

Central Oahu Non-Potable Water Master Plan Phase 2

Prepared for
The Commission on Water Resource
Management
Honolulu, Hawaii
November 16, 2014

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List of Abbreviations

ADC	Agribusiness Development Corporation
BMP	best management practices
CAB	Combat Aviation Brigade
CFU	colony-forming unit
CLEARs	Comprehensive Leaching Risk Assessment System
CONPWMP	Central Oahu Non-Potable Water Master Plan
CORP	Central Oahu Regional Park
CWRM	Commission on Water Resource Management
EDCs	endocrine disrupting chemicals
ENV	City and County of Honolulu, Department of Environmental Services
EPOCs	emerging pollutants of concern
FDA	Food and Drug Administration
FSMA	Food Safety Modernization Act
GPAD	gallons per acre per day
HBWS	Honolulu Board of Water Supply
HAR	Hawaii Administrative Rules
HARC	Hawaii Agriculture Research Center
HDOA	Hawaii Department of Agriculture
HDOH	Hawaii Department of Health
HRS	Hawaii Revised Statutes
IWREDSS	Irrigation Water Requirement Estimation Decision Support System
MAV	moving average
MBR	membrane bioreactor
MGD	million gallons per day
OHA	Office of Hawaiian Affairs
PHaRs	pharmaceutical residues
STV	statistical threshold value
TBL	Triple Bottom Line
TMK	tax map key
TMDL	total maximum daily load
UV	ultra-violet
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WUP	Water Use Permit
WRF	Water Reclamation Facility
WMP	Watershed Management Plan
WWTP	Wastewater Treatment Plant

Executive Summary

There is a significant water demand that can be met with non-potable water sources in Central Oahu. By taking a regional approach involving multiple stakeholders, the opportunity to partner and leverage resources can lead to economic savings and avoided costs. Appropriate coordination, advocacy, and the continued exchange of ideas and pursuit of potential opportunities can help achieve more efficient utilization and conservation of our water resources.

Wastewater reuse addresses both water supply and wastewater disposal concerns, and opportunities to implement expanded use of available non-potable water supplies should be encouraged. Together with enhanced water conservation program measures, the increased use of recycled water can significantly contribute to a sustainable water resource management approach to future development and expanded agricultural operations.

Recognizing the potential benefits of greater coordination, the Commission on Water Resource Management (CWRM) undertook efforts to explore and identify available options and opportunities for development and integration of alternative non-potable sources. The Central Oahu Non-Potable Water Master Plan (CONPWMP) comprises two phases, Phase 1 which was completed in 2013 and Phase 2, which refines current and future non-potable water demand and identifies potential supply options to meet these demands in three selected areas of Central Oahu.

An assessment of current Waiahole Ditch and groundwater use permittees was conducted to determine each Tax Map Key (TMK) area's potential for using alternative non-potable water supplies. A spreadsheet based evaluation was done for three (3) geographic areas:

1. Kunia Road Corridor
2. Former Galbraith Estate Property
3. Kamehameha Highway Corridor

The evaluation included identification of the following end user attributes:

- | | | |
|--|---|---------------------------------------|
| • Tax Map Key | • Landowner | • Lessee of Record |
| • Water Use Permit (WUP) | • Corresponding WUP Acreage | • Associated Well Number |
| • WUP Allocation | • Current Reported Pumpage | • Projected Water Demand (by TMK) |
| • Water Quality Needed | • Potential Supply Sources | • Available Quantity of Supply |
| • Appraisal of Required Infrastructure | • Approximate Distance to End Use Parcel (from Supply Source) | • Identified Benefits and Constraints |

The total Central Oahu non-potable water demand summarized in Table ES-1 focuses exclusively on areas currently served by potable groundwater wells. The current WUP allocations for each geographic area were used rather than current pumpage/use for each TMK. The future (potential) demand is based on total agricultural acreage multiplied by a duty of 2,500 gallons per acre per day (GPAD) which was determined to be the best available duty for estimating water demands within the Kunia Road Corridor based on the findings in the Waiahole Ditch contested case hearing. The future demands are not projected out to a specific date but assumes that all available agricultural acreage will be irrigated.

Table ES-1. Total Current and Future Central Oahu Non-Potable Water Demand		
Location	Current Allocation (MGD)	Future (Potential) Demand (MGD)
Kunia Road Corridor	5.96	17.20
Former Galbraith Estate Property	2.00	4.29
Kamehameha Highway Corridor	2.05	2.36
Total	10.01	23.85

Based on current WUP allocations, the total Central Oahu non-potable water demand being supplied by Waiahole Ditch and existing potable groundwater wells is 19.79 MGD.

Total reported water use (based on a 12 month moving average (MAV) as of 12/31/13) for parcels within Central Oahu supplied by Waiahole Ditch and existing potable groundwater wells is 9.67 MGD.

Future non-potable water demands are projected to increase based on agricultural parcels being put into cultivation on the former Galbraith Estate lands. Additional non-potable water demand may also come from expanded agricultural irrigation within the Kunia Road Corridor on lands not currently served by Waiahole Ditch or groundwater sources.

A single preferred water supply option was not identified for any of the selected study areas. Instead, a more holistic approach was taken to arrive at a grouping of technically feasible alternatives, many of which can be more fully integrated with each other to develop a long-term and adaptive water supply system.

While there are concerns regarding the application of recycled water over potable water aquifers, recycled water should continue to be explored as a potentially viable alternative source for meeting non-potable water demands which may “free up” current irrigation use of potable water supplies for future drinking water purposes. Water reuse has been practiced successfully on the mainland and in Hawaii, and in combination with aggressive water conservation, can significantly contribute to the sustainable development and management of our island’s water resources.

Accordingly, this plan provides information for key stakeholders and decision makers on maximizing non-potable water supply to meet growing non-potable water needs of Central Oahu. Potential project partnerships, including funding and/or financing options should be identified and coordinated for successful implementation. Through regional planning, larger community benefits and objectives can be achieved that are financially feasible and sustainable into the future. These benefits and objectives include:

- Promoting the highest and best use of water
- Maximizing the use of available non-potable water supply options
- Promoting agriculture in Central Oahu
- Reducing current regulatory requirements related to the use of water from Wahiawa Reservoir
- Reducing discharge to surface and near-shore waters
- Leveraging of funds and resources

In furtherance of these benefits/objectives, the recommended next steps include:

- Continuing stakeholder collaboration and improving coordination
- Addressing water quality concerns regarding the long-term application of recycled water over the potable aquifer via appropriate studies
- Supporting and enhancing current public education and outreach efforts
- Facilitating effective integration between key planning components such as the:
 - Water Resource Protection Plan

- Water Quality Plan
- Agricultural Water Use and Development Plan
- Oahu Water Management Plan

Section 1

Introduction

Recognizing the potential demand for non-potable water in Central Oahu and the finite potable water sources in the region, the Commission on Water Resource Management (CWRM) undertook a study of Central Oahu to explore a regional solution to meeting irrigation water needs through the increased utilization of non-potable water sources such as recycled wastewater and stormwater capture and reuse. This report identifies current and potential sources and uses of non-potable water, possible strategies to match supply and demand, and integration of opportunities for using non-potable water for irrigation.

Water reuse is well established on many of the islands and it continues to play an important role in sustaining our State's water resources. There are numerous benefits including preservation of water supplies and the reduction of wastewater effluent disposal through beneficial reuse of treated wastewater effluent. Despite these benefits, the annual volume of recycled water beneficially reused in Hawaii has not substantially increased since 2004.

Typically, golf course irrigation has been the most common use of recycled water. Agricultural irrigation with recycled water is ongoing in the North Shore of Oahu and has viable potential for expansion to Central Oahu given the large amount of water needed for crop irrigation.

The policy of the CWRM is that water should be put to its highest and best use in that the quality of the water supply should be matched to the quality of water needed. From a sustainability perspective, this means that potable water should be used for drinking water purposes and other domestic needs, and non-potable water should be used for agriculture, landscape, and golf course irrigation, and other non-potable needs.

It is also the policy of the CWRM to promote the viable and appropriate reuse of recycled water insofar as it does not compromise beneficial uses of existing water resources. CWRM does not have the authority to mandate recycled water use, but CWRM may, within a designated water management area, require the installation of dual-line plumbing systems for purposes of appropriate reuse applications. The CWRM may also deny an application for use of public trust resources if an alternate source, such as recycled water, is available.

The Hawaii State Department of Health (HDOH) has jurisdiction and authority over wastewater reclamation and reuse in Hawaii. The CWRM, in matters of water quality and public health and safety, defers to the authority and expertise of the HDOH, which administers the State's water quality protection programs.

Water reuse addresses both water supply and wastewater disposal concerns, and opportunities to implement expanded use of available non-potable water supplies should be encouraged. Together with enhanced water conservation program measures, the increased use of recycled water can significantly contribute towards a sustainable water resource management approach to future development and expanded agricultural operations.

Increasing regulatory requirements for treated wastewater as well as stormwater is another contributing factor compelling water reuse in Hawaii. As these regulatory mandates require higher quality effluent standards, opportunities to utilize recycled water should be explored and implemented, if technically and economically feasible, and be included in regional water supply strategies.

Infrastructure for the conveyance and distribution of non-potable water is increasing, but in most cases development of this infrastructure is being done by separate entities and without consideration of integration. If water planning and implementation continue in a piecemeal fashion, the opportunity to coordinate, partner, and leverage resources may be lost. This could result in higher capital and operating costs, isolated projects, and potentially unfavorable outcomes. A regional approach with many stakeholders offers a greater range of savings and avoided costs. Coordinated planning and integration of these efforts would benefit and promote optimization of non-potable water use, pollution reduction, increased environmental compliance, energy savings, shared costs, and preservation of high quality groundwater.

Recognizing the potential benefits of greater coordination, the CWRM undertook efforts to explore and identify available options and opportunities for development and integration of alternative non-potable sources. The Central Oahu Non-Potable Water Master Plan (CONPWMP) comprises two phases, Phase 1 which was completed in 2013 and Phase 2, which refines current and future non-potable water demand and identifies potential supply options to meet these demands in three selected areas of Central Oahu.

1.1 Central Oahu Non-Potable Water Master Plan Objectives (Phases 1 and 2)

The following comprises the key objectives of the CONPWMP:

1. Consult with 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 Wahiawa Reservoir (i.e., Lake Wilson), City and County of Honolulu Wahiawa Wastewater Treatment Plant (WWTP), Schofield Barracks WWTP, 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 demand for non-potable water in three general areas in Central Oahu, including but not limited to agricultural demands in the Kunia Road Corridor, the former Galbraith Estate property, and landscape, park, and golf course irrigation demands along the Kamehameha Highway Corridor, and other non-potable uses in the residential, military, and commercial sectors.
4. Explore options for matching the sources of non-potable water identified in Objective 2 with the water demands identified in Objective 3.
5. Identify selected scenarios for integration of available and potential non-potable water supplies.

Additional sub-objectives of the plan included:

- Maximize the use of available non-potable water supply options.
- Identify options which facilitate improvement of water quality in Wahiawa Reservoir, whereby future irrigation water supply from the reservoir is not regulated as reclaimed water.
- Assess current non-potable water supply constraints relative to service area location, available storage and conveyance infrastructure, and rough estimates of required infrastructure capital costs based on best available information.

The initial appraisal of non-potable water opportunities was addressed in Phase 1 of the plan and focused on determining stakeholder issues, current and past planning efforts, and potential non-potable water opportunities. Phase 2 of the plan focuses on refining supply and demand estimates

and identifying prospective options and possible scenarios for increased non-potable water use in Central Oahu.

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 and implementing non-potable water use in Central Oahu. Interviews and other communications were held with the following key stakeholders who currently manage, regulate, generate, and/or use non-potable water to solicit their input and to request for available information:

- Commission on Water Resource Management (CWRM)
- Hawaii Department of Health (HDOH)
- Hawaii Department of Agriculture (HDOA)
- Agribusiness Development Corporation (ADC)
- City and County of Honolulu, Department of Environmental Services (ENV)
- Honolulu Board of Water Supply (HBWS)
- Hawaii Agriculture Research Center (HARC)
- Aqua Engineers
- United States Army Directorate of Public Works
- United States Environmental Protection Agency (USEPA)
- Castle & Cooke Hawaii

Goals of the stakeholder interviews and discussions were to:

- Collect information related to potential users, projects, and regulatory issues, and to assess current opportunities/obstacles to non-potable water use and integration.
- Develop broader awareness of non-potable water use and project opportunities that can help achieve political, administrative, and financial support for implementation.

Section 2

Refinement of Non-Potable Water Demands and Water Supply Options

Non-potable water is a viable option for both agricultural and landscape/golf course irrigation in Central Oahu. The Kunia Road Corridor is largely comprised of agricultural parcels used for growing diversified agriculture and seed corn. In the Kamehameha Highway Corridor, current non-potable irrigation demand includes the Sandwich Isles Communications parcel, Central Oahu Regional Park (CORP), Mililani Golf Course, Mililani Agricultural Park, and Waikele Golf Course. Figure 2-1 shows the areas of non-potable demand in Central Oahu that are presently using water from Waiahole Ditch and/or existing groundwater sources, as well as potential areas for future non-potable water service.

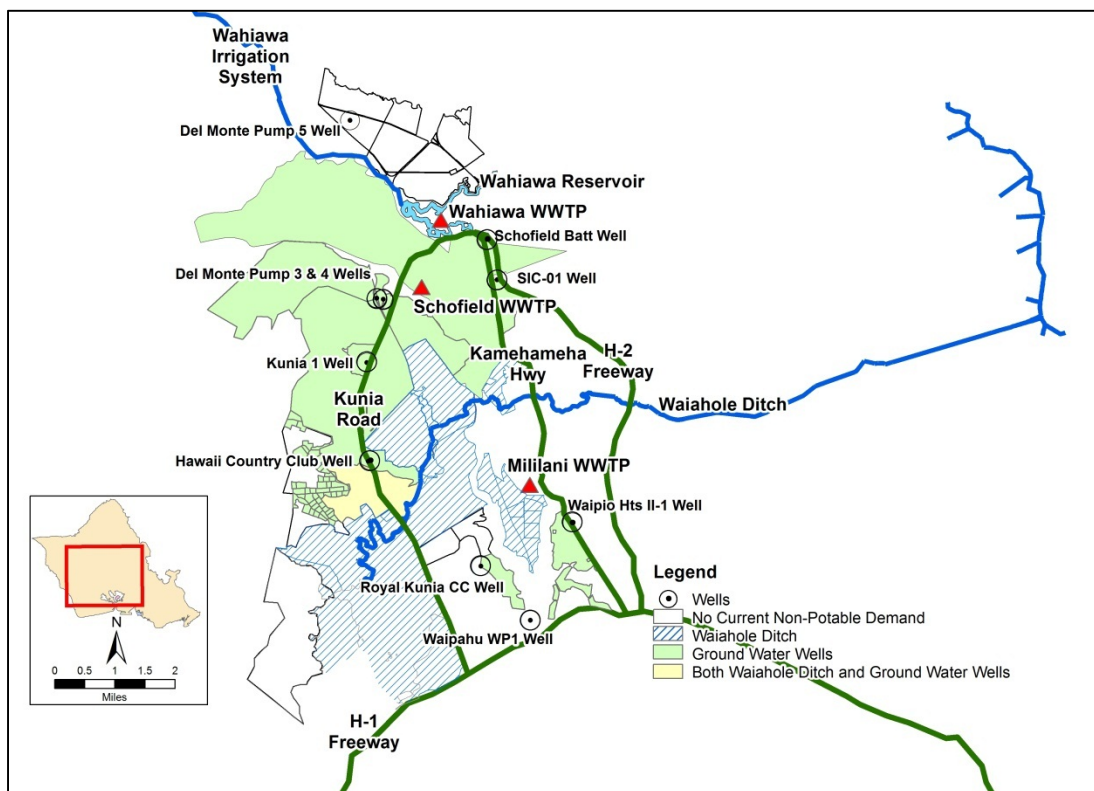


Figure 2-1 Existing Non-Potable Demand

2.1 Kunia Road Corridor

The land holdings within the Kunia Road Corridor are owned or operated by Monsanto Company, Syngenta Hawaii LLC, Hawaii Agricultural Research Center (HARC), Pioneer Hi-Bred International, Kunia Loa Ridge Farmlands, Island Palm Communities LLC, Fat Law's Farm, Nihonkai Lease Co. Ltd.,

Robinson Kunia Land LLC, Edmund C. Olson Trust No. 2, the State of Hawaii, the U.S. Government, and private country clubs. Based on CWRM's WUP data and water use reports, the total permitted allocation and current water use within the Kunia Road Corridor are as follows:

- Total Waiahole Ditch Water Use Permit Allocation: 7.40 million gallons per day (MGD)
- Total Groundwater Use Permit Allocation: 5.96 MGD
- Total Current Usage/Pumpage: 7.66 MGD

The total current usage/pumpage is based on the 12 month moving average (MAV) as of December 2013. This total includes pumpage from potable groundwater wells and Waiahole Ditch.

The CWRM's policy is to achieve the highest and best use of our water resources. Accordingly, the plan focused on those parcels that are currently using high-quality groundwater to meet their irrigation needs. Parcels already utilizing non-potable water via water use permit allocations from Waiahole Ditch were not included for further analysis beyond the initial screening phase of this study. Whereas those parcels identified as potential areas for future non-potable water demand and without any present source of irrigation water supply were included as part of this assessment.

As noted above, the total groundwater WUP allocation for the Kunia Road Corridor is 5.96 MGD. This amount does not include the WUP allocation for a non-potable groundwater source in the Kunia Road Corridor with a current allocation of 1.075 MGD. Another well provides 5.65 MGD of water to the parcels owned by the United States Government for Schofield Barracks and Wheeler Army Airfield. Only 1.00 MGD of this water is allocated for non-potable purposes, and that amount is used for the current pumpage and current allocation calculations. Of the 5.96 MGD that can be replaced by a non-potable water source, 3.96 MGD is currently allocated for agricultural usage.

To estimate potential future non-potable water demands, an agricultural irrigation duty of 2,500 gallons per acre per day (GPAD) was used. The 2,500 GPAD duty was derived from the Waiahole Ditch contested case hearing in which intensive fact-finding was conducted on the issue of the quantity of water needed to support diversified agriculture in the Kunia Road Corridor. While the 2004 Agricultural Water Use and Development Plan offers 3,400 GPAD as "the best available estimate for diversified crop farming in Hawaii," the 3,400 GPAD was based on metered water usage in the Department of Agriculture's Lalamilo Irrigation System, which is located in a different climate regime on the island of Hawaii. The fact that the Waiahole Ditch contested case hearing was focused in part on estimating the water needs for diversified agricultural in Central Oahu supports the use of 2,500 GPAD as the best available duty for estimating water demands within the Kunia Road Corridor.

Figure 2-2 shows the areas currently receiving high quality groundwater for irrigation as well as potential areas for future non-potable water service. Combined, the total amount of land area is 6,570 acres, and 6,078 acres are available for agricultural usage. Using a duty of 2,500 GPAD, the estimated non-potable water demand for the total agricultural acreage is 15.20 MGD.

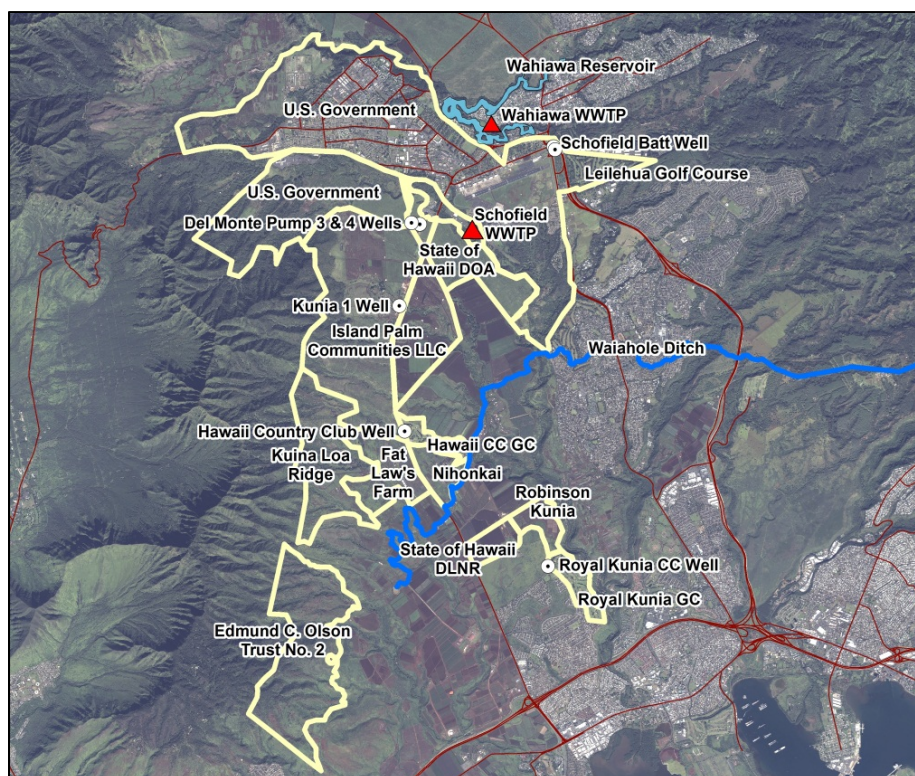


Figure 2-2. Kunia Road Corridor Non-Potable Demands

The golf course irrigation water demand associated with Royal Kunia Country Club, Hawaii Country Club, and Leilehua Golf Course has been included as part of the Kunia Road Corridor assessment. All three golf courses are currently being irrigated with high quality groundwater. The allocation for Royal Kunia Country Club is 0.60 MGD, and the allocation for Hawaii Country Club is 0.40 MGD. The total current non-potable demand associated with Leilehua Golf Course and on base use is 1.00 MGD. These golf courses currently do not have plans for expansion, and the future demand assumes that the existing WUP allocations are sufficient for future irrigation demands. The total projected non-potable water demand for the area is summarized in Table 2-1.

Irrigation Type	Total Area (acres)	Current Allocation (MGD)¹	Future (Potential) Demand (MGD)
Agricultural	6,078	3.96	15.20
Royal Kunia Country Club Golf Course	163	0.60	0.60 ²
Hawaii Country Club Golf Course	136	0.40	0.40
Leilehua Golf Course	193	1.00 ³	1.00
Total	6,420	5.96	17.20

¹ Current WUP allocations were used as the basis for quantifying current demands (in lieu of using monthly reports of use).

² Estimates of future water demand for golf course irrigation assumed no expansion and therefore no increase above the existing WUP allocation.

³ Estimated amount of the potable groundwater WUP allocation being used for non-potable landscape/golf course irrigation.

Based on a total projected agricultural water demand at full cultivation of 15.20 MGD, the total future non-potable water demands for the Kunia corridor can be estimated as 17.20 MGD.

2.2 Former Galbraith Estate Property

The State recently acquired agricultural lands from the Galbraith Estate just north of the Wahiawa Reservoir. This land is now owned by the Agribusiness Development Corporation (ADC) and the Office of Hawaiian Affairs (OHA), and plans are being developed to put these parcels into cultivation. One of the parcels will be used for pasture land, and the other parcels will be used for diversified agriculture. Presently, none of the land in the former Galbraith Estate property is being used for agricultural operations.

Based on CWRM's WUP data and water use reports, the total permitted allocation and current water use within the former Galbraith Estate is as follows:

- Total Waiahole Ditch Water Use Permit Allocation: 0 MGD
- Total Groundwater Use Permit Allocation: 2 MGD
- Total Current Usage/Pumpage: 0 MGD (12-MAV as of 12/31/13)

The current 2 MGD WUP allocation was based on 1,778.7 acres of pineapple agriculture with a duty of 1,124 GPAD. However, pineapple is no longer being cultivated. In the next few years, ADC expects to have 1,186 acres of land put into cultivation for diversified agriculture and 32 acres of land used for pasture. Further down the road, OHA expects to put its 507 acres into cultivation as well which would increase the agricultural water demand within the former Galbraith Estate property. Assuming a duty of 2,500 GPAD for diversified agriculture and a total acreage of 1,693 acres, the future water demands for the area are estimated to be 4.23 MGD. For the pasture area, CWRM's Irrigation Water Requirement Estimation Decision Support System (IWREDSS) model was used. This model was developed by the University of Hawaii to estimate crop irrigation requirements in Hawaii. For the 32 acres of pasture land, IWREDSS calculated a total water demand of 0.06 MGD. The total future water demands for the former Galbraith Estate property is summarized in Table 2-2.



Figure 2-3. Former Galbraith Estate Property Non-Potable Water Demands

Table 2-2. Current and Projected Non-Potable Irrigation Water Demand in the Former Galbraith Estate Property

Irrigation Type	Total Area (acres)	Current Allocation (MGD)¹	Future (Potential) Demand (MGD)
Diversified Agriculture	1,693	2.00 ²	4.23
Pasture	32	-	0.06
Total	1,725	2.00	4.29

¹ Current WUP allocations were used as the basis for quantifying current demands (in lieu of using monthly reports of use).

² The existing WUP allocation of 2.00 MGD was for pineapple cultivation. The current reported water use (12-MAV) as of December 2013 is 0 MGD.

With a total area of 1,725 acres being put into cultivation, there is a total projected future demand of 4.29 MGD.

2.3 Kamehameha Highway Corridor

Areas of current groundwater use for non-potable purposes include agricultural and landscape/golf course irrigation located on both the east and west sides of Kamehameha Highway running from the H-1 Freeway to Wahiawa. These include the Sandwich Isles Communication parcel, the Waikele Golf Course, and CORP.

Based on CWRM's WUP data and water use reports, the total permitted allocation and current water use in the Kamehameha Highway Corridor are as follows:

- Total Waiahole Ditch Water Use Permit Allocation: 2.38 MGD
- Total Groundwater Use Permit Allocation: 2.05 MGD
- Total Current Usage/Pumpage: 2.01 MGD (12-MAV as of 12/31/13)

As noted above, the total (Waiahole Ditch and groundwater) WUP allocations can be compared against the potential agricultural water use to determine an estimate of additional water demands for the subject area. However, future agricultural water demand along Kamehameha Highway may decrease in the future because of a proposed solar farm that is expected to reduce the amount of agricultural land in the Mililani Agricultural Park from 610 to 232 acres.

