Technical Subcommittee Report on Water Loss

August 12, 2020

To Protect and Enhance Kentucky's Environment

Technical Subcommittee

- Subcommittee Members
  - Paul Miller, Director Division of Water
  - Kent Chandler, Vice-Chairman Public Service Commission
  - Craig Miller, General Manager Alliance Water Resources
  - Lindell Ormsbee; PE, PH, PhD, D.WRE University of Kentucky
  - Gary Larimore, Executive Director Kentucky Rural Water Association
  - Ben Hale, Executive Director Big Sandy Area Development District
- Support staff
  - DEP – Deputy Commissioner John Lyons
  - DOW – Asst. Director Carey Johnson, Tammi Hudson, Alicia Jacobs, and Jory Becker
  - KRWA – Joe Burns

Why Water Loss?

- Water loss and failing infrastructure are nationwide issues.
- The average water loss for a drinking water system in Kentucky is 24%*.
- Martin County Water District reports an average of 70% water loss.
- A water system in rural Kentucky produces a monthly average of 20M gallons for a population of approximately 9,000 people.
- MCWD produces an average of 52.5M gallons per month, and sells 14.6M gallons.
- Every gallon produced costs money to treat and pump.

*ASCE 2018 Report

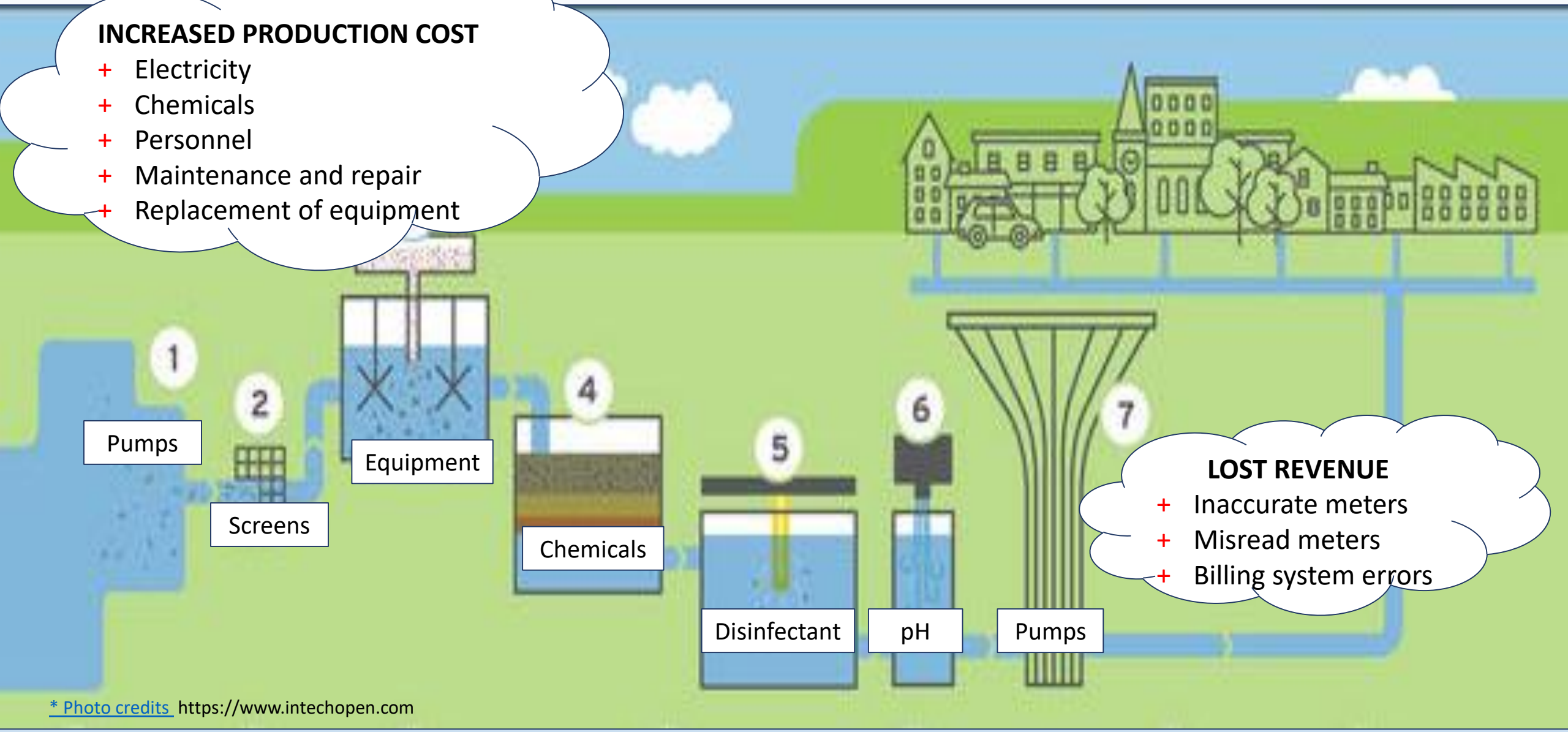
Causes of Water Loss

- Water loss is a red flag of operational, managerial, and financial difficulties.
