired on certain crops. Possible loss of use of diverted water from Windward Oahu. Increased cost of maintenance.
Incentives	Larger supply of water can produce greater income and/or provide lower costs to users.

Stakeholder	Aqua Engineers (AE)
Contact Person	Sheldon Hunt, President and CEO
Contact Information	3560 Koloa Road Kalaheo, Hawaii 96741 P – 808-853-3099 shunt@aquaengineers.com
Primary Business	Hugh Strom – Vice President
Relationship to Plan	Operates and maintains the Schofield Barracks WWRF to produce R-1 quality recycled water.

Interview Summary	AE (Sheldon Hunt and Hugh Strom) and Army Department of Public Works (Trey Maddox)
	September 19. 2012
	• Synopsis of meeting with Larry Jefts:
	  • He is planning on leasing DOA land.
	  • Kunia corridor has a water demand of 16 mgd.
	  • Jefts' agricultural operations needs are 7 mgd.
	  • Plans to build reservoir capacity of 14 -15 MG for use on northern Robinson property and new DOA leases.
	• Schofield expects to produce 3.0 mgd of recycled water in about 3 years with troop build-up; currently about 2.0 mgd.
	• 1 mgd is dedicated to the Army (Leilehua Golf Course, landscaping, cemetery, and recreational areas).
	• Wants to extend R-1 pipeline down Kunia Road to serve customers and to discharge into Waiahole Ditch; may not be cost effective for only 2 mgd.
	• AE is interested in stormwater and wants to be a partner.
	• Would like to meet Kunia Corridor potential demand with supplemental water from Lake Wilson.
	• Could also tie Wahiawa R-1 water into pipeline.
	• Schofield WWRF also needs relief during wet weather periods.
	• AE wants to discontinue discharging its treated effluent into Dole Ditch.
	• Kunia agriculture looks like the best option for reuse but treatment plant inflow needs augmentation to meet projected demand.
	• There is an old Oahu Sugar irrigation ditch along Kunia Road that could be used thereby reducing construction costs.
	• Phycal will be operating a bio-fuel pilot and will be using 70,000 gallons per day of R-1; it will be trucked to the plant.
	• AE interested in opportunity to assist Castle & Cooke with R-1 facility; will make contact.

Benefits to Stakeholder	Expanded use of recycled water for irrigation. Expanded role of water purveyor. Expanded distribution network for R-1 recycled water. Contract operation or ownership opportunities. If wastewater scalping facilities are constructed by developers, the developers will not want to operate and maintain the facilities in the long-term. They will either be managed by ENV or by private companies. Help client (Army) meet sustainability mission.
Stakeholder Issues	Competitive ownership roles. Capacity to treat and store stormwater. Limited current wastewater treatment capacity.
Incentives	Eliminate/reduce cost of discharge to Dole Ditch. Increased revenue for irrigation water sales.

Stakeholder	Environmental Protection Agency (EPA)
Contact Person	Jared Blumenfeld, Region 9 Administrator
Contact Information	75 Hawthorne Street Mail Code: ORA-1 San Francisco, CA 94015 P – 415-947-8702 Blumenfeld.jared@epa.gov
Primary Business	Federal agency responsible for promulgation and enforcement of environmental regulations.
Relationship to Plan	Oversees National Pollutant Discharge Elimination System (NPDES) permits for the City and County of Honolulu's Sand Island and Honouliuli Wastewater Treatment Plants.

Interview Summary	EPA – Susan Polanco and Cheryl McGovern (by phone)
	September 14, 2102
	• Cheryl McGovern is EPA's Recycled Water Coordinator.
	• EPA supports recycled water use but has no authority over it; it is a state issue.
	• Draft Recycled Water Guidelines is a compendium of information, not a regulation.
	• EPA funded an 8-year pilot project for Monterey Regional Sanitation District to demonstrate the impact of recycled water on crops such as strawberries, lettuce, and spinach.
	• Much of the produce we purchase at major retailers in Hawaii is irrigated with recycled water in the Salinas, California area.
	• EPA can provide informational support:
	  • Studies on stormwater quality, and reclamation and reuse.
	  • Commercial users of recycled water.
	  • Mcgovern.cheryl@epa.gov
	• Orange County Sanitation District developed a model public outreach program for indirect reuse of recycled water for drinking water:
	  • Excellent program
	  • Overcame public opposition
	  • Words to use/avoid
	  • Focused on technology, test results, and how it affected water quality vs. source of water
	• Pharmaceuticals and personal care products can be removed from water through treatment (vadose zone of soil and processes such as ozone); pollution prevention a better step.
	• There are no guidelines for stormwater reclamation and reuse:
	  • Need water quality data
	  • EPA supports beneficial use of stormwater
	  • Expensive to capture
	• Schofield Barracks has a stormwater permit; concern about chemical use on base and maintenance buildings.
	• Office of Research and Development gets funding each year; possibility of funding for some activities in Hawaii.
	• DOH gets funding through 319 grants for non-point sources.
	• San Luis Obispo Creek and Truckee River both have minimum streamflow standards that use recycled water (San Luis Obispo is court-ordered).
	• EPA asked about state water conservation efforts, stating that it is easier than recycling.
	• EPA is also promoting the use of gray water to offset potable water use.