In the Kamehameha Highway Corridor, CORP is the largest area of demand. According to water pumping data, the 12-MAV as of December 2013 showed that the public park used 0.24 MGD. It is irrigated by the Waipio Heights II-1 well, shown in Figure 2-4, which has a WUP allocation of 1.00 MGD. The Sandwich Isles Communications parcel has a WUP of 0.10 MGD for agricultural irrigation. However, as of December 2013, the 12-MAV was 0 MGD. The Waikele Golf Course has a WUP allocation of 0.95 MGD. Current pumpage is 0.31 MGD and there are no plans for expansion.

Current plans for Koa Ridge Makai call for the construction of 3,500 residential units, a mixed use higher density Village Center, a 28-acre medical complex, commercial and light industrial uses, an elementary school, churches and community centers, and neighborhood and community parks on 576 acres of land along the Kamehameha Highway Corridor. Several consultations with Castle and Cooke Hawaii discussed the on-site non-potable irrigation requirements for the proposed Koa Ridge Makai development. Though no quantifiable estimate of non-potable demand could be determined at this time, it can be reasonably assumed that some future amount of landscape/park irrigation will be required as part of the project development and such future demands could be met through the use of available non-potable water sources.

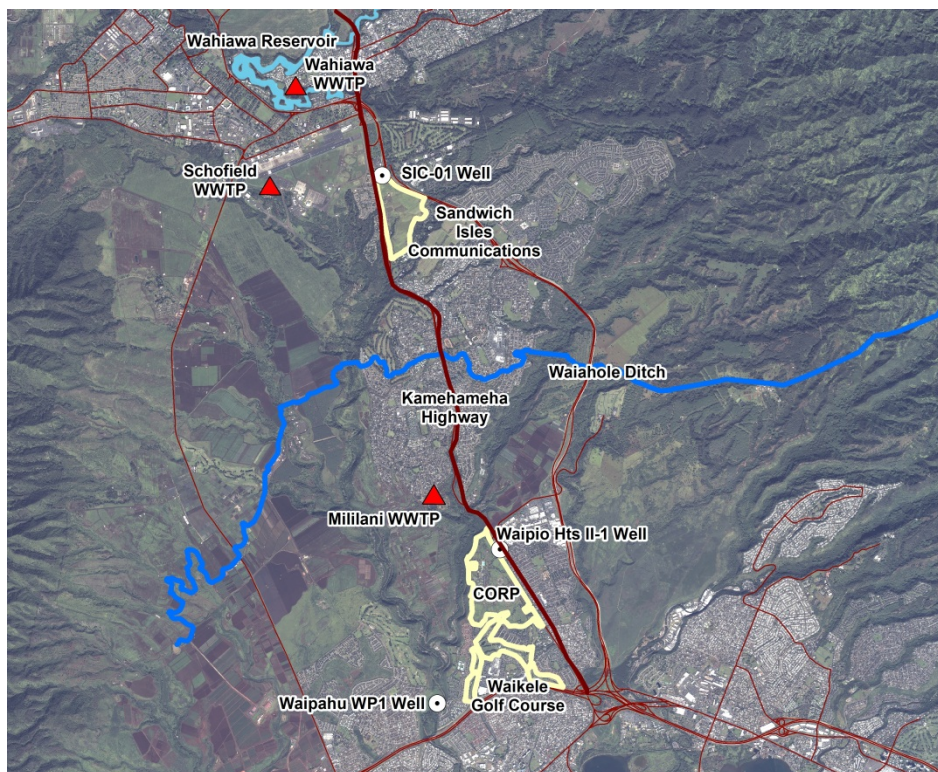


Figure 2-4. Kamehameha Highway Corridor Non-Potable Water Demands

Table 2-3. Current and Projected Non-Potable Irrigation Water Demand in the Kamehameha Highway Corridor			
Irrigation Type	Total Area (acres)	Current Allocation (MGD) ¹	Future (Potential) Demand (MGD)
Agriculture	163	0.10 ²	0.41
Park Irrigation	267	1.00	1.00
Golf Course ³	122	0.95	0.95
TOTAL	552	2.05	2.36

¹ Current WUP allocations were used as the basis for quantifying current demands (in lieu of using monthly reports of use).

² The current reported water use (12-MAV) as of December 2013 is 0 MGD.

³ Estimates of future water demand for golf course irrigation assumed no expansion and therefore no increase above the existing WUP allocation.

In light of the type of non-potable irrigation (i.e., golf course and park irrigation) and no immediate plans to increase acreage at these sites, it was assumed for purposes of this study that future water demands will not increase beyond the current permitted allocations. As shown in Table 2-3 above, the projected future additional demand for non-potable water service along Kamehameha Highway is 2.36 MGD.

2.4 Summary of Total Non-Potable Water Demands

As previously noted the following estimates of current and projected non-potable water use focused upon those demands being met through existing potable groundwater sources (and does not include non-potable water irrigation being supplied by Waiahole Ditch). Additional non-potable water demand may come from expanded agricultural irrigation within the Kunia Road Corridor on lands not

presently under cultivation and from planned agricultural operations on the former Galbraith Estate lands. Figure 2-5 shows these future areas of non-potable water demand in Central Oahu. The total projected non-potable water demand for Central Oahu is summarized below in Table 2-4.

Location	Current Allocation (MGD)	Future (Potential) Demand (MGD)
Kunia Corridor	5.96	17.20
Former Galbraith Estate Property	2.00	4.29
Kamehameha Highway Corridor	2.05	2.36
TOTAL	10.01	23.85

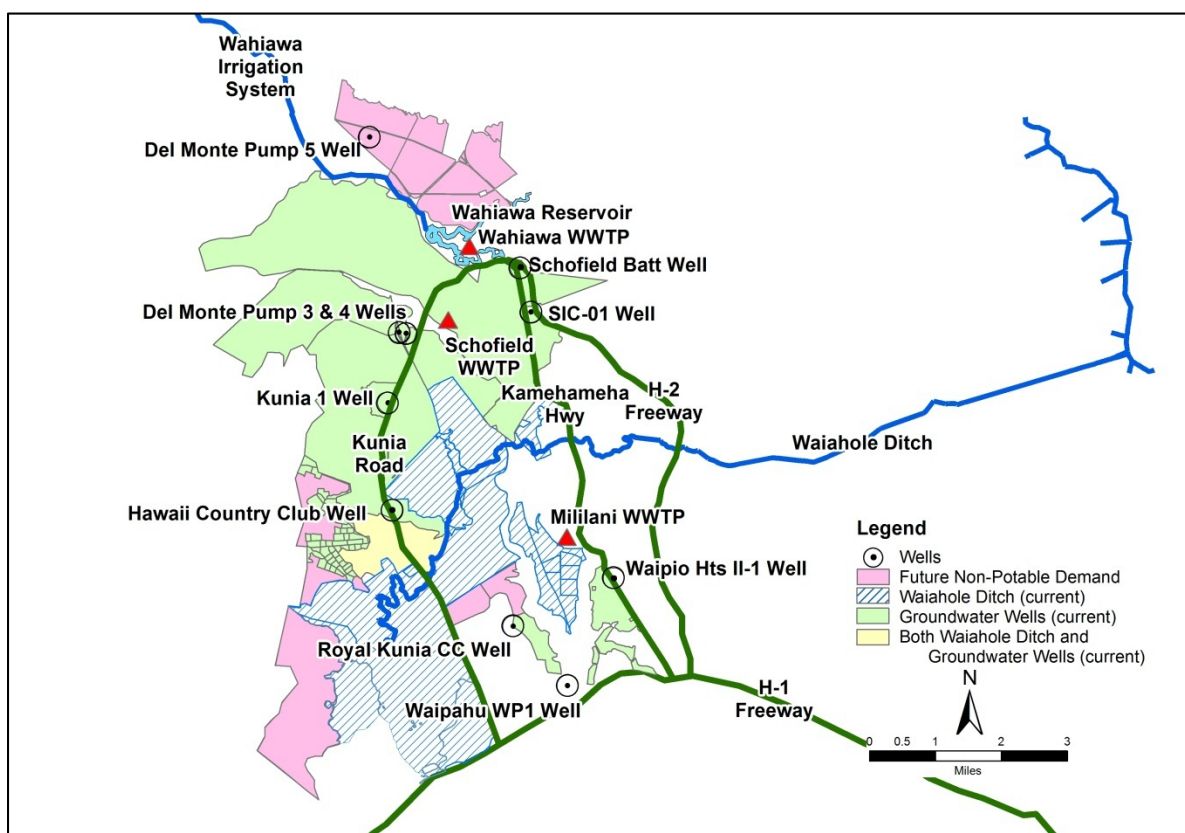


Figure 2-5. Current and Future Areas of Non-Potable Water Demand in Central Oahu

2.5 Current Sources of Irrigation Water Supply

Oahu's potable water supply comes almost exclusively from high quality groundwater, which is also used to meet various non-potable water demands. If alternative water sources could be used to meet these non-potable water demands, potentially 23.85 MGD of groundwater could be preserved for future potable use.

Central Oahu's existing non-potable water supply comes from two principal sources: Waiahole Ditch and groundwater wells. Of these wells, the Kunia 1 well, cannot be used for potable drinking water supply per USEPA/DOH regulations.

Waiahole Ditch has a capacity of 50 MGD and currently conveys just over 12 MGD of water from Windward Oahu to Central Oahu ending in Kunia. The CWRM is authorized to allocate up to 15 MGD through water use permits for agriculture and other uses along the ditch alignment through Mililani to the Kunia Road Corridor. Figure 2-6, shows those areas currently served by non-potable water from Waiahole Ditch. The current cost of water from Waiahole Ditch ranges from 57 cents per thousand gallons for agricultural users to \$1.20 per thousand gallons for non-agricultural users.



Groundwater Wells. Some of the Central Oahu region's agricultural and landscape irrigation needs are being met by existing potable and non-potable wells. Figures 2-6 and 2-7 show each well's location, their commonly used well names, and permitted areas of use as stated on WUP records. The only non-potable well is the Kunia 1 Well, which has been previously contaminated by agricultural practices.

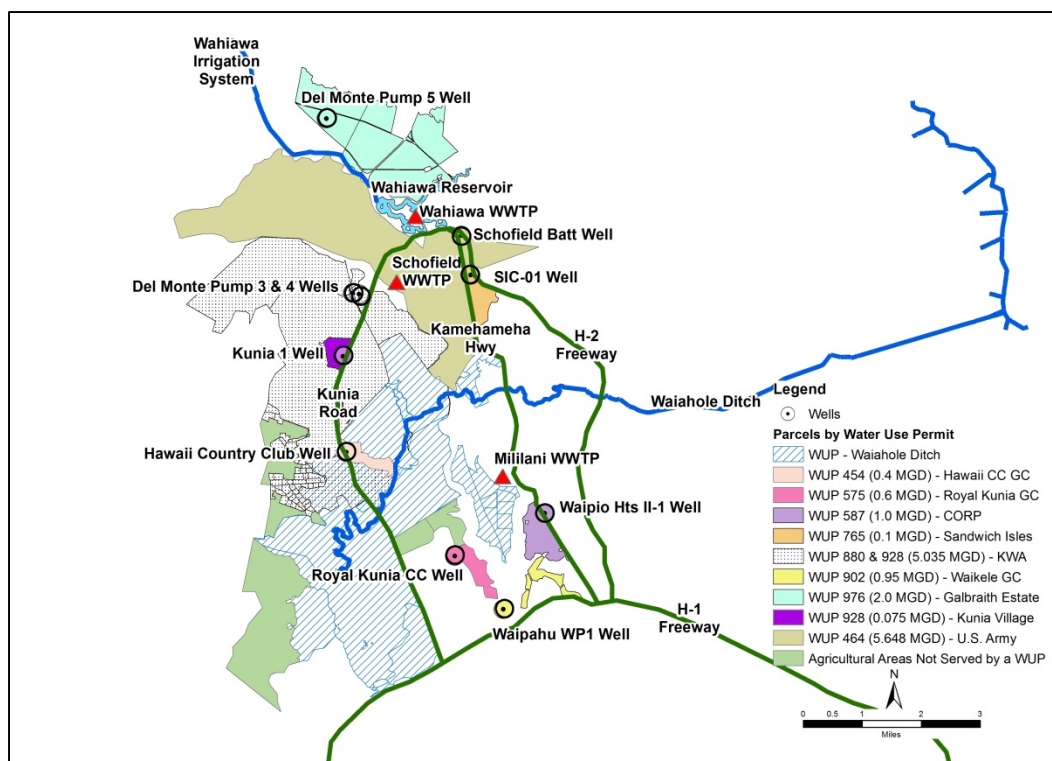


Figure 2-6. Wells and Water Use Permit Parcels in Central Oahu

The Kunia 1 well and the Del Monte Pump 3 and 4 wells irrigate agricultural lands in the Kunia Road Corridor. Two other wells in the Kunia Road Corridor are the Hawaii Country Club and Royal Kunia Country Club wells which provide potable water for turf irrigation for the two golf courses.

The Del Monte Pump 5 well services the ADC and OHA lands in the former Galbraith Estate property. South of the Wahiawa Reservoir is the Schofield Batt well, which supplies potable water to the Army-owned lands, which include the Leilehua Golf Course, Schofield Barracks, and Wheeler Army Airfield.

In the Kamehameha Highway Corridor, there are three large areas of land being serviced by groundwater wells. Sandwich Isles Communications owns a large parcel of land just below the

Leilehua Golf Course and is serviced by potable water from the SIC-01 well. The Waipio Hts II-1 well serves CORP, and the Waipahu WP1 well serves the Waikele Golf Course. Although additional treatment will be required prior to its use as a potable drinking water source, the Waipio Hts II-1 well has been classified as a potable water source. Regardless of the current use and classification of the wells, all the previously mentioned wells except the Kunia 1 well could be redirected to support drinking water needs if alternate non-potable sources can be used instead.

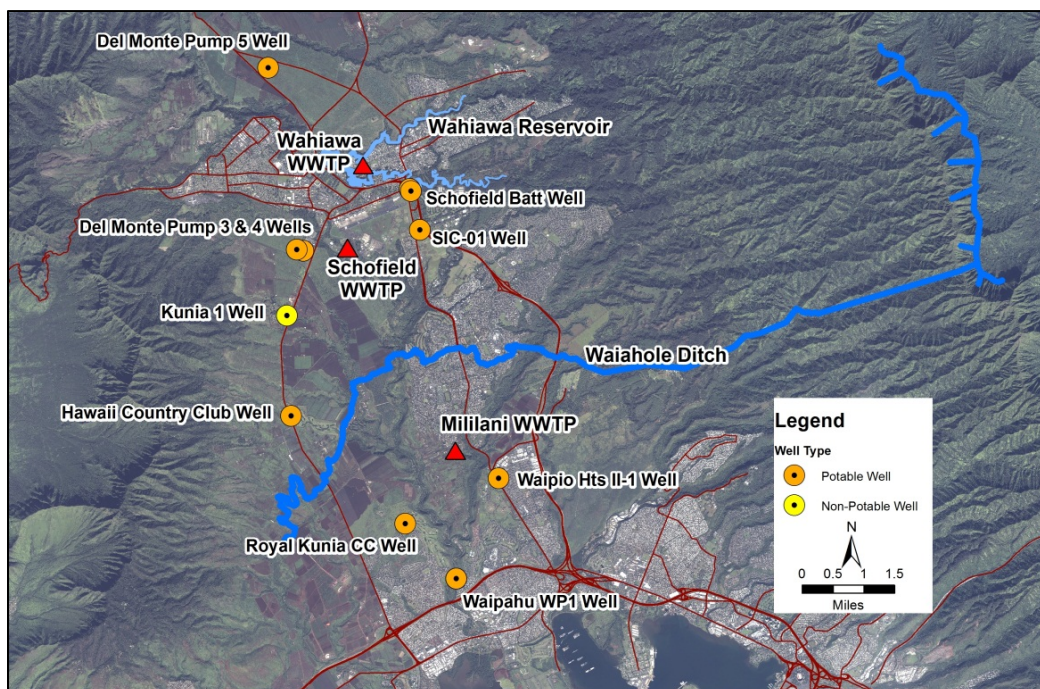


Figure 2-7. Central Oahu Well Designations

2.6 Future Sources of Irrigation Water Supply

In the future, additional sources of non-potable water may become available in the Central Oahu region. These additional sources include the Wahiawa and Schofield WWTPs, Wahiawa Reservoir, stormwater runoff, and the prospective availability of reclaimed wastewater from a future R-1 facility within the Kamehameha Highway Corridor, possibly using the existing Mililani WWTP site.

Wahiawa WWTP currently produces approximately 1.6 MGD of R-2 water, which is below its design capacity of 2.5 MGD. The plant produces tertiary-treated effluent using clarifiers, activated sludge, and ultra-violet (UV) treatment. A number of upgrades have been completed at the Wahiawa WWTP, and the facility is undergoing final commissioning, which will result in R-1 quality effluent. These upgrades include construction of a Membrane Bioreactor (MBR) as well as a new biofilter, upgrading of the UV system, R-1 pump station, and modification of existing secondary clarifiers to flow equalization basins.

The HDOH has not yet certified the treated effluent from Wahiawa WWTP as R-1 quality. As it relates to Storage Impoundments, per current HDOH Reuse Guidelines, the reuse system shall include adequate storage impoundment(s) or a backup disposal system to prevent any overflow or discharges from the system when the irrigation system is not in operation or when wastewater effluent quantities exceed the irrigation requirements.

With respect to Emergency Backup Systems, when recycled water produced at the treatment facility fails to meet the filtered effluent and disinfection criteria established in the HDOH Reuse Guidelines,

such effluent shall not be discharged into the reuse system storage or to the reuse system. Such substandard recycled water (i.e., off-spec water) shall be either stored for subsequent additional treatment or shall be discharged to another reuse system requiring lower levels of treatment or to an effluent disposal conforming with Hawaii Administrative Rules (HAR), Title 11, Chapter 62, Sections 11-62-25 & 26, and approved by HDOH. Emergency system storage shall not be required where another approved alternate reuse area is incorporated into the system design to ensure continuous facility operation in accordance with HDOH guidelines or where an alternate effluent disposal system has been approved by HDOH.

The HDOH has most recently advised that the present reuse guidelines are going to be revised to remove the requirement for backup storage. Current administrative rules, Chapter 11-62, HAR, requires that a wastewater treatment plant (including R-1 facilities) shall have a primary and backup effluent disposal systems. The reuse area is usually considered the primary disposal if all of the effluent can be routed for reuse. The facility will need to have a backup disposal system to handle the off-spec and wet weather flows.

The Wahiawa WWTP does not have adequate backup storage for off-spec and wet weather flows, and does not presently have a primary disposal point as defined above (other than Wahiawa Reservoir). Per HDOH guidelines, the Wahiawa facility will require primary and backup effluent disposal systems prior to HDOH certification of the treated effluent as R-1 quality water. The Wahiawa WWTP currently discharges R-2 quality effluent at the bottom of the Wahiawa Reservoir through a 24-inch outfall with diffusers. The release of R-2 quality effluent into Wahiawa Reservoir results in the non-potable water supply in the reservoir to be regulated as reclaimed water. While R-2 water can be used for irrigation applications, there are additional reuse guideline requirements attached to using this lesser quality of recycled water.

Once requirements of the HDOH Reuse Guidelines are met, the treated effluent will be certified as R-1 quality effluent. While there are no immediate plans to increase production of reclaimed water beyond the current 1.6 MGD, upgraded certification as R-1 quality water will reduce current monitoring requirements and facilitate expanded irrigation applications. The future sale of reclaimed water by ENV will require identification of a qualified purveyor for the sale and distribution of R-1 water, including establishment of an acceptable R-1 pricing schedule.

Schofield WWTP, which is operated by Aqua Engineers, currently treats 2.3 MGD of wastewater from U.S. Army facilities at Schofield Barracks and Wheeler Army Airfield. The WWTP produces R-1 quality water through MBR treatment with UV disinfection, however, the UV system is still pending HDOH approval. The HDOH presently classifies the recycled water as R-2 because Schofield WWTP also lacks a primary disposal option which is required for R-1 classification, and the UV system still needs to be validated by HDOH. Schofield WWTP currently discharges its effluent into Dole Ditch, and Dole Food Company currently charges the Army/Aqua Engineers for the right to discharge treated effluent into Dole Ditch, which is a component of the Wahiawa Irrigation System.



Treated effluent from both WWTPs is either directly or indirectly discharged into the Wahiawa Irrigation System which is blended with Wahiawa Reservoir water to provide irrigation water supply for agriculture on the North Shore and is presently designated R-2 quality water by the HDOH. These sources are not integrated and currently supply reclaimed wastewater independently of one another.

Integration of these two sources could help balance non-potable water supply and demand within Central Oahu and also reduce reliance on high quality groundwater for non-potable water uses.

Schofield WWTP has the capacity to treat 4.2 MGD, and in the future, the treatment plant is projected to produce 3 MGD of reclaimed water. The effluent will be certified as R-1 quality after all applicable HDOH Reuse Guideline requirements have been met.

Future plans for use of Schofield WWTP's treated effluent include 1 MGD of R-1 water for the Army's on base irrigation use, including irrigation of Leilehua Golf Course. The remaining 2 MGD of R-1 quality water will be available for other irrigation purposes elsewhere.

A private farmer who leases property from HDOA immediately south of the Schofield WWTP has initiated plans to build several on-site open reservoirs to store non-potable water. Aqua Engineers, in conjunction with the Army, has already designed and constructed a 16-inch pipeline from Schofield WWTP to the leased property. The construction of the reservoirs is currently pending completion of an environmental assessment.

Figure 2-8 shows the current and previously planned infrastructure associated with the Schofield WWTP, which includes:

- A 16-inch R-1 water pipeline from Schofield WWTP to the agricultural parcel leased by HDOA
- A proposed pipeline connection from Schofield WWTP to open lagoons for storage of off-spec and wet weather flows, including a return flow pipeline to the WWTP for treatment of stored flows; and
- Abandoned underground oil storage tanks that represent additional storage of 16.2 million gallons for future potential integration

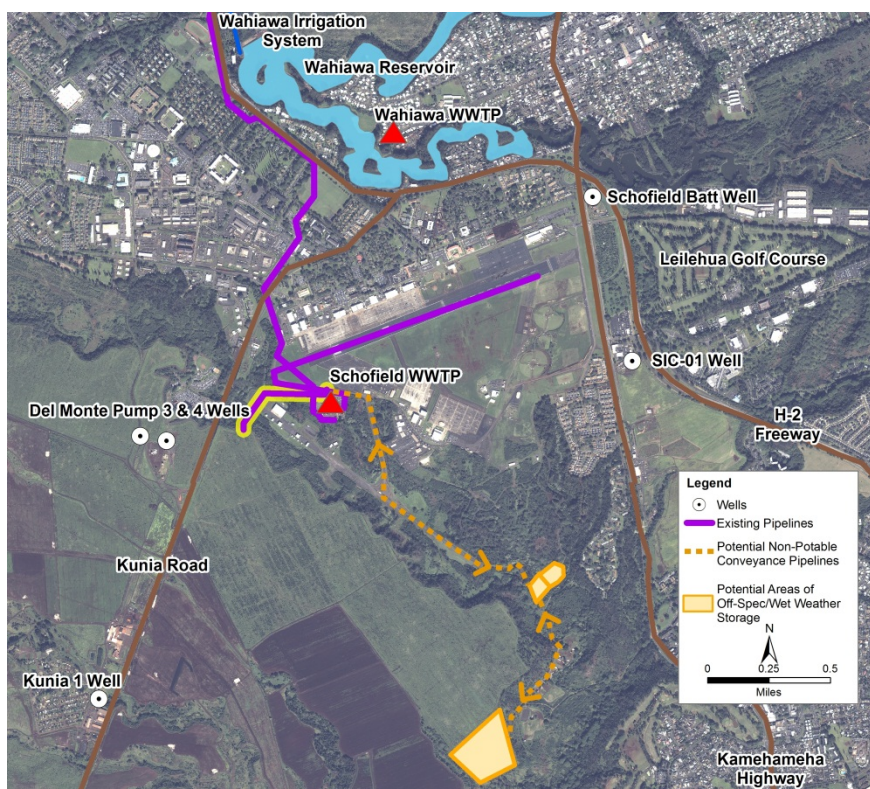


Figure 2-8. Existing and Potential Schofield WWTP Infrastructure

Wahiawa Reservoir serves agricultural lands on the North Shore of Oahu through a network of irrigation ditches. The reservoir is fed by the north and south forks of Kaukonahua Stream that descends from the Koolau Mountains. According to the United States Geological Survey (USGS) data collected between 2006 and 2010, the north and south forks had annual average daily flows of 8.31 MGD and 11.13 MGD, respectively. That equates to an average daily flow of about 19 MGD into Wahiawa Reservoir. The total capacity of the reservoir is about 2.5 billion gallons, and presently, water supply from Wahiawa Reservoir is used entirely on the North Shore.



Effluent from the City and County of Honolulu's Wahiawa WWTP continues to be discharged to the Wahiawa Reservoir (since 1928). Currently, 1.6 MGD of treated effluent is released into the reservoir, and in accordance with HDOH Reuse Guidelines, the water in Wahiawa Reservoir is designated and regulated as R-2 quality water.

Potential Stormwater Reclamation Options. Reclamation and reuse of stormwater also provides an alternative non-potable water supply and can reduce sediment load to Oahu's near-shore waters. Surface water runoff is the most significant source of pollution to Oahu's coastline and 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. In 2008, the CWRM, through funding from the U.S. Bureau of Reclamation, conducted a statewide appraisal of stormwater reclamation and reuse, which identified localized opportunities in Central Oahu.

The CONPWMP Phase 1 report assessed the option of capturing and treating the runoff generated during storm events at Wheeler Army Airfield. Assuming 0.5 inches of rainfall per storm event and an impervious area of capture of 190 acres, 0.36 MGD of water could be collected and treated. This amounts to an annual volume of 130 million gallons. This potential stormwater supply would need to be captured and treated before being used for subsequent irrigation.