- Operational difficulties - line breaks; water theft; excessive or varying pipe pressures; inconsistency in daily tasks; insufficient maintenance; outdated operating procedures.
- Managerial concerns - faulty and failing infrastructure; inadequate planning for longevity; lack of properly trained staff.
- Financial struggles - poor billing system; excessive debt; disproportionate operating costs; shortage of funds.

Effects of Water Loss

INCREASED PRODUCTION COST

+ Electricity
+ Chemicals
+ Personnel
+ Maintenance and repair
+ Replacement of equipment



LOST REVENUE

+ Inaccurate meters
+ Misread meters
+ Billing system errors

* Photo credits https://www.intechopen.com

Immediate and Ongoing Actions

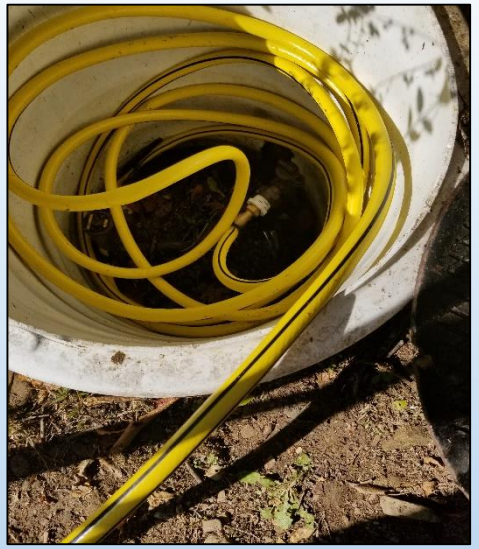
- Administrative improvements
  - Keeping and retaining reliable records.
  - Converting billing software and training employees on use.
  - Regularly and uniformly assessing fees.
  - Informing public of utility changes that impact them.
  - Update website to enhance customer relations.
- Operational improvements
  - Training and educating employees on proper maintenance and repair.
  - Locating and mapping lines, meters, and leaks.
  - Creating consistency in processes such as meter reading.
  - Using Standard Operating Procedures.
  - Conducting a vulnerability assessment and emergency plan.
  - Prosecuting for water theft.

What Does Water Theft Look Like?

