Maui Department of Water Supply (DWS)

Hydraulic Model of the Maui County DWS System

Presentation to Water and Infrastructure Committee

February 3, 2025

carollo

Agenda

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Hydraulic modeling

02

Examples of use

03

Next steps and future work

01

Hydraulic modeling

Introduction to Carollo

Matt Huang, P.E.

Project Manager
Associate Vice President

1,500 employees

National firm

Water is all we do

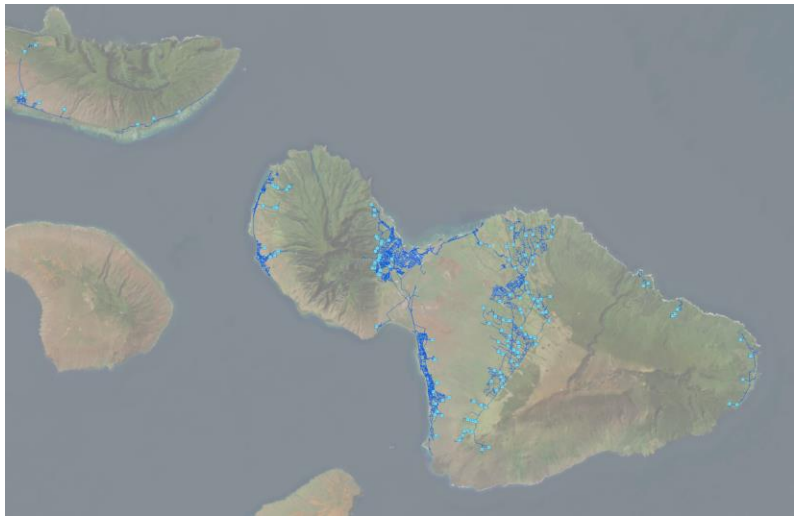
Office in Honolulu, supported by national team members

Scope of Work

- Asset inventory
- Condition assessment of WTPs, wells, tanks, and booster pump stations
- Conversion of fire protection plans from CAD to GIS
- Construction and calibration of five hydraulic models
- System evaluation
- Recommended capital improvement program
- Hydraulic model training
- Model maintenance procedures

What is a hydraulic model?

- A hydraulic model is a mathematical simulation that predicts how water moves through a water distribution system.
- Model contains:
  - Potable transmission and distribution system pipelines
  - Water sources (wells, water treatment plants)
  - Reservoirs and tanks
  - Booster pump stations
  - Pressure reducing stations



What is the process of developing a hydraulic model?

Model development

- Convert pipelines
- Add facilities/attributes
- Add elevations
- Add demands
- Add usage patterns

Model calibration

- Field data collection
- Compare model results and field data

System evaluation

- System pressures
- Pipeline velocities
- Pump capacities
- Ability for tanks to refill