More recently, the Army has initiated the design and construction of a Combat Aviation Brigade (CAB). A number of new facilities are planned for construction in 17 phases. Currently the first two phases have been funded and are under construction. As proposed, the CAB complex would encompass approximately 1,600,000 square feet of facility space. Stormwater flows are expected to increase as the amount of impervious surfaces increase. To mitigate potential impacts, the construction of underground detention basins is planned at each new facility. Up to 2.8 million gallons of stormwater detention capacity associated with planned on-base improvements at Schofield Barracks, shown in Figure 2-9, may be developed. This stormwater capture and retention infrastructure comprises fourteen-200,000 gallon capacity underground storage chambers. This new stormwater collection system is designed for retention and directed infiltration purposes and is not being constructed for reclamation and reuse of stormwater for irrigation purposes. However, because the majority of stormwater will be captured off rooftops, treatment needs may be minimal. Notwithstanding, in all cases, integration of stormwater reclamation and reuse as an alternative non-potable water supply will be largely dependent upon available storage and required treatment for irrigation reuse.

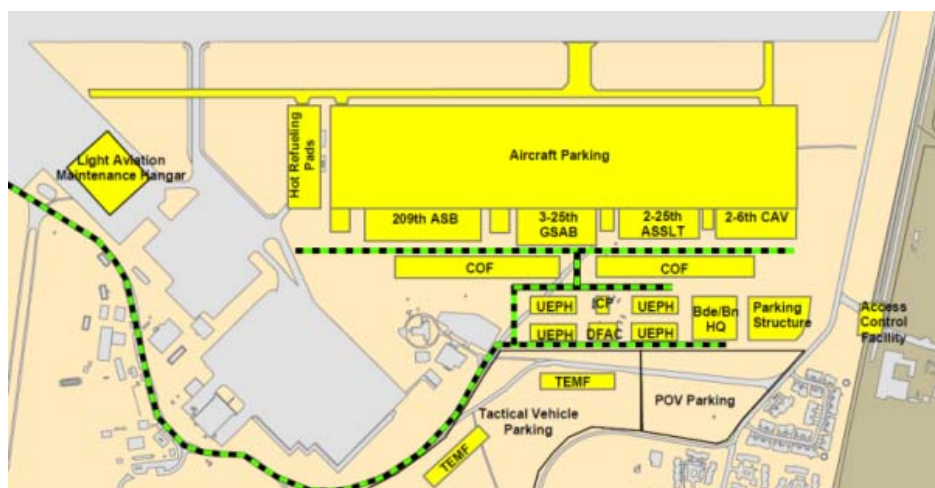


Figure 2-9. Planned Construction of Underground Storage

Mililani R-1 Facility. The concept of installing an R-1 wastewater reclamation facility at the existing Mililani WWTP site to treat current wastewater flows from Mililani has been discussed for several years. Construction of a Mililani R-1 facility could produce additional non-potable water supply that can be used to offset the present use of groundwater sources and can result in reduced overall wastewater flows to the Honouliuli WWTP. However, the handling and processing of solids would not be reduced as part of the proposed R-1 reclamation facility. The reduction of downstream wastewater flows through implementation of a Mililani R-1 facility could create additional capacity for accommodation of effluent flows from the planned Koa Ridge Makai development. The Koa Ridge Makai development will consist of 3,500 residential housing units and is expected to produce 1.12 MGD of wastewater effluent.

The total future non-potable water supply, excluding the non-potable supply from Waiahole Ditch, is summarized in table 2-5.

Table 2-5. Total Potential Future Supply (excluding ditch and groundwater)	
Supply Source	Supply Volume (MGD)
Wahiawa WWTP R-1	1.60
Schofield WWTP R-1	3.00
Wahiawa Reservoir ¹	4.86
Stormwater ²	0.36
Mililani R-1 Facility ³	1.12
TOTAL⁴	10.94

- ¹ The potential supply of non-potable water from Wahiawa Reservoir assumes for planning purposes a possible allocation of 25% of the current flow through the reservoir for use in the Central Oahu area.
- ² The amount of stormwater listed in the table represents the potential supply from the Wheeler Army Airfield runoff and does not include the total amount of CAB-related storage that is planned to be constructed with a storage capacity of 2.8 million gallons.
- ³ The supply volume for the potential Mililani R-1 Facility assumes an amount equal to the potential Koa Ridge Makai wastewater flows.
- ⁴ These totals do not include any potential supply from the possible diversion of surface water from North Kaukonahua Stream.

2.7 Matching Current and Future Areas of Use to Available and Potential Sources of Non-Potable Water Supplies

An assessment of current Waiahole Ditch and groundwater use permittees was conducted to determine each TMK area's characteristics using a spreadsheet based evaluation for the Kunia Road Corridor, the former Galbraith Estate lands, and the Kamehameha Highway Corridor, and included identification of the following end user attributes:

- | | | |
|--|---|---------------------------------------|
| • Tax Map Key | • Landowner | • Lessee of Record |
| • Water Use Permit (WUP) | • Corresponding WUP Acreage | • Associated Well Number |
| • WUP Allocation | • Current Reported Pumpage | • Projected Water Demand (by TMK) |
| • Water Quality Needed | • Potential Supply Sources | • Available Quantity of Supply |
| • Appraisal of Required Infrastructure | • Approximate Distance to End Use Parcel (from Supply Source) | • Identified Benefits and Constraints |

This referenced spreadsheet data has been included in Appendix A.

Figures 2-10 through 2-12 graphically illustrate the potential non-potable water sources described above and their available quantities that could be used independently or in combination to meet current and projected non-potable water demands within the Kunia, Galbraith, and Kamehameha Highway areas.

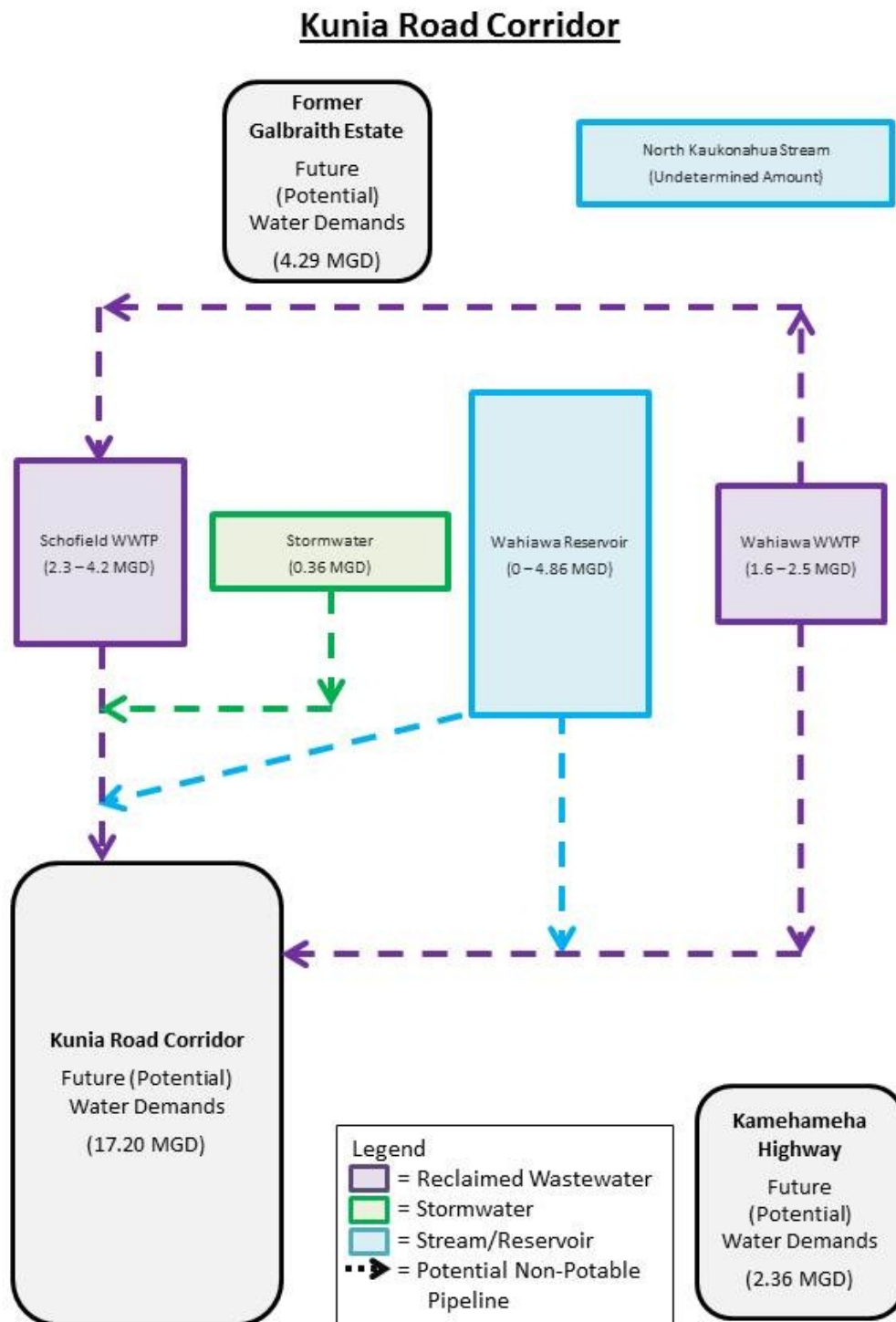


Figure 2-10. Schematic of Potential Kunia Corridor Non-Potable Sources and Demands

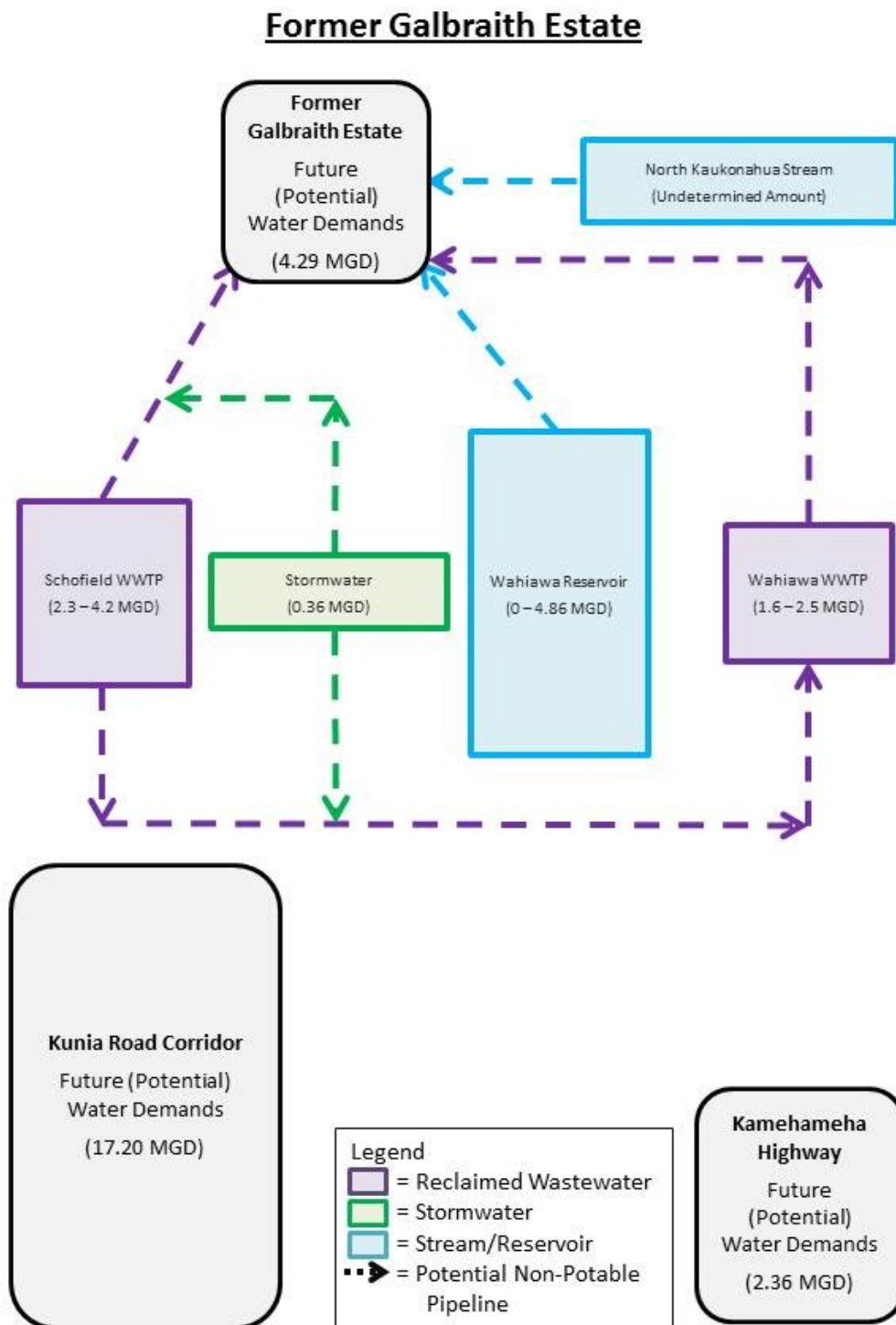


Figure 2-11. Schematic of Potential Former Galbraith Estate Non-Potable Sources and Demands

Kamehameha Highway Corridor

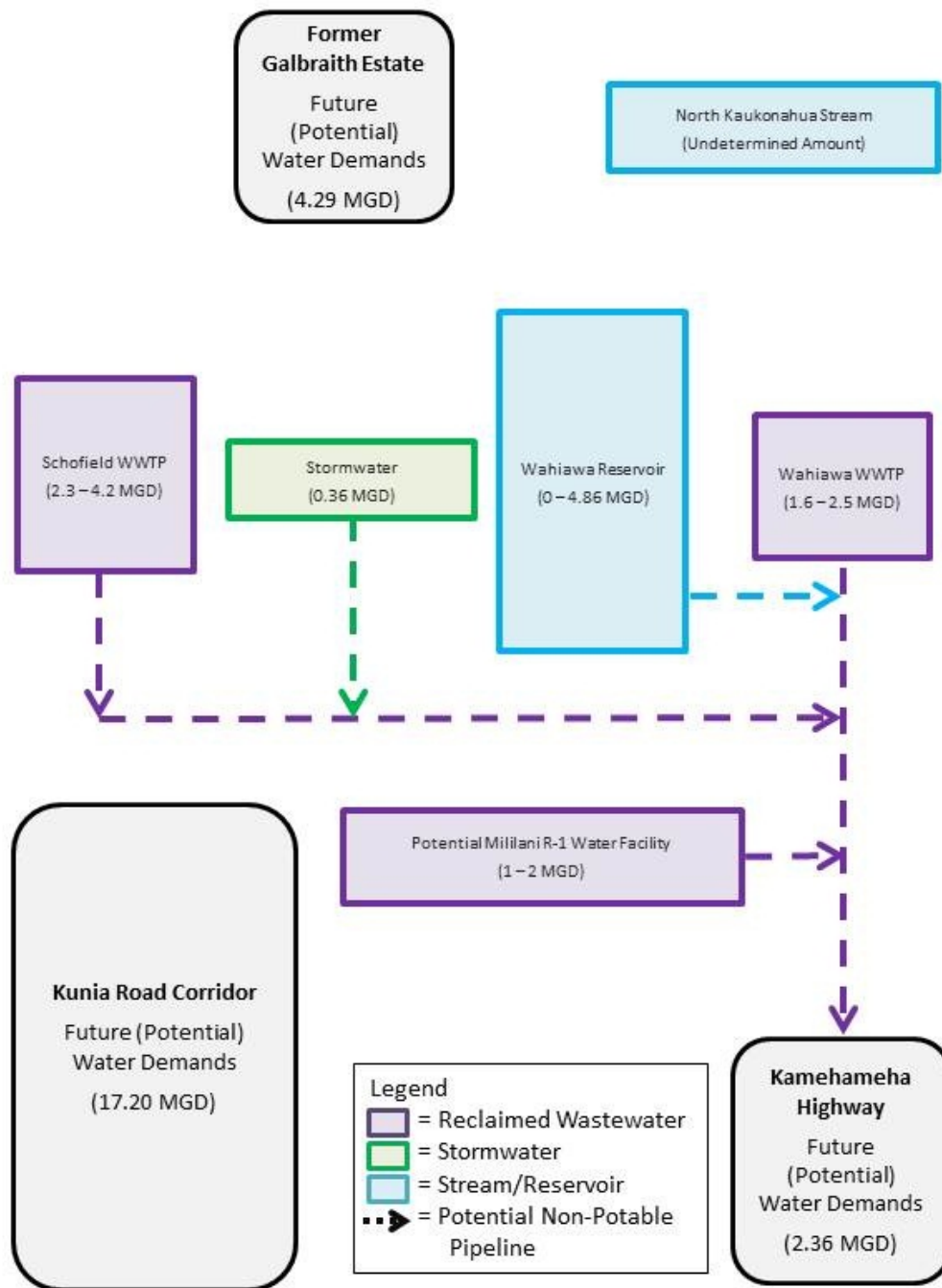


Figure 2-12. Schematic of Potential Kamehameha Highway Non-Potable Sources and Demands

Section 3

Integration of Potential Water Supply and Demand

3.1 Alternative Water Supply Scenarios

Based on the data described in Section 2, several alternative water supply scenarios were identified for the Kunia Road Corridor, the former Galbraith Estate, and the Kamehameha Highway Corridor. In developing these scenarios, a number of key sub-objectives were incorporated as part of the scenario planning considerations. These sub-objectives included:

- Maximize the use of available non-potable water supply options; and
- Identify options which facilitate improvement of water quality in Wahiawa Reservoir, whereby future irrigation water supply from the reservoir is not regulated as reclaimed water.

ENV has indicated that future more restrictive discharge requirements may be on the horizon tied to total maximum daily loads (TMDLs) established by HDOH. These pending changes may make it more economical for ENV to stop discharging into the reservoir to avoid costly and enhanced effluent treatment.

Stakeholder interviews have indicated a general consensus that “cleaning up” Wahiawa Reservoir would be beneficial for irrigation water users and the general community as a whole. Accordingly, various alternative water supply scenarios identified in this section include options that incorporate the curtailment of current wastewater effluent disposal practices, specifically, the continued discharge of treated effluent into Wahiawa Reservoir. It is also understood from stakeholder interviews and input received at neighborhood board meetings that there is continuing issue about where the available water supply from Wahiawa Reservoir should be used.

The North Shore area neighborhood boards have expressed their wish to keep the water from the reservoir flowing north. While this will need to be further discussed as part of the ongoing North Shore and Central Oahu Watershed Management Plans, Phase 2 of the CONPWMP attempts to lay out all potential scenarios matching available supply and projected demands for non-potable water. The CONPWMP will not determine whether the water from Wahiawa Reservoir will supply the North Shore or Central Oahu, but instead identifies opportunities for integrating potential supply options within the Kunia Road, former Galbraith Estate, and Kamehameha Highway areas.

In light of various uncertainties and the fact that individual end users are proceeding independently with non-potable infrastructure plans and construction, a single integrated and preferred water supply option could not be identified for any of the selected study areas. Instead, a more holistic approach was taken to arrive at a grouping of technically feasible alternatives, many of which can be more fully integrated with each other to develop a long-term and adaptive water supply system.

Figure 3-1 shows the entire CONPWMP boundary and highlights the three focus areas of the plan. This map also shows the areas of non-potable water demand that are currently being supplied from Waiahole Ditch and/or existing potable and non-potable groundwater wells.

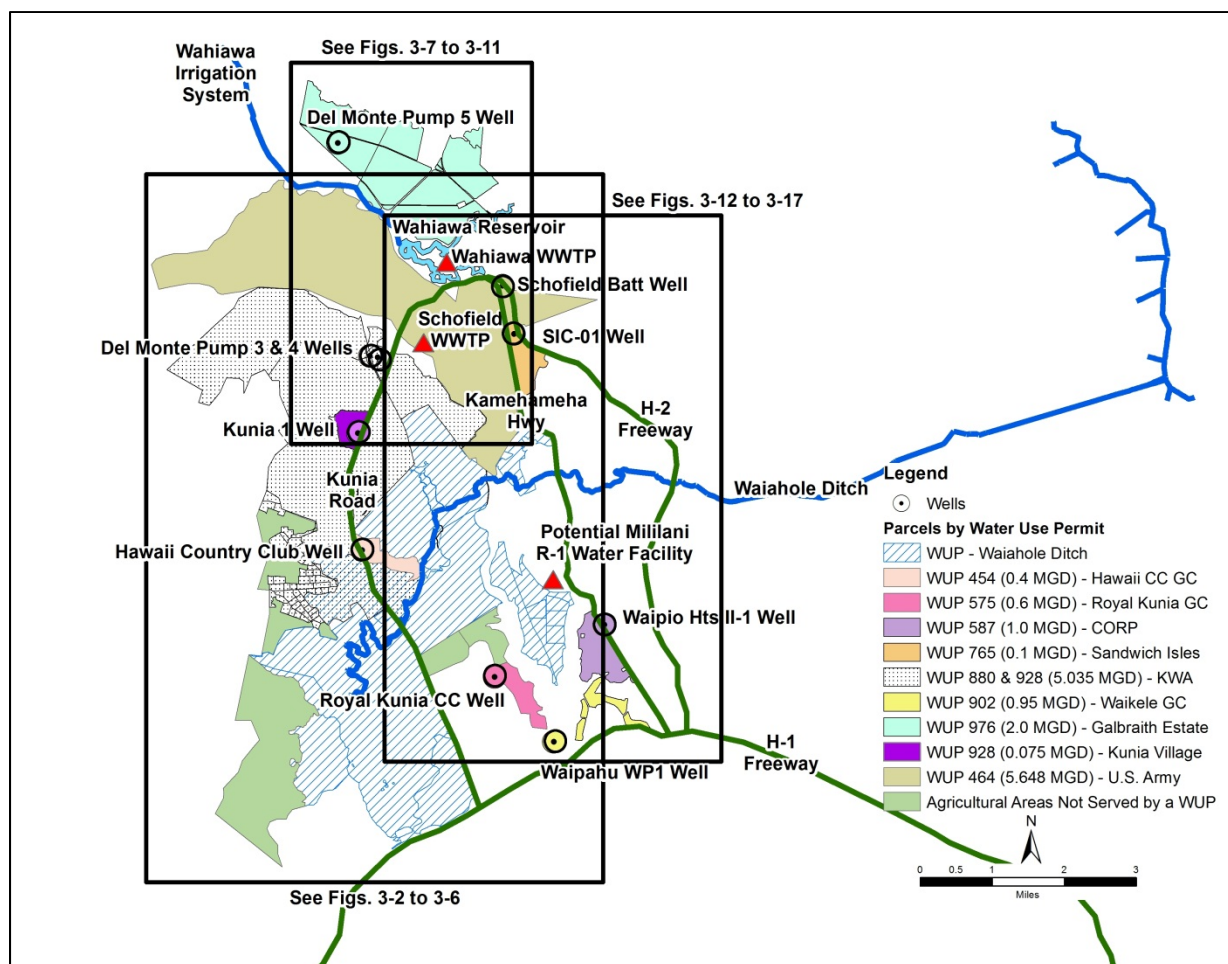


Figure 3-1. Central Oahu Boundary and Three Focus Areas

3.2 Kunia Road Corridor Water Supply Options

The multi-option scenarios depicted in Figures 3-2 to 3-6 incorporate available and potential non-potable water supply alternatives to meet current and future water demands. These integrated supply scenarios include the following sequence of options:

- Figure 3-2 illustrates one of several potential alignments for an R-1 water pipeline from Schofield WWTP down Kunia Road.
- Figure 3-3 shows the potential alignment of an R-1 water pipeline from Wahiawa WWTP down Kunia road.
- Figure 3-4 displays the potential alignment of an R-1 water pipeline from Wahiawa WWTP down Kunia road integrating R-1 flows from Wahiawa WWTP and Schofield WWTP.
- Figure 3-5 illustrates the potential integration of stormwater supply in combination with an integrated Wahiawa WWTP and Schofield WWTP R-1 water supply system. This stormwater supply option could be similarly integrated with an independent Schofield R-1 water system or Wahiawa R-1 water system as shown in Figures 3-2 and 3-3, respectively.
- Figure 3-6 depicts a pipeline from Wahiawa Reservoir and interconnection with the R-1 water supply from Wahiawa WWTP. The Wahiawa Reservoir pipeline option could be similarly integrated with the Schofield R-1 water supply pipeline option.

