
7 September 2018

# Evaluation of City Water System's Response in Fountaingrove to the October 2017 Fire

City of Santa Rosa


# Agenda

- Introduction
- Process of Investigation
- Consultant Introduction
- Report Highlights
- Findings and Recommendations
- Wrap-up with Next Steps

# Introduction

Joe Schiavone

Deputy Director – Water and Sewer Operations
Water DOC Incident Commander

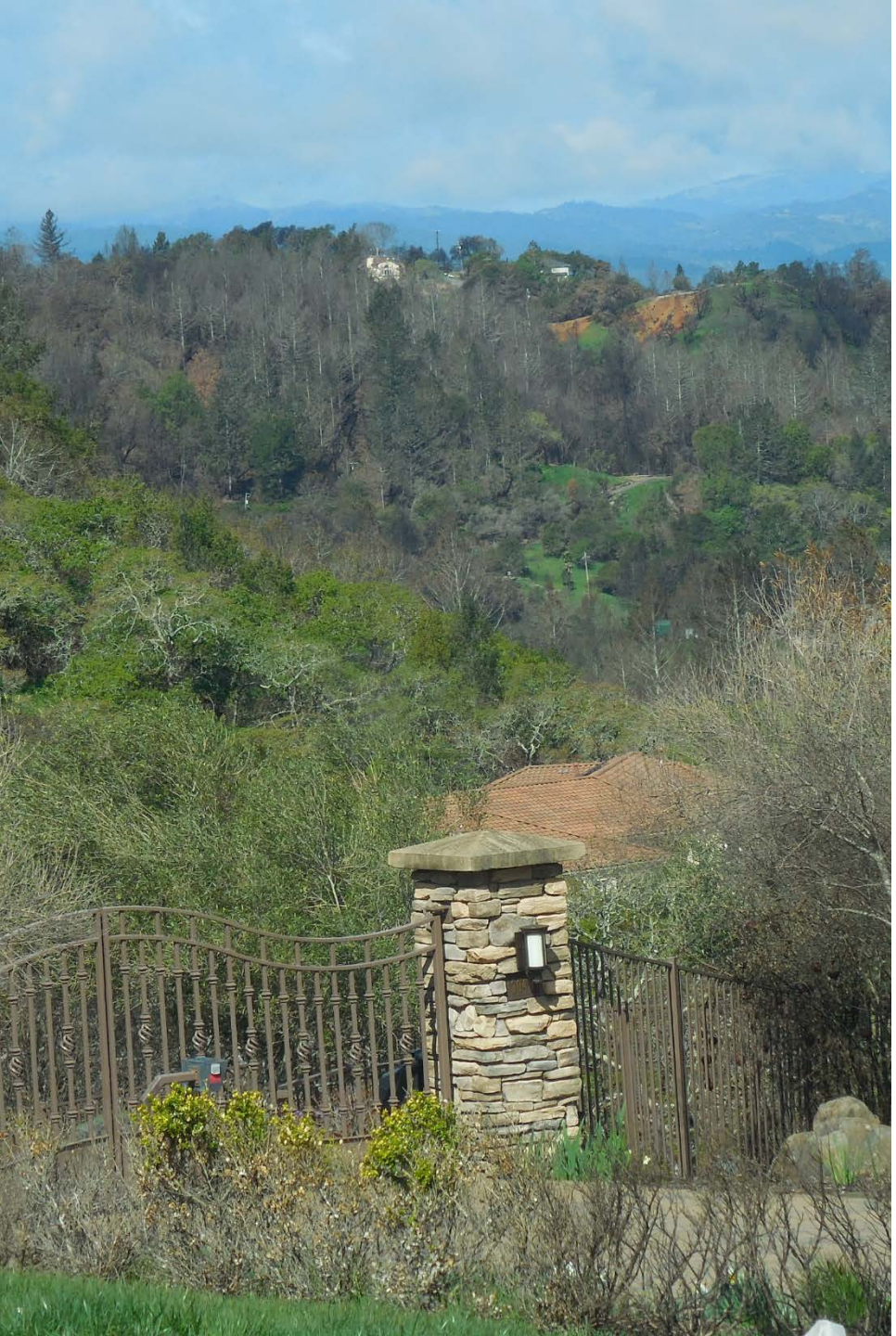
# Recap of the Tubbs Fire and the City's Response

