

# Central Oahu Non-Potable Water Master Plan - Appraisal of Opportunities

January 23, 2013



COMMISSION ON WATER RESOURCE MANAGEMENT  
DEPARTMENT OF LAND AND NATURAL RESOURCES

# Central Oahu Non-Potable Water Master Plan Objectives:

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

# Background

# Previous Non-Potable Water Studies, Plans, and Projects

- DOH Reuse Guidelines (1993/2002)
- Monterey Regional Water Pollution Control Agency - Recycled Water Pilot Study (1998)
- BWS Recycled Water Application Study (2005)
- CWRM Stormwater Reclamation and Reuse (2008)
- Wahiawa Irrigation System Assessment (2007)
- Wahiawa R-1 Pipeline to Central Oahu Regional Park - BWS
- Schofield Barracks WWRF R-1 Facility – U.S. Army/Aqua Engineers
- Upgrade of Wahiawa WWTP to MBR – ENV
- Koa Ridge Development – Castle & Cooke

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

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

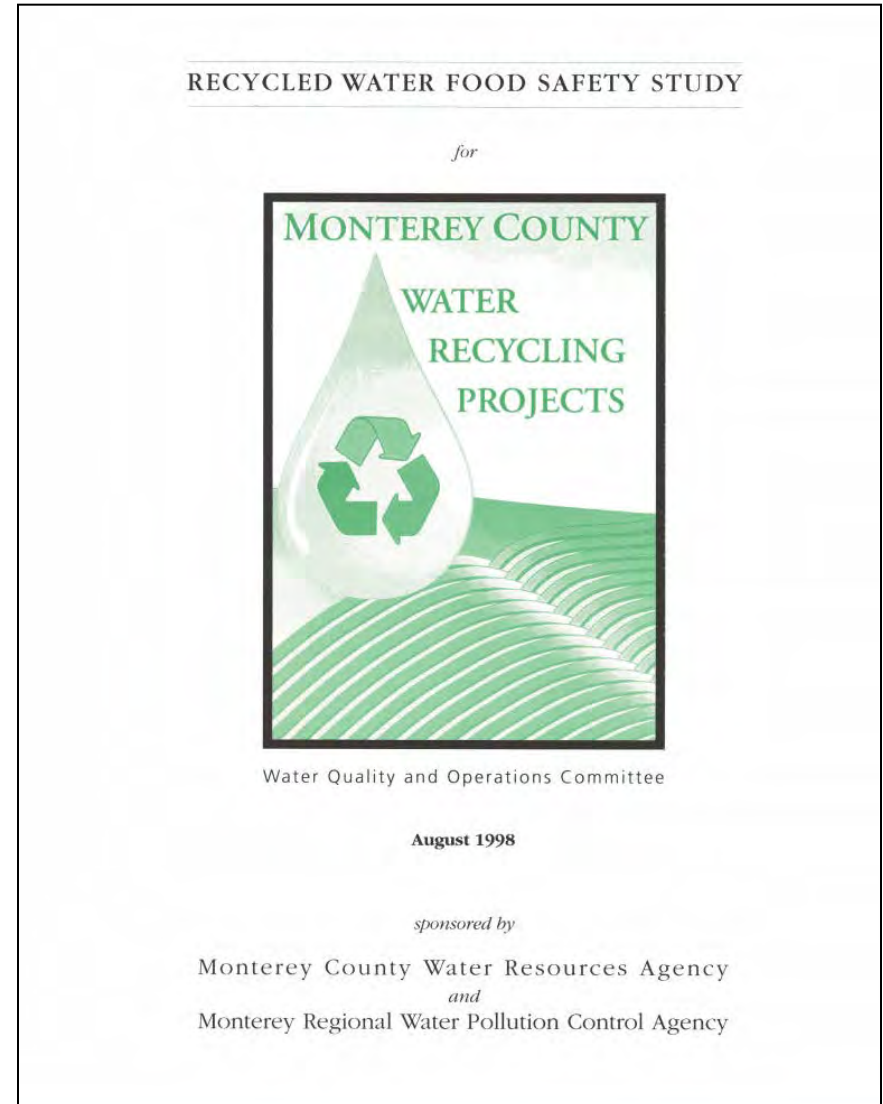
TABLE 3-1 SUMMARY OF SUITABLE USES FOR RECYCLED WATER

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

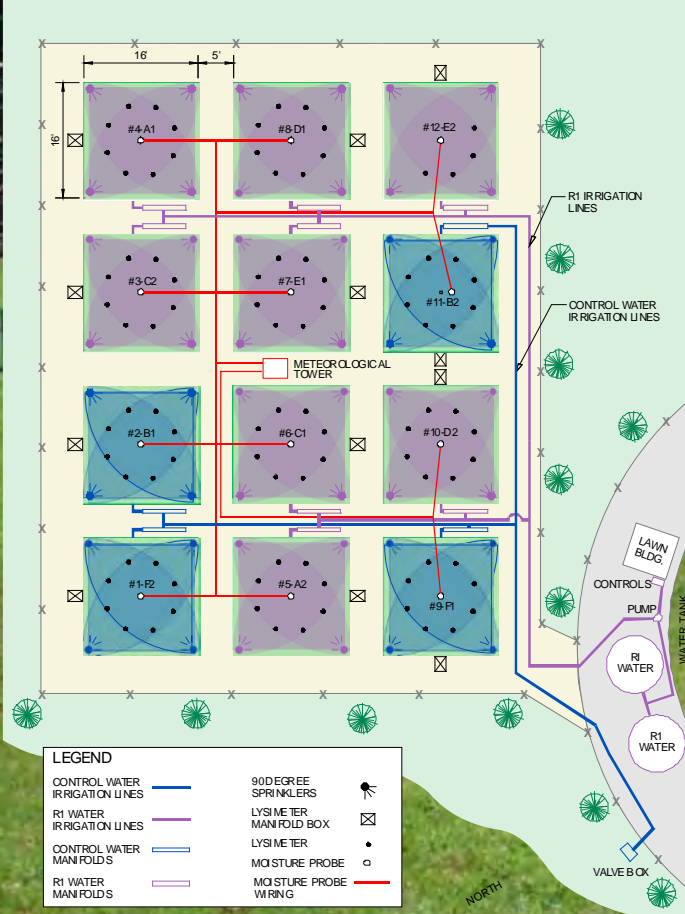
# Recycled Water Use in America's "Salad Bowl"