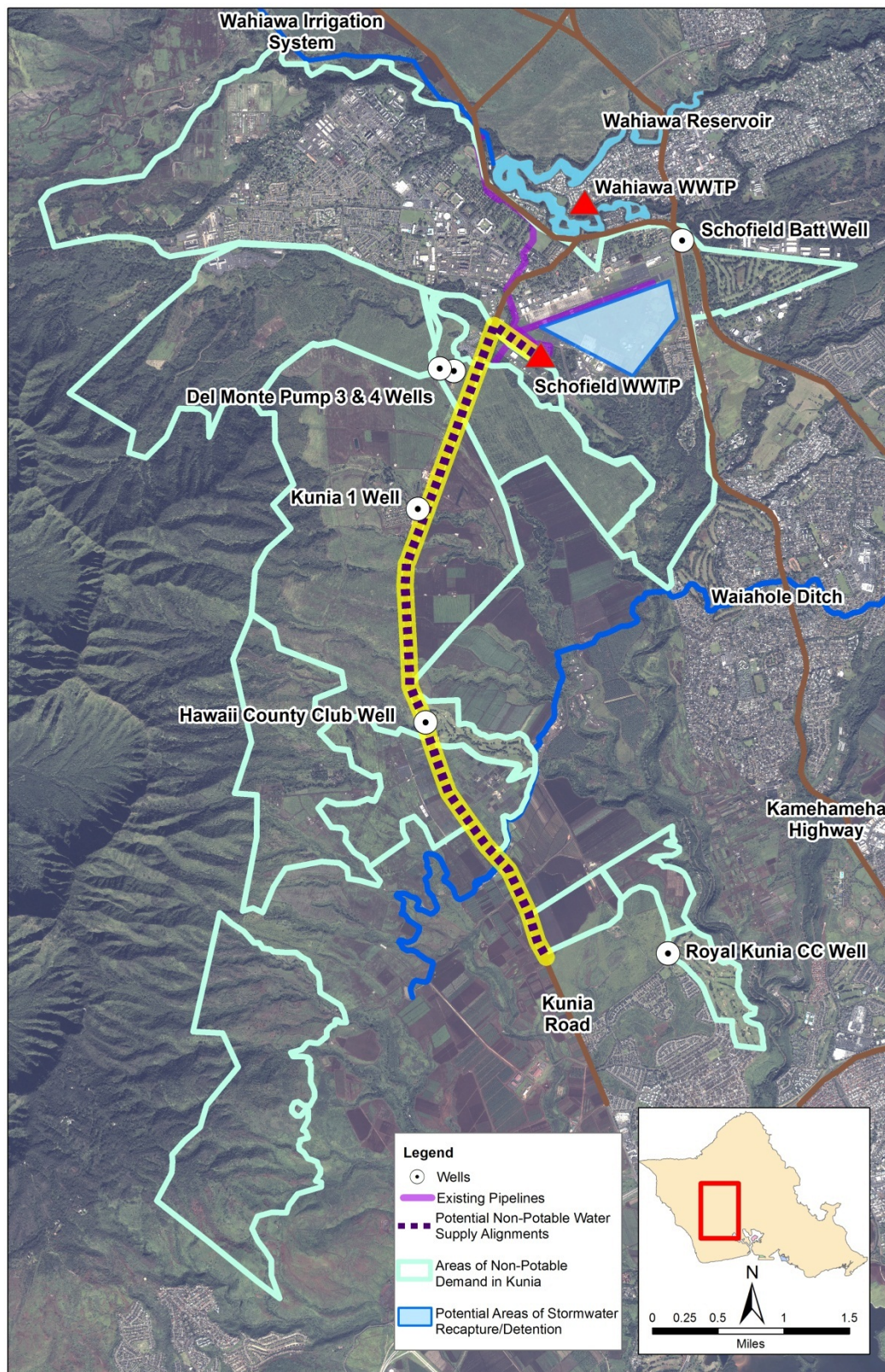


Figure 3-2. Potential Alignment from Schofield WWTP down Kunia Road

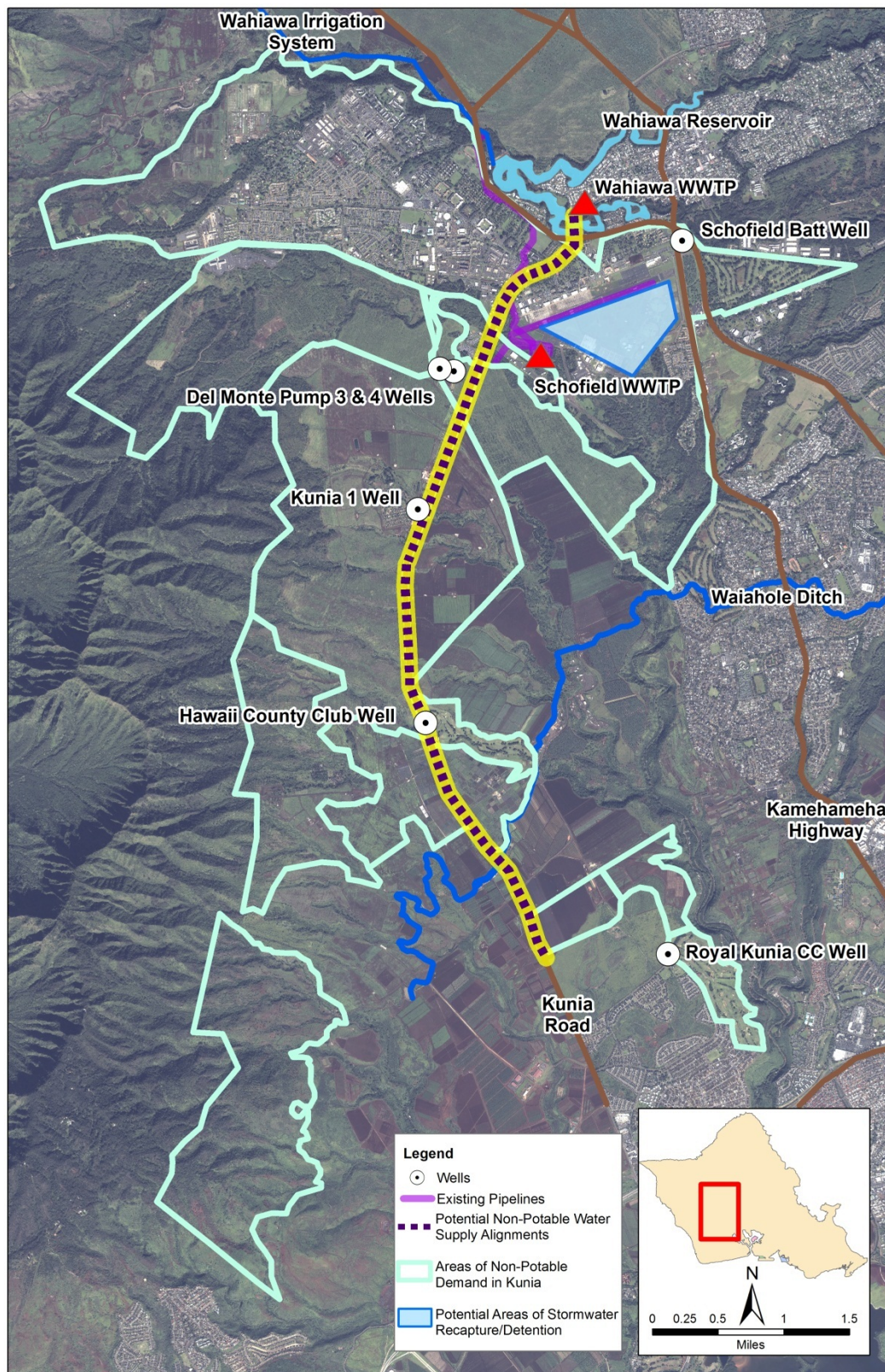


Figure 3-3. Potential Alignment from Wahiawa WWTP down Kunia Road

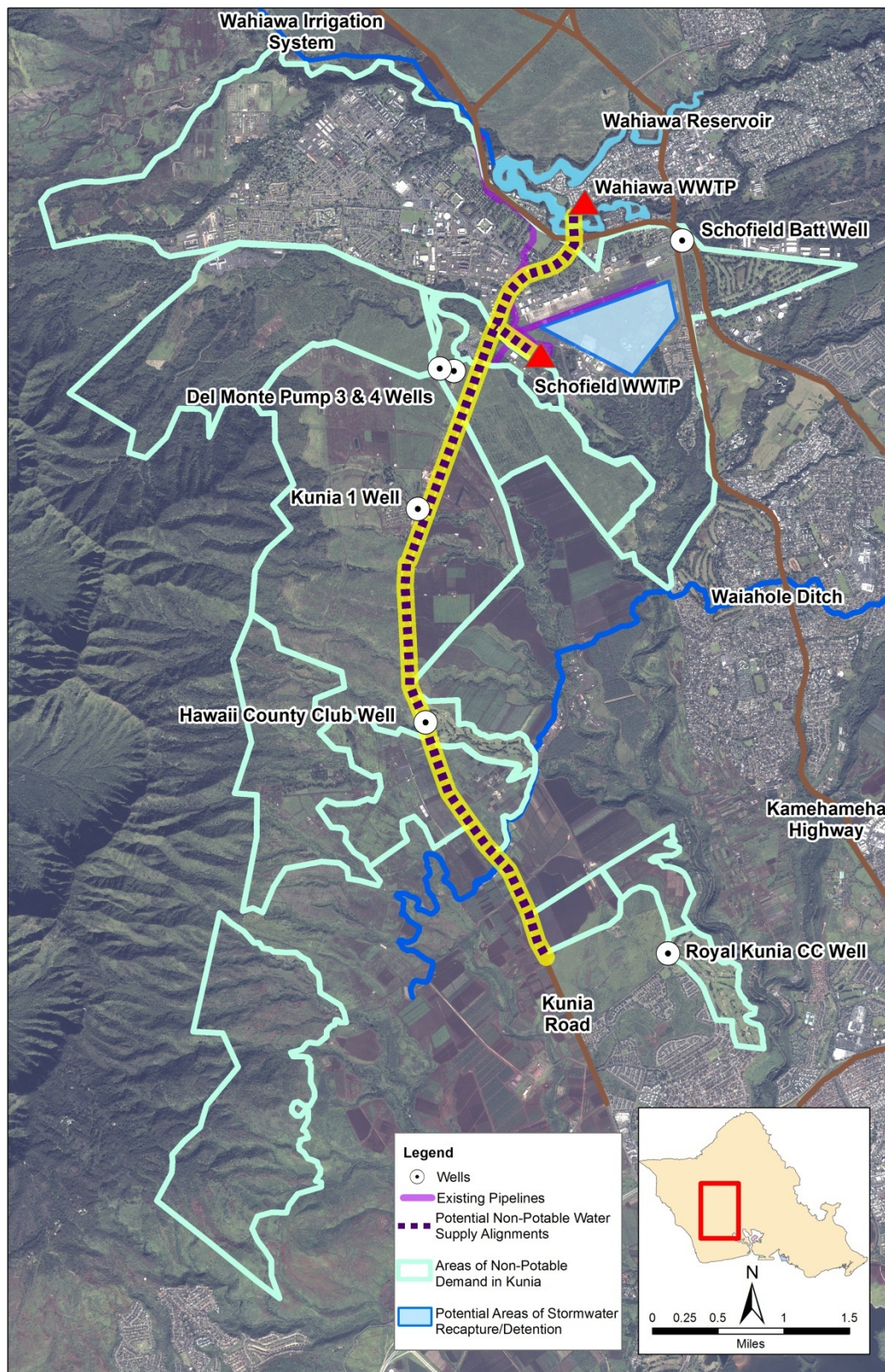


Figure 3-4. Potential Alignment from Wahiawa WWTP and Schofield WWTP down Kunia Road

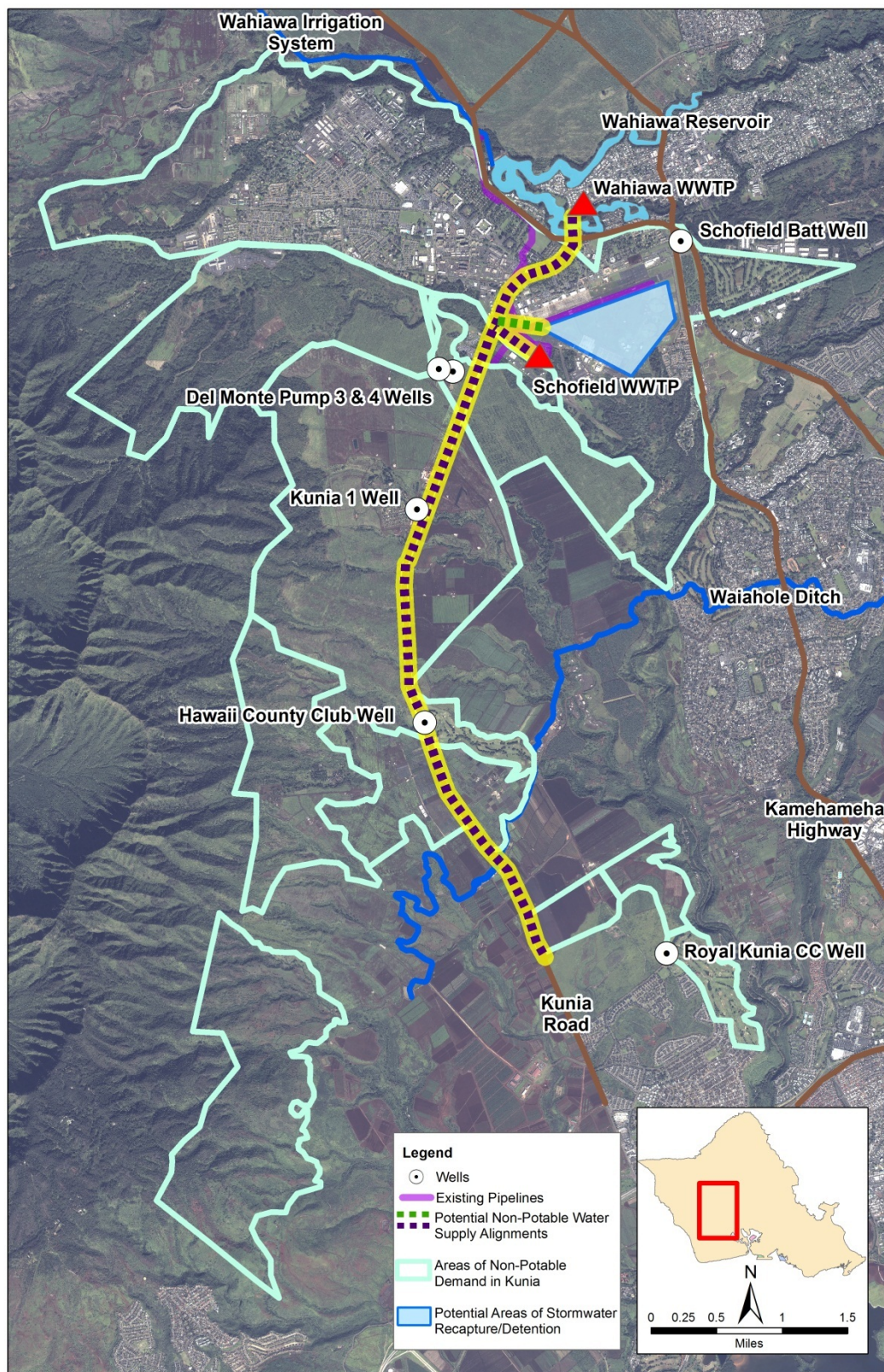


Figure 3-5. Potential Integration of Stormwater down Kunia Road

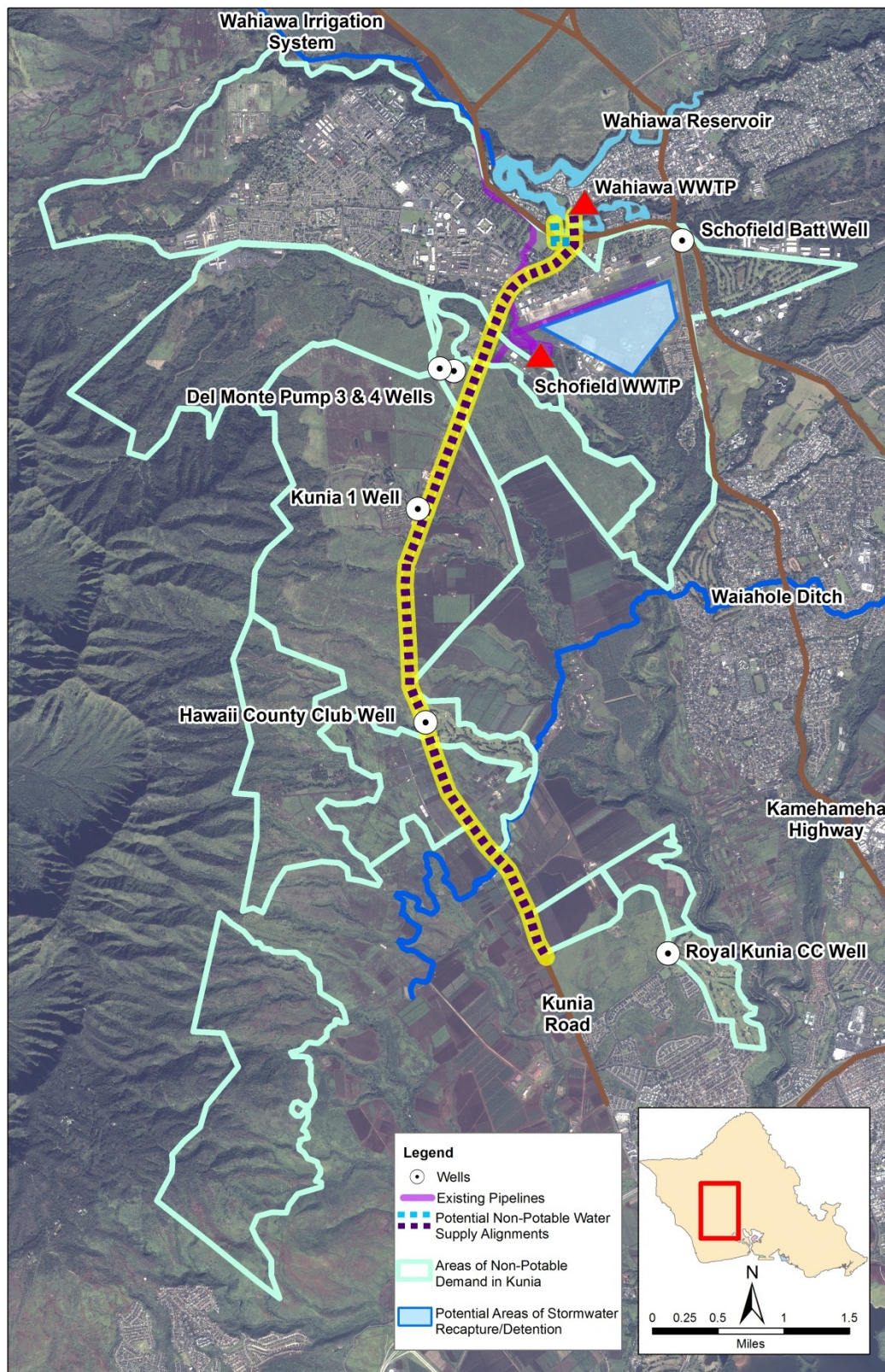


Figure 3-6. Potential Interconnection of Wahiawa Reservoir to Wahiawa WWTP down Kunia Road

3.3 Former Galbraith Estate Water Supply Options

The former Galbraith Estate property is made up of eight large parcels that are separately owned between the Agribusiness Development Corporation (ADC) and the Office of Hawaiian Affairs (OHA). ADC has plans to construct three reservoirs on their property, which are shown in the following figures. Figure 3-7 through 3-11 depict the following sequence of options:

- Figure 3-7 illustrates one of several potential alignments for an R-1 water pipeline from Schofield WWTP to the former Galbraith property.
- Figure 3-8 shows the potential alignment of an R-1 water pipeline from Wahiawa WWTP to the former Galbraith property.
- Figure 3-9 displays the potential alignment of an R-1 water pipeline from Wahiawa WWTP with an interconnection to R-1 flows from the Schofield WWTP.
- Figure 3-10 illustrates the potential integration of stormwater supply in combination with an integrated Wahiawa WWTP and Schofield WWTP R-1 water supply system. (This stormwater supply option could be similarly integrated with an independent Schofield R-1 water system option as shown in Figure 3-7.)
- Figure 3-11 depicts a pipeline from Wahiawa Reservoir to the former Galbraith property. The Wahiawa Reservoir pipeline option can be integrated with the Schofield WWTP and/or Wahiawa WWTP R-1 water supply pipeline options. Shown separately in Figure 3-11 is a potential pipeline and stream diversion from the North Fork of Kaukonahua Stream to the former Galbraith property. This potential supply option would be subject to all applicable permits and approvals, including but not limited to, an amendment to the current interim instream flow standards.

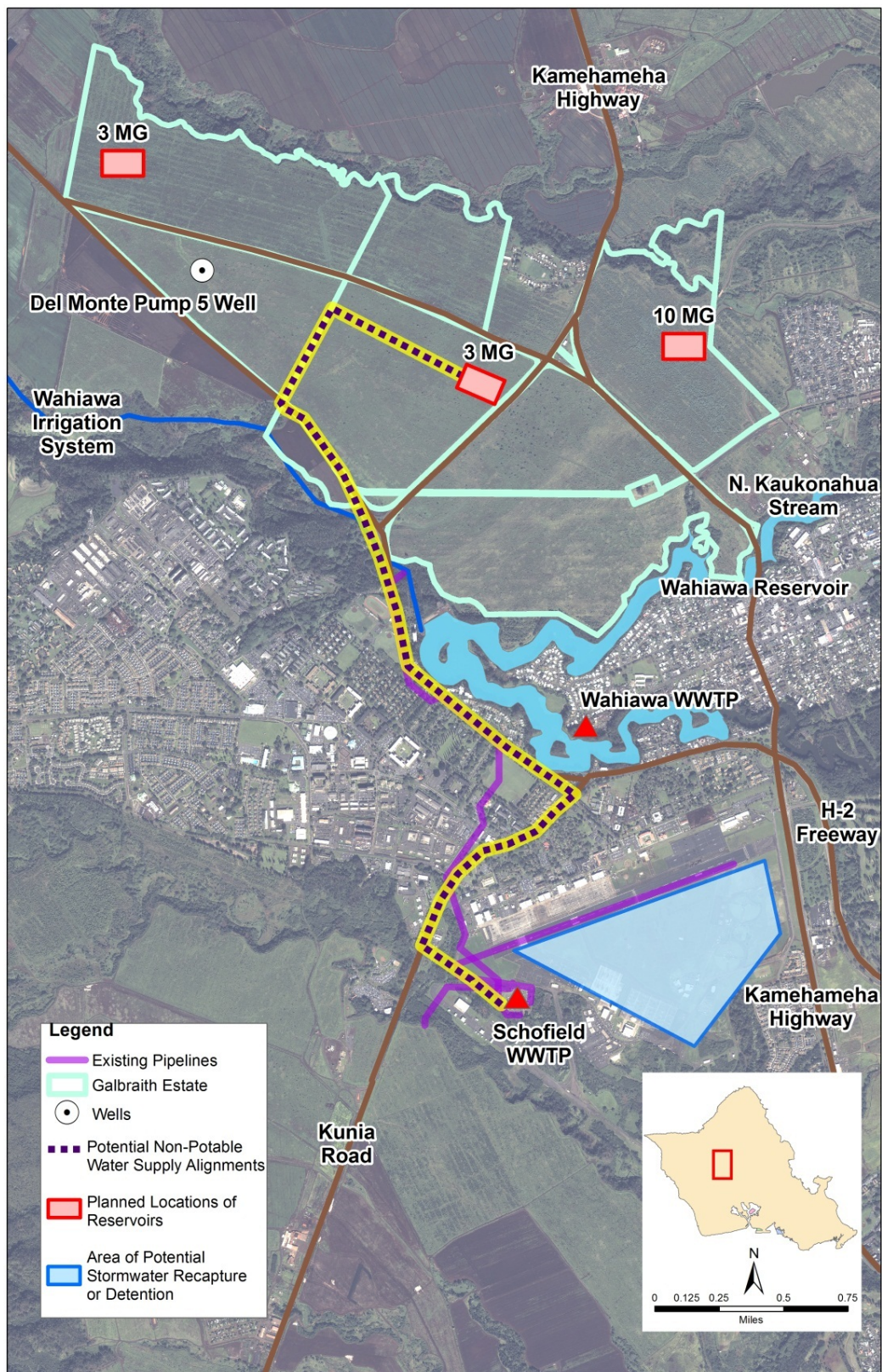


Figure 3-7. Potential Alignment from Schofield WWTP to the Former Galbraith Estate

