

US EPA ARCHIVE DOCUMENT

Makena Wastewater A Case Study

PRESENTED BY:

Makena Wastewater Corporation

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**DOWLING
COMPANY, INC.**

BUILDING IN BALANCE®

Holistic Green Design

- Integrated design strategies that concurrently produce multiple environmental benefits.
 - Reduce resource consumption
 - Minimize or eliminate polluting effects



Design Objectives

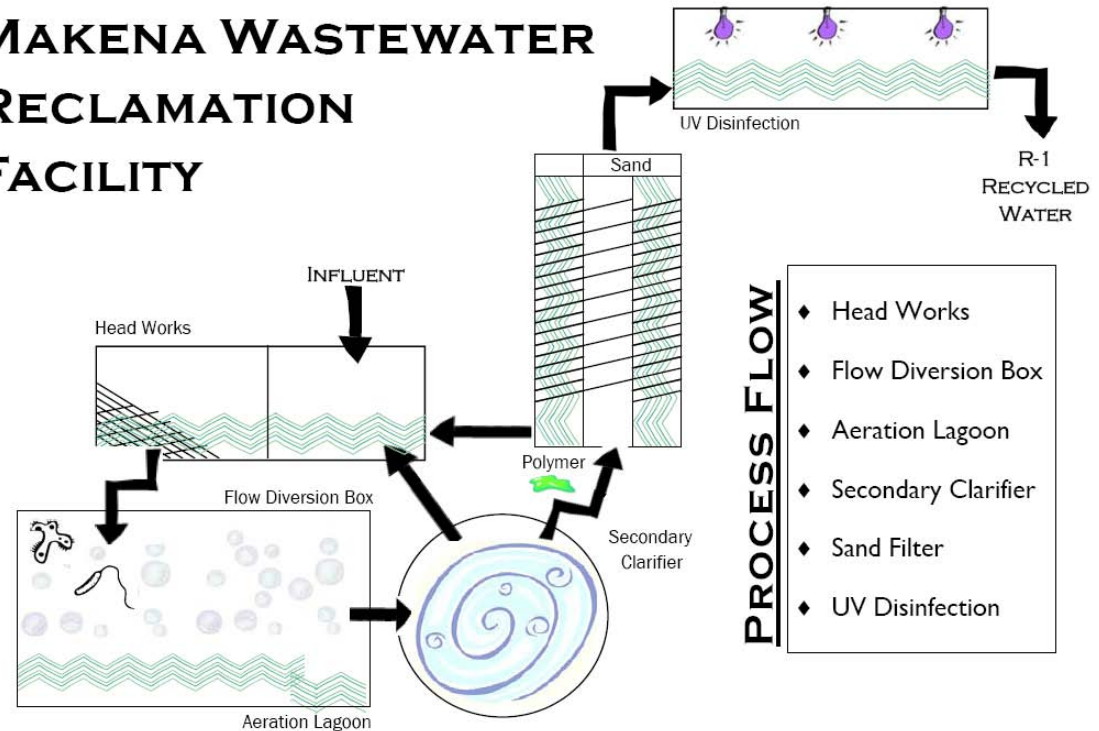
- Maximize efficient use of water
 - Tertiary treatment
 - Dual pipeline system
 - Golf course renovation
 - 100 percent reuse of effluent
- Prevent environmental risks associated with wastewater injection
 - Surface application
 - Storm water filtration system
 - On-shore and near shore water quality monitoring
- Eliminate the use of fossil-fuel based energy
 - Photovoltaic system
 - NEM
- Minimize cost
 - 3rd Party PPA
 - Rebates and Incentives
 - Payback Period



Water Efficiency: Tertiary Treatment

- Treatment capacity of 750,000 gpd
 - Currently treats 60,000-80,000 gpd
- Highest level of treatment
 - UV filtration step
 - System override
- Produces R-1 effluent
 - Suitable for reuse
- No injection

MAKENA WASTEWATER RECLAMATION FACILITY



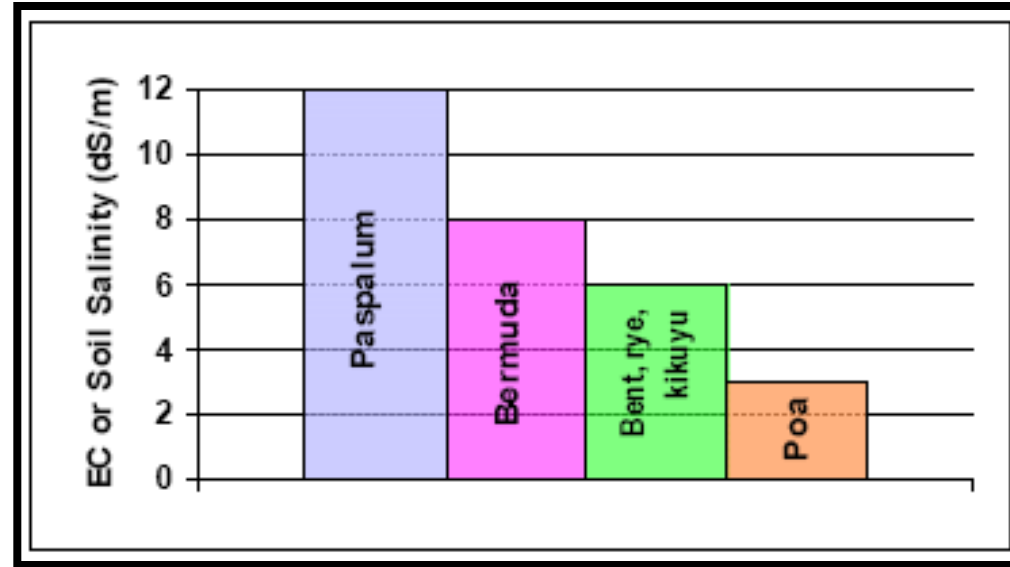
Water Efficiency: Dual Pipeline

- Required for transmission
- Often most costly component
- Golf course
 - largest user
 - fortunately within close proximity