## Sea Mist Farms (Monterey)

- Artichokes
- Lettuce
- Spinach
- 80% recycled water use on 11,000 acres
- California (2007)
  - 540 million gallons per day of recycled water
  - 46% used on agricultural crops



# BWS Recycled Water Application Study



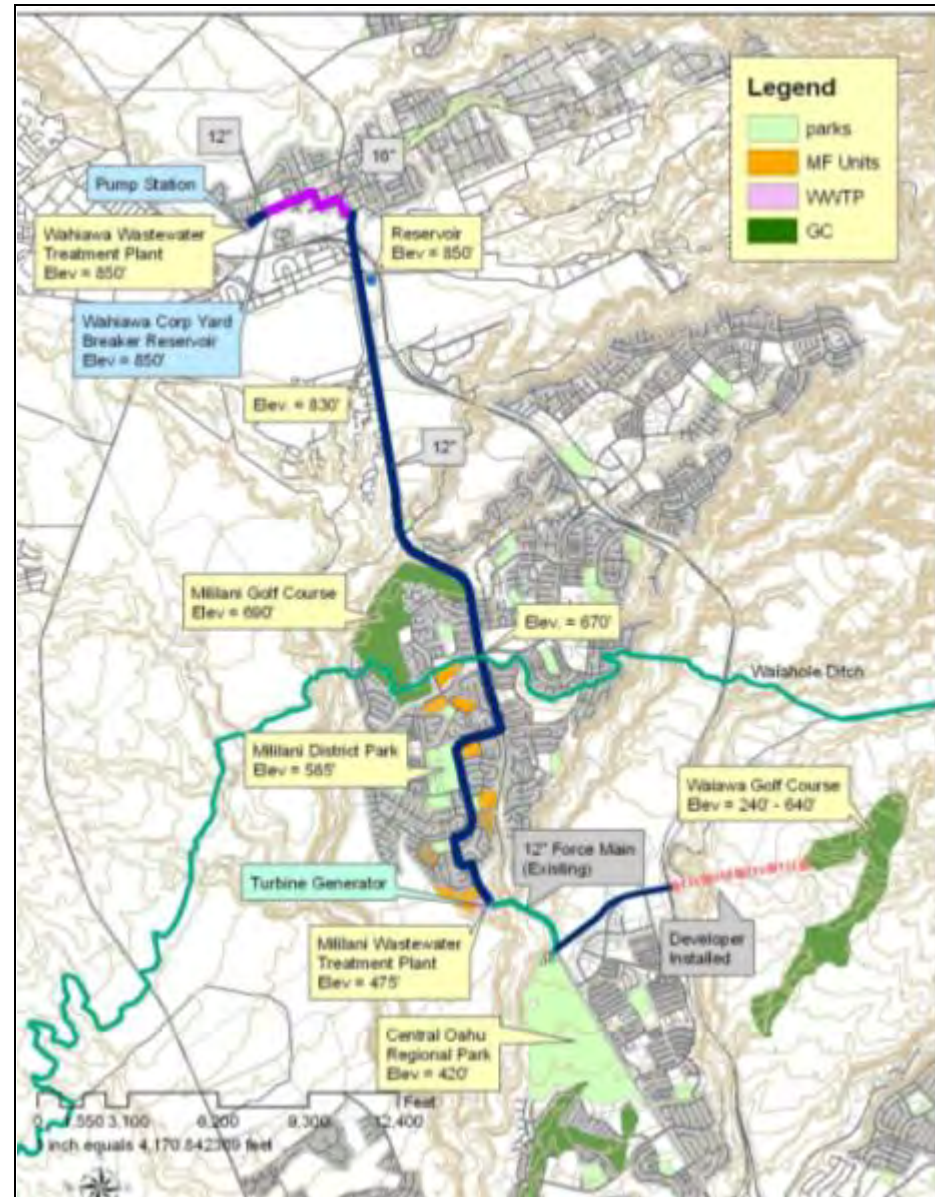
# Stormwater Reclamation and Reuse





# Wahiawa Pipeline to CORP

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



# CONPWMP Project Planning Approach:

## Stakeholder Involvement

- Identify and interview key stakeholders

## Regional Assessment

- Identify end uses and water supply/demand
- Review current and planned water-related projects
- Evaluate current barriers and enablers