Jumper installed after meter was removed

Hose used as Jumper Connection

Un-Metered Connection – illegal by-pass with professional installation



Un-Metered Connection

Jumper Connections

Meter register was removed and radio transmitter wire was cut

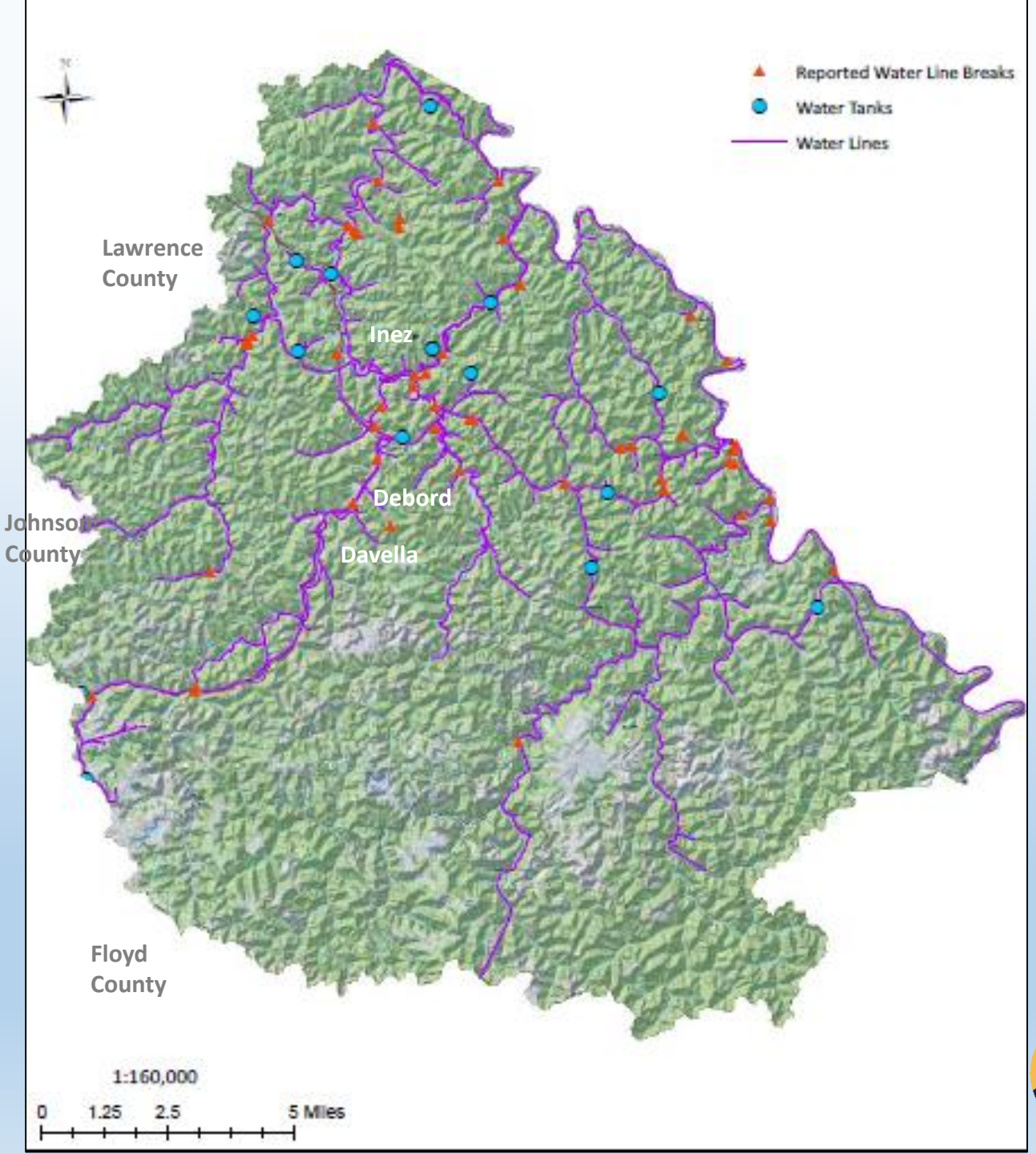
Stolen Meter is Used

Long Term Actions

- Improve revenue and available funds.
  - Reduce water loss which reduces excess treatment of unused water.
  - Require more training for operators.
  - Evaluate spending and operational costs.
  - Implement asset management plan.