Benefits to Stakeholder	Reclamation and reuse of stormwater can help mitigate pollution issues associated with TMDLs. Helps achieve NPDES goal of "Pollutant Discharge Elimination". Improves receiving water quality by reducing surface water runoff.
Stakeholder Issues	Environmental and human health risks. Impact on public consumption of food crops and on groundwater quality.

Stakeholder	State of Hawaii Department of Health (DOH)
Stakeholder	Gary Gill, Deputy Director, Environmental Health Administration
Contact Information	1250 Punchbowl Street Honolulu Hawaii 96813 P - 808-586-4424; F – 808-586-4444 E-mail: gary.gill@doh.hawaii.gov
Additional Contacts	Stuart Yamada – Chief - Environmental Management Division Alec Wong – Clean Water Branch Joanna Seto – Safe Drinking Water Branch Marshall Lum/Sina Pruder - Wastewater Branch Laura McIntyre – Environmental Planning Office
Primary Business	State regulatory authority for promulgating and enforcing regulations pertaining to drinking water, wastewater treatment, stormwater, and water quality compliance.
Relationship to Plan	Some uses of non-potable water require regulatory approval and some regulations might need changes for full use of non-potable water sources.
Interview Summary	DOH - Gary Gill, Joanna Seto, Sina Pruder, Marshall Lum, and Dan Chang September 11, 2012 • The current administration supports water reuse and conservation (they referenced the Governor's New Day Plan). • DOH can support efforts through policy and state revolving fund (SRF) loans. • Can promote water reuse through new DOH policy or amended policy. • DOH is initiating a potable and recycled water quality monitoring program to test for pollutants of concern including pharmaceuticals (they indicated stormwater is part of it also). Future Contaminant Leaching Model Study being done by WRRC. • There is concern about the unknowns of stormwater but DOH is supportive of the concept. DOH looking for a mainland "model" regarding stormwater recapture and recharge (e.g., vegetated swales, etc.) to keep runoff from leaving people's properties. • We raised the issue of the caprock aquifer being declared "R-1" if recycled water were to be used for recharge; Gary Gill questioned the reasoning/basis for any such designation; Sina seemed to support the designation. (Gary indicated that he would have staff look into this caprock designation issue and DOH's policy.) • DOH supports the concept of a stormwater utility and might introduce it in the upcoming legislature; Gary Gill is waiting for a draft. • DOH has a new Total Maximum Daily Loads (TMDL) coordinator (Randee Tubal). • Gary Gill offers a voice of reason and is willing to question the basis for policies that may be barriers to the goals of the NPWMP. • DOH in general is supportive of the expanded reuse concept; however, they cited the need for appropriate studies before regarding any possible impacts from the application of reclaimed water over the potable aquifer. • DOH also mentioned that they have had discussions with Castle and Cooke regarding re-purposing of the Mililani WWTP, as well as meeting with Tim Steinberger related to a scalping unit at Ala Wai Golf Course. • DOH was amenable to making a short presentation during the upcoming stakeholder meeting and/or to respond to questions related to their Reuse Guidelines and/or other program related questions.
Benefits to Stakeholder	Reduction in near-shore pollution. This will happen if stormwater is integrated for non-potable water use. Augmented streamflow might benefit TMDL in receiving waters (streams and ocean) since less erosion from stormwater runoff. Provides alternative to effluent disposal.
Stakeholder Issues	Applicable regulations for different types of non-potable water and their integrated uses. The most restrictive regulations will likely drive the regulations for integrated use. Need to develop new regulations (e.g., stormwater reuse). Potential human and environmental health risks. Potential risk to groundwater and food crop consumption.
Incentives	Integration of currently segregated programs for oversight. Wastewater disposal, recycled water, and stormwater are all separate programs.