## Appraisal of Non-Potable Water Use Opportunities

- Identify potential opportunities
- Prepare conceptual integration strategies

# Establish a non-potable water advisory group



# Stakeholder Interviews

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

# Key Interview Outcomes

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

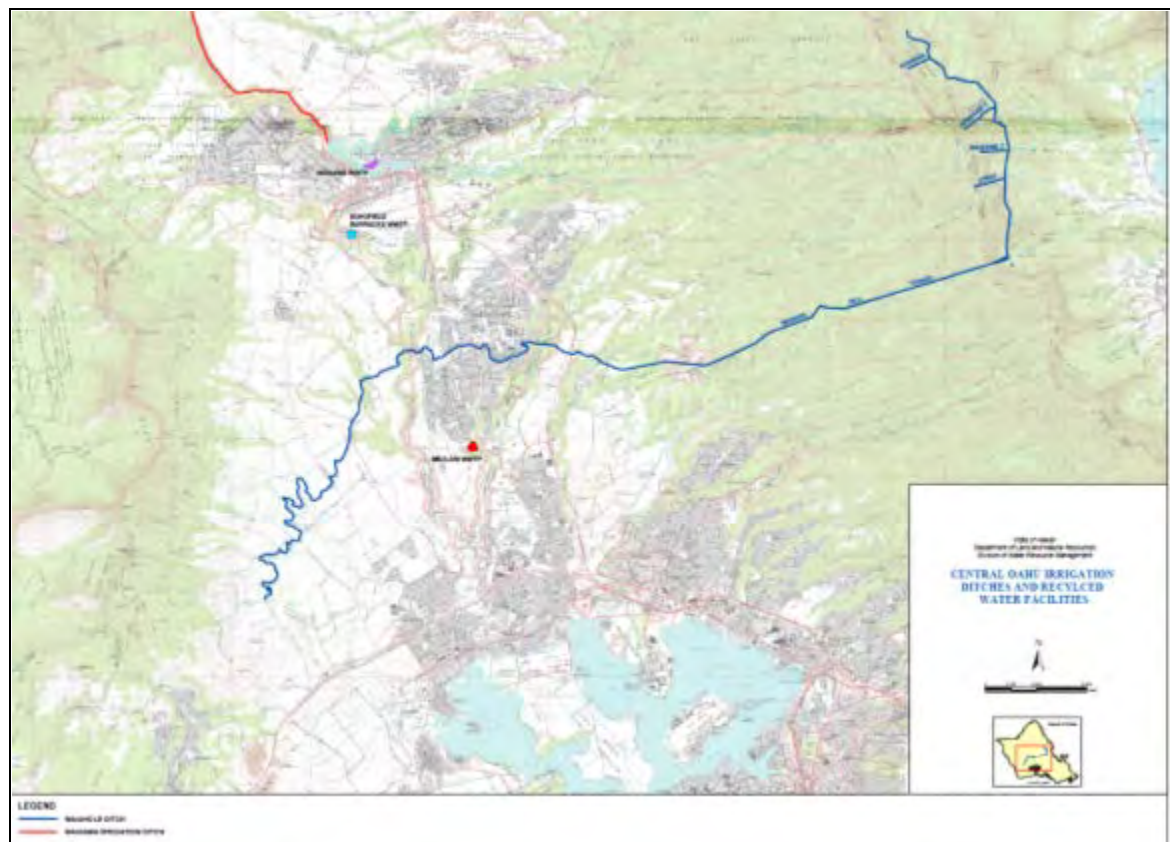
# Key Interview Outcomes

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

# October 11, 2012 Stakeholder Meeting

- Potential landowner liability associated with long-term use
- Public (agriculture, distributors, public) outreach pertaining to recycled water
- Quantifying and matching non-potable water supply and demand
- Integration of cross-regional planning
- Regulatory policy
- Cost/benefit analysis of opportunities
- Funding/financing of opportunities
- Timing and time constraints
- Partnerships

# Inventory of current and potential sources of non-potable water in Central Oahu





# Current / Potential Sources of Non-Potable Water

## Current:

- Schofield Barracks Wastewater Reclamation Facility – R-1 Water (Aqua Engineers)
- Wahiawa Wastewater Treatment Plant – R-1 Water (City and County of Honolulu)
- Lake Wilson (Wahiawa Reservoir)
- Waiahole Ditch – Non-potable Irrigation Water (Agribusiness Development Corporation)
- Wahiawa Irrigation System – Non-potable Irrigation Water (Dole Food and others)
- Groundwater Wells (Honolulu Board of Water Supply and private wells)

## Potential:

- Stormwater from Wheeler Army Air Field and Mililani area
- Koa Ridge Makai Development – R-1 Water Scalping Facility (Castle & Cooke)

# Schofield Barracks WWRF – R-1 Facility

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



# Wahiawa Wastewater Treatment Facility

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





Wahiawa WWTP

Wahiawa State  
Freshwater St. Fk.

Ralston Field

Leilehua Golf Course

Wheeler Air Force  
Base Runway

Schofield  
Barracks WWTP

Kipapa Park

Mililani District Park

Melemanu Park

Kaomaaiku Park

Oil Storage  
Reservoirs

Mililani Golf Course

Kipapa Neighborhood Park

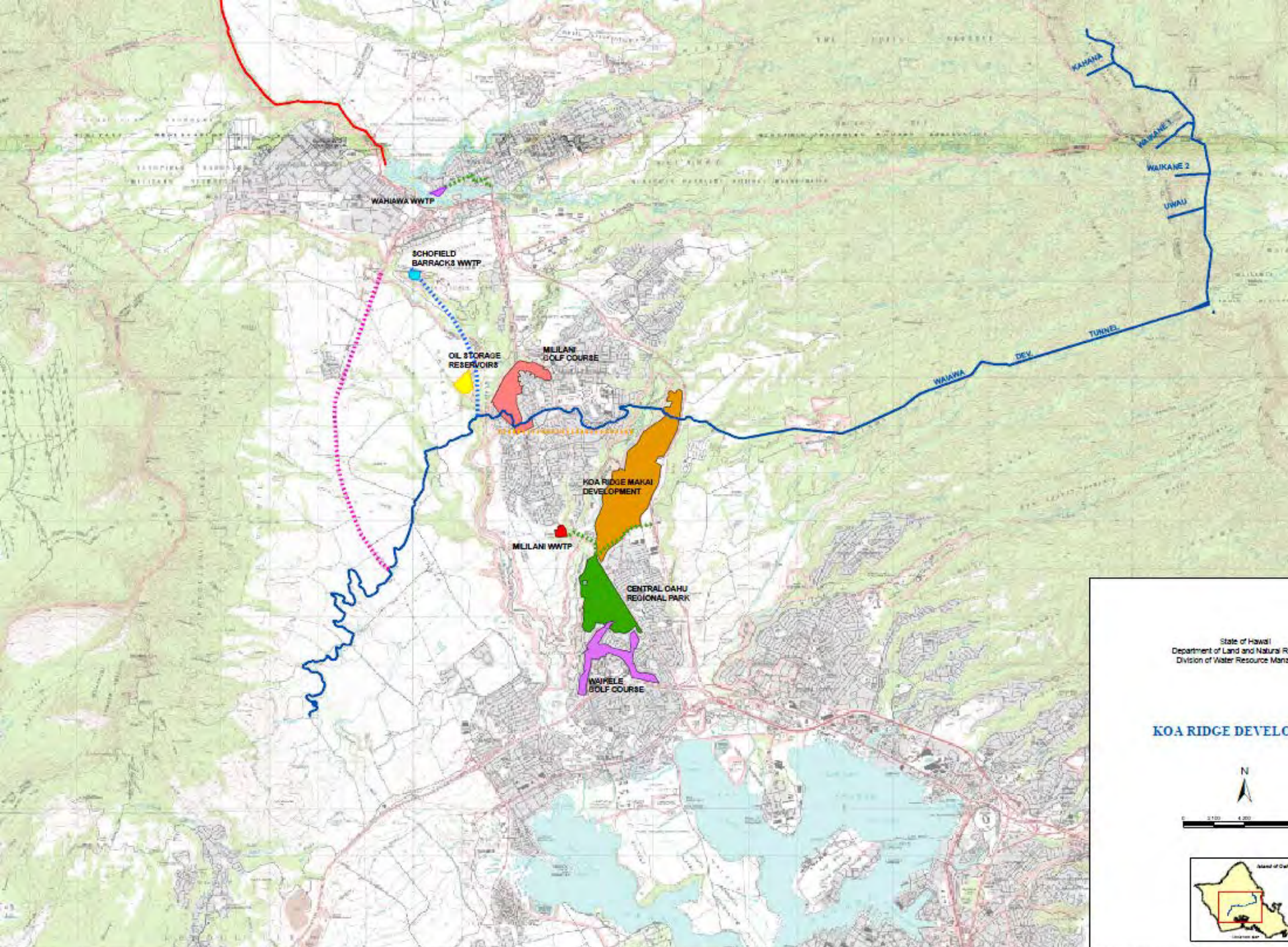
Makaunulau  
Community Park

Mililani Waena Park

Mililani Neighborhood Park

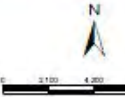
Mililani Town Center Park

Waihole Ditch



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Division of Water Resource Management

