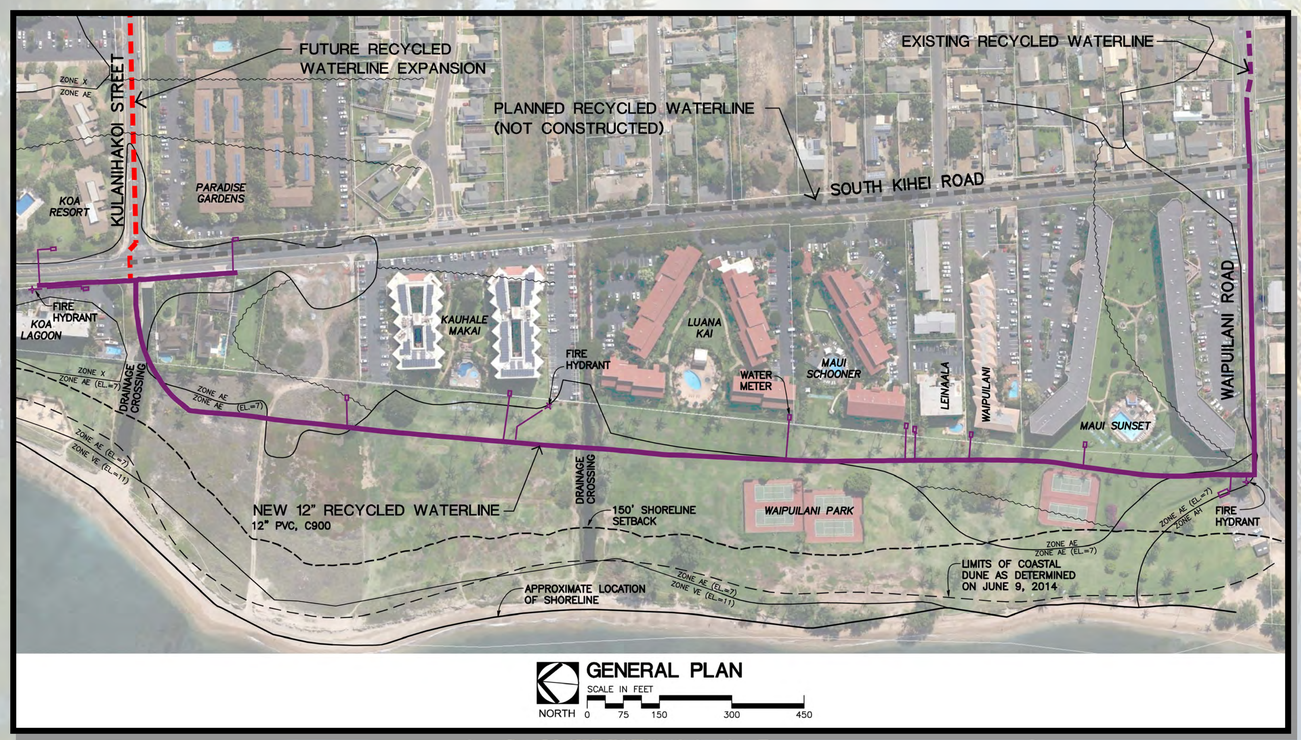
SOUTH MAUI RECYCLED WATER SYSTEM EXPANSION PROJECT

The waterline was installed using horizontal directional drilling under two drainageways where the shoreline sand plugs create *muliwais* or ponds.

Fusing together lengths of PVC waterlines.

Backfilling trenches after installation of waterline at Waipuilani Park.

Waterline installation fronting the condominium properties.



PROJECT TEAM

Agency:	**County of Maui, Department of Environmental Management, Wastewater Reclamation Division**
Contractor:	**Goodfellow Bros., Inc.**
Civil Engineer:	**Fukumoto Engineering, Inc.**
Geotechnical Engineer:	**Hawaii Geotechnical Consulting, Inc.**
Archaeologist:	**Scientific Consultant Services, Inc.**

PROJECT SUMMARY

The South Maui Recycled Water System Expansion project included approximately 3,600 linear feet of 12-inch C900 PVC recycled waterline in Kihei. Service laterals were installed to nine condominium properties. Two service laterals were installed at Waipuilani Park to areas that are separated by drainageways. Three fire hydrants were installed. The alignment picked up from the end of the existing recycled waterline near South Kihei Road and Waipuilani Road, extended down Waipuilani Road, through Waipuilani Park, and back out to South Kihei Road at Kulanihakoi Street.