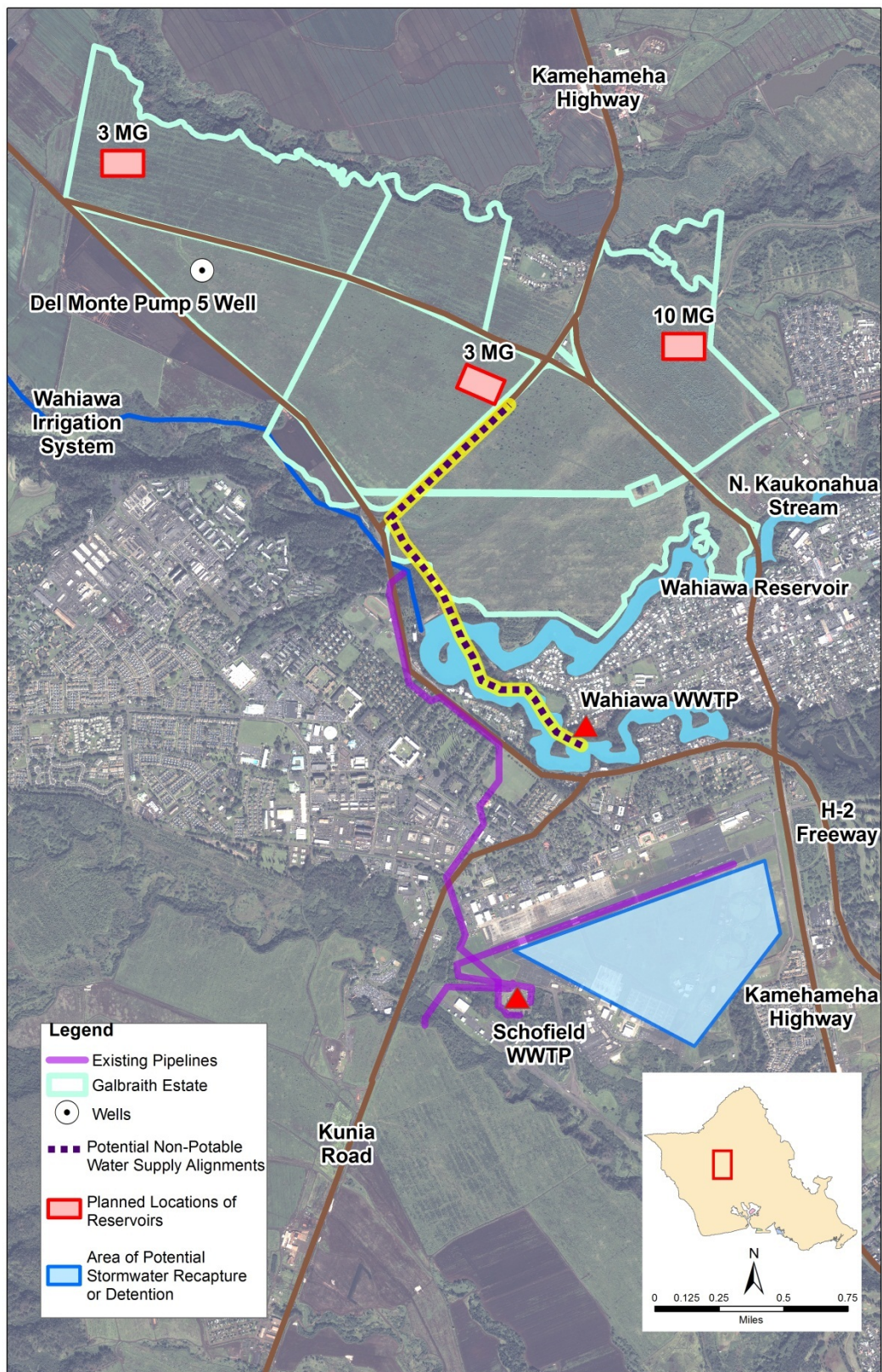


Figure 3-8. Potential Alignment from Wahiawa WWTP to the Former Galbraith Estate

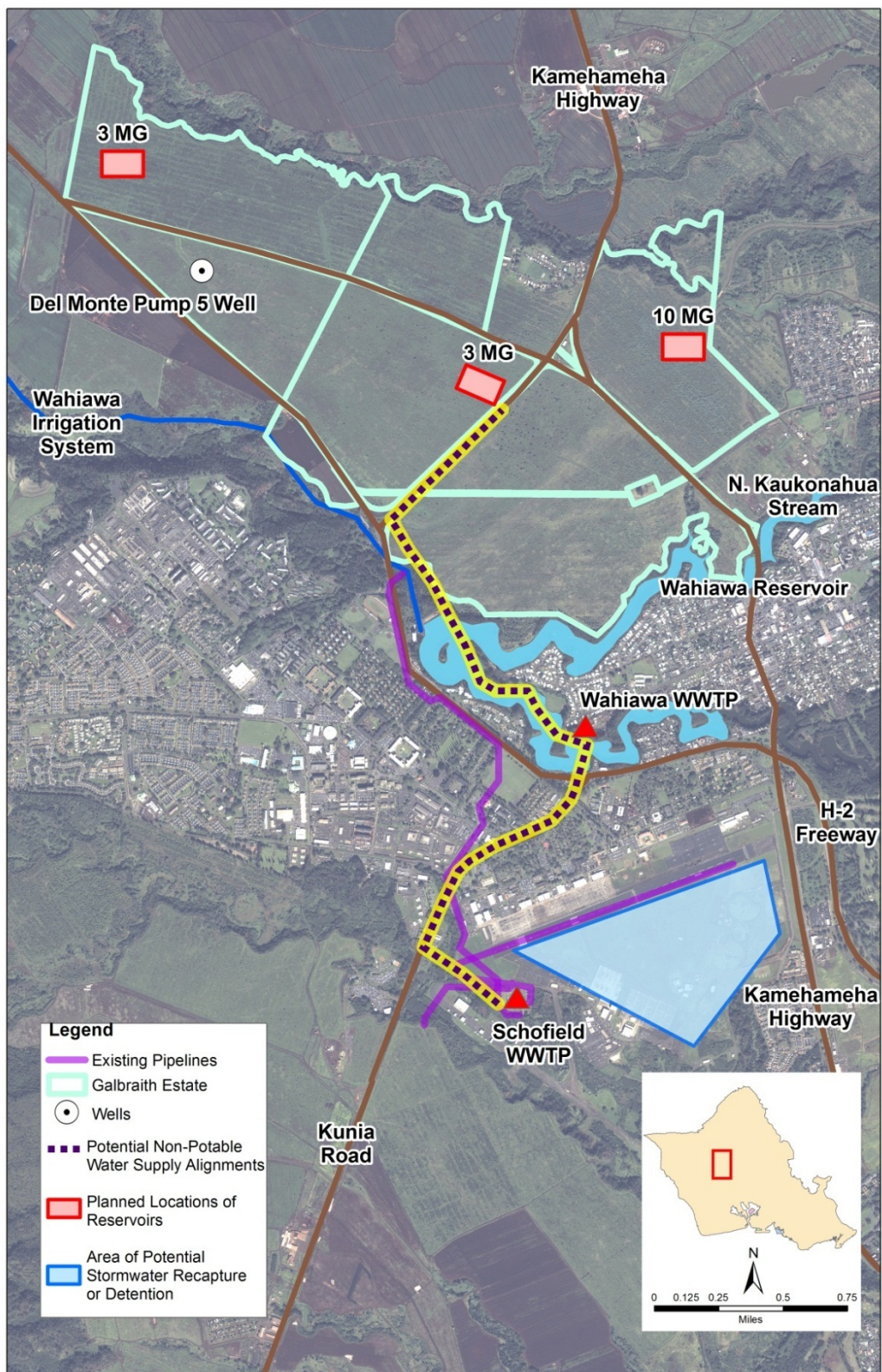


Figure 3-9. Potential Interconnection between Schofield WWTP and Wahiawa WWTP to the Former Galbraith Estate

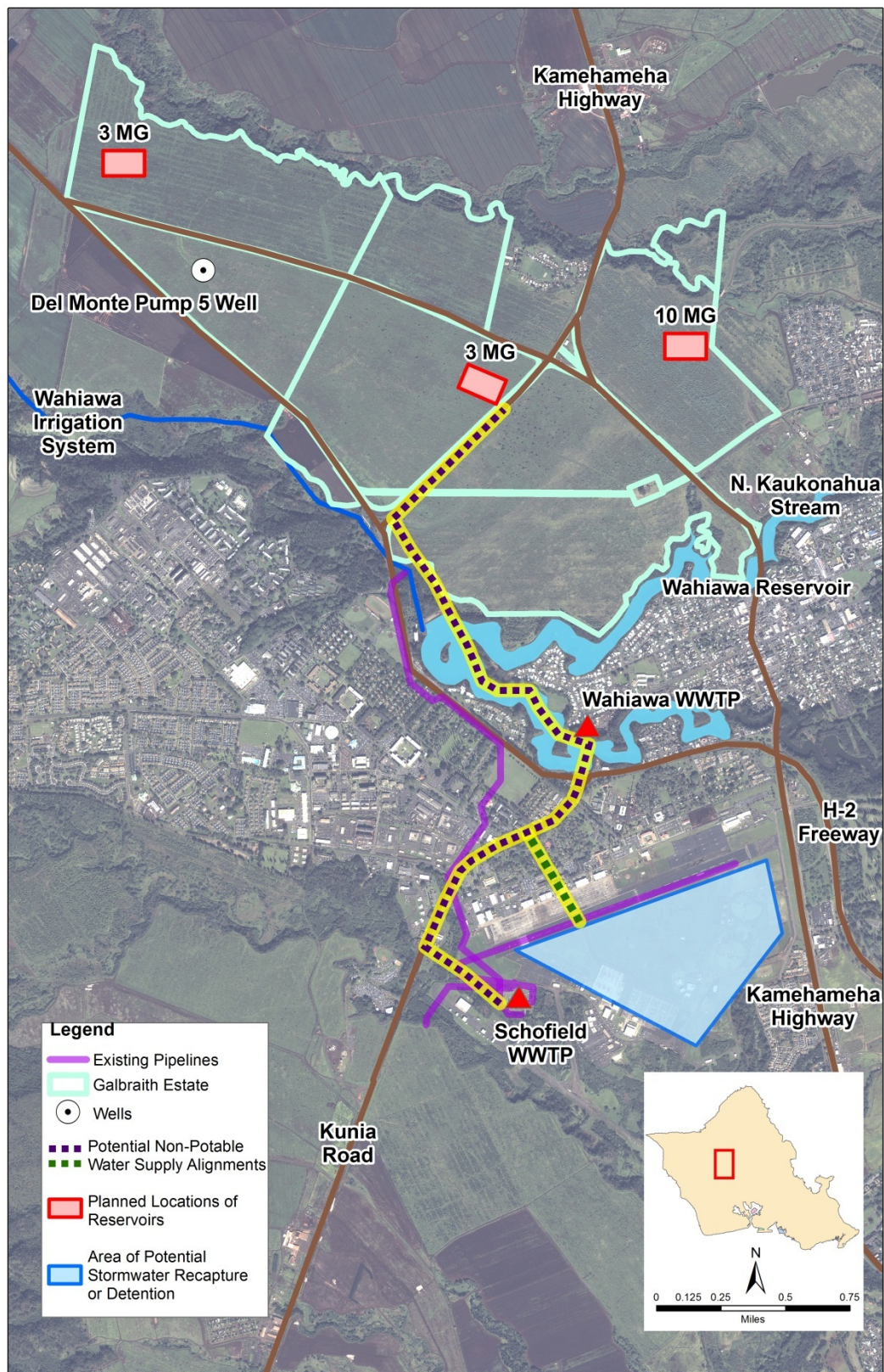


Figure 3-10. Potential Integration of Stormwater to the Former Galbraith Estate

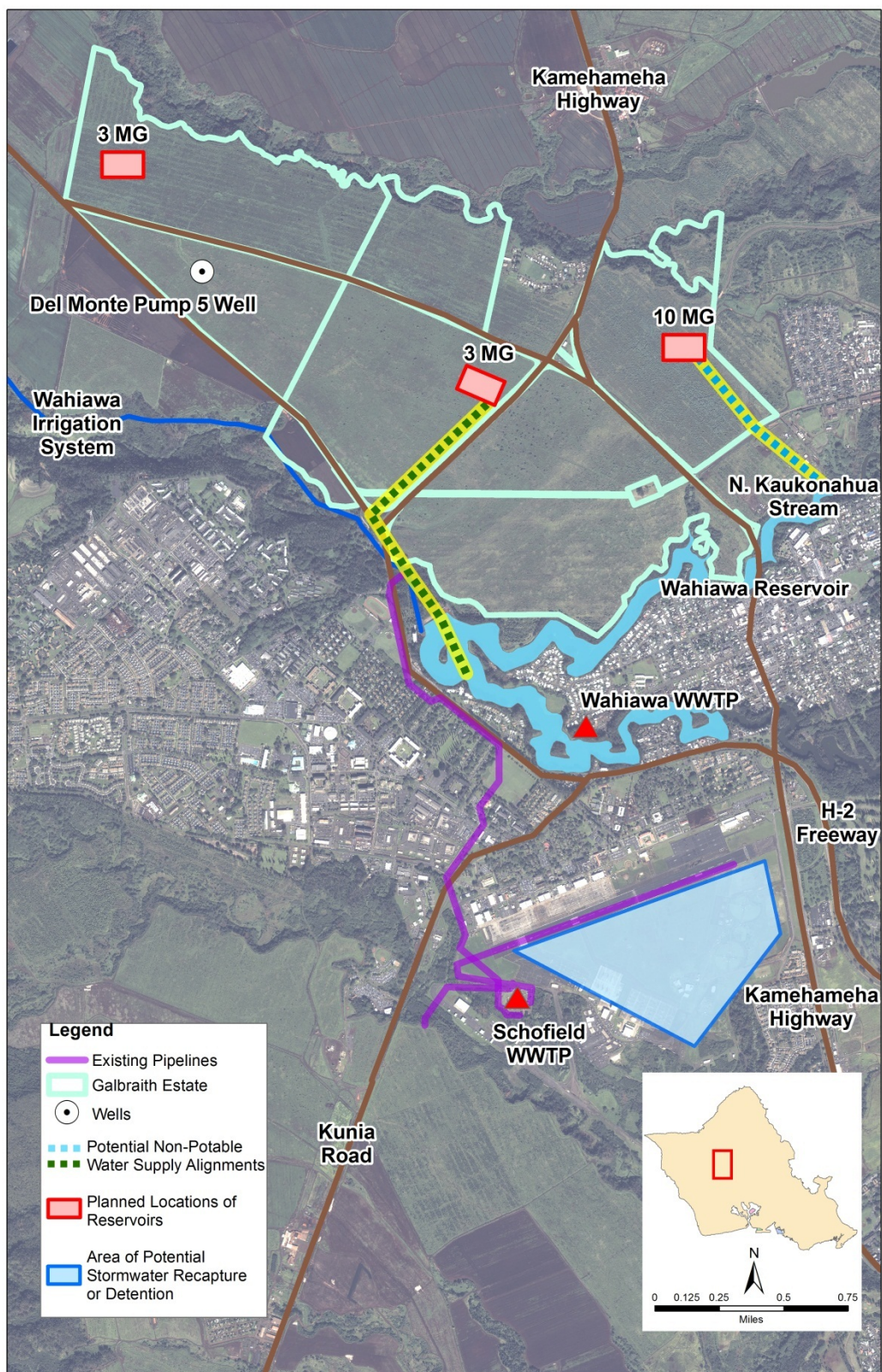


Figure 3-11. Potential Alignments from Wahiawa Reservoir and North Kaukonahua Stream to the Former Galbraith Estate

3.4 Kamehameha Highway Corridor Water Supply Options

The three areas in the Kamehameha Highway Corridor that can benefit from using non-potable water are the Sandwich Isles Communications agricultural parcel, CORP, and the Waikele Golf Course. Figures 3-12 through 3-17 show various scenarios of conveying non-potable water to these properties.

- Figure 3-12 illustrates one of several potential alignments for an R-1 water pipeline from Schofield WWTP to the Kamehameha Highway area.
- Figure 3-13 shows the potential alignment of an R-1 water pipeline from Wahiawa WWTP to the Kamehameha Highway area.
- Figure 3-14 displays the potential alignment of an R-1 water pipeline from Wahiawa WWTP with an interconnection to R-1 flows from the Schofield WWTP.
- Figure 3-15 illustrates the potential integration of stormwater supply in combination with an integrated Wahiawa WWTP and Schofield WWTP R-1 water supply system. This stormwater supply option could be similarly integrated with an independent Schofield R-1 water system or Wahiawa R-1 water system as shown in Figures 3-12 and 3-13, respectively.
- Figure 3-16 depicts a pipeline from Wahiawa Reservoir and interconnection with the R-1 water supply from Wahiawa WWTP. The Wahiawa Reservoir pipeline option can be similarly integrated with the Schofield R-1 water supply pipeline option.
- Figure 3-17 depicts the possible integration of a potential Mililani R-1 Water Facility with an R-1 water supply pipeline from Wahiawa WWTP and/or Schofield WWTP. The Mililani R-1 Water Facility could also be implemented as an independent, regional, non-potable water supply. Existing effluent flows from Mililani could be treated at the Mililani R-1 Water Facility for subsequent use at various adjacent or downstream locations. Implementation of a Mililani R-1 Water Facility could reduce downstream effluent flows thereby creating additional capacity for accommodation of effluent flows from the planned Koa Ridge Makai development. This potential additional capacity may help reduce required infrastructure and/or offset other development-related costs. These “offsets” may include freeing up potable water allocations currently being used for non-potable irrigation purposes such as the current irrigation of CORP.

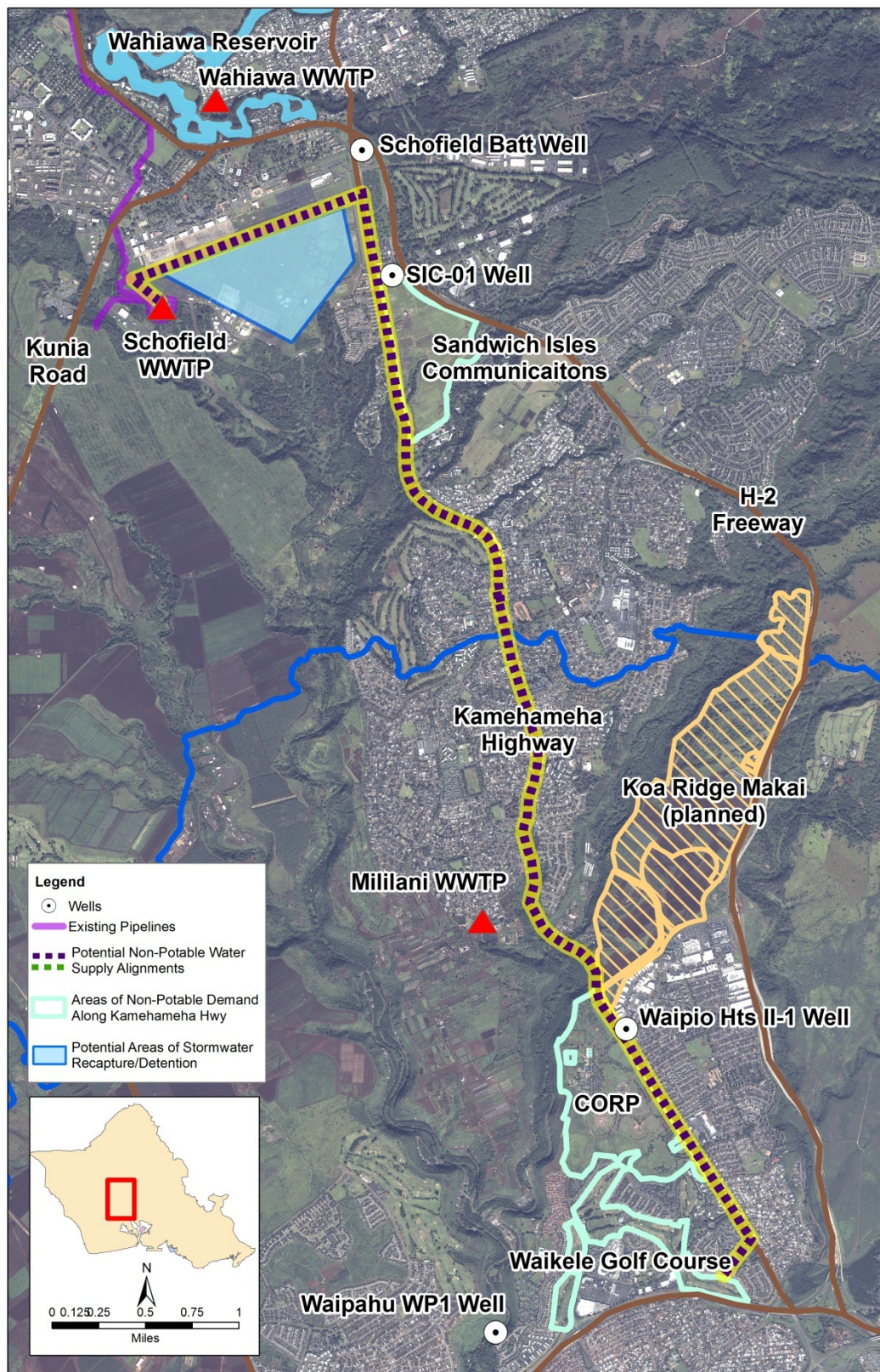


Figure 3-12. Potential Alignment from Schofield WWTP down Kamehameha Highway

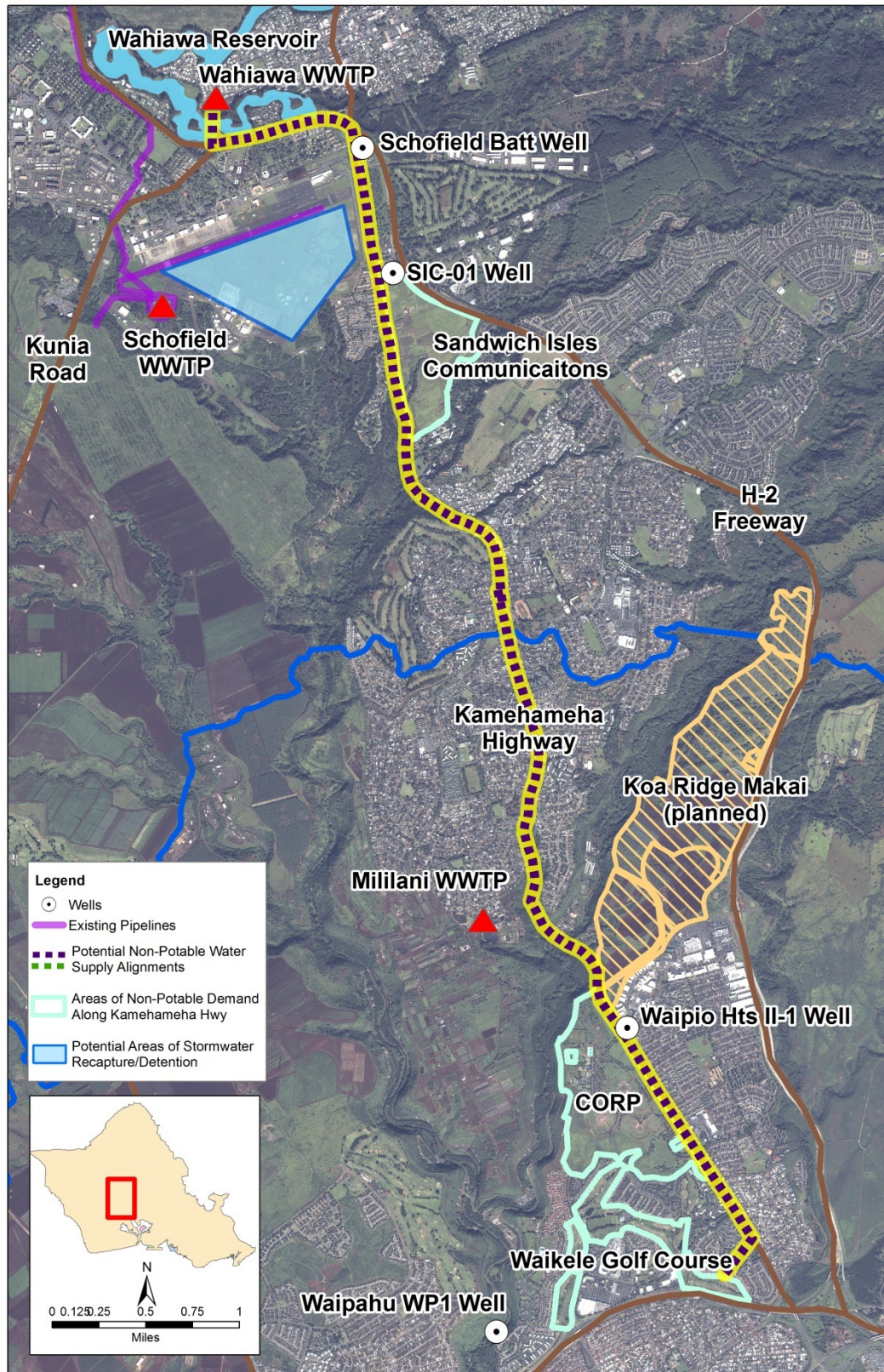


Figure 3-13. Potential Alignment from Wahiawa WWTP down Kamehameha Highway

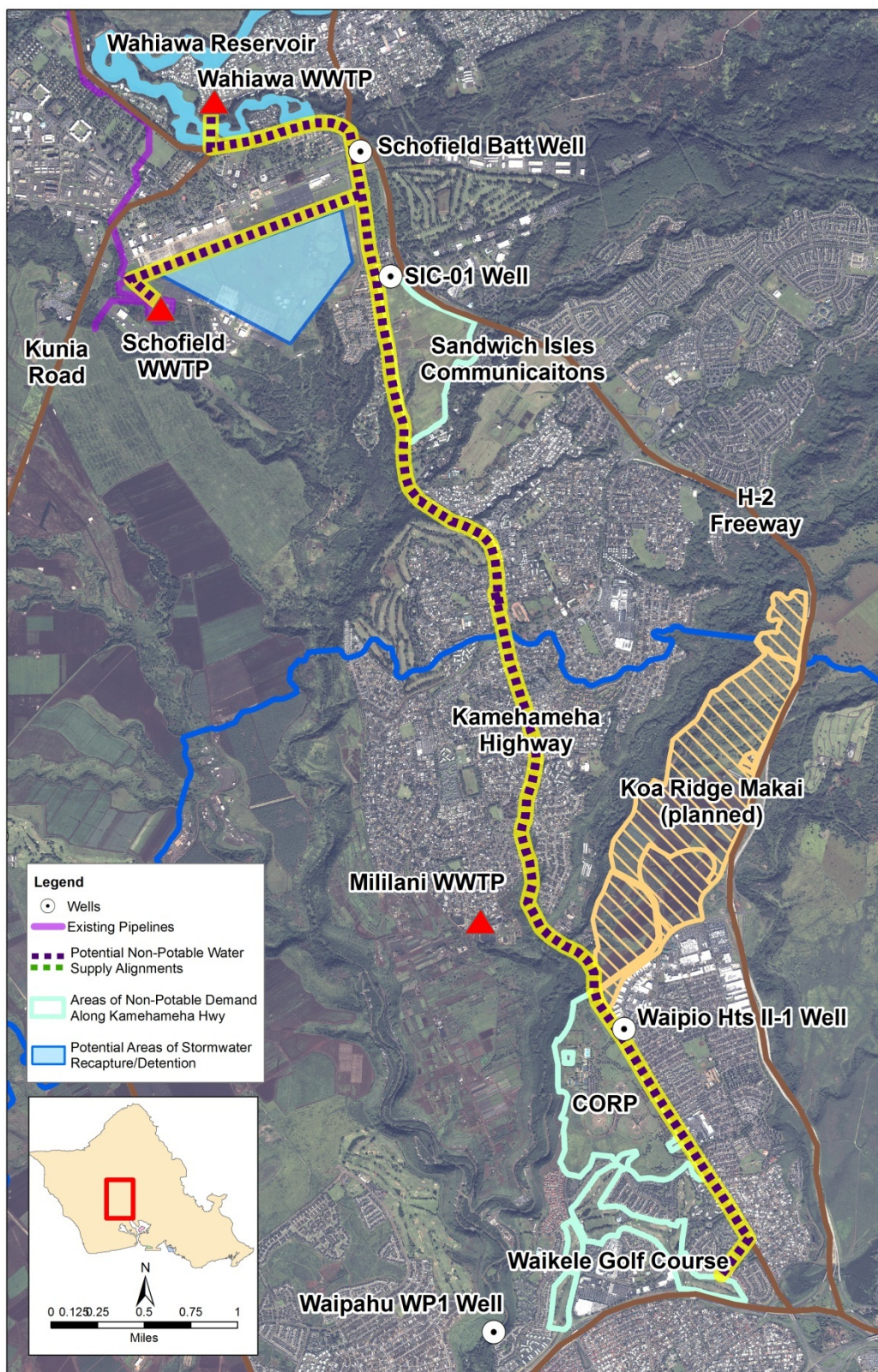


Figure 3-14. Potential Interconnection between Wahiawa WWTP and Schofield WWTP down Kamehameha Highway