### KOA RIDGE DEVELOPMENT



LEGEND

# Potential Non-Potable Water Supply

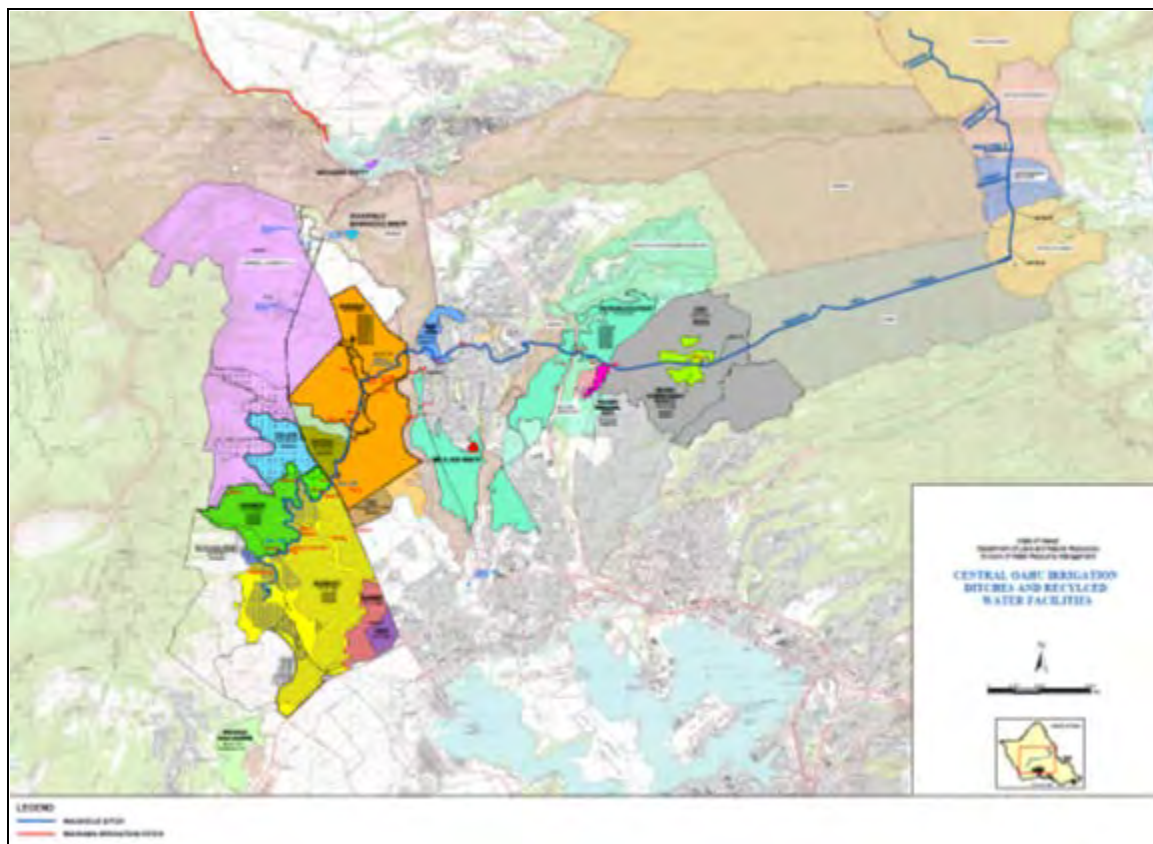
## Potential Supply<sup>1</sup>

- Schofield Barracks WWRF
  - 2 mgd current
  - 3 mgd future
- Wahiawa WWTP
  - 2 mgd current
- Lake Wilson
  - 30 mgd
- Waiahole Ditch<sup>2</sup>
  - 15 mgd