Stakeholder	State of Hawaii Department of Agriculture (HDOA)
Contact Person	Scott Enright, Deputy Director
Contact Information	1428 South King Street Honolulu, Hawaii 96814-2512 P – 808-973-9560
Primary Business	Through its Agricultural Resource Management Division, the department operates the State's Agricultural Park Program. The major objective of this program is to assist people who are interested in leasing land for farming ventures by providing irrigation water, reasonably priced farmland with infrastructure and facilities to encourage competition within the industry.
Interview Summary	HDOA – Scott Enright and Brian Kau September 21, 2012 • HDOA supports recycled water use. • Larry Jefts is the leading agriculturalist and has to be on-board; he can influence others. • FSMA may be key determining factor; act is likely two years out. • FSMA will be administered locally by DOH, but will pass off the farm side to DOA, which has jurisdiction up to distribution. • Food safety issues primarily associated with microbiological contamination. • Food safety audits will be required. • DOA has a FSMA task force which can include recycled water use in its recommendations. • Some retailers such as Costco are anticipating the regulation and are developing or have audit protocols in place. • Tish Uyehara of Armstrong Produce is very knowledgeable about food safety and would be a good point of contact. Ms. Uyehara also sits on the ADC Board. • Dean Okimoto, head of the Farm Bureau would be another good contact. • HDOA supports agricultural outreach regarding recycled water; may initiate their own outreach. • State Senator Donovan Dela Cruz would like to remove Wahiawa WWTP effluent from Lake Wilson to provide more flexible use of Lake Wilson water. • HDOA thinks Lake Wilson water could be diverted south for use other than North Shore irrigation. • ENV wants to discharge treated Waimanalo effluent into HDOA's Waimanalo Irrigation System, but wants to charge DOA for the water. • Waimanalo WWTP is considered R-2, needs UV to bring it to R-1. • HDOA concerned about cost implications including any required monitoring and possible need to replace all existing Waimanalo irrigation pipe with purple pipe. • Clarification of burdens on purveyors & farmers needed. • HDOA conducted a survey among its Waimanalo Irrigation System customers – one survey subject was the acceptability of recycled wastewater among the customers, results are pending.
Benefits to Stakeholder	More water resources available for agricultural irrigation. Expanded use ALISH lands. Expanded distribution network to serve more agricultural land. Increased reliability of water resources. Mitigates current limited storage capacity. Reduced need for fertilization (e.g., nutrients in recycled water). Provides water where alternatives are not available. Reduces erosion.
Stakeholder Issues	Cost of water. Users might be concerned about quality of some water sources. Though the water resources might be integrated, some types of water might not be desired on certain crops. Exported produce irrigated with recycled water. Who would be responsible for compliance with recycled water guidelines (i.e., landholder, user, etc)? Federal food safety requirements.

Stakeholder	City and County of Honolulu Department of Environmental Services (ENV)
Contact Person	Tim Steinberger, Director
Contact Information	1000 Uluohia Street, Suite 308 Kapolei, Hawaii 96707 P – 808-768-3486 F – 808-768-1591 E-mail: tsteinberger@honolulu.gov
Additional Contacts	Ross Tanimoto – Deputy Director
Primary Business	Administers environmental programs for the treatment of wastewater for discharge, solid waste reuse and disposal, and stormwater management.
Relationship to Plan	ENV operates the Wahiawa and Honouliuli WWTPs that are located in Central Oahu. ENV programs can benefit from potential opportunities that will reduce stormwater discharges to near-shore waters and from the reduction of the amount of raw wastewater that needs to be treated due to increased non-potable water reuse.

Interview Summary	Tim Steinberger (ENV Director) and Kelsey Gaddy (Executive Assistant to the Mayor)
	September 28, 2012
	• An overview of the CONPWMP project was provided by CWRM (Lenore).
	• ENV stated that the MBR unit at the Wahiawa WWTP would be completed by the end of next year (2013). The MBR plant will be able to produce R-1 quality water but the treated effluent may not be designated as R-1 because there is no independent wet weather storage.
	• Per ENV, if the DOH considered Lake Wilson as an open reservoir, a permit would not be required. However, DOH views Wahiawa "Reservoir" as a lake, thus a DOH permit is required.
	• ENV operates the Wahiawa WWTP under a 1994 Consent Decree requiring secondary (R-2) treatment. R-1 designation (after installation of the MBR system) will be dependent upon having 21 day storage capacity for wet weather/off spec water. Without storage, the R-1 water may still be considered R-2.
	• ENV noted that MBR operational costs are high.
	• ENV stated that prior consideration was given by BWS to take R-1 water from Wahiawa WWTP to the Central Oahu Regional Park (CORP). Offers were also made by ENV to the Army to connect to the Schofield WWTP, including bringing the pipeline from Wahiawa to the fence line of the base.
	• If ENV is going to supply R-1 water to a purveyor (yet to be determined), ENV wants some level of payment to recover their treatment costs.
	• ENV noted that earlier discussions with the State Department of Transportation (DOT) identified concerns by DOT regarding any new transmission infrastructure along Kamehameha Highway, which is under DOT jurisdiction.
	• ENV acknowledged the Kunia Road pipeline option but cited the possible concerns/costs regarding the pumping requirements to get the R-1 water over the uphill saddle of the roadway.
	• Per ENV, EPA may consider Waiahole Ditch as a "stream," which would require permitting if R-1 is discharged into the ditch system.
	• ENV stated that there are several options under consideration regarding the future use of the Mililani WWTP. ENV noted that two studies were conducted for the Mililani facility, including the option to use the Mililani facility for a small MBR treatment plant to treat 500,000 gpd to provide R-1 water for CORP. Effluent from the Mililani subdivision would be scalped and treated. Per ENV, the Department of Facility Maintenance (DFM) is currently using portions of the facility for stormwater management purposes. ENV is updating its I/I plan and may want to use the facility as an equalization basin or holding facility.
	• ENV viewed the proposed Koa Ridge project as an unplanned project, as it was not included in the West Mamala Bay Facilities Plan. An update of the Facilities Plan is currently underway and flows from these developments (Koa Ridge and Waiawa) will be addressed. Tim noted that there have been no formal contact/discussions with Castle & Cooke regarding their concept of constructing a MBR scalping facility for Koa Ridge.
	  • Tim was supportive of the stormwater reclamation concept, noting the potential for increased stormwater regulation. Numeric limits on NPDES discharge are pending.
	  • ENV stated that they cannot be a purveyor of R-1 water but can be a supplier to the purveyor. Tim acknowledged that potentially the HDOA, ADC, or AE could be a purveyor of R-1 water via a purchase agreement with ENV.
	  • ENV stated that while many stakeholders favor the elimination of R-1 discharge into Lake Wilson, there are others who favor the continued input of reclaimed wastewater into the lake. Discharge into the lake