02

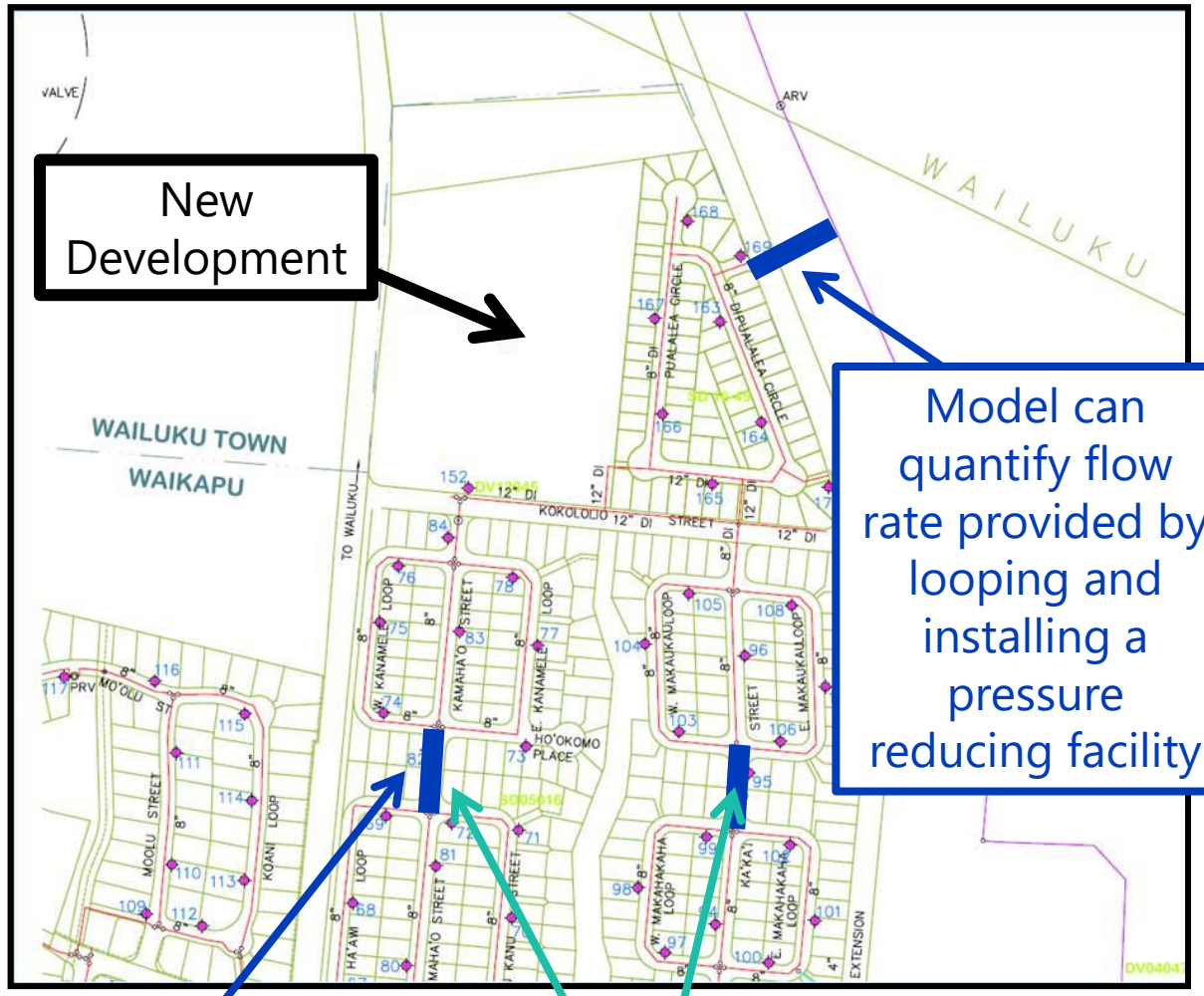
Examples of use

What does a hydraulic model provide to DWS?

- Meet regulations
- Provide service according to land use plan
- Address operational concerns

Available fire flow

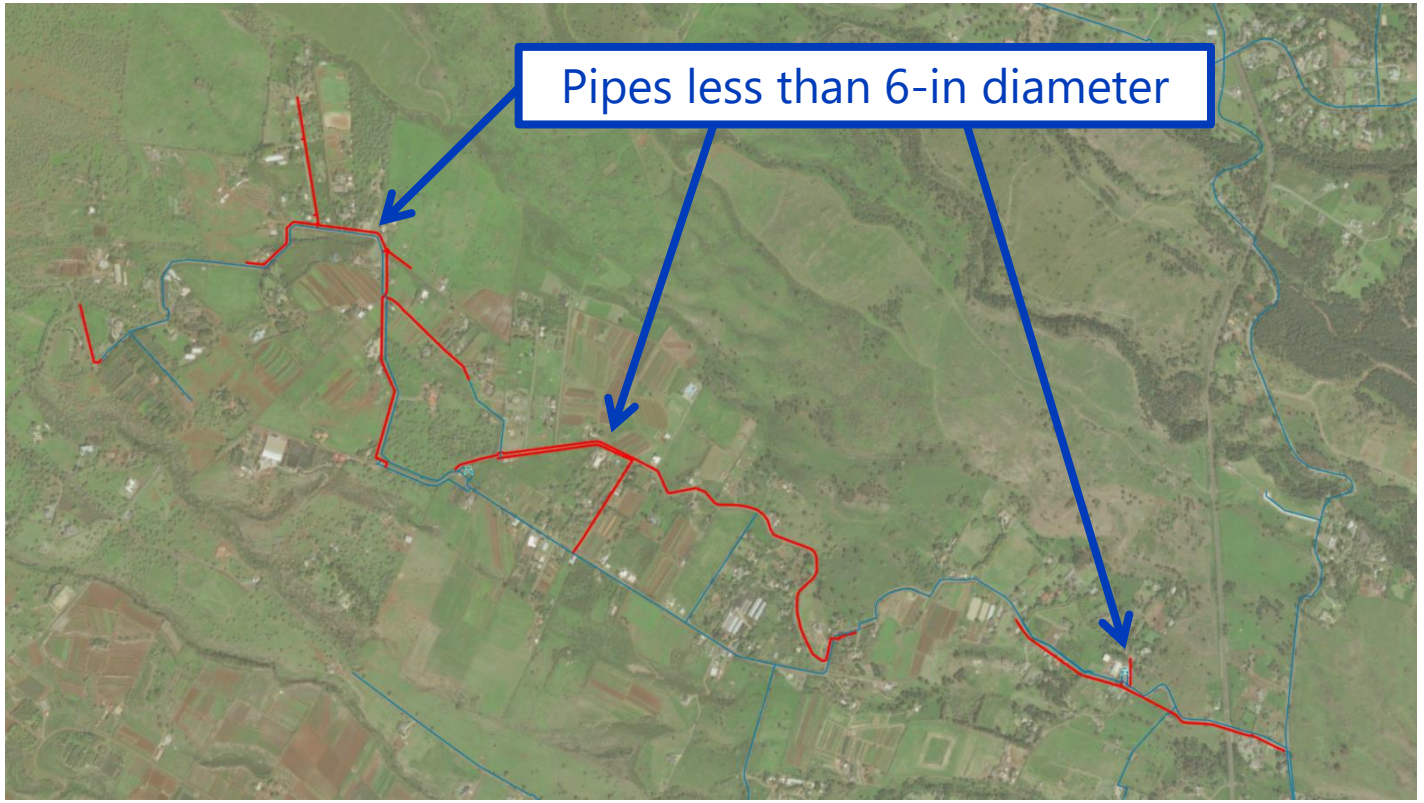
- Assesses ability of a hydrant or standpipe to provide a target fire flow rate
- For new development? For a public facility (school)? For a critical customer (hospital, dialysis center)?
- Determine target fire flow rate:
  - » If model suggests existing piping unable to meet fire flow
  - » Solution: install larger pipe, or connect to nearby larger pipe