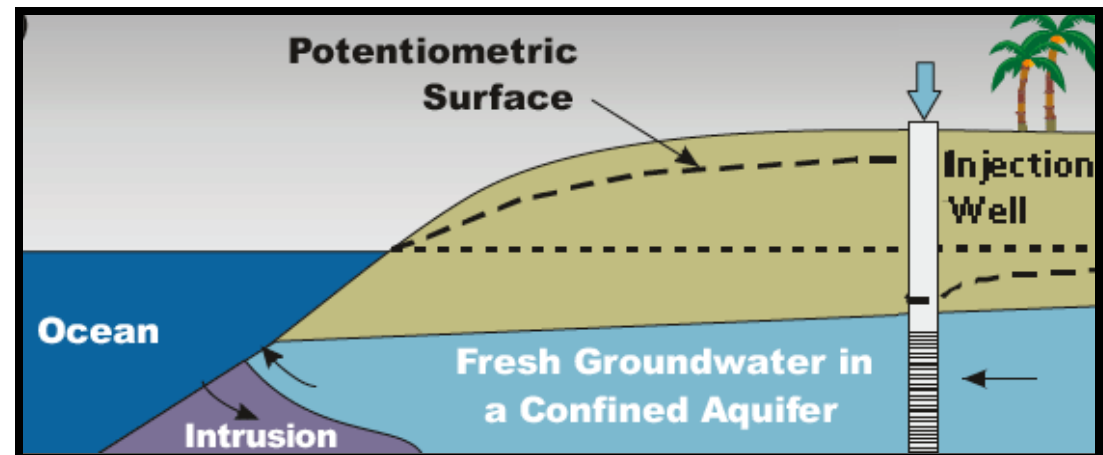
Maximize Water Efficiency: Golf Course Renovation, Effluent Reuse

- 100 percent reuse
- No potable water
 - Supplemented with brackish water pumped from on-site wells
- Diverts effluent from injection
- Water efficiency Improvements
- Synergy: nutrients in wastewater reduce the amount of fertilizer required



Pollution Prevention: No Injection Wells

- Wasteful practice
- Eutrophication caused by nutrient loading
 - Damages delicate reef and near shore marine ecosystem



Pollution Prevention: Surface Application

- Prevent environmental risks associated with wastewater injection
 - Surface application
 - Storm water filtration system
 - Water quality monitoring





Resource Conservation & Pollution Prevention: Photovoltaic Energy

- First net-zero energy wastewater reclamation facility in Hawaii
- Renewable energy for an energy intensive process
- Minimize and eventually eliminate the use of fossil-fuels
- Offset high cost of treatment





Financing: Solar Power & Service Agreement



- PPA
 - 15-years with an option to extend term
 - Purchase clause (MWC)
 - Negotiated rate
 - MECO Rate - \$0.35
 - AHK - \$0.33 (3 percent lower)
 - (usually slightly below utility rate)
- NEM

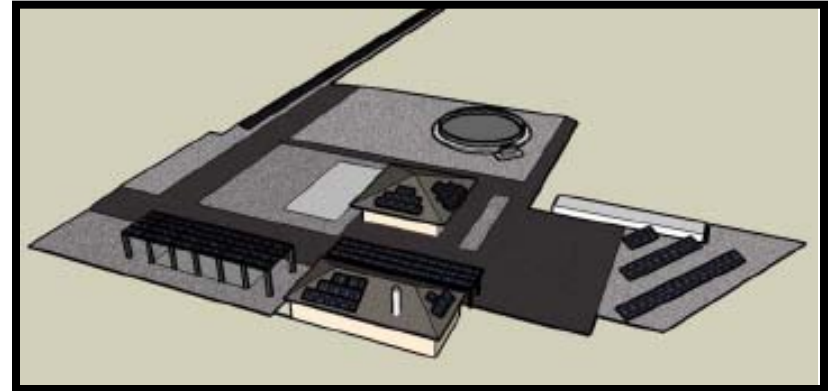
Two-Phase Installation



- Size: 200 KW
 - Phase I: 96KW
 - Phase II: 110KW
- Cost: \$1.9M
 - Phase I: \$900K
 - Phase II: ~\$1M.
- Payback period
 - 7 years per phase
- Tax Credit
 - 35% state
 - 30% federal

Phase I: 96KW

- Installer: Hoku Solar
- Completed May, 2009
- Offsets $\frac{1}{2}$ current energy demand



Phase II: 104KW

- With the addition of phase II array, PV systems will
 - Generate enough energy to power the entire WWRF and 2 pump stations
 - Net-Zero Energy Facility
- Cost: ~\$1M.
 - ~7 years
- Annual savings
 - 300,000 kWh
 - \$100,000
 - 175 barrels of imported oil
- Over system lifetime (25 years), offset of:
 - 4,814 tons of carbon dioxide
 - 22 tons of sulfur oxide
 - 8 tons of nitrogen oxide



Thank you

*Makena*

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