Stakeholder	City and County of Honolulu Department of Environmental Services (ENV)
	keeps the water level in the lake higher during dry weather periods. Tim noted that the Division of Aquatic Resources was also in favor of the continuance of R-1 input into Lake Wilson. • Tim noted that there may still be concerns over the recreational use of Lake Wilson regardless of the elimination of R-1 water into the lake. • With regard to the proposed Koa Ridge development, ENV stated that some City wastewater system upgrades would be required. The Waipahu pump station capacity is okay but the current capacity of the force main to Honouliuli would need to be upsized. Per Tim, there are plans for a third force main to be constructed by 2018. If a scalping plant is included as part of the development, ENV may not take ownership of the facility. The Koa Ridge option may need wet weather storage or off-site improvements based upon peak capacity during wet weather conditions. Koa Ridge and Waiawa will need to address LID for stormwater infrastructure development. • Tim stated that the City's current wastewater policy is consistent with the current 208 Water Quality Plan regarding decentralized treatment plants. • When posed the question of a scalping plant versus additional secondary treatment upgrades, Tim responded that it will depend on the cost tradeoffs between the two alternatives for the Koa Ridge development. • Per Tim, Lake Wilson could be used as wet weather/off spec storage for R-1 water from Wahiawa WWTP when water is not conveyed/used, however, DOH would need to approve use of Lake Wilson to meet the requirement for 21 day storage. • ENV cited prior concerns by HBWS as to the recharge of the Ewa Caprock with R-1 water due to BWS efforts to develop a larger customer base for the purchase of recycled water. CWRM noted Barry Usagawa's recent comments/support of the Kumagai Trench recharge option. Tim also mentioned DOH's prior concerns regarding possible "seepage/leakage" of treated effluent from the caprock and potential impacts to near shore waters (e.g., the Maui reinjection well concerns). • Tim stated that despite lower overall water consumption (e.g., conservation, low flow toilets, etc.) and lower wastewater flow, future wastewater solids disposal will be an issue. Hydraulic capacity may be okay but solids handling will increase. • Per Tim, the Kamehameha Highway pipeline option has potential benefits to DOT to meet their landscaping irrigation needs along the highway, but DOT may still have transmission infrastructure concerns/limitations. Kunia Road on the other hand is under City jurisdiction. • ENV stated that about $500M is being allocated for the Honouliuli WWTP secondary treatment upgrades (for 24 mgd). The plant's design capacity is 52 mgd and operates at around 32 mgd capacity. Currently, 24 mgd is processed with 12 mgd at primary treatment and discharged via the outfall; and 12 mgd at secondary treatment, which is then provided to HBWS's Honouliuli WWRF. • Lastly, following the meeting with ENV, CWRM noted that there appears to be concerns by DOH and BWS regarding any maps that show the actual location of wells. Therefore, it was suggested that our presentation maps might instead identify the parcels which are using potable water for non-potable purposes as confirmed by existing water use permits.
Benefits to Stakeholder	Reduced stormwater volume - ENV is responsible for municipal stormwater permits on Oahu; surface water runoff is the biggest source of pollution to near-shore waters. Reducing stormwater runoff can help meet TMDLs, but also might be considered a supplemental project by EPA. Scalping of wastewater and treatment for reuse will reduce the needed treatment capacity of Honouliuli RWWTP. Aid in wastewater treatment plan NPDES compliance. Reuse versus disposal alternative for Wahiawa WWTP. Revenue generation for recycled water. Reduction in lawsuits and civil actions; build/improve relationships.
Stakeholder Issues	The cost to meet near-term capital needs is over $1 billion. Sludge from scalping facilities will need to be treated on-site, but preferable discharged into the collection system for treatment at one of the Regional WWTPs.
Incentives	Lower cost of compliance with TMDLs, particularly if stormwater can be reclaimed and reused. Lower capital costs for expansion for Regional WWTPs.