Prioritize improvements for fire flow

Model suggests many locations in each system can't meet the full recommended fire flow

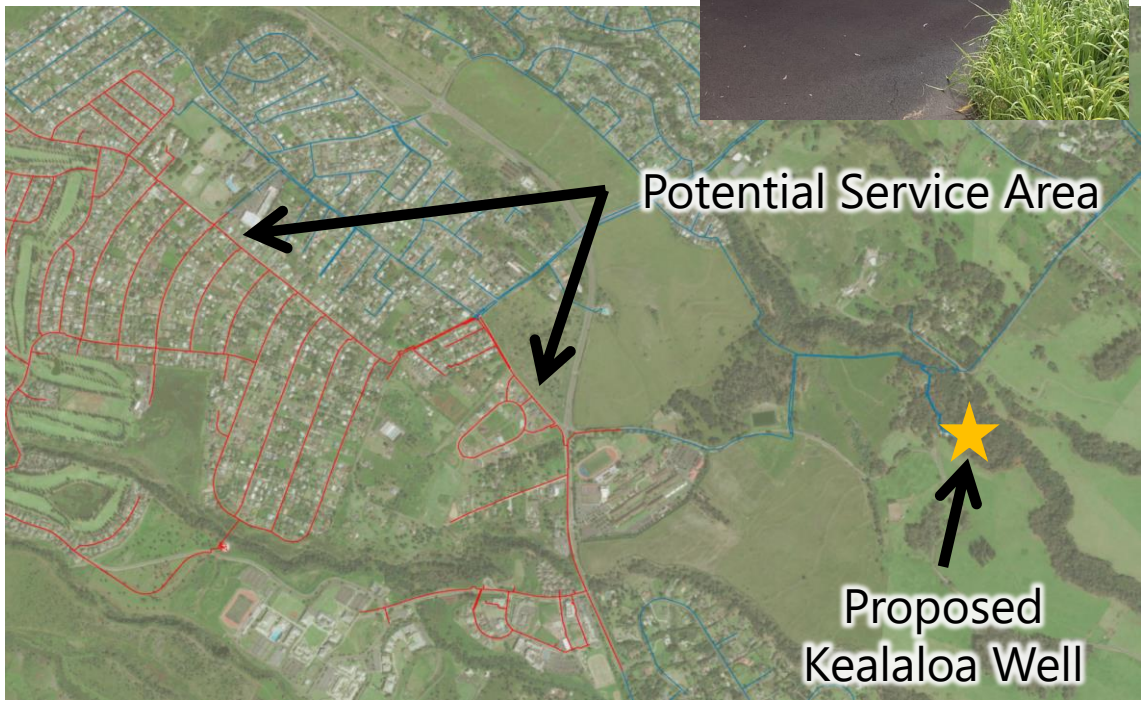
Small diameter pipes limit flow; a condition common in all systems