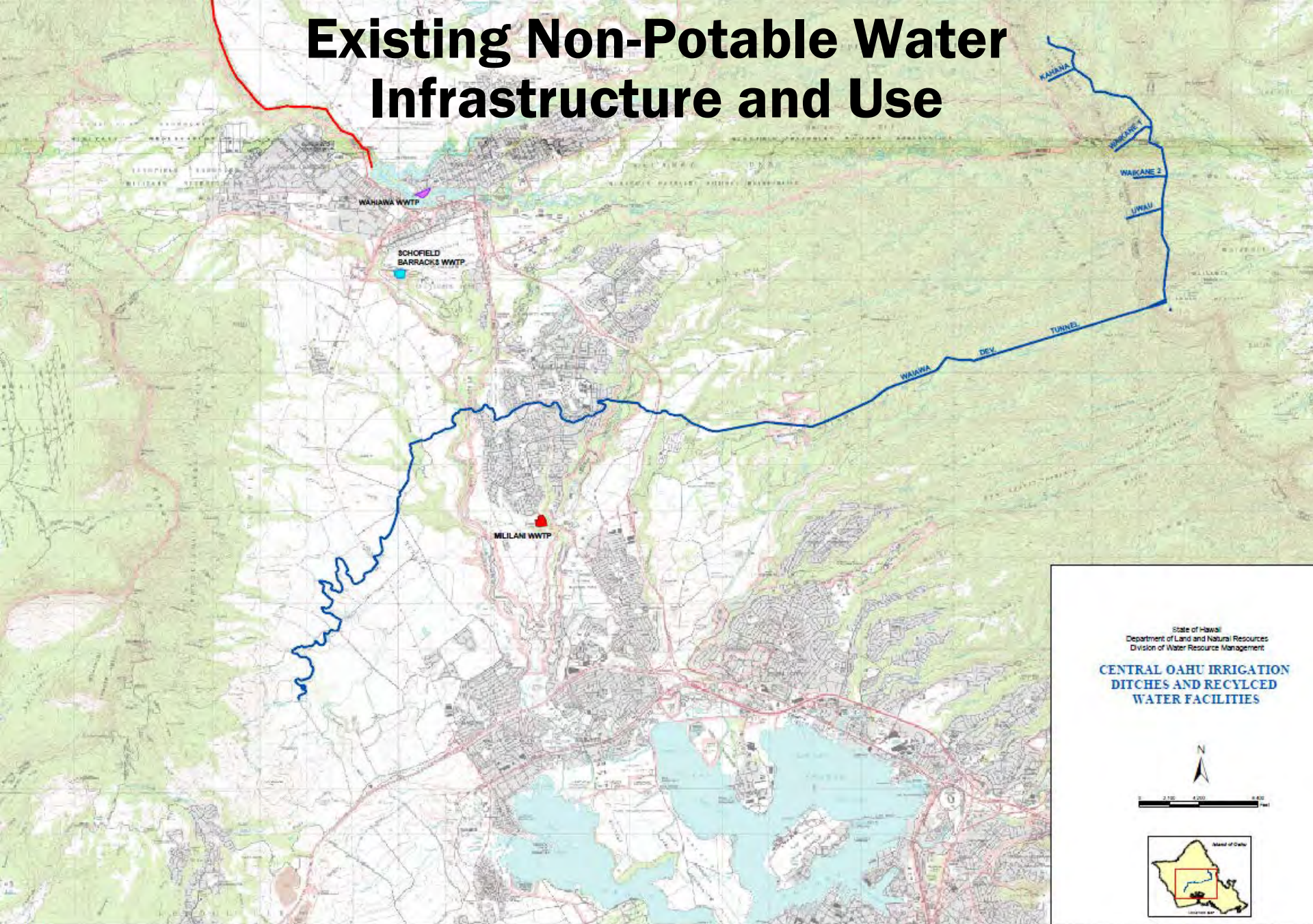
<sup>1</sup> Excluding Stormwater

<sup>2</sup> Subject to Water Use Permitting

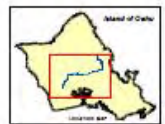
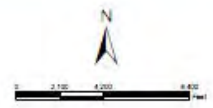
# Identification of current and future uses for non-potable water



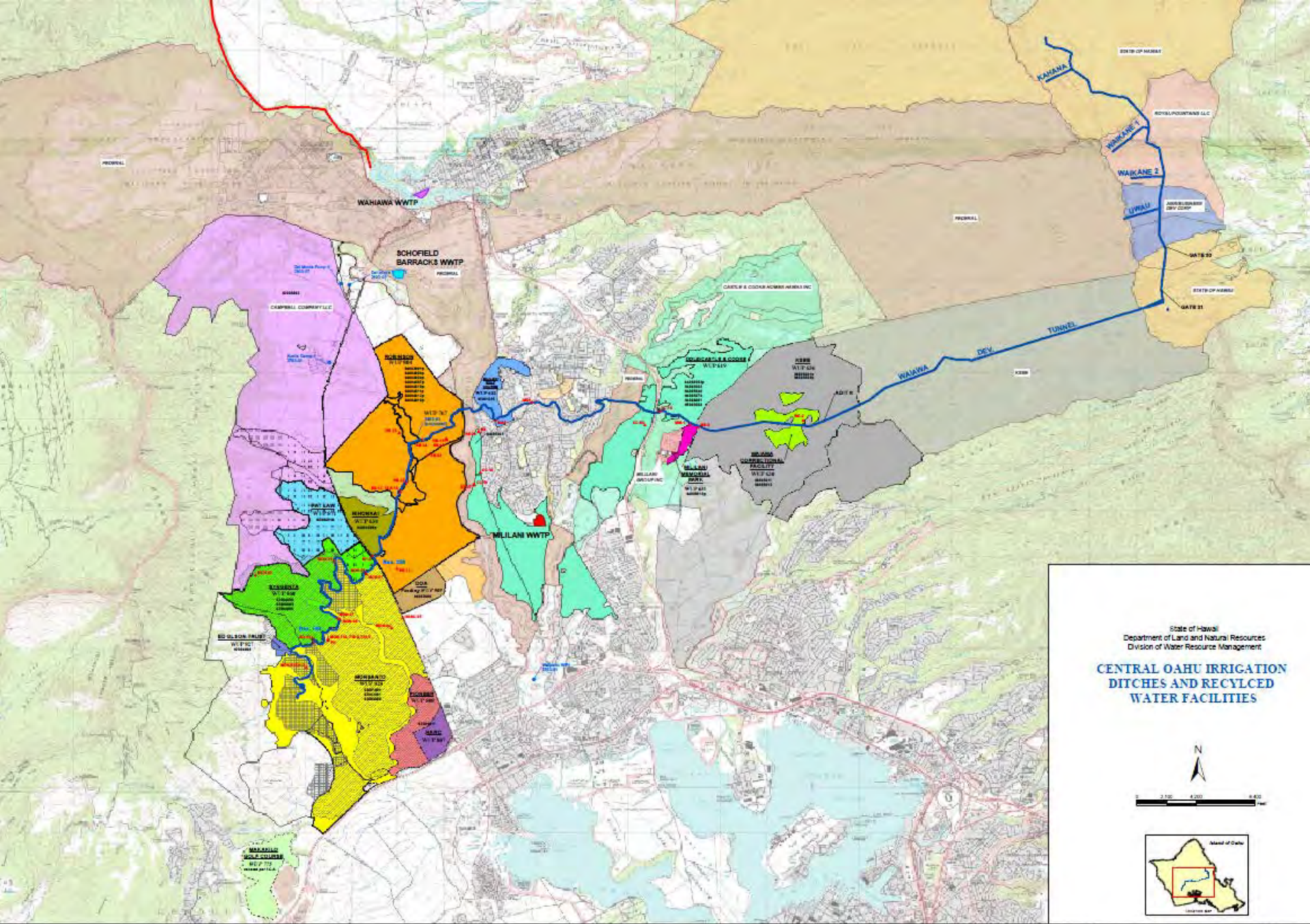
# Existing Non-Potable Water Infrastructure and Use



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Department of Land and Natural Resources  
Division of Water Resource Management  
**CENTRAL OAHU IRRIGATION  
DITCHES AND RECYCLED  
WATER FACILITIES**

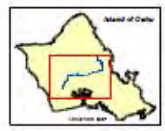
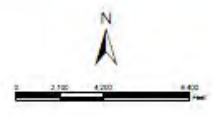






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 Division of Water Resource Management