Stakeholder	Honolulu Board of Water Supply (HBWS)
Contact Person	Ernest Lau, Manager and Chief Engineer
Contact Information	630 S. Beretania Street Honolulu, Hawaii 96843-0001 P – 808-748-5066 e-mail: elau@hbws.org
Additional Contact	Barry Usagawa – Manager of Planning
Primary Business	Manages Oahu's municipal water resources and distribution system to comply with state and federal safe drinking water regulations. HBWS also owns the Honouliuli Water Recycling Facility that provides R-1 quality recycled water for irrigation, and reverse osmosis water for industrial uses.
Relationship to Plan	Increased use of non-potable water for irrigation can reduce the amount of potable groundwater that is pumped and the energy associated with it. HBWS also has non-potable wells that can potentially be used for some applications.

Interview Summary	HBWS – Barry Usagawa
	September 17, 2012
	• There is a need for outreach/education to farmers regarding R-1.
	• WRRC is studying crop intake of recycled water constituents, which may be an issue.
	• Percolate contamination is not an issue:
	  • Brown & Caldwell Study results
	  • Reuse guidelines require application at ET rate
	  • Economic disincentive for over-irrigation
	• If R-1 & stormwater are introduced to ditch, does ditch become a regulated system?
	• Potable water demand is down in Central Oahu due to conservation efforts.
	• There are 12 potable water wells in Mililani that have water use permits for a total of 7.5 mgd
	• Recycled water to CORP would free up water currently being used from Waipio Heights Wells II; this water could then be treated in GAC and used for potable water.
	• City Parks Dept. has agreed to help fund development of alternative non-potable source to CORP.
	• If recycled water is brought to CORP then it could easily reach Waikele Golf Course.
	• Waikele GC pumps 2 times, if storage is constructed at upper end, can avoid pumping costs.
	• DOT is widening Kipapa Gulch, would be good to add capacity for pipelines.
	• It costs HBWS approximately $6 per gallon to develop a well, so a benefit to greater non-potable use is capital cost avoidance.
	• A recycled water pipeline was planned from Wahiawa WWTP to CORP at a cost of approximately $19 million; never constructed.
	• It would be helpful to align non-potable water master plan objectives with watershed management plan objectives:
	  • Promote sustainable watersheds.
	  • Protect and enhance water quality and quantity.
	  • Protect Native Hawaiian rights and traditional and customary practices.
	  • Facilitate public participation, education, and project implementation.
	  • Meet future water demands at reasonable costs.
	• Benefits of recycled water in Central Oahu:
	  • Meet future potable water demand (although being met now)
	  • Pump less groundwater = save energy
	  • Get Waipio Wells II back for potable use
	  • Pumping less could possibly raise head levels and increase stream flow
	  • Enough R-1 in Waiahole could reduce Windward diversions
	  • Could help minimum in-stream flow standards
	• Any investment in non-potable water system has to be repayable.
	• HBWS noted that increased use of non-potable water supply would reduce potable water consumption

Stakeholder	Honolulu Board of Water Supply (HBWS)
	thereby affecting HBWS revenues. A reduction in revenue could result in a rate increase for consumers. It was also noted that, presently, expanded use of recycled water will not result in a direct avoided cost benefit in terms of offsetting capital costs for development of new sources, because of the reduced consumption due to conservation practices by consumers. • Roby Abe of HDR is a contract for the recycled water study from Wahiawa to CORP.
Benefits to Stakeholder	Conservation of potable groundwater for non-potable uses. An estimated 32 mgd of groundwater is used for irrigation for Waipahu-Waiawa and Wahiawa aquifers. Excess water in Waiahole Ditch could be conveyed to the Ewa Plain for groundwater recharge to reduce chlorides in the Ewa Plain caprock. Increased availability of non-potable groundwater for treatment. CORP uses non-potable water for irrigation. If an alternative non-potable source can be used, the non-potable groundwater could be treated in an existing GAC system for potable use. Long-term indirect potable reuse is a future consideration. Support planning CIP and water use and development plans. Potential expanded role as purveyor of water that is analogous to role with recycled water at Honouliuli.
Stakeholder Issues	Application of non-potable water over the potable water aquifer. Some constituents in the water (e.g., endocrine disruptors) are of concern. Public perception of application in accessible areas.
Incentives	Reduced energy costs associated with groundwater pumping. Reduces new source development costs. The capital cost for a new source well is approximately $6 per gallon.