- Named for its origin near Tubbs Lane on the outskirts of Calistoga, the fire started around 9:45 p.m. Sunday, October 8, 2017
- Fueled by ideal fire conditions, it rapidly grew and intensified, reaching the Fountaingrove area of Santa Rosa by 1 a.m. on October 9
- Evacuation was the first order of business

# Goals of the Evaluation

- Assess the performance of the water system in Fountaingrove in response to the Tubbs Fire
- Determine lessons learned and provide recommendations for system resilience

**Did the water system do what it was designed to do and what are the opportunities to improve?**



# Focus on Fountaingrove

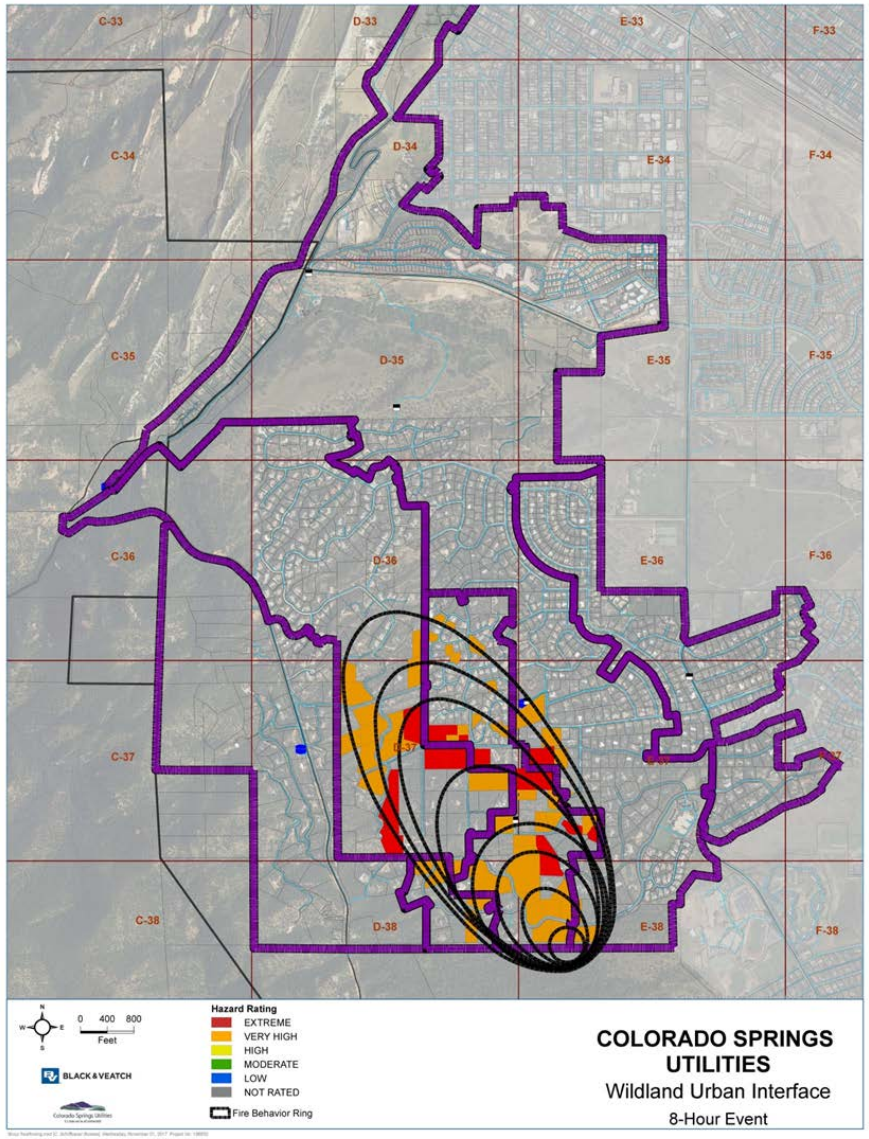
- Wildland-urban interface
  - Difficult terrain
  - Highly susceptible to fire
- Water supply requires a series of pump stations and tanks
- Damage was devastating
- How can lessons from Fountaingrove be applied city-wide?