### CENTRAL OAHU IRRIGATION DITCHES AND RECYCLED WATER FACILITIES



- LEGEND**
- WAIAHOLE DITCH
  - WAIHAWA IRRIGATION DITCH

# Current/Potential Non-Potable Water Demand

## Estimated Demand

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

# Potential Integration Opportunities

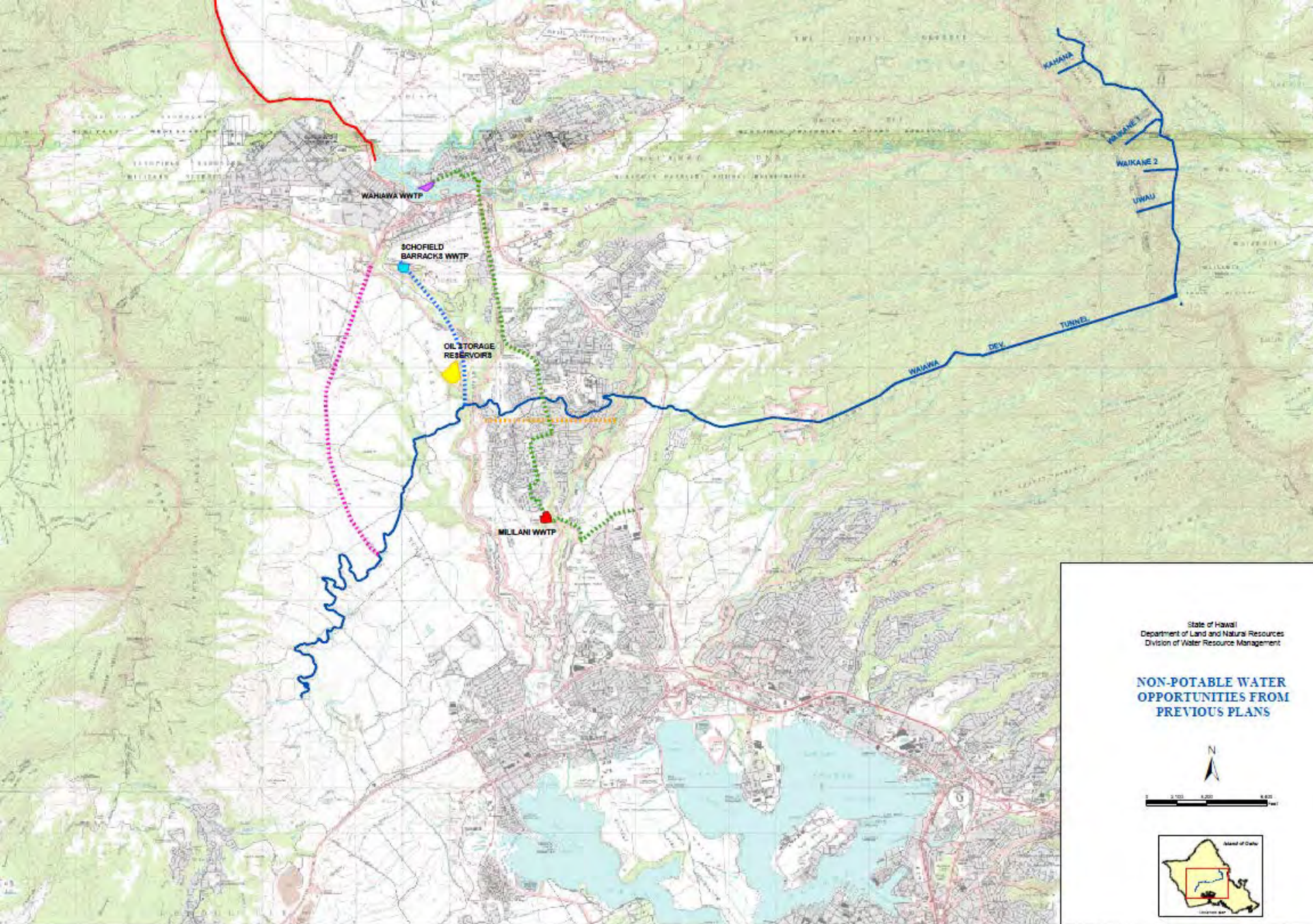
# Assessment of Non-Potable Water Opportunities

- Kamehameha Highway R-1 Water Pipeline (Wahiawa WWTP)
- Kunia Road R-1 Water Pipeline (Schofield Barracks WWTP)
- Stormwater Reclamation/Reuse
- Koa Ridge Development Scalping Facility
- Mililani Wastewater Treatment Plant
- Waiahole Ditch (inter-connection/extension)

# Kunia Road R-1 Water Pipeline

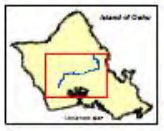
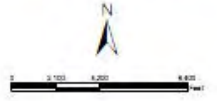
The Kunia Road R-1 pipeline would run along Kunia Road to users in the Kunia Corridor and involves five (5) potential stakeholders:

- Aqua Engineers
- Department of Environmental Services (ENV)
- Dole Food Hawaii
- Agribusiness Development Corporation (ADC)
- U.S. Army Garrison Hawaii
- The pipeline could potentially integrate three (3) non-potable water sources:
  - Schofield WWTP
  - Wahiawa WWTP
  - Lake Wilson
- The pipeline is not cost-effective for conveying only 2.0 mgd of recycled water.