Limited budget > prioritize improvement projects

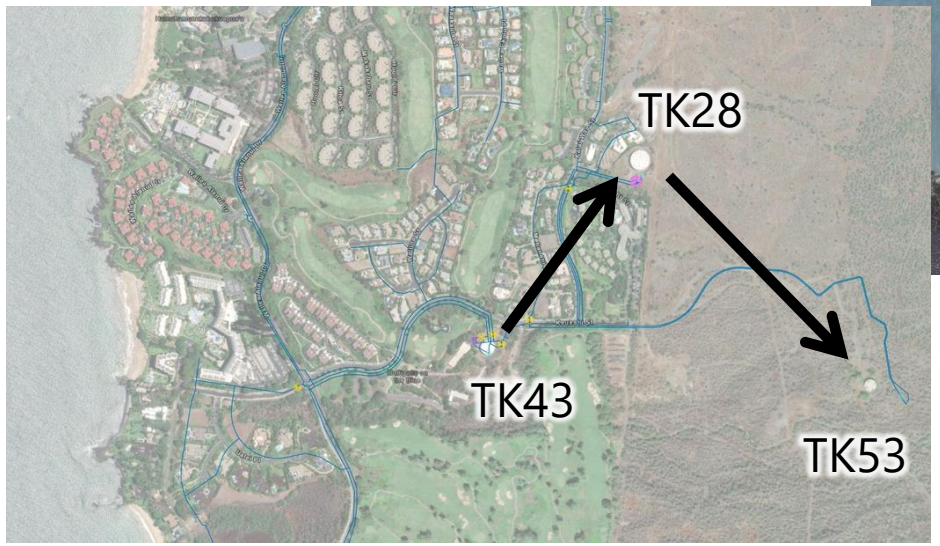
Impact of new groundwater wells

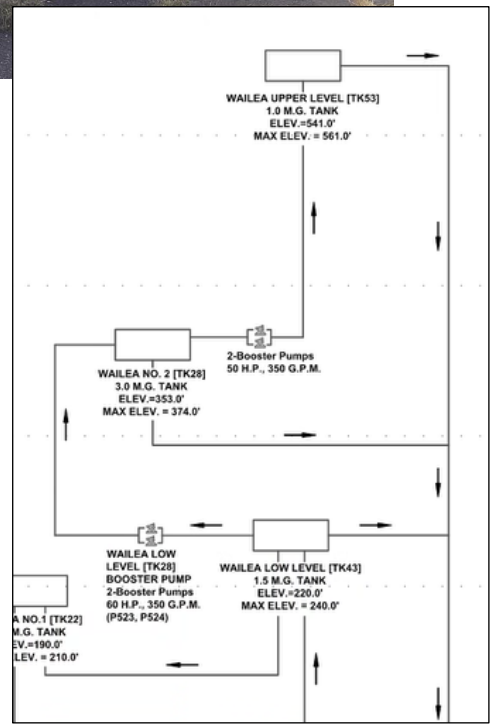
- **Upcountry System:** existing non-municipal wells identified to connect to the water system
- Model can evaluate best connection points and benefits to the system
  - » Benefits to pressure, maintaining tank levels
- Model can tell what area a new supply (groundwater well) can serve



Operational assistance: reservoir shutdown

- Model can evaluate impacts due to taking a facility out of service
  - » Quantify impacts (pressure, fire flow)
- **Central System:** Removing Wailea Upper Level Tank (TK53) for one to two weeks for maintenance
  - » Model identifies pumping operations at Wailea Low Level Tank (TK43) during outage