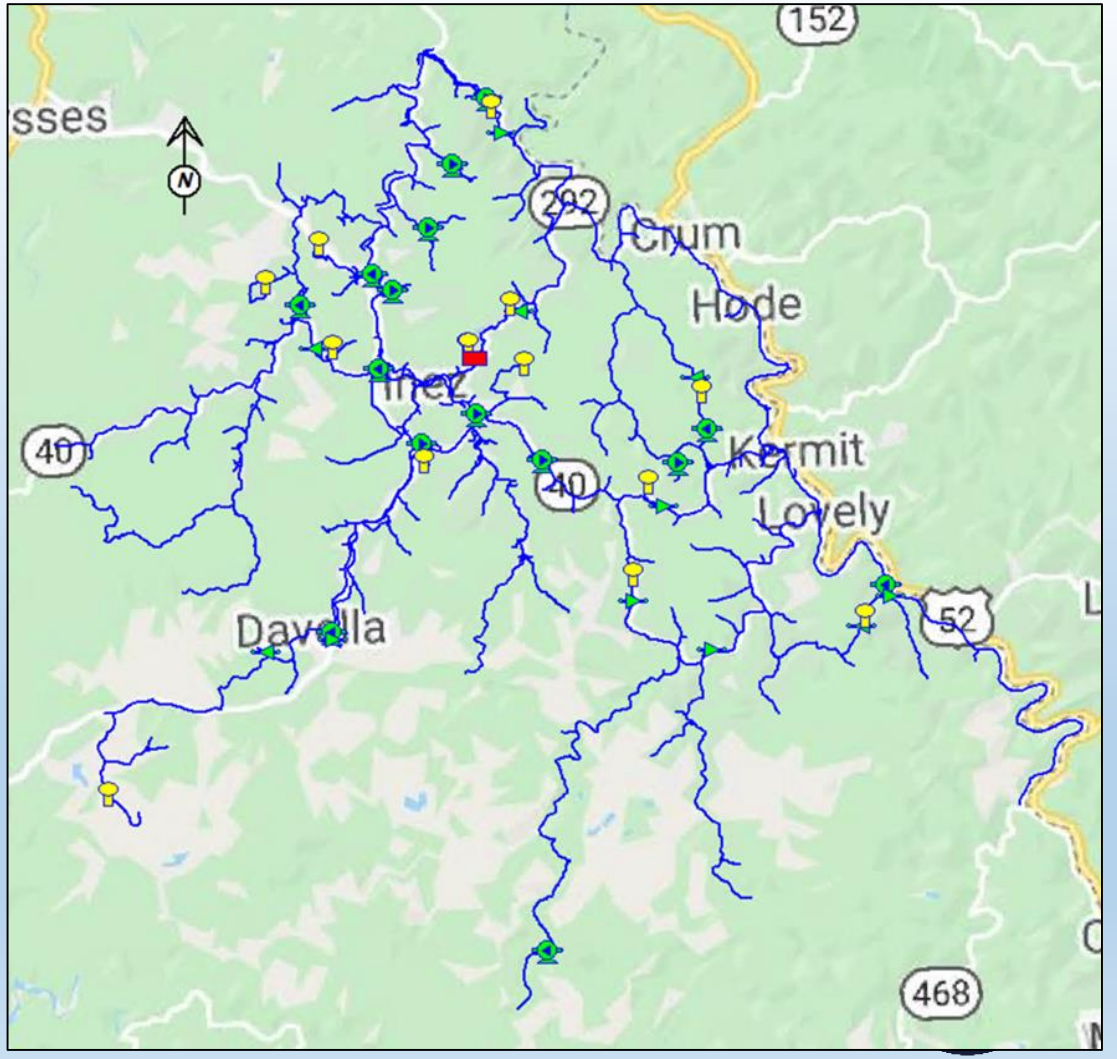
- Understand distribution system.
  - Develop a 5-year construction improvement plan.
  - Replace and improve infrastructure.
  - Purchase more leak detection equipment and utilize appropriately.
  - Purchase equipment for distribution repair crew.
  - Implement paperless workflow tracking.
  - Install and use radio meter-read system for all customers.