PUBLIC BENEFIT

- **Exceptional trees**

Four monkey pod trees in front of the Maui Schooner Resort were slated to be removed as part of a 2011 road improvement project on South Kihei Road. With great public opposition to remove the trees, the County designated the trees as "exceptional trees" to protect them. As a result, the road improvement project, which included a recycled waterline in the road, was not constructed. Instead, the South Maui Recycled Water System Expansion Project rerouted the alignment away from the road and exceptional trees to the ocean side of the condominiums inside the County park.

- **Less traffic disruption**

By installing the waterline in the park, almost half a mile of trenching was eliminated on South Kihei Road, reducing traffic impact on this major thoroughfare. Traffic impact was further reduced near the Kulanihakoi Street intersection because of the contractor's suggestion to shift the waterline into the roadway shoulder.

ENVIRONMENTAL CONSIDERATIONS

- **Water reclamation and conservation**

Reclaimed water is a valuable resource that can be used instead of potable drinking water for things like irrigation and fire protection. The new condominium properties added to the system will reduce domestic water demand by approximately 180,000 gallons per day. That is equivalent to the domestic water demand of 300 single family homes. The future Kihei High School is estimated to use an additional 100,000 to 225,000 gallons. Recycled water system expansion to the high school is currently under design and will connect to the end of this project.

- **Wastewater Disposal**

Reusing water reduces the amount of water that is wasted and disposed of through injection wells. The existing system currently uses up to 50% of wastewater from the Kihei Wastewater Reclamation Facility during summer months. The existing system is now nearly 20 years old, but when it was initially constructed, it was the first pressurized system in the State of Hawaii to provide continuous service to its users.

- **Avoid disruption of drainageways**

The new recycled waterline crossed two drainageways that are usually blocked by sand at the shoreline, forming *muliwais* (brackish water ponds or estuaries). Impact to two existing *muliwais* was eliminated by horizontal directional drilling (HDD). The HDD machine drilled a hole that accurately followed the design alignment, and then pulled the pipe back through the hole.

ENGINEERING DIFFICULTY

- **Alternate alignment**

Conventional engineering thinking is to place utilities in the roadways, and that was the original approach for this recycled waterline. However, when the roadway project mentioned above stalled, a creative alternate placed the recycled waterline in the County-owned park.

- **Adjacent to Shoreline**

Various design and permitting tasks were added for the project located adjacent to the shoreline: vertical alignments to go under *muliwais*, determining jurisdiction with the Army Corps of Engineers, determining shoreline setback, and locating coastal dunes.

CONSTRUCTION DIFFICULTY

- **Traffic, Utilities and Ground Water**

Although a good length of waterline was eliminated from South Kihei Road, work at the intersection of Waipuilani Road and Kulanihakoi was challenging with the heavy traffic. Installation in the road was also difficult due to installation below the ground water table and needing to avoid many existing utilities.

- **Numerous Land Owners**

For the condominium properties, their major asset is being oceanfront. Owners and guests were constantly going back and forth from their properties to the beach. Safe pedestrian access was provided at all times.

- **Landscaping**

Decisions were made in the field to reroute the recycled waterline to save trees and preserve the landscape throughout the park. The many types of grasses and plants that needed to be restored fronting each condominium property posed an added challenge.

The purple color of pipes, manhole covers, fire hydrants and irrigation sprinkler heads signifies recycled water that is not intended for human consumption.

Horizontal directional drilling was used under two drainageways and in South Kihei Road due to: the waterline being installed below the groundwater table, and the need to avoid conflicts with a 36-inch drainline and drainage culvert.

Students from Maui High School visited the site during Career Shadowing Day to hear about the construction challenges and witness them firsthand.

Event: **HSPE MAUI CHAPTER 2016 PROJECT OF THE YEAR COMPETITION**

Sponsor: **Hawaii Society of Professional Engineers Maui Chapter**

Date: **January 25, 2016**

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