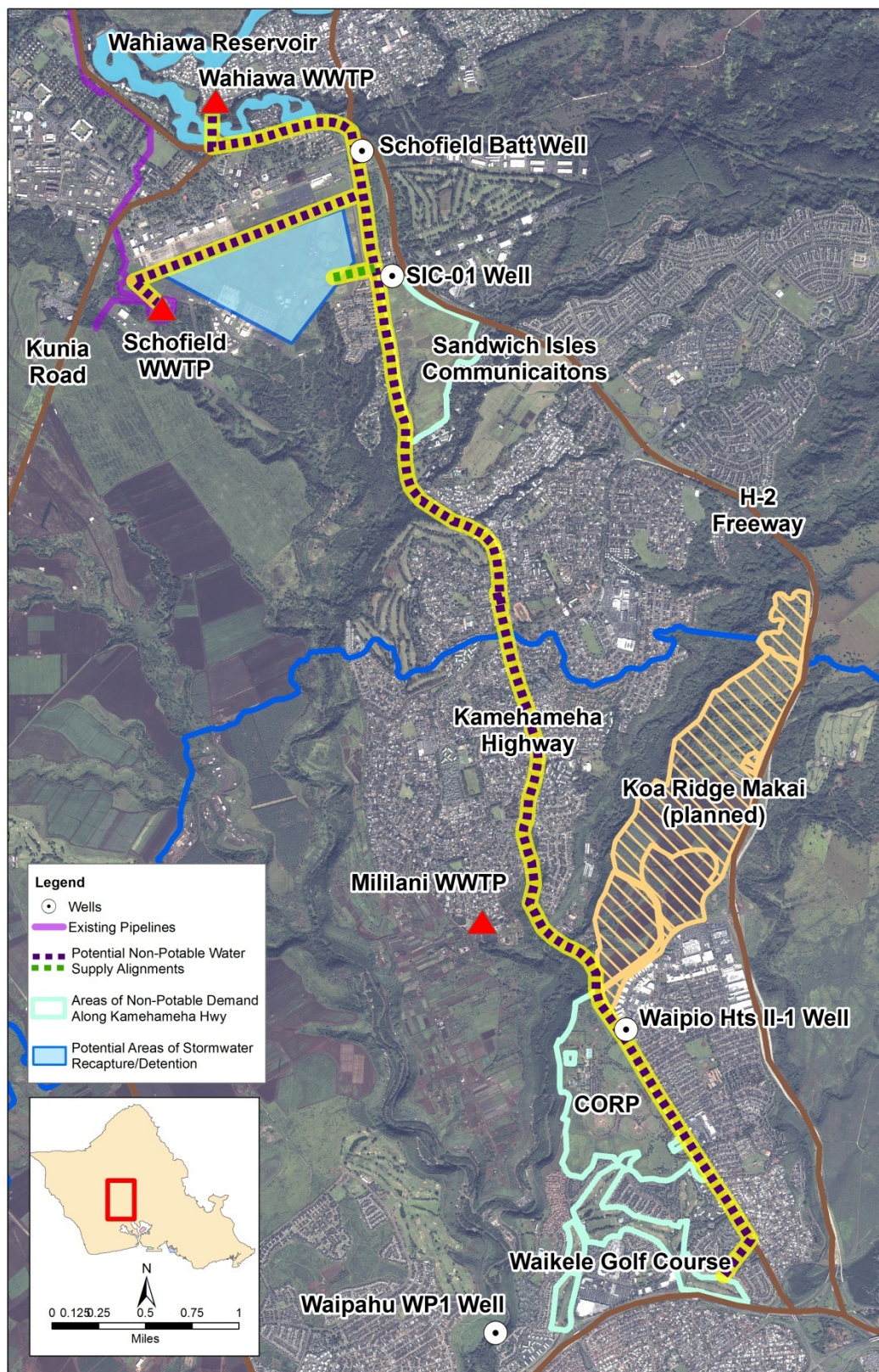


Figure 3-15. Potential Stormwater Integration down Kamehameha Highway

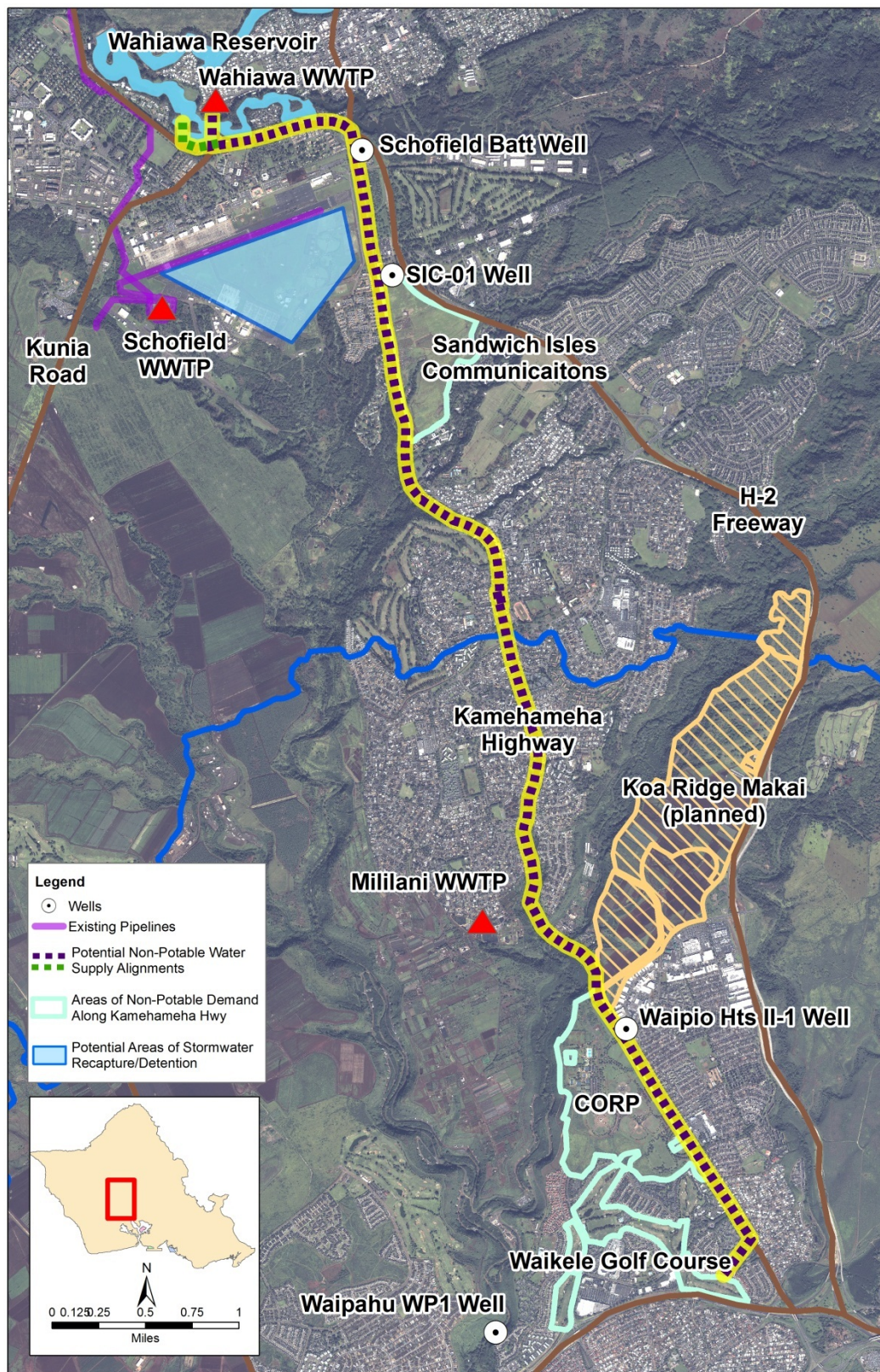


Figure 3-16. Potential Integration of Wahiawa Reservoir down Kamehameha Highway

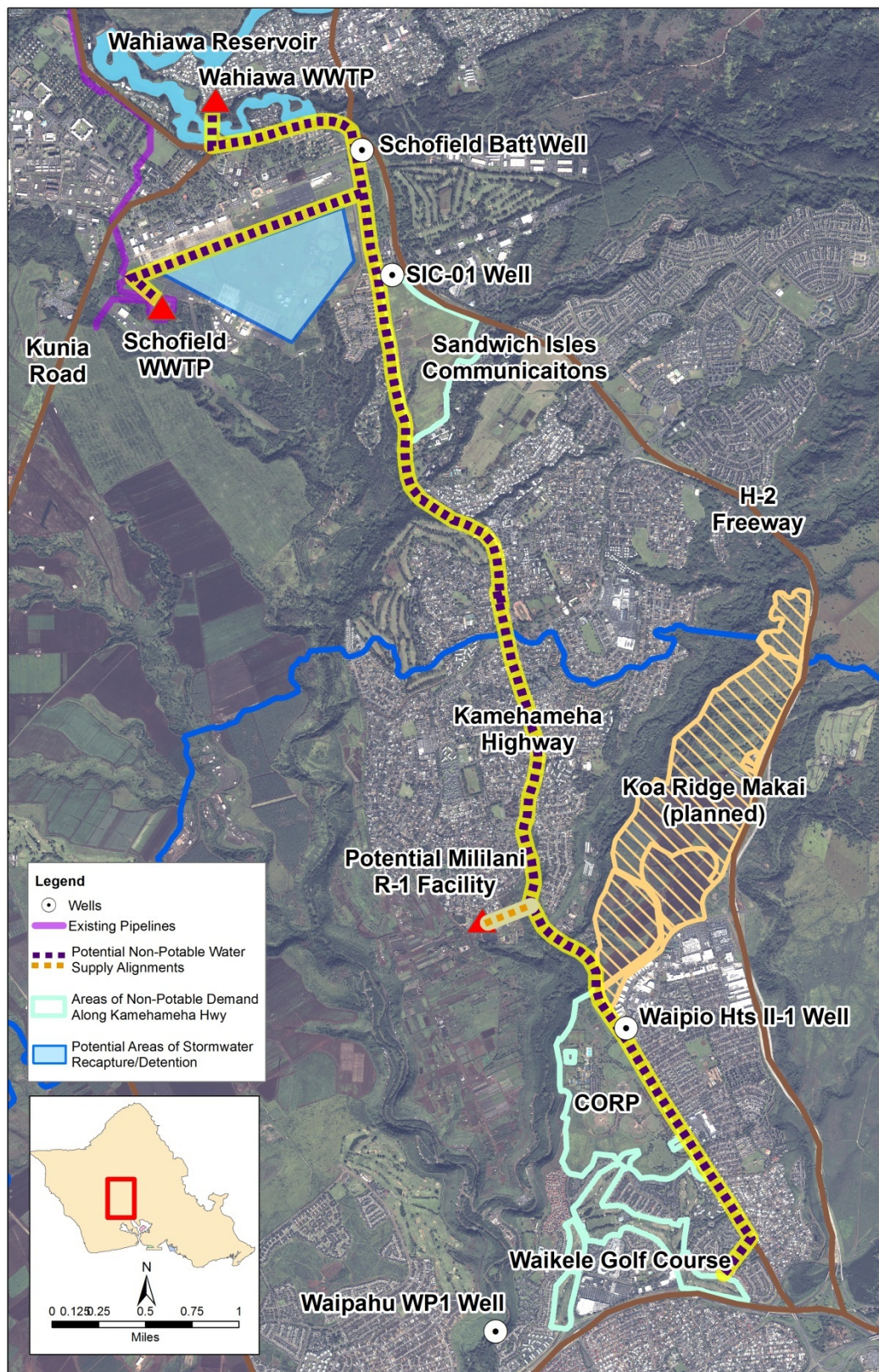


Figure 3-17. Potential Integration of a Mililani R-1 Facility down Kamehameha Highway

3.5 Benefits and Constraints

3.5.1 Benefits

There is a significant water demand that can be met with non-potable water sources in the Central Oahu area. By taking a regional approach involving multiple stakeholders, the opportunity to partner and leverage resources can lead to economic savings and avoided costs. Appropriate coordination, advocacy, and the continued exchange of ideas and pursuit of potential opportunities can help achieve more efficient utilization and conservation of our water resources.

The State Water Code, Section 174C-5(6), Hawaii Revised Statutes (HRS) provides that the Commission “shall cooperate with federal agencies, other state agencies, county or other local governmental organizations, and all other public and private agencies created for the purpose of utilizing and conserving the waters of the State, and assist these organizations and agencies in coordinating the use of their facilities and participate in the exchange of ideas, knowledge, and data with these organizations and agencies.”

Section 174C-5(13), HRS further provides that the Commission “shall plan and coordinate programs for the development, conservation, protection, control, and regulation of water resources based upon the best available information, and in cooperation with federal agencies, other state agencies, county or other local governmental organizations, and other public and private agencies created for the utilization and conservation of water.”

Recycled water is a viable alternative source for meeting non-potable water demands and can “free up” current irrigation use of potable water supplies for future drinking water purposes. In combination with aggressive water conservation, use of reclaimed storm and wastewater can significantly contribute towards the sustainable development and management of our island’s water resources.

3.5.2 Constraints

There are concerns regarding the application of recycled water over potable water aquifers and the allowed uses of recycled water in the proposed rules of the Food Safety Modernization Act. Public acceptance will also continue to be a key determinant for successful implementation of any water reuse project. Continued public outreach and education will be essential to public support and funding, and proactive efforts should be sustained in educating the community, stakeholders, government officials, and local farmers about the benefits and safety of using reclaimed wastewater and other potential alternative non-potable water supplies.

3.5.2.1 Potential Impacts to Drinking Water Sources

Concerns have been raised regarding potential impacts associated with the long-term application of recycled water over the potable aquifer. Most of the potential reuse areas are situated over the potable aquifers in Central Oahu, and in light of the historic effects from agricultural pesticides, concerns regarding aquifer protection may be a potential roadblock to implementation. To evaluate the potential effects from irrigation with recycled water, a number of projects have been independently initiated by the HDOH, HDOA/Water Resources Research Center, and HBWS/USGS to study the safety and efficacy of irrigation with treated wastewater.

1. The HDOH study parameters include, but are not limited to:
 - Identifying what contaminants are removed by the conversion/treatment of sewage to R-1 quality water.

- Determining the role that Hawaii soils play in the removal or retardation of remaining contaminants.
- Identifying which contaminants are most likely to migrate to the groundwater; and
- Assessing what areas in Hawaii are most suitable for application of reclaimed wastewater.

Data from the above study elements will be used to model the leaching potential of wastewater contaminants through the use of a Comprehensive Leaching Risk Assessment System (CLEARS), which is a GIS based model developed by the University of Hawaii. This model was originally developed to evaluate pesticide leaching and has been expanded to include volatile contaminants and now wastewater contaminants.

2. The HDOA/WRRC project will study the leaching and plant uptake of selected constituents in R1 treated wastewater used for leafy vegetable crop irrigation. The study will involve:
 - Evaluation of the feasibility of using R1 quality recycled water from Schofield WWTP and/or Wahiawa WWTP for irrigation of food crops in Central Oahu. Both of these treatment plants utilize MBR technology to produce exceptional quality effluent. There are concerns that salt, metals, trace organics, and several other chemicals including emerging pollutants of concern (EPOCs), pharmaceutical residues (PhaRs) and endocrine disrupting chemicals (EDCs) present in recycled water could adversely impact water quality of the underlying potable water aquifers and/or accumulate in food crop tissues.
 - This study will seek to understand the transport behavior of contaminants in recycled irrigation water through the unsaturated (vadose) zone to the underlying groundwater as well as the uptake of those chemicals by plants/cash crops relevant to the area if irrigated for several growing seasons.
 - The study will also determine the efficacy of the natural soil in the area in attenuating and degrading chemicals in the effluent, and will also identify the depth of irrigation (using recycled water) that the soil can accommodate without affecting the groundwater and the irrigated crops.
3. The HBWS/USGS project will study the “Effects of Irrigation with Treated Wastewater on Groundwater Quality in North-Central Oahu.” The objective of the study is to assess the effects of irrigation with treated wastewater on groundwater quality in North-Central Oahu, particularly in regards to emerging contaminants of concern including endocrine disrupting chemicals, pharmaceuticals, and trace elements. It should be noted that the study area has been irrigated with wastewater blended with Wahiawa Reservoir water for many decades. There were no guidelines or restrictions on reuse in earlier periods. Thus, any findings of contaminants in the groundwater may represent a “worst-case” scenario, relative to the levels of treatment, monitoring, and restrictions that would be imposed for any future reuse project.
 - The study approach includes sampling irrigation water and (20) groundwater wells upgradient of, beneath, and downgradient of the irrigation area using treated wastewater in North-Central Oahu.
 - Samples will be analyzed for a wide variety of emerging contaminants and potential tracers, including organic, inorganic, and isotopic analytes.

Once completed, the three studies will result in additional data and further guidance on the issue of long-term application of treated effluent over the potable water aquifer. More definitive information on whether emerging contaminants of concern will impact the underlying potable water aquifer from the application of treated wastewater will help to design and develop appropriate monitoring and further proactive risk assessment modeling, as needed.

3.5.2.2 Food Safety and Modernization Act (FSMA)

The Food Safety Modernization Act (FSMA) of 2010 expands the authority of the Food and Drug Administration (FDA). It grants FDA a number of new powers, including mandatory recall authority, which the agency has sought for many years. The FSMA requires FDA to undertake more than a dozen rulemakings and issue at least 10 guidance documents, as well as a host of reports, plans, strategies, standards, notices, and other tasks.

The FSMA is divided into four titles: prevention of food safety hazards, detection of and response to food safety problems, improving the safety of imported foods, and miscellaneous provisions. FDA is required to review relevant health data every two years and to issue guidance documents or regulations setting contaminant-specific performance standards for the most significant foodborne contaminants. The FSMA adds a new Section 419 to the Federal Food, Drug, and Cosmetic Act (21 U.S.C. § 350h) that requires FDA to establish standards for the safe production and harvesting of fresh produce.

Not later than 1 year after the date of enactment, FDA, in coordination with USDA and State departments of agriculture, is required to publish a proposed rule to establish minimum standards for the safe production and harvesting of those types of fruits and vegetables, “including specific mixes or categories of fruits and vegetables,” that are raw agricultural commodities for which FDA has determined that such standards minimize the risk of serious adverse health consequences or death. Such regulations must include standards addressing soil amendments, hygiene, packaging, temperature control, animal encroachment, and **water**.

Based on FDA’s outreach efforts and public comments, the FDA is proposing revisions to its proposed rule on produce safety that are more flexible and less burdensome in key areas. The FDA is accepting comments for 75 days after the publication date. The FDA published the original proposed rule on January 16, 2013, and the comment period closed on November 22, 2013; no additional comments are being accepted on the original proposed rule. The FDA will accept comments on the revised provisions while continuing to review comments already received on the original proposed rule. The comment period opened on September 29, 2014.

- The FDA is proposing various revisions to the microbial standard for water that is directly applied during the growing of produce (other than sprouts). The agency is updating the microbial quality standard to reflect data that supports the 2012 Environmental Protection Agency recreational water quality criteria.
- Farmers with agricultural water that does not initially meet the proposed microbial standard would have additional means by which they could meet the standard and then be able to use the water. These options include establishing a sufficient interval of days between last irrigation and harvest to allow time for potentially dangerous microbes to die off. They could also apply an interval of days between harvest and the end of storage using appropriate microbial die-off or removal rates, provided there is adequate supporting data. And there is an option to calculate and apply appropriate pathogen removal rates for activities such as commercial washing.
 - A number of commenters felt that the FDA should allow for microbial die-off that occurs naturally in the field before the crop is harvested. This provision provides that flexibility. However, any of these options would have to provide the same level of public health protection and not increase the likelihood that the covered produce will be adulterated.
- Recognizing that water sources have different levels of contamination risk, the FDA is proposing a tiered and more targeted approach to testing each source of untreated water that will be less burdensome on farmers while still protective of public health. The revisions reduce how often the water is tested, with the frequency depending on the water source (i.e. surface or ground water) and on the results of prior tests.

- Under the revised standard, the geometric mean of samples is not to exceed 126 colony-forming unit (CFU) of generic E.coli per 100 mL of water and the statistical threshold value (STV) of samples is not to exceed 410 CFU of generic E.coli in 100 mL of water. The STV approximates the 90th percentile of the water quality distribution and is intended to be a value that should not be exceeded by more than 10 percent of the samples taken.
- Under the proposed tiered approach, for untreated surface water—considered the most vulnerable to contamination—the FDA would require farms to do a baseline survey of the quality of agricultural water directly applied to produce (other than sprouts) during growing, using a minimum of 20 samples, collected during a time period(s) as close as practical to harvest over the course of two years. The baseline findings would be used to determine if the water meets the microbial quality standard.
 - After the baseline has been established, an annual survey of a minimum of five samples per year would be required to verify the water quality profile and confirm that the water is still used appropriately. If the annual survey does not support the current water quality profile, a new water quality profile would be required. Water use would need to be modified as soon as practical and no later than the following year.
 - If there is reason to believe that the water-quality profile no longer represents the quality of the water because of a significant water event, such as changes in adjacent land use, erosion or other impacts to the water that are outside the farmer’s control, a new water quality profile must be developed. Water use would need to be modified as soon as practical and no later than the following year.
 - For untreated surface water used for other purposes for which the proposed rule prescribes a microbial standard (e.g., hand washing), the FDA is proposing to require testing with an adequate frequency to provide reasonable assurances that the water meets the required microbial standard, with adequate documentation supporting the testing frequency.
- For untreated ground water used for any purpose for which the proposed rule prescribes a microbial standard, water must be tested at least four times over a growing season or over a period of one year, using a minimum of four samples collected during a time period(s) as close as practical to harvest.
- For both untreated surface water and untreated ground water, farms would be required to test the quality of each agricultural water source.
- In addition, the FDA is proposing to permit data sharing among farms, and for farms to rely on testing data from third parties, under certain circumstances. For example, farms that share a water source may share testing data from that water source to meet the proposed testing requirements if there is no reasonably identifiable source of likely microbiological contamination between the sampling sites and the farms involved.

It is presently unclear as to how the proposed rules apply to the use of recycled water or stormwater reuse. These proposed regulations may be an additional constraint/obstacle to the expanded use of available non-potable water supply options for agricultural irrigation. Included for reference in Appendix B is Table ES-1: Summary of Institutional Issues Affecting Stormwater Reclamation and Reuse from the CWRM’s 2008 report, “An Appraisal of the Statewide Framework for Stormwater Reclamation and Reuse in Hawaii.”

3.5.2.3 Financing and Cost

Determining and reaching agreement on the “value” and pricing of the non-potable water supply will also be a key component to implementation. Proponents have maintained that the price of the non-potable water supply should be established to encourage its use and should not be more expensive

than other available water sources. At the same time, potential purveyors have countered that the pricing of recycled water should take into consideration the costs of both the required capital improvements and the operations and maintenance costs associated with the treatment necessary for suitable use of this non-potable water supply.

As an example Maui County's water reuse program was set to encourage users to connect to the distribution system and the revenue from recycled water sales is not enough to recover all costs associated with the production and delivery of recycled water. Accordingly, sewer user fees were slightly increased and sewer users currently pay for approximately 75% of the program's costs.

- Maui County's (2012) Recycled Water Rates are as follows:
 - \$0.15 per 1,000 gallons for Major Agriculture;
 - \$0.33 per 1,000 gallons for Agriculture (including golf courses); and
 - \$1.28 per 1,000 gallons for All Other Uses.
- In addition to connection fees for South and West Maui, an "Avoided Cost" customer classification has been established to allow Maui County to match the rate a consumer previously spent on their non-potable water source.

With respect to the City and County of Honolulu, the Honouliuli Water Reclamation Facility (WRF) provides most of the County's current reuse supply and HBWS is the current purveyor of R-1 water supply from the Honouliuli WRF.

- Unlike Maui County, the City and County of Honolulu does not have a mandatory reuse ordinance and HBWS promotes the use of recycled water through competitive pricing, which resulted in initial rates being appreciably lower than the costs to produce and convey the recycled water.
- Initial capital expenditures associated with expanding the distribution system were subsidized by HBWS potable water users, as compared to the subsidy from sewer water users in Maui County.
- As initial recycled water agreements expire, HBWS is seeking to establish recycled water rates that reflect the true cost of service, however, increased rates may discourage continued use of recycled water in lieu of less expensive groundwater sources.
 - The current R-1 recycled water rate effective July 1, 2014 is \$1.68 per thousand gallons.

The final scope of this project did not include a robust benefit-cost analysis for preferred opportunities or an analysis of recycled water pricing. However, coarse estimates of reclaimed water pipeline material costs were developed for selected options within the three focus areas of the plan. It should be clearly noted that pipe material costs are only one of many required component costs, and the following rough estimates have been provided solely as a means for relative comparison of the identified options.

Kunia Road Corridor Pipeline

A potential alignment for supplying the Kunia Road Corridor with non-potable water is shown in Figure 3-18. The pipeline cost calculation assumes a 5.5 mile alignment and the potential conveyance of 4 MGD of non-potable water. Based on a 14 or 16-inch diameter pipeline, a rough cost estimate of the pipe material cost would range from \$8.1M to \$9.3M.

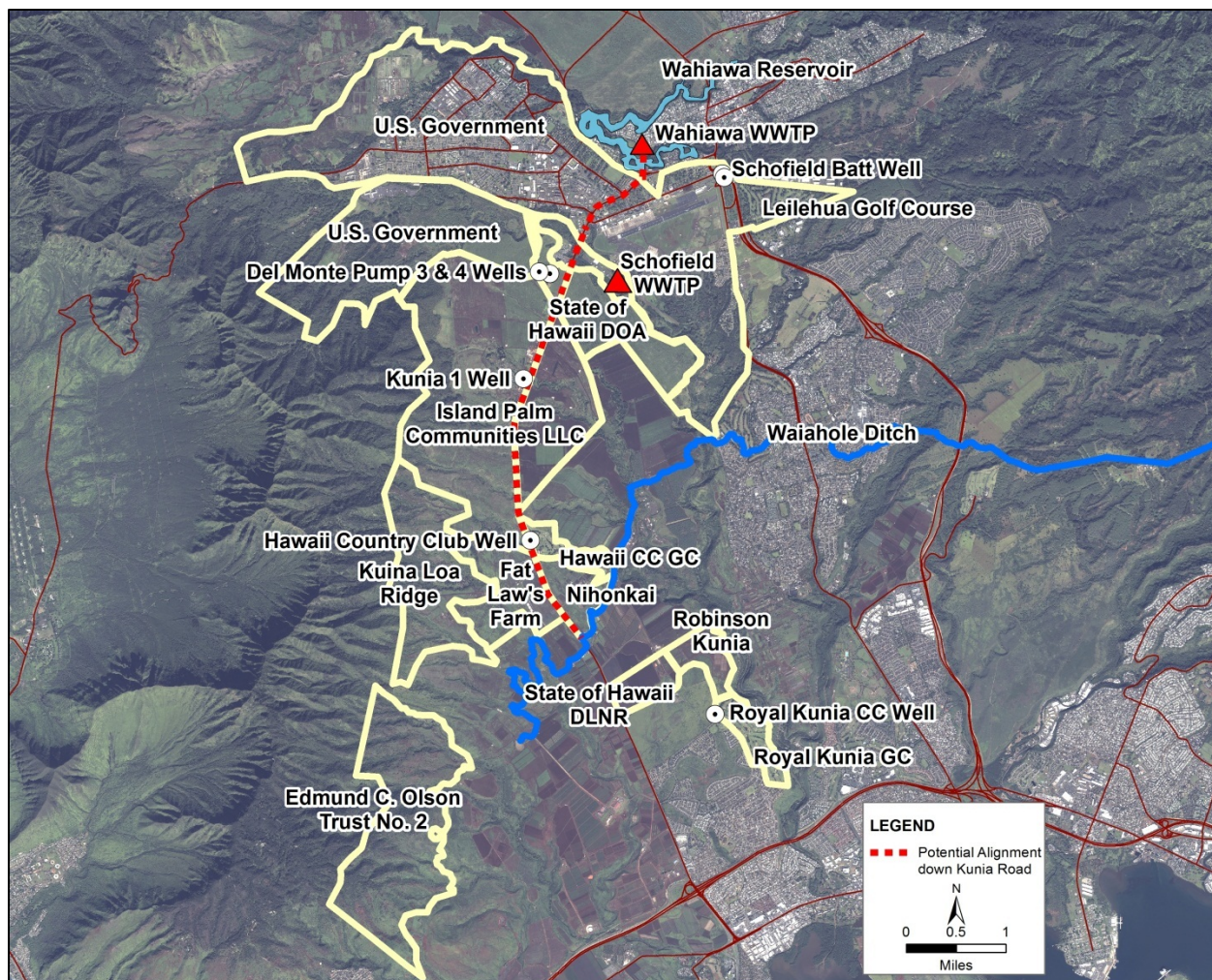


Figure 3-18. Potential Alignment down Kunia Road

Former Galbraith Property Pipeline

A potential alignment for supplying the former Galbraith property with non-potable water is shown in Figure 3-19. The pipeline cost calculation assumes a 1.0 mile alignment and the potential conveyance of 4 MGD of non-potable water. Based on a 14 or 16-inch diameter pipeline, a rough cost estimate of the pipe material cost would range from \$1.5M to \$1.7M.

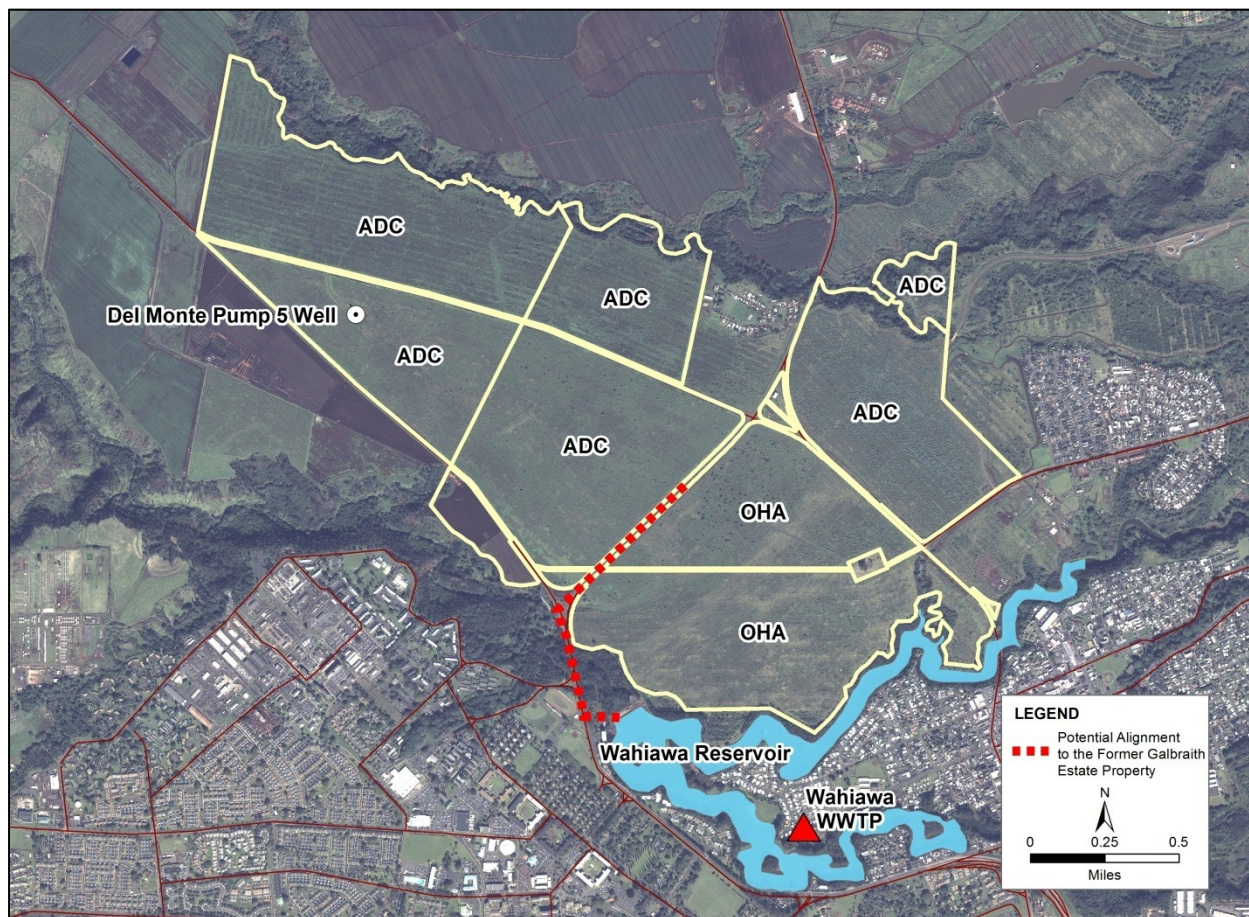


Figure 3-19. Potential Alignment to the Former Galbraith Estate Property

The shortest route to the ADC lands would be through OHA's property, but will require negotiations with OHA. Alternatively, the pipeline could be routed in avoidance of OHA's property, which will increase the length and cost of the required pipeline.

Kamehameha Highway Pipeline

A potential alignment for supplying the Kamehameha Highway area with non-potable water is shown in Figure 3-20. The pipeline cost calculation assumes an 8.0 mile alignment and the potential conveyance of 4 MGD of non-potable water. Based on a 14 or 16-inch diameter pipeline, a rough cost estimate of the pipe material cost would range from \$11.8M to \$13.5M.

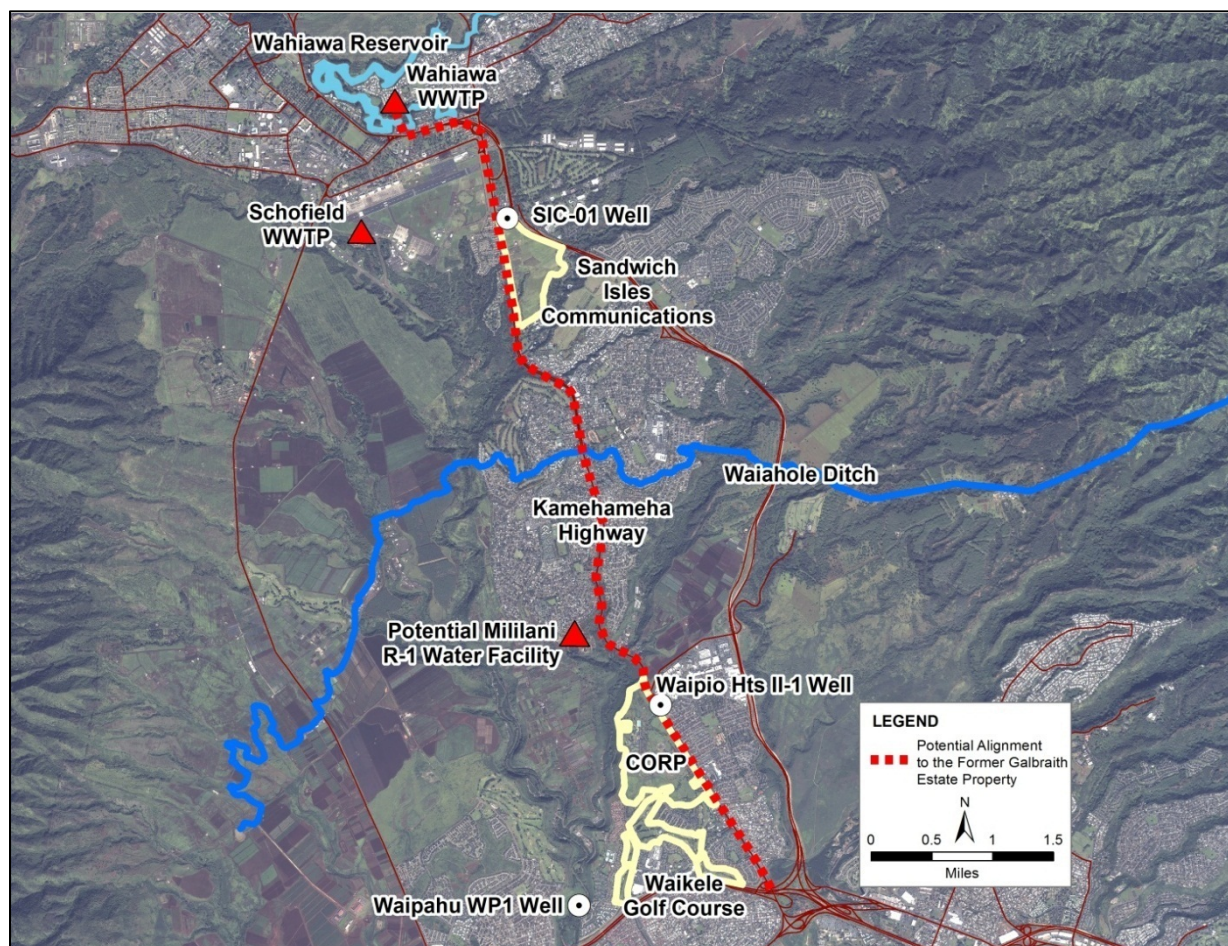


Figure 3-20. Potential Alignment down Kamehameha Highway

The above ball park estimates do not include any planning, design, construction or other ancillary infrastructure costs that may be required for each respective option. Such additional elements include, but are not limited to, reclaimed water pump station costs, new wastewater collection pipeline and pump station costs, and/or any associated regional wastewater reclamation facility costs, which will need to be further evaluated upon selection of a preferred option or scenario. Similarly, costs associated with the potential integration of stormwater recapture and reuse were not included as part of this assessment, which will include on-base collection, storage, and treatment of stormwater and the construction of additional pipelines to transport the stormwater for integration with the R-1 water supply from the Schofield WWTP and/or Wahiawa WWTP.

3.5.2.4 Public Outreach and Education

Public outreach and education has been an issue throughout both phases of this plan because of the public's cautious acceptance of agricultural products grown with recycled water. Much of the produce grown on the mainland and exported to Hawaii is grown using recycled water. At the same

time, information needs to be shared with local farmers advising them of the benefits from the proper application of recycled water for agricultural irrigation. A proactive public education program must be sustained and political support needs to be secured for funding of alternative non-potable water supply projects.

Section 4

Conclusions and Recommendations

4.1 Regional Approach

Growing uncertainty about water supplies, increasing demand, and new challenges and opportunities in stormwater and wastewater management all indicate that it is time for a coordinated and integrated regional approach to water resource planning in Central Oahu.

If water planning and implementation continue in a piecemeal fashion, the opportunity to coordinate, partner, and leverage resources may be lost. This could result in higher capital and operating costs, isolated projects, and potentially unfavorable outcomes. A regional approach with many stakeholders offers a greater range of savings and avoided costs.

Reusing wastewater in Central Oahu could reduce the size and capital costs of the planned secondary treatment upgrades at the Honouliuli WWTP. That would also reduce the operation and energy cost to pump wastewater to Honouliuli. Through a regional plan, projects that might not work financially on their own become possible when integrated in a wider system.

Capturing stormwater and treating wastewater (to R-1) on a regional basis preserves potable water in the ground for future domestic use and builds a reserve against drought and future climate change. Treating and distributing wastewater locally reduces discharge to the ocean and sediment loading of the reefs during high rainfall events, improves near shore water quality, and (importantly for the County) lowers the number of potential Clean Water Act violations.

4.2 Life Cycle, Triple Bottom Line Assessments

The use of non-potable water in any particular project will depend upon the economics of that specific situation. However, the benefits and costs of using non-potable water on a district or regional basis need a broader and deeper analysis. Individual operations are constrained in time, location, supply, demand, and financing. But a regional approach incorporates more variables, more options, and may resolve a number of problems, not just one.

The goal of “Life Cycle Assessment” (or “Cradle to Grave Design”) is to compare the full range of environmental effects assignable to products and services by quantifying all inputs and outputs of material flows and assessing how these material flows impact the environment. This information is used to improve processes, support policy, and provide a sound basis for informed decisions. The methods for conducting a Life Cycle Assessment are well developed within the industry.

The goal of a “Triple Bottom Line” or “TBL” assessment is to analyze the impacts on people, the environment, and the economy. TBL is especially important in regional approaches where social and environmental considerations are elevated.

Thus, a regional plan for non-potable water and/or wastewater reuse should analyze a) the full Life Cycle Assessment of the project, and b) the integrated Triple Bottom Line impacts on people, the environment, and the economy. By examining both the Life Cycle Assessment and the Triple Bottom Line on a regional basis, important new savings, new comparisons, and new solutions are possible.

In this way, the opportunity costs of continuing down the same path we are on now (disparate, unconnected operations) can be compared with an integrated plan across sectors (local treatment of wastewater, energy, groundwater savings, increased and reliable irrigation, risk financing, reduced ocean discharge, resilience against future drought, hurricanes, and tsunamis).

For example, a network of small to modest size R-1 wastewater treatment facilities, distributed appropriately in central Oahu may provide multiple benefits at an overall lower cost and make sense as a system, whereas alone, no single facility would work financially. The system might “work” collectively because, over time, many other costs are avoided. Investing in a local R-1 facility may avoid the need to construct a long pipeline. It may offset a current need to pump groundwater. It may reduce energy costs and flatten the demand curve for new energy generation. It may provide more reliable agricultural irrigation and groundwater recharge in the face of increasingly irregular climate change and drought conditions. Importantly, it may build resilience and proof of concept for gradual relocation of wastewater infrastructure away from low lying shoreline areas as part of a long term civil defense plan against future hurricanes and tsunamis.

4.3 Cross-Regional Planning and Integration

A single preferred water supply option was not identified for any of the selected study areas. Instead, a more holistic approach was taken to arrive at a grouping of technically feasible alternatives, many of which can be more fully integrated with each other to develop a long-term and adaptive water supply system.

Greater coordination and integration of water supply planning and project implementation should be established. The HBWS is currently undertaking such efforts as part of its development of the North Shore Watershed Management Plan (WMP) and the Central Oahu Watershed Management Plan as it relates to both potable and non-potable water supply and demand. The CONPWMP should help to inform the WMPs in regards to non-potable water use and development. The WMPs will also provide a mechanism for integration of regional planning between agencies such as HDOA and ADC, as well as private entities.

4.4 Recommendations

While there are concerns regarding the application of recycled water over potable water aquifers, recycled water should continue to be explored as a potentially viable alternative source for meeting non-potable water demands which may “free up” current irrigation use of potable water supplies for future drinking water purposes. Water reuse has been practiced successfully on the mainland and in Hawaii, and in combination with aggressive water conservation, can significantly contribute to the sustainable development and management of our island’s water resources.

Accordingly, this plan provides information for key stakeholders and decision makers on maximizing non-potable water supply to meet growing non-potable water needs of Central Oahu. Potential project partnerships, including funding and/or financing options should be identified and coordinated for successful implementation. Through regional planning larger community benefits and objectives can be achieved that are financially feasible and sustainable into the future.

These benefits and objectives include:

- Promoting the highest and best use of water
- Maximizing the use of available non-potable water supply options
- Promoting agriculture in Central Oahu
- Reducing current regulatory requirements related to the use of water from Wahiawa Reservoir
- Reducing discharge to surface and near-shore waters

- Leveraging of funds and resources

In furtherance of these benefits/objectives, the recommended next steps include:

- Continuing stakeholder collaboration and improving coordination
- Addressing water quality concerns regarding the long-term application of recycled water over the potable aquifer via appropriate studies
- Supporting and enhancing current public education and outreach efforts
- Facilitating effective integration between key planning components such as the:
 - Water Resource Protection Plan;
 - Water Quality Plan;
 - Agricultural Water Use and Development Plan; and
 - Oahu Water Management Plan.

Section 5

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 the Commission on Water Resource Management and Brown and Caldwell dated July 9, 2013. This document is governed by the specific scope of work authorized by the Commission on Water Resource Management; 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 the Commission on Water Resource Management and other parties and, unless otherwise expressly indicated, have made no independent investigation as to the validity, completeness, or accuracy of such information.

This document sets forth the results of certain services performed by Brown and Caldwell with respect to the property or facilities described therein (the Property). CWRM recognizes and acknowledges that these services were designed and performed within various limitations, including budget and time constraints. These services were not designed or intended to determine the existence and nature of all possible environmental risks (which term shall include the presence or suspected or potential presence of any hazardous waste or hazardous substance, as defined under any applicable law or regulation, or any other actual or potential environmental problems or liabilities) affecting the Property. The nature of environmental risks is such that no amount of additional inspection and testing could determine as a matter of certainty that all environmental risks affecting the Property had been identified. Accordingly, THIS DOCUMENT DOES NOT PURPORT TO DESCRIBE ALL ENVIRONMENTAL RISKS AFFECTING THE PROPERTY, NOR WILL ANY ADDITIONAL TESTING OR INSPECTION RECOMMENDED OR OTHERWISE REFERRED TO IN THIS DOCUMENT NECESSARILY IDENTIFY ALL ENVIRONMENTAL RISKS AFFECTING THE PROPERTY.

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Section 6

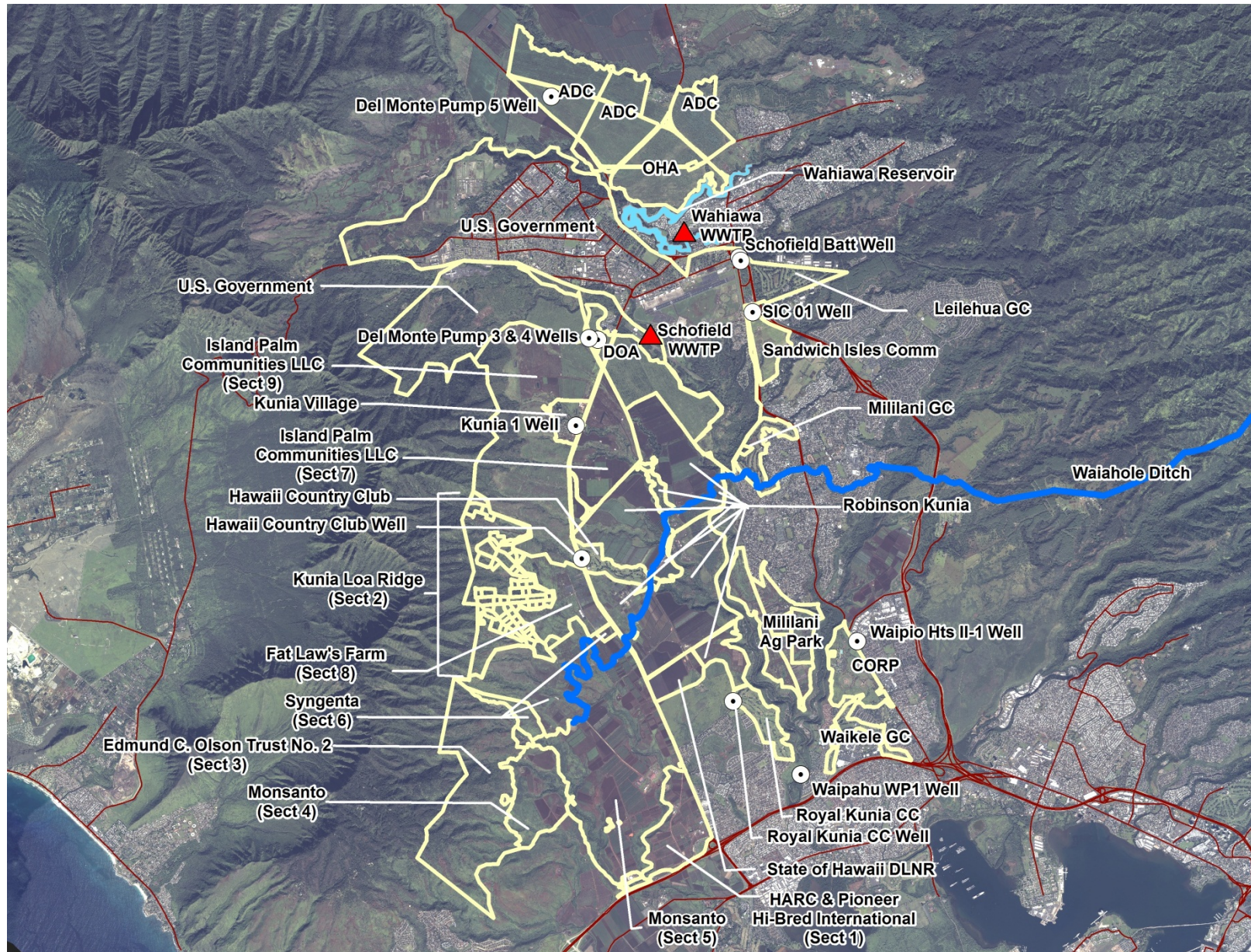
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Appendix A: Source and Supply Spreadsheets



Kunia Road Corridor

TMK	Land Owner	Lessee	Area (acres)	WUP	Well Number	Total WUP Allocation (MGD)	Current Pumpage (MGD)	Projected Demand (factor of 2500 GPAD) (MGD)	Water Quality Needed	Supply Source	Volume (MGD)	Required Infrastructure	Approx Distance to End Use Parcel (miles)	Benefits	Constraints
9-2-001:011	HARC and Pioneer Hi-Bred International	HARC and Pioneer Hi-Bred International Section 1	390	807 (Waiahole Ditch) 808 (Waiahole Ditch)	3-2657-005 3-2853-001 3-2953-001 3-2953-002 3-2953-003 3-3053-001 3-3151-001	0.73	0.62	0.975	Non-Potable	Waiahole Ditch	15	Existing infrastructure	N/A	Currently using non-potable Waiahole	Parcel is located below Waiahole Ditch. Wouldn't be practical to bring Schofield WWTP R-1 water this far.
										Wahiawa Reservoir	19.44	Pipeline	7.5	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	7.5	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	6.5	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	6.5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.
multiple	Kunia Loa Ridge Farmlands	Kunia Loa Ridge Farmlands Section 2	854	928 (Well) 880 (Well)	3-2703-001 3-2803-005 3-2803-007	5.035	2.2	2.135	Non-Potable	Existing well source	5.035	Pipeline	2.5		Some of these lots are not part of the existing WUP but are currently using the well water.
										Wahiawa Reservoir	19.44	Pipeline	5	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	5	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	4.5	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	4.5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.

Kunia Road Corridor

TMK	Land Owner	Lessee	Area (acres)	WUP	Well Number	Total WUP Allocation (MGD)	Current Pumpage (MGD)	Projected Demand (factor of 2500 GPAD) (MGD)	Water Quality Needed	Supply Source	Volume (MGD)	Required Infrastructure	Approx Distance to End Use Parcel (miles)	Benefits	Constraints
9-2-004:008	Edmund C. Olson Trust No. 2	Edmund C. Olson Trust No. 2 Section 3	1,276	827 (Waiahole Ditch)	3-2657-005 3-2853-001 3-2953-001 3-2953-002 3-2953-003 3-3053-001 3-3151-001	0.024	0.002	3.19	Non-Potable	Waiahole Ditch	15	Existing infrastructure	N/A	Currently using non-potable Waiahole	Parcel is located below Waiahole Ditch. Wouldn't be practical to bring Schofield WWTP R-1 water this far.
										Wahiawa Reservoir	19.44	Pipeline	7.5	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	7.5	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	6.5	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	6.5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.
9-2-004:009	Monsanto Company	Monsanto Company - Oahu Section 4	437	828 (Waiahole Ditch)	3-2657-005 3-2853-001 3-2953-001 3-2953-002 3-2953-003 3-3053-001 3-3151-001	2.636	2.13	1.0925	Non-Potable	Waiahole Ditch	15	Existing infrastructure	N/A	Currently using non-potable Waiahole	Parcel is located below Waiahole Ditch. Wouldn't be practical to bring Schofield WWTP R-1 water this far.
										Wahiawa Reservoir	19.44	Pipeline	8	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	8	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	7	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	7	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.

Kunia Road Corridor

TMK	Land Owner	Lessee	Area (acres)	WUP	Well Number	Total WUP Allocation (MGD)	Current Pumpage (MGD)	Projected Demand (factor of 2500 GPAD) (MGD)	Water Quality Needed	Supply Source	Volume (MGD)	Required Infrastructure	Approx Distance to End Use Parcel (miles)	Benefits	Constraints
9-2-001:001	Monsanto Company	Monsanto Company - Oahu Section 5	1,829	828 (Waiahole Ditch)	3-2657-005 3-2853-001 3-2953-001 3-2953-002 3-2953-003 3-3053-001 3-3151-001	2.636	2.13	4.5725	Non-Potable	Waiahole Ditch	15	Existing infrastructure	5.6	Currently using non-potable Waiahole	Parcel is located below Waiahole Ditch. Wouldn't be practical to bring Schofield WWTP R-1 water this far.
										Wahiawa Reservoir	19.44	Pipeline	6	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	6	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	5	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.
9-2-004:011	Syngenta Hawaii LLC	Syngenta Hawaii LLC Section 6	849	none	3-2657-005 3-2853-001 3-2953-001 3-2953-002 3-2953-003 3-3053-001 3-3151-001	N/A	N/A	2.1225	Non-Potable	Waiahole Ditch	0.59	Existing infrastructure	N/A	Currently using non-potable Waiahole	None
9-2-004:003 9-2-004:006 9-2-004:012				860 (Waiahole Ditch)		0.59	0.40			Wahiawa Reservoir	19.44	Pipeline	5.5	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	5.5	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	4.5	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	4.5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.

Kunia Road Corridor

TMK	Land Owner	Lessee	Area (acres)	WUP	Well Number	Total WUP Allocation (MGD)	Current Pumpage (MGD)	Projected Demand (factor of 2500 GPAD) (MGD)	Water Quality Needed	Supply Source	Volume (MGD)	Required Infrastructure	Approx Distance to End Use Parcel (miles)	Benefits	Constraints
9-2-005:022	Island Palm Communities LLC	Monsanto Sections 7 & 9	2,400	928 (Well) 880 (Well)	3-2703-001 3-2803-005 3-2803-007	5.035	2.2	6.00	Non-Potable	Existing well source	5.035	Existing infrastructure	0.5		
										Wahiawa Reservoir	19.44	Pipeline	3.5	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	3.5	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	2.5	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	2.5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.
9-2-004:010	Fat Law's Farm, Inc	Fat Law's Farm, Inc Section 8	426	871 (Waiahole Ditch) 880 (Well)	3-2657-005 3-2803-005 3-2803-007 3-2853-001 3-2953-001 3-2953-002 3-2953-003 3-3053-001 3-3151-001	4.511	1.53	1.065	Non-Potable	Existing well source	0.551	Existing infrastructure	3		
										Waiahole Ditch	15	Existing infrastructure	N/A	Currently using non-potable Waiahole	None
										Wahiawa Reservoir	19.44	Pipeline	5	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	5	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	4	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	4	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.

Kunia Road Corridor

TMK	Land Owner	Lessee	Area (acres)	WUP	Well Number	Total WUP Allocation (MGD)	Current Pumpage (MGD)	Projected Demand (factor of 2500 GPAD) (MGD)	Water Quality Needed	Supply Source	Volume (MGD)	Required Infrastructure	Approx Distance to End Use Parcel (miles)	Benefits	Constraints
9-2-005:026	U.S. Government	Del Monte Fresh Produce	1,359	928 (Well) 880 (Well)	3-2703-001 3-2803-005 3-2803-007	5.035	2.2	3.3975	Non-Potable	Existing well source	5.035	Existing infrastructure	0		
										Wahiawa Reservoir	19.44	Pipeline	2.5	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	2.5	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	1.5	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	1.5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.
7-6-001:001	U.S. Government	U.S. Government (Leilehua Golf Course)	5,112 (193 GC)	464 (Well)	3-2901-002 3-2901-003 3-2901-004 3-2901-010	5.648	3.06	1 ²	Non-Potable	Existing well source	1	Existing infrastructure	0.5		None
										Wahiawa Reservoir	19.44	Pipeline	1.5	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	1.5	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	2	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	None
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	1	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.

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TMK	Land Owner	Lessee	Area (acres)	WUP	Well Number	Total WUP Allocation (MGD)	Current Pumpage (MGD)	Projected Demand (factor of 2500 GPAD) (MGD)	Water Quality Needed	Supply Source	Volume (MGD)	Required Infrastructure	Approx Distance to End Use Parcel (miles)	Benefits	Constraints
7-7-001:001	U.S. Government	Schofield Barracks/Wheeler Army Airfield	10,099	464 (Well)	3-2901-002 3-2901-003 3-2901-004 3-2901-010	5.648	3.06	1 ²	Non-Potable	Existing well source	1	Existing infrastructure	1		None
										Wahiawa Reservoir	19.44	Pipeline	1	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	1	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipelines	0.5	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	0	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.
9-4-002:080	State of Hawaii DLNR	Royal Kunia Agricultural Park	150	None	N/A	N/A	N/A	0.375	Non-Potable	Waiahole Ditch	15	Pipeline	N/A	Use non-potable Waiahole water	Parcel is located below Waiahole Ditch. Wouldn't be practical to bring Schofield WWTP R-1 water this far.
										Wahiawa Reservoir	19.44	Pipeline	6	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	6	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipelines	5	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.

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TMK	Land Owner	Lessee	Area (acres)	WUP	Well Number	Total WUP Allocation (MGD)	Current Pumpage (MGD)	Projected Demand (factor of 2500 GPAD) (MGD)	Water Quality Needed	Supply Source	Volume (MGD)	Required Infrastructure	Approx Distance to End Use Parcel (miles)	Benefits	Constraints
9-4-004:008	Robinson Kunia Land, LLC	Kunia Water Association, Inc	1	880 (Well)	3-2803-005 3-2803-007	3.96	1.535	0.0025	N/A	Existing well source	3.96	Existing infrastructure	3		None
										Wahiawa Reservoir	19.44	Pipeline	5	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	5	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipelines	4	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	4	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.
9-4-004:009	Nihonkai Lease Co Ltd	Nihonkai Lease Co Ltd	205	634 (Waiahole Ditch) 880 (Well)	3-2657-005 3-2853-001 3-2953-001 3-2953-002 3-2953-003 3-3053-001 3-3151-001 3-2803-005 3-2803-007	4.44	1.635	0.5125	Non-Potable	Existing well source	3.96	Existing infrastructure	3.5		None
										Waiahole Ditch	15	Existing infrastructure	N/A	Currently using non-potable Waiahole	None
										Wahiawa Reservoir	19.44	Pipeline	5	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	5	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	4	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	4	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.

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TMK	Land Owner	Lessee	Area (acres)	WUP	Well Number	Total WUP Allocation (MGD)	Current Pumpage (MGD)	Projected Demand (factor of 2500 GPAD) (MGD)	Water Quality Needed	Supply Source	Volume (MGD)	Required Infrastructure	Approx Distance to End Use Parcel (miles)	Benefits	Constraints
9-4-003:001 9-4-004:004 9-4-004:007 9-4-004:010 9-4-004:011 9-4-004:012 9-4-004:019	Robinson Kunia Land, LLC	Robinson Kunia Land, LLC	2,207	804 (Waiahole Ditch)	3-2657-005 3-2853-001 3-2953-001 3-2953-002 3-2953-003 3-3053-001 3-3151-001	2.39	1.14	5.5175	Non-Potable	Waiahole Ditch	15	Connection	N/A	Existing ditch on property. Low water price. Low infrastructure cost.	GWUP needed. Windward SW impacts. Water quality issues.
										Wahiawa Reservoir	19.44	Pipelines	5	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipelines	5	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipelines	4	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	4	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.
9-4-012:002	State of Hawaii DOA	Private Farmer	487	928 (Well) 880 (Well)	3-2703-001 3-2803-005 3-2803-007	5.035	2.2	1.2175	Non-Potable	Existing well source	5.035	Existing infrastructure	0.5		
										Wahiawa Reservoir	19.44	Pipelines	1	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipelines	1	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipelines	0.5	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	0.5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.

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TMK	Land Owner	Lessee	Area (acres)	WUP	Well Number	Total WUP Allocation (MGD)	Current Pumpage (MGD)	Projected Demand (factor of 2500 GPAD) (MGD)	Water Quality Needed	Supply Source	Volume (MGD)	Required Infrastructure	Approx Distance to End Use Parcel (miles)	Benefits	Constraints
9-4-004:020	E & H Third Family LTD Partnership	Hawaii Country Club	136	454 (Well)	3-2603-001	0.4	0.36	0.4	Non-Potable	Existing well source	4	Existing infrastructure	0		
										Wahiawa Reservoir	19.44	Pipelines	4	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipelines	4	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	3	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	3	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.
9-2-005:023	HARC	Del Monte Fresh Produce	119	928 (Well)	3-2703-001	1.075	0.66	0.2975	Non-Potable	Existing well source	1.075	Existing infrastructure	0		
										Wahiawa Reservoir	19.44	Pipelines	2.5	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipelines	2.5	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	1.5	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	1.5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.

Kunia Road Corridor

TMK	Land Owner	Lessee	Area (acres)	WUP	Well Number	Total WUP Allocation (MGD)	Current Pumpage (MGD)	Projected Demand (factor of 2500 GPAD) (MGD)	Water Quality Needed	Supply Source	Volume (MGD)	Required Infrastructure	Approx Distance to End Use Parcel (miles)	Benefits	Constraints
9-4-012:003	State of Hawaii DOA	DOA	77	928 (Well) 880 (Well)	3-2703-001 3-2803-005 3-2803-007	5.035	2.2	0.1925	Non-Potable	Existing well source	5.035	Existing infrastructure	1.5		
										Wahiawa Reservoir	19.44	Pipelines	1.75	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipelines	1.75	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	0.75	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	0.75	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.
9-4-002:046	JAC Hawaii Inc.	Royal Kunia Country Club	163	575 (Well)	3-2401-007	0.6	0.37	0.6	Non-Potable	Existing well source	0.6	Existing infrastructure	0		
										Wahiawa Reservoir	19.44	Pipelines	7.5	Preserve GW.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipelines	7.5	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	6.5	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	6.5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.

¹There is an additional 2.8 million gallons of stormwater storage available, but it is not a daily flow

²Projected demand for the U.S. Army owned land is 1 MGD for Leilehua Golf Course and on-base usage

Former Galbraith Estate Property

TMK	Land Owner	Lessee	Area (acres)	WUP	Well Number	Total WUP Allocation (MGD)	Current Pumpage (MGD)	Projected Demand (factor of 2500 GPAD) (MGD)	Water Quality Needed	Supply Source	Volume (MGD)	Required Infrastructure	Approx Distance to End Use Parcel (miles)	Benefits	Constraints
7-1-001:003 7-1-001:002 7-1-001:005 7-1-001:012 6-5-002:010 6-5-002:025	State of Hawaii	ADC	1218	976 (Well)	3-3103-001	2	0	3.045	Non-Potable	Existing well source	2	Existing infrastructure	1		None
										Wahiawa WWTP	2	Pipeline	1.5	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Potential study looking into the design of a pipeline to service this area. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Wahiawa Reservoir	19.44	Pipeline	1	Preserve GW. Potential study looking into the design of a pipeline to service this area.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Schofield WWTP	3	Pipeline	3.5	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										North Kaukonahua Stream	8.31	Pipeline	0.75	Preserve GW. Avoids restrictions associated with using water from the reservoir.	Will be subject to instream flow standards.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	3.5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.
7-1-001:008 7-1-001:026	State of Hawaii	OHA	507	976 (Well)	3-3103-001	2	0	1.2675	Non-Potable	Existing well source	2	Existing infrastructure	2		None
										Wahiawa WWTP	2	Pipeline	1.5	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Potential study looking into the design of a pipeline to service this area. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Wahiawa Reservoir	19.44	Pipeline	1	Preserve GW. Potential study looking into the design of a pipeline to service this area.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Schofield WWTP	3	Pipeline	3.5	Preserve GW. R-1 Primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										North Kaukonahua Stream	8.31	Pipeline	0.75	Preserve GW. Avoids restrictions associated with using water from the reservoir.	Will be subject to instream flow standards.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	3.5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.

¹There is an additional 2.8 million gallons of stormwater storage available, but it is not a daily flow

Kamehameha Highway Corridor

TMK	Land Owner	Lessee	Area (acres)	WUP	Well Number	Total WUP Allocation (MGD)	Current Pumpage (MGD)	Projected Demand (factor of 2500 GPAD) (MGD)	Water Quality Needed	Supply Source	Volume (MGD)	Required Infrastructure	Approx Distance to End Use Parcel (miles)	Benefits	Constraints
9-5-002:003	Sandwich Isles Communications	Sandwich Isles Communications	163	765 (Well)	3-2801-003	0.10	0	0.41-0.55	Non-Potable	Existing well source	0.47	Existing infrastructure	0		
										Wahiawa Reservoir	19.44	Pipeline	1.5	Preserve GW. Potential study looking into the design of a pipeline to service this area.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	1.75	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off- spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	1.5	Preserve GW. R-1 primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	0.5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.
9-5-001:035	YHB Mililani GC LLC	Mililani Golf Course	165	632 (Waiahole Ditch)	3-2657-005 3-2853-001 3-2953-001 3-2953-002 3-2953-003 3-3053-001 3-3154-001	0.25	0.12	0.25	Non-Potable	Waiahole Ditch	15	Existing infrastructure	N/A	Currently using non-potable Waiahole	None
										Mililani MBR (Koa Ridge Flows)	1.12	Construct MBR facility and pipeline	2.5	Preserve GW. Reclaim Koa Ridge Makai wastewater flows.	Need to construct MBR Facility and pipeline. Need a purveyor. Community may not support construction of MBR facility at this location.
										Wahiawa Reservoir	19.44	Pipeline	2.5	Preserve GW. Potential study looking into the design of a pipeline to service this area.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	3	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off- spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	3	Preserve GW. R-1 primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	2.5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.

Kamehameha Highway Corridor

TMK	Land Owner	Lessee	Area (acres)	WUP	Well Number	Total WUP Allocation (MGD)	Current Pumpage (MGD)	Projected Demand (factor of 2500 GPAD) (MGD)	Water Quality Needed	Supply Source	Volume (MGD)	Required Infrastructure	Approx Distance to End Use Parcel (miles)	Benefits	Constraints
9-4-005:074	City and County of Honolulu	CORP	267	587 (Well)	3-2500-001	1.00	0.24	1	Non-Potable	Existing well source	1	Existing infrastructure	0		
										Wahiawa Reservoir	19.44	Pipeline	6	Preserve GW. Potential study looking into the design of a pipeline to service this area.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	6	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off- spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	6	Preserve GW. R-1 primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Mililani MBR (Koa Ridge Flows)	1.12	Construct MBR facility and pipeline	1	Preserve GW. Reclaim Koa Ridge Makai wastewater flows.	Need to construct MBR Facility and pipeline. Need a purveyor. Community may not support construction of MBR facility at this location.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	5.5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.
9-4-007:010 9-4-007:036 9-4-007:055 9-4-007:057	Hoban E&C USA Inc	Waikele Golf Course	122	902 (Well)	3-2301-001 3-2301-002 3-2301-003 3-2301-004 3-2301-005 3-2301-006 3-2301-007 3-2301-008 3-2301-009 3-2301-010	0.95	0.47	0.95	Non-Potable	Existing well source	0.95	Existing infrastructure	0.5		
										Wahiawa Reservoir	19.44	Pipeline	7	Preserve GW. Potential study looking into the design of a pipeline to service this area.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	7.5	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off- spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	7	Preserve GW. R-1 primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Mililani MBR (Koa Ridge Flows)	1.12	Construct MBR facility and pipeline	2.5	Preserve GW. Reclaim Koa Ridge Makai wastewater flows.	Need to construct MBR Facility and pipeline. Need a purveyor. Community may not support construction of MBR facility at this location.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	6.5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.

Kamehameha Highway Corridor

TMK	Land Owner	Lessee	Area (acres)	WUP	Well Number	Total WUP Allocation (MGD)	Current Pumpage (MGD)	Projected Demand (factor of 2500 GPAD) (MGD)	Water Quality Needed	Supply Source	Volume (MGD)	Required Infrastructure	Approx Distance to End Use Parcel (miles)	Benefits	Constraints
9-4-003:002 9-4-005:094 9-4-005:091 9-4-005:090 9-4-005:092 9-4-005:093	Castle and Cooke Inc	Mililani Agricultural Park	610	619 (Waiahole Ditch)	3-2657-005 3-2853-001 3-2953-001 3-2953-002 3-2953-003 3-3053-001 3-3154-001	2.13	1.18	0.5-0.79 ²	Non-Potable	Wahiawa Reservoir	19.44	Pipeline	5.5	Preserve GW. Potential study looking into the design of a pipeline to service this area.	No pipeline. Pipeline easements needed. Need to pump. Currently serving N. Shore. Need IIFS amendment.
										Wahiawa WWTP	2	Pipeline	6	Preserve GW. R-1 Classification pending. R-1 Primary disposal. Remove current discharge of effluent into Wahiawa Reservoir improving water quality. Can provide wet weather flow option if interconnected to Schofield WWTP pipeline.	R-1 certification subject to identification of off-spec/wet weather discharge. No pipeline. Pipeline easements needed. Need City ENV buy in. No existing utility. Currently serving N. Shore.
										Schofield WWTP	3	Pipeline	5.5	Preserve GW. R-1 primary disposal. Can provide wet weather flow option if interconnected to Wahiawa WWTP pipeline.	No pipeline. No water purchase agreement.
										Mililani MBR (Koa Ridge Flows)	1.12	Construct MBR facility and pipeline	0.5	Preserve GW. Reclaim Koa Ridge Makai wastewater flows.	Need to construct MBR Facility and pipeline. Need a purveyor. Community may not support construction of MBR facility at this location.
										Stormwater	0.36 2.8 ¹	Detention basins & pipelines	5	Detention basins exist. Help to meet TMDLs. Reduce polluted runoff into streams & nearshore waters.	Modification of basins for supply storage. Design to eliminate 1st flush. Unreliable volumes, supplemental source needed.

¹There is an additional 2.8 million gallons of stormwater storage available, but it is not a daily flow

²The Mililani Ag Park will reduce in acreage to approximately 232 acres.

Appendix B: State and Local Water Regulations

This appendix includes Table ES-1: Summary of Institutional Issues Affecting Stormwater Reclamation and Reuse from An Appraisal of the Statewide Framework for Stormwater Reclamation and Reuse in Hawaii.

Category	Source	Reference	Language / Issue	Comment	Opportunity for Resolution
State Water Regulations	Hawaii Revised Statutes State Water Code Chapter 174C Commission on Water Resource Management Department of Land and Natural Resources State of Hawaii (format like the below table)	§174C-2	Groundwater and surface water are held as public trusts for the benefit of all people. The CWRM has considerable authority to protect surface and groundwater quantity and quality.	Issues such as stream flow standards, in-stream diversions, and Native Hawaiian Water Rights can potentially promote and hinder stormwater reclamation and reuse.	Diversion of water from streams is the major area of controversy for maintaining minimum stream flow, protecting habitat, and protecting cultural activities. These concerns can be mitigated by reclaiming and reusing stormwater in the area in which it falls or flows through normally dry gulches. Whereas human activity has diverted water from streams for use in other areas, human activity has also increased the amount of stormwater runoff through gulches due to the increase in impervious surface area from developments.
		§174C-51.5	The CWRM, as a condition for issuing permits pursuant to this part, may require the use of dual line water supply systems in new industrial and commercial developments located in designated water management areas.	Though the intent of the language was to promote the use of recycled wastewater, its use of the term <i>nonpotable water</i> could apply equally to reclaimed stormwater. Though there is no requirement for developers to develop nonpotable water sources, the language could promote the use of reclaimed stormwater if a source is made available.	Require new developments to incorporate stormwater reclamation and reuse into their designs. Require zero net loss of groundwater recharge in water supply rules and regulations for new developments.
	Hawaii Administrative Rules Title 11, Chapter 23 - Underground Injection Control Clean Water Branch Department of Health State of Hawaii	§11-23-09 (A)	Any new injection well, other than subclass D injection wells, shall be sited beyond an area which extends at least one-quarter mile from any part of a drinking water source. This includes not only the surface expression of the water supply well, tunnel or spring, but also all portions of the subsurface collection system which may extend laterally, either at right or inclined angles to the ground surface. The area of protection shall be delineated by a reasonably smooth curve drawn to connect the points extending one-quarter mile beyond the most extensive portions of the drinking water source and its collection system.	An injection well for stormwater is considered a subclass C injection well, so this regulation applies. Location of any stormwater recharge facility above the Underground Injection Control (UIC) line will require careful delineation of zones of influence for potable water wells. The location of any stormwater injection well for direct recharge would be limited by the spatial dimensions of this regulation. An entire aquifer could be considered the drinking water source, further limiting direct injection.	Provide the level of treatment necessary for groundwater recharge. All groundwater recharge of stormwater will require some level of treatment. Non-potable water aquifers will require less than potable water aquifers. This is a potentially expensive resolution, but might be attractive financially as aquifer levels decrease due to decrease in recharge.
	Hawaii Administrative Rules Title 11, Chapter 20 - Rules Pertaining to Potable Water Systems Safe Drinking Water Branch Department of Health State of Hawaii	HAR 11-20	Direct connections between surface and groundwater can result in a groundwater drinking water source being designated as Groundwater Under the Direct Influence (GWUDI) of surface water.	GWUDI designation would require that groundwater be treated in the same manner as surface water, which would be costly. Situations that would result potentially in a GWUDI designation would be resisted by public (and private) water supply agencies. An analysis of stormwater discharge monitoring reports show that some stormwater quality exceeds drinking water numerical limits. There are insufficient data available in discharge monitoring reports (DMR) to determine if untreated stormwater will comply with all drinking water quality requirements. There are no microbiological data reported for stormwater, yet this is a critical parameter for determining compliance with all water quality standards.	Provide the level of treatment necessary for groundwater recharge.

Category	Source	Reference	Language / Issue	Comment	Opportunity for Resolution
State Water Regulations (continued)	Hawaii Administrative Rules Title 11, Chapter 54 – Water Quality Standards Clean Water Branch Department of Health State of Hawaii	HAR 11-54	Total maximum daily loads (TMDL) will limit discharge of certain pollutants (receiving water dependent) from point sources, such as stormwater system outfalls	TMDLs might require that stormwater be treated to meet specific waste load allocations. Such treatment would be expensive and encourage developers to seek alternatives to direct discharge of stormwater to surface waters. This could promote technologies and best management practices for stormwater reclamation and reuse.	Require existing and new developments to reduce stormwater runoff rather than just mitigate peak runoff events.
	Hawaii Administrative Rules Title 11, Chapter 62 – Guidelines for Treatment and Use of Recycled Water Wastewater Branch Department of Health State of Hawaii	HAR 11-62	There are three classes of recycled water. Each class is determined by the level of treatment. The two highest levels of recycled water must meet specific microbiological quality requirements, and, in the case of the highest level of recycled water, turbidity requirements. Compliance with quality requirements for recycled water is determined at the end of the treatment process, not at the point of reuse.	The DOH has verbally said that integration of recycled water and stormwater would require that stormwater meet recycled water quality. An analysis of stormwater discharge monitoring reports (DMRs) show that some stormwater quality exceeds recycled water numerical limits. There are insufficient data available in DMRs to determine if untreated stormwater will comply with all recycled water quality requirements. There are no microbiological data reported for stormwater, yet this is a critical parameter for determining compliance with all water quality standards.	Compliance with recycled water guidelines is determined at the end of the treatment required for a given class of recycled water. Since there are no DOH regulations for stormwater reuse, combining stormwater with post-treatment recycled water should not require stormwater to meet any specific quality. Develop quality requirements for specific end-uses of reclaimed stormwater, similar to recycled water.
	Hawaii Administrative Rules Title 11, Chapter 55 – Water Pollution Control (Appendix B – NPDES General Permit Authorizing Discharges Of Storm Water Associated With Industrial Activities) Clean Water Branch Department of Health State of Hawaii	Discharge Monitoring Report Review	The small number of existing stormwater monitoring points might not adequately characterize stormwater quality from all sources.	Additional characterization of stormwater quality is necessary to determine if it can be used effectively for recharge to drinking water and non-potable aquifers, or integration with recycled water. Treatment of stormwater to meet applicable water quality standards might be necessary in cases where clean catchment cannot be achieved.	Characterize stormwater from a given service area prior to implementation of reclamation and reuse to determine the degree of treatment needed, if any. Develop quality requirements for specific end-uses of reclaimed stormwater, similar to recycled water.
Local Regulatory	Rules Pertaining to Storm Drainage Department of Planning City and County of Honolulu, January 2000 Storm Drainage Standard Department of Public Works County of Hawaii October 1970 Storm Water Runoff System Department of Public Works County of Kauai July 2001 Rules for Design of storm drainage facilities Department of Public Works & Waste Management County of Maui July 1995	Reference from City and County of Honolulu (similar language is in all County design standards) §1-5.1 D.2.a-d Section 5.8	Specific treatment levels (i.e., infiltration, vegetated swales, bioretention filters, and other filters) are required for stormwater flow-through treatment (little or no storage).	Some level of treatment is required for stormwater injection into potable and non-potable water aquifers irrespective of water quality.	These same treatment requirements could equally enhance or mitigate the degree of additional treatment for stormwater reuse.