Understanding a Distribution System and Line Breaks

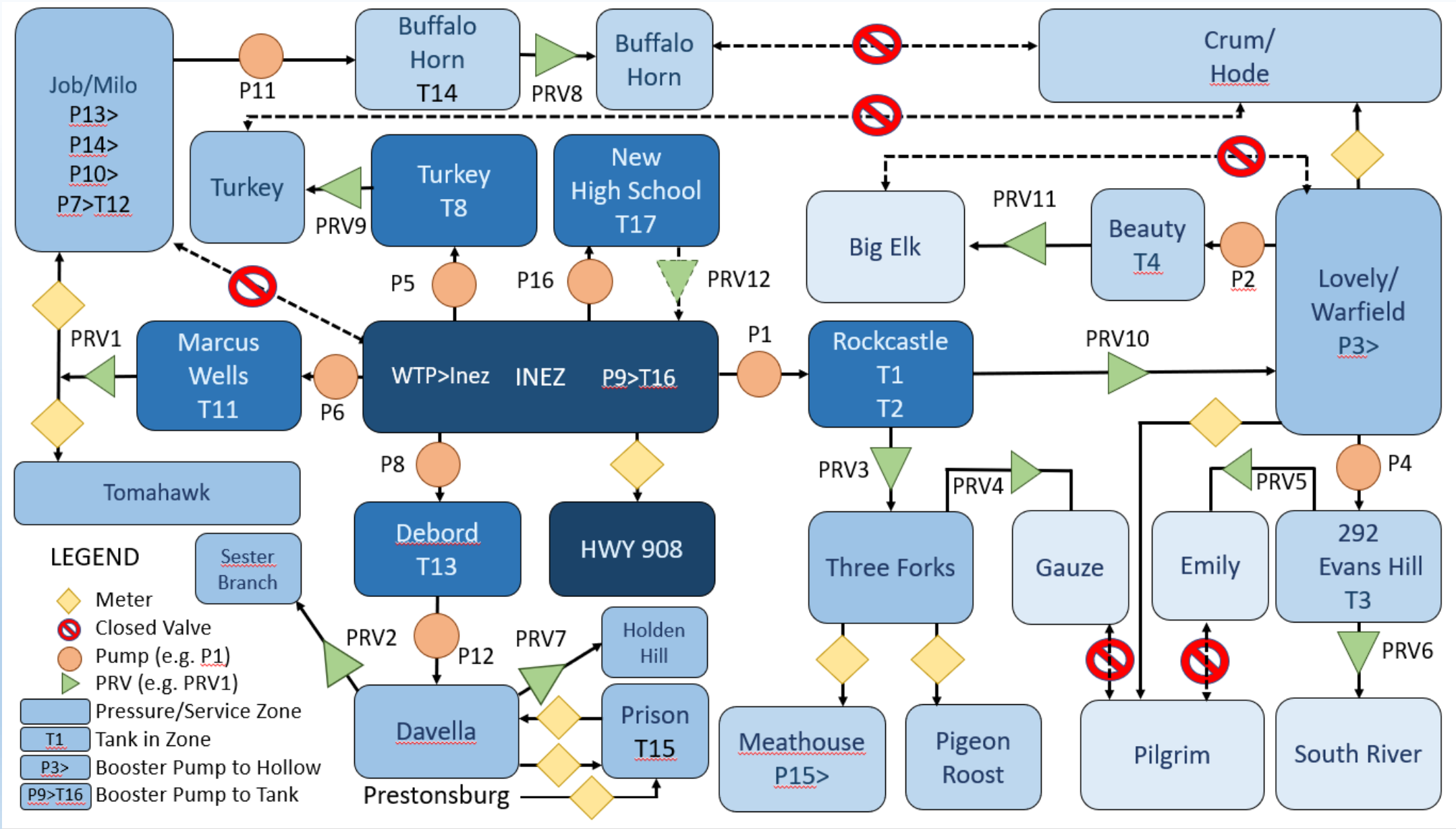


Hydraulic Model

- Two Different Hydraulic Models
  - Bell Engineers
    - To be used for evaluating upgrades to the system
  - KWRRI
    - To be used for evaluating:
      - Operations (24 hour simulations)
      - Water quality
      - Pressure transients
- Model Status
  - Both models are unvalidated/uncalibrated
  - KWRRI model is running
    - 24 hour simulations (“reasonable” pressures)
    - Water quality
    - Pressure transients
- Future Work
  - Continue model validation
  - Continue model calibration



Martin County System Schematic



Next Steps for Distribution System

- Continue locating, mapping, and repairing leaks.
- Finalize hydraulic model.
- Review ongoing construction projects and their impact on the distribution system.
- Use hydraulic model to identify and prioritize future projects.
- Determine solutions based on cost and standard industry practices.

Questions?