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**NON-POTABLE WATER  
 OPPORTUNITIES FROM  
 PREVIOUS PLANS**



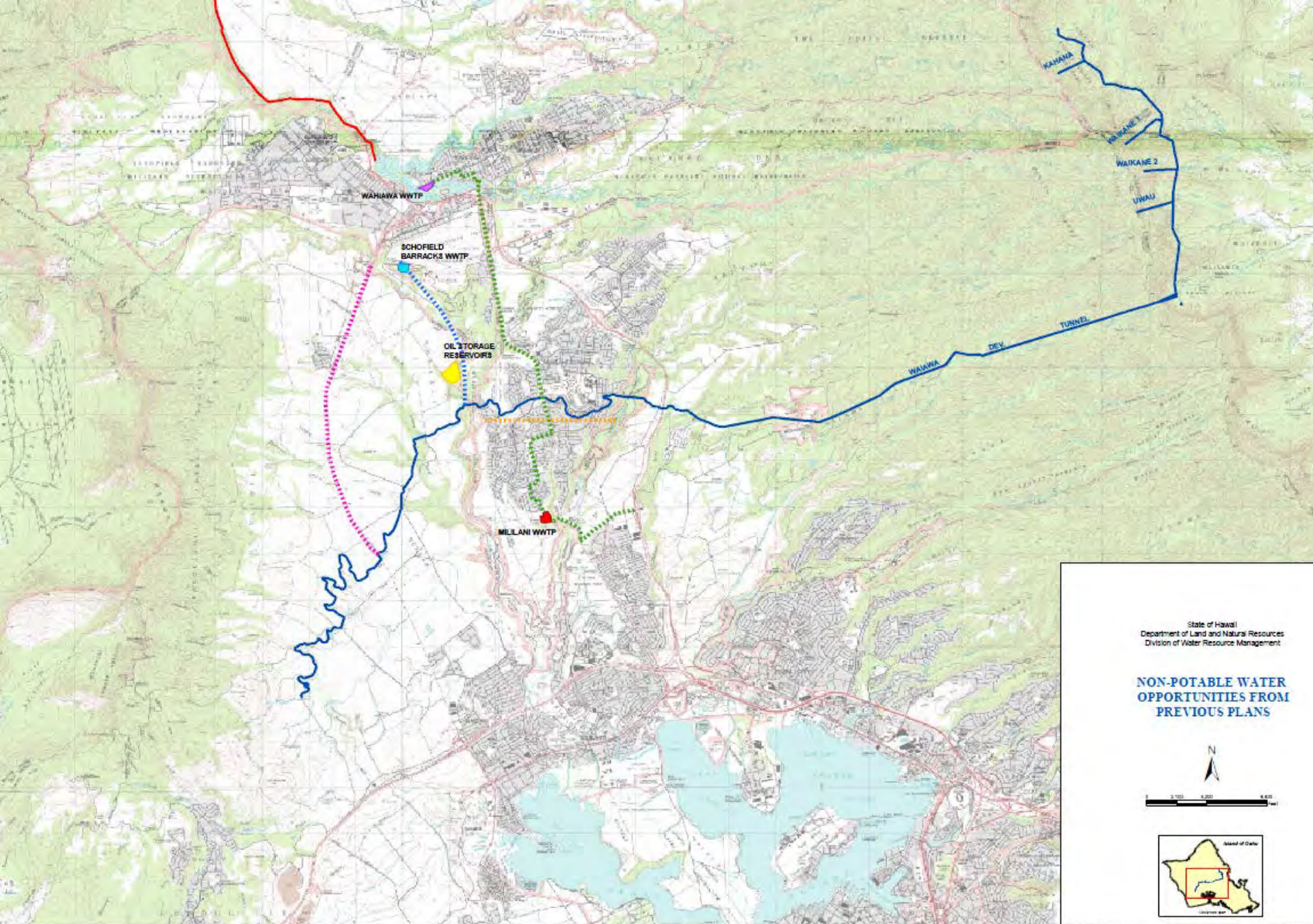
**LEGEND**

WAIHOLE DITCH	OPTION A	OPTION C
WAHIAWA IRRIGATION DITCH	OPTION B	OPTION D

# Multi-Purpose Pipeline from Wahiawa WWTP to Waiahole Ditch

This multi-purpose pipeline would extend from Wahiawa WWTP to Waiahole Ditch in the Kunia area.

- The pipeline could convey R-1 water from Wahiawa, Schofield Barracks, stormwater from Wheeler AAFB, and water from Lake Wilson, and could potentially integrate 9 MG of abandoned fuel storage reservoirs.
- Stakeholders include:
  - Agribusiness Development Corporation (ADC)
  - Aqua Engineers
  - Department of Environmental Services (ENV)
  - U.S. Army Garrison Hawaii
- Multiple non-potable water sources could be used in this pipeline, however, acceptance of recycled water use will be a key issue.