Stakeholder	Hawaii Agriculture Research Center (HARC)
Contact Person	Stephanie Whalen, Executive Director
Contact Information	Mailing Address: P.O. Box 100, Kunia, HI 96759 Physical Address: 92-1770 Kunia Road, Kunia, HI 96759 P – 808-621-1352; F – 808-621-1359 swhalen@harc-hspa.com
Primary Business	Researches and applies science and technology to achieve solutions and to identify new agricultural opportunities to support a viable agricultural sector in Hawaii.
Relationship to Plan	HARC can be a recipient of non-potable water and a resource organization for providing research and for implementing use non-potable water sources. Potential advocate for expanded non-potable water use.
Interview Summary	• Potential changes to food safety standards will affect demand/use of NP sources. However, sellers (such as Costco, markets, etc.) have their own criteria and can impose their own standards, which can be higher than current federal standards. Different inspection standards by the various parties creates considerable expense and confusion for producers. • Ms. Whalen, in addition to being the HARC Executive Director, also serves as the President of the Kunia Water Cooperative (KWC) and the President of the Kunia Water Association (KWA). • KWC farmers/growers currently use water from the Waiahole Ditch system for irrigation. The Kunia Water Cooperative was formed when the Waiahole Ditch was purchased by the State from Amfac. The members of the cooperative had to commit to using a specified amount of water in order to be sure that the bond that was issued to purchase the system could be paid. This water source is available to those parcel below or adjacent to it and also now to a parcel that is not below or adjacent but above. • The Kunia Water Association is made up of 6 to 7 parcel owners with water allocations from 3 wells. KWA members use water from three (3) well sources. The wells were all placed under the management of the association by way of deed restrictions. One of the wells is under the responsibility of Del Monte because it is a superfund site they are responsible for. the KWA gets that water for free since Del Monte is required to pump 750kgd and has no where to put it. When they fulfill their responsibility and EPA declares the site clean then the KWA will be responsible for any costs associated with that well and its pumping costs. Two (2) wells in the Schofield area are operated by KWA and are regulated under Water Use Permit, WUP No.880, for 3.96 mgd. One of the 2 wells is under the military jurisdiction and KWA is licensed to use and maintain it. • There are currently 3 parcel owners in both water organizations. Syngenta, Fat Law Farms and Monsanto. • Aside from the 2.5 MG storage and 120-unit housing for farm tenants, KWA does not own or control any NP infrastructure. KWA may have "rights-of-way" or possible corridors within their current control for the construction of NP infrastructure. • Ms. Whalen provided information on the proposed Kunia Agricultural Village and the Central Oahu Agricultural Cluster projects, which recognize the availability and potential use of R-1 water for irrigation purposes. • Ms. Whalen noted that KWA's operating costs range from 53 cents/kgal to 75 cents/kgal, just to break even. Under a unified agricultural cluster approach, operating costs could be averaged and allocated across all users (e.g., KWA and KWC members). In addition, a bulk water use permit allocation could be considered to optimize water usage from existing wells. • The differing costs associated with water supply from wells, Waiahole Ditch, and NP supply (R-1 and stormwater) will need to be averaged and allocated based on all of the consumers in the area. • Maps and other information were provided by Ms. Whalen. Once a composite map of the area is prepared showing the various parcels under cultivation, Ms. Whalen can assist us in identifying which parcels can (or cannot) use NP water. This will be helpful in delineating areas which can benefit from a dual water system that provides both potable and NP water supply. • Ms. Whalen offered her assistance to help communicate and coordinate implementation of the plan. Her position as the HARC Executive Director and President of KWA and KWC will be extremely helpful in securing support for expanded use of NP sources of water.
Benefits to Stakeholder	Scientific role in assessing non-potable water quality and use. Increased water sources for new agriculture. Biofuels production requires significant water use. Possible rate equity among users. Different rates for ditch and groundwater pumping are now used. Support acceptance of non-potable water sources.

Stakeholder	Public Works Department (U.S. Army Garrison Hawaii)
Contact Person	Bob Eastwood (Awaiting more information)
Contact Information	Address Phone Fax E-mail
Primary Business	Administers public works activities at Wheeler Army Airfield and Schofield Barracks in Central Oahu.
Relationship to Plan	Oversees contract with Aqua Engineers and manages stormwater runoff from the airfield and base.
Interview Summary	Combined meeting with Aqua Engineers.
Benefits to Stakeholder	Reduced stormwater runoff. Runoff from Wheeler Army Airfield will eventually be subject to a TMDL. Consistent with sustainability mission. Sustainability focus will increase community support.
Stakeholder Issues	Cost of implementation.
Incentives	Potential savings of fee currently paid to Dole for effluent disposal/reuse.