03

Next steps and future work

Next Steps

Provide input for Capital Improvement Program based on existing needs

Hydraulic model training to enable DWS staff to perform evaluations in-house

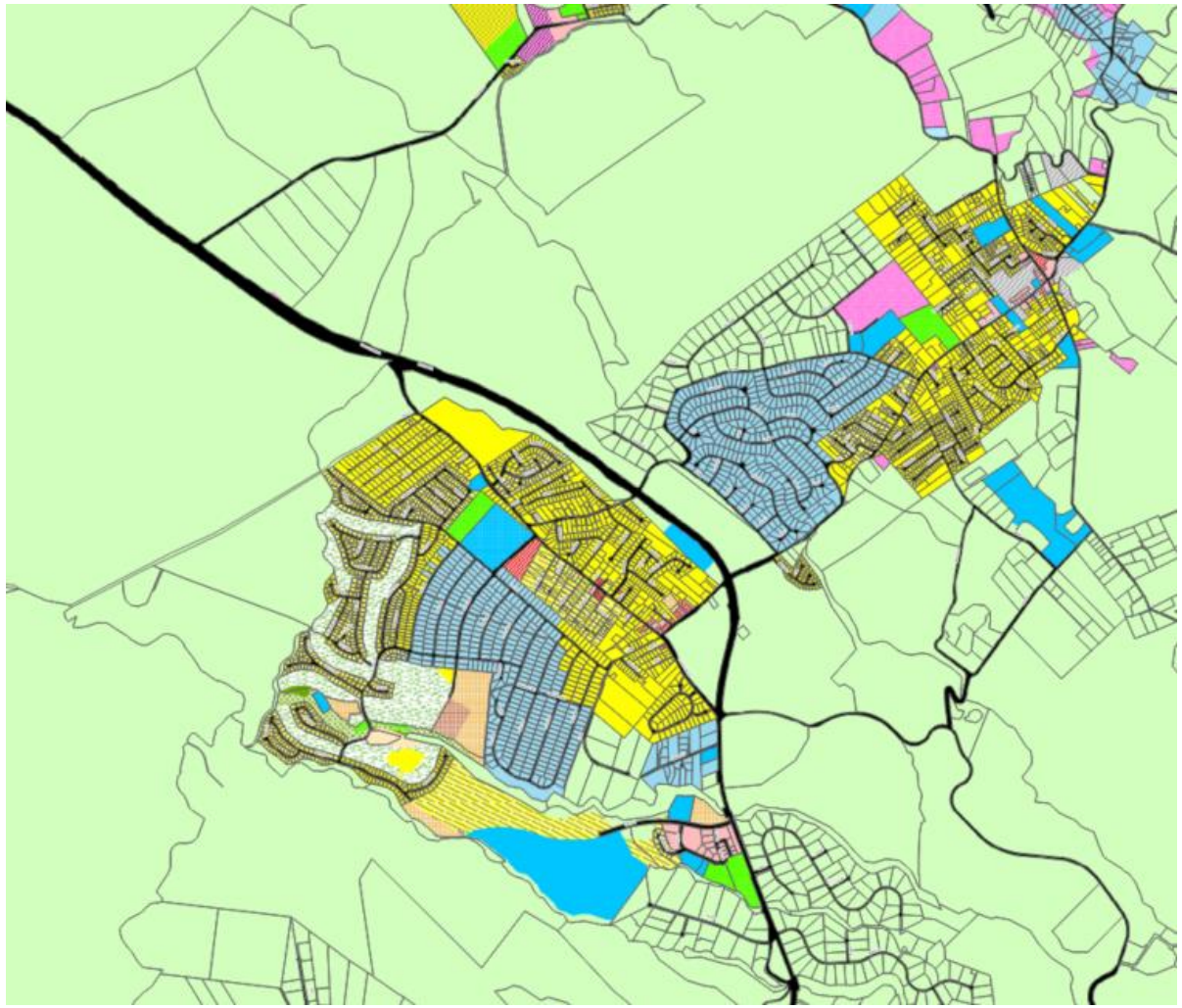
Process for model maintenance

Potential Future Work

- **Master plan**

Define infrastructure and supply needs to serve approved land use plan

Prioritization for replacing aging pipelines



Thank You

WAI Committee

From: Linda K. Kimura <Linda.Kimura@co.maui.hi.us>
Sent: Thursday, January 30, 2025 10:02 AM
To: WAI Committee
Cc: John Stufflebean; James A. Landgraf; James L. Jensen; cishida@carollo.com; Matt Huang (mhuang@carollo.com); Stacy Takahashi
Subject: WAI Committee-2/3 at 1:30 pm Department of Water Supply Hydraulic Model Study Presentation
Attachments: 2025-01-30 WAI Committee Meeting of 2025-02-03 Department of Water Supply Hydraulic Model Study Presentation.pptx

Attached is Water's presentation for WAI Committee meeting. Please let me know if you have any questions.

Thank you,
Linda