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**NON-POTABLE WATER OPPORTUNITIES FROM PREVIOUS PLANS**



**LEGEND**  
 — WAIHOLE DITCH  
 — WAIHAWA IRRIGATION DITCH

●●●●● OPTION A  
 ●●●●● OPTION B

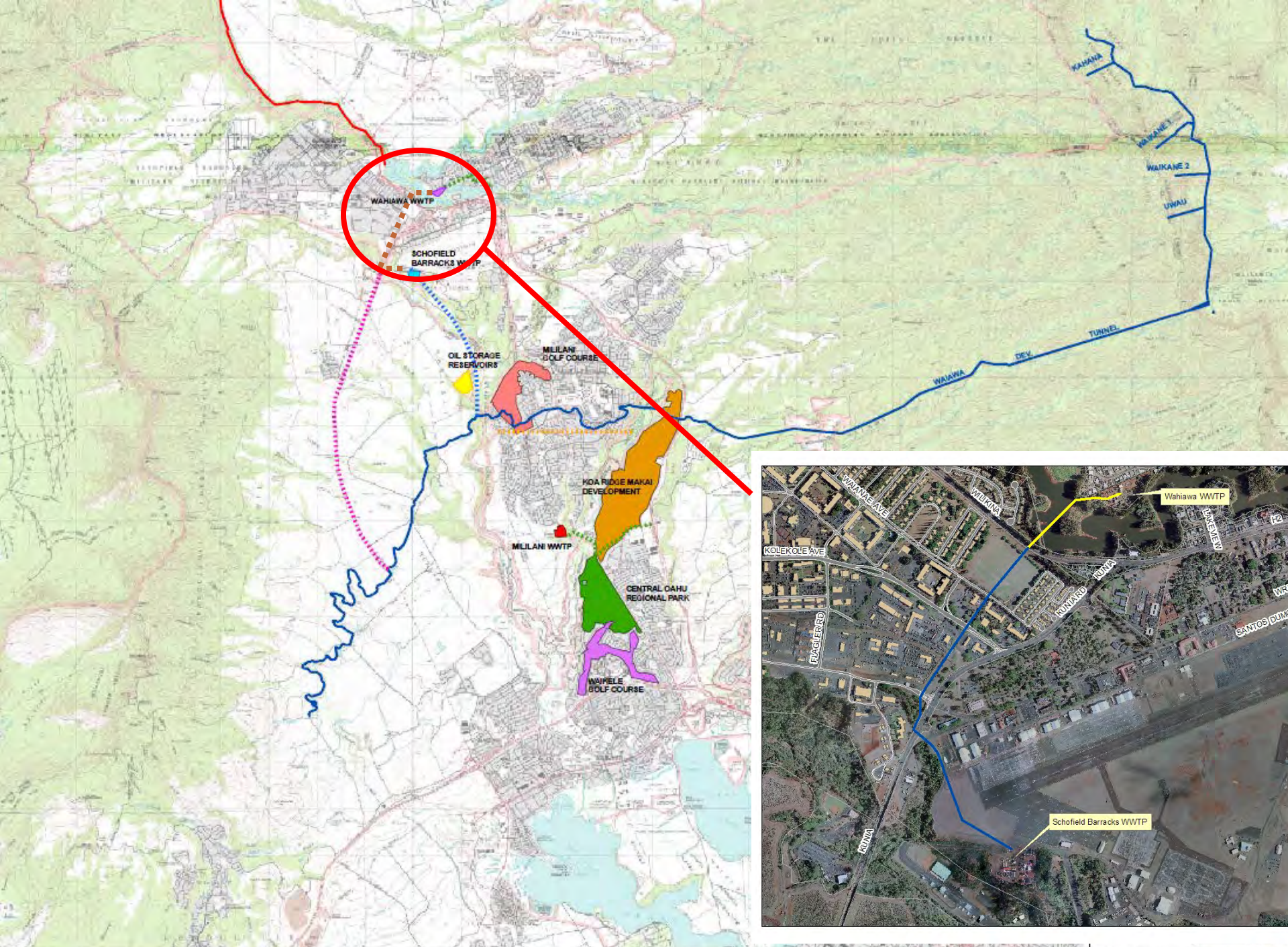
●●●●● OPTION C  
 ●●●●● OPTION D



# Waiahole Ditch Improvements

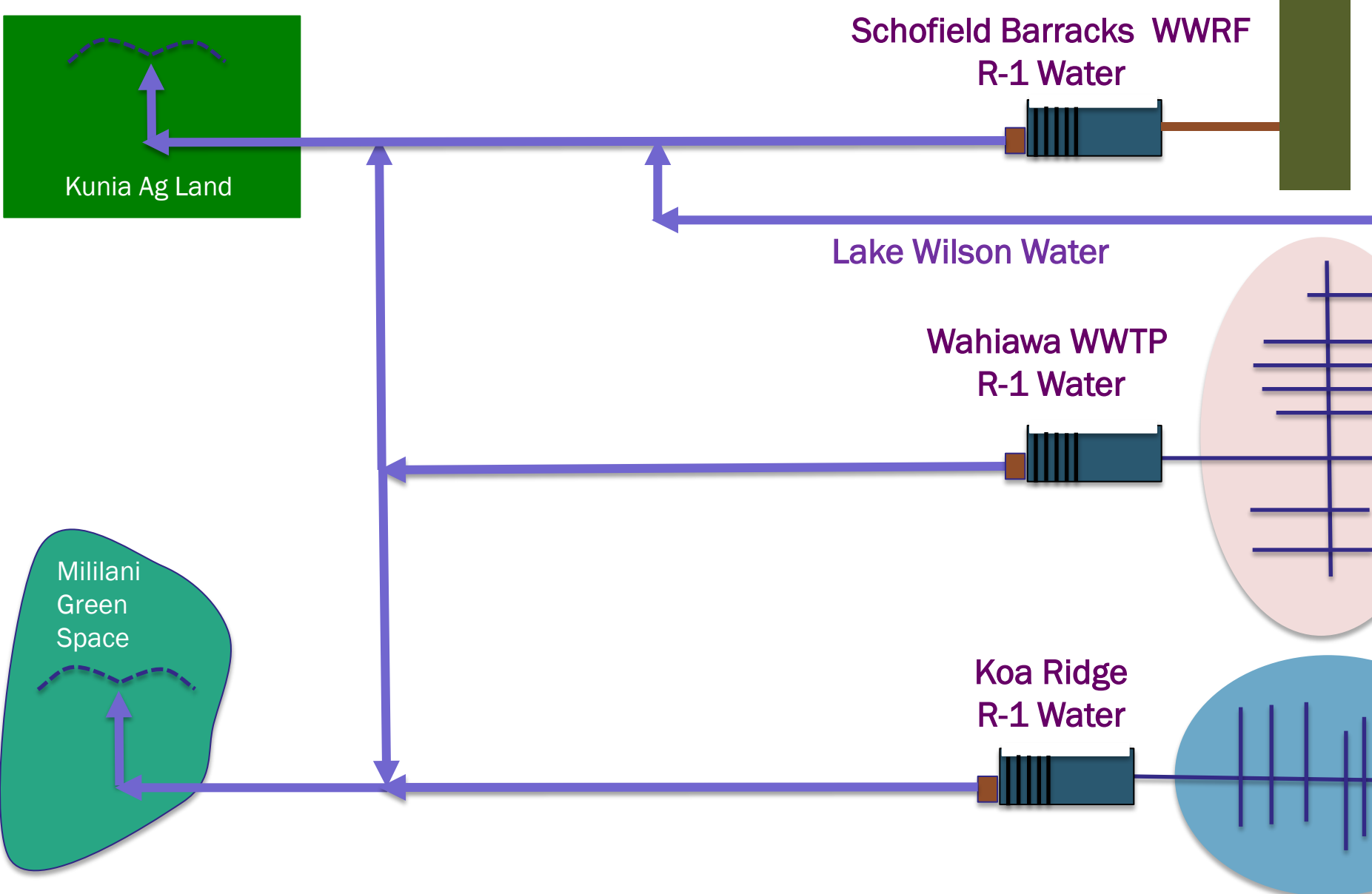
ADC is considering replacing a portion of open ditch with a pipeline through the Mililani area. Integration of Waiahole Ditch improvements could result in:

- Construction of a recycled water pipeline along the Ditch right-of-way as an alternative to discharging recycled water directly into the Ditch.
- A pressurized recycled water pipeline that would allow conveyance in two directions.
- An additional option may include use of the abandoned Mililani WWTP for off-line storage of Waiahole Ditch water.
- This opportunity would involve three (3) potential stakeholders:
  - ADC, Aqua Engineers, and ENV.



LEGEND

# Recycled Water Scenarios



# Next Steps

- Facilitate continued stakeholder involvement
  - Including expanded outreach regarding the purchase/use of products grown using recycled water
- Address regulatory issues and associated policy changes that may facilitate increased use of non-potable water
- Refine current estimates of non-potable water supply and demand
- Refinement of identified opportunities including:
  - Identification of required infrastructure improvements (pipeline size and length, interconnections, etc.)
  - Preliminary cost-benefit analysis and determination of economic/non-economic benefits for selected opportunities

# Summary

- 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 knowledge, can help achieve efficient utilization and conservation of our water resources.
- The CWRM's proactive participation can play an important and vital role in facilitating the implementation of such projects.

# Closing Thought

“It is never too late to implement,  
what might have been accomplished.”

# Mahalo