Stakeholder	Castle & Cooke
Contact Person	Garret Matsunami, Director of Engineering Site Construction
Contact Information	Mailing Address: P.O. Box 898900, Mililani, Hawaii 96789-8900 Physical Address: 95-1099 Ainamakua Drive, Mililani, Hawaii 96789 P – 808-626-3625; F – 808-626-3664 gmatsunami@castlecooke.com
Primary Business	Castle & Cooke develops residential and commercial property.
Relationship to Plan	Castle & Cooke is planning a large development (Koa Ridge) in Central Oahu and also owns undeveloped property.
Interview Summary	Castle & Cooke – Garret Matsunami September 18, 2012 • Presently, Castle and Cooke is in their third appeal for the Koa Ridge Makai Development. • Converting Ag land to urban. • Supreme Court overturned one decision and they had to resubmit their Koa Ridge application. • Koa Ridge Flows; 8 mgd peak wet weather; 3 mgd average dry weather flow (ADWF) Makai Development; 3 mgd ADWF Mauka Development. • Potable demand is 2.5 mgd. • Minimal non-potable demand. • City's wastewater collection system in the area is "at capacity"; will need to build a $40 million 36-inch pipeline to Waipahu Pump Station. • Rail issues might limit or affect installation. • A recycled water scalping facility is a preferred option. • Important to know if ENV system can handle the waste solids only. • Wants to locate scalping plant facility at old Mililani WWTP. • There has been public opposition to changes at Mililani WWTP. • Mililani Ag Park is owned by Castle & Cooke. • Could mandate which crops are grown at Mililani Ag Park? • Planning to build a 20 megawatt solar farm on land adjacent to Mililani WWTP and Ag Park. • Decision on reuse depends on ENV and DOH. • Stormwater from Koa Ridge Makai will discharge to a gulch.
Benefits to Stakeholder	Increases opportunities to provide wastewater service to new developments at a potentially lower cost. Stormwater reuse opportunities for new development. The Koa Ridge development is adjacent to Waiahole Ditch. Supplies non-potable water for development needs (e.g., green space). Enhances public relations through a perception of sustainability.
Stakeholder Issues	Cost of construction of recycled water facility versus conveyance of wastewater to the Honouliuli WWTP for treatment and disposal. Long-term role and responsibilities for operations and maintenance.
Incentives	Wastewater conveyance from Koa Ridge to Waipahu Pump Station is estimated to be $40 million. Cost of a recycled water scalping facility might be more economical. Might mitigate HBWS concern about loss of recharge with the Koa Ridge Mauka development.

Stakeholder	State of Hawaii Department of Transportation (HDOT)
Contact Person	Alvin Takeshita, Highways Administrator
Contact Information	869 Punchbowl Street, Room 513 Honolulu, Hawaii 96813 P – 808-587-2220 F – 808-587-2340
Primary Business	HDOT administers and maintains Hawaii's highway system.
Relationship to Plan	A significant amount of stormwater runoff occurs from the highway system and median strips and other right-of-ways are irrigated.
Interview Summary	HDOT – Alvin Takeshita, and Kelly Sato September 13, 2012 • Department is $173 million in the red. • Has MS-4 permit. • Using bio-swales and LID. • Would prefer capture and reuse. • Safety concern of storing water. • Working outside their right-of-way is a big issue. • Currently irrigating Mililani interchange with potable water (but have reduced use). • Employs temporary irrigation with potable water for plant growth and erosion control on new construction. • Facing TMDLS for Kapaa, Kaneohe, Kaaawa, Ala Wai, and Waimanalo.
Benefits to Stakeholder	Reduced stormwater runoff will help mitigate TMDLs. Non-potable water irrigation of median strips and right-of-ways.
Stakeholder Issues	Cost of implementation.

Appendix C: Stakeholder Meeting Notes

Central Oahu Non-Potable Water Master Plan General Stakeholder Meeting Summary

October 11, 2012

QUESTIONS/ISSUES DISCUSSED:

- Does non-potable demand exceed supply? Need data
- Existing data supports this supply and demand (NP)
- Concerns about differing water qualities and appropriate uses of recycled/NP water.
- Agriculture customers have concerns about food safety – general public and produce buyers
- How does California promote Title 22 uses? Same quality as HI R1.
- Mainland considering direct potable reuse.
- Stormwater has timing issues recycled water is constant – should HI have direct reuse?
- Lack of storage prob. for stormwater.
- In some US cities indirect potable reuse of recycled wastewater discharged into surface water supply sources.
- FSMA will drive acceptance of recycled water. Need to convince food distributors.
- Recycled water higher quality than surface water (bacteria).
- Should stormwater be used to recharge groundwater aquifers? (ASR)
- Why is there still an issue with PPCP applied over groundwater sources? There is existing study; also application rate < ET requirement.
- DOH concerns with continuous application and effects/impacts an underlying groundwater – investigation of quality of recycled water from different WWRF.
- Need to communicate/educate public about water quality.
- Is there a contradiction where reservoirs are recharging ground water?
- If recycled water use is found to deteriorate groundwater quality, water suppliers may have opposition.
- Not certain what restrictions would be imposed if contaminants are found due to recycled water. Current study is to determine recycled water quality and constituency, many unknowns.
- Is there a distinction between recycled application rates and groundwater recharge?
- High precipitation (storm) events could cause infiltration into groundwater.
- Should look to California for a "model" for guidelines for farmers, to not be too restrictive for reuse.
- Concerns about duration of study to determine groundwater impacts.
- DOH study aims to identify contaminants in recycled water.
- DOH study not only for PPCP's, but also for new fertilizers – EPA CA study of crop uptake took 8 years; current study is precautionary.
- EPA has concerns (some surface water).
- Interested parties should look at Brown and Caldwell study (CORP).
- Who would be responsible to remediate any future contamination of groundwater? This could discourage producers to use recycled water.
- Clarification – Mililani MBR/scalping facility could/should be operated by entity other than ENV.
- Waipio Hts. II well currently used to irrigate CORP. Could be used for potable supply if treated (carbon) well is contaminated.

- Exploring existing pipeline along Kunia Road.
- MBR WWRF needs off-spec storage to be classified as R1.
- WWRF needs to have back-up discharge ability (storage) in order to be classified as R1.
- ENV has space to construct storage at Wahiawa – since this is an evolving situation –uncertainties for future requirements.
- Should Recycled Water Guidelines be revised in light of new technology?
- Key factor for R1 is STORAGE of off-spec. There are several options available other than storage.
- Discussion of sending off-spec water to separate R2 system for reuse.
- Combined R1/R2 system?
- BWS will ascertain North Shore NP demands – should be done prior to decision to move water.
- Waiahole ditch easement could be used to convey recycled water (not-blended).
- Need to define/clarify regulations on allowable uses of recycled water.
- Does North Shore need existing amount of Wahiawa Rec. water? North Shore community wants to explore future demands before Wahiawa water is committed. Need to evaluate supply versus demand.
- Concerns with stormwater sediments and turbidity – depends on surface.

KEY ISSUES

- Liability/responsibility for complying with regulations especially future regulations.
- Responsibility for funding of infrastructure?
- Public perception of use of recycled water; education/outreach is important; technology can meet challenges.
- Interrelationship between regional planning; supply and demands.
- How will EPA (new) guidelines impact Hawaii?
- Stormwater; funding & liability.
- What are the goals and objectives?
- Waiahole Ditch – winter surplus ~mgd; encourage users to construct reservoirs – incentives for-free (?) water during surplus flows.
- Barriers include contradictory regulatory requirements, i.e., need for discharge permits during storm events. Can arrangements be worked out with regulatory agencies?
- Why are we doing this? What are general objectives? Cost-effectiveness of alternative NP supplies?
- Additional benefit of stormwater reuse is reduced TMDLs.
- Public perception; economics when several organizations involved.
- Cost of use/delivery; economic evaluation.
- Education/outreach and transparency necessary for public acceptance.
- Uncertainty of quality of recycled water; liability and responsibility; need for research to characterize quality of recycled water and to identify contaminants to monitor. DOH has responsibility to protect public health. What are long-term future effects?
- Concerns with timing of DOH study results and how this impacts decision making; may have economic consequences.
- DOH supports total water use concept/total water management.
- CWB supports reuse of NP water.

- Need for public education and outreach for acceptance of recycled water reuse. Need for evaluation of supply and demand. Hawaii may have water shortage in the future.
- DOH guidelines 10 years old – new technologies, recycled water requirements costly to end users. Compliance with guidelines?
- Need for reasonable solutions and regulations to move forward; some regulations are costly; Need to promote HI sustainability/food security.

MAP DISCUSSION

- Consider using gulches as settling basins to mitigate sediments. i.e., check dams (BMP).
- Who is responsible for natural/undeveloped areas? (stormwater)
- There may be uses for Wahiawa res. water for users along Kunia Road, south of reservoir (including Schofield Stormwater). Regulatory requirements will affect decisions.
- Need to choose either:
  1. Kunia Road corridor
  2. Kamehameha Hwy. corridor
- Mililani potable water demand is less than anticipated. Does this reduce sewer flows?
- DPP will make determination of excess sewer capacity.
- State/government agency actions?
- Private sector next steps/planning. Should capture private sector plans and what government can do to promote NP water use.
- Government should enable system operations through reasonable regulations. Make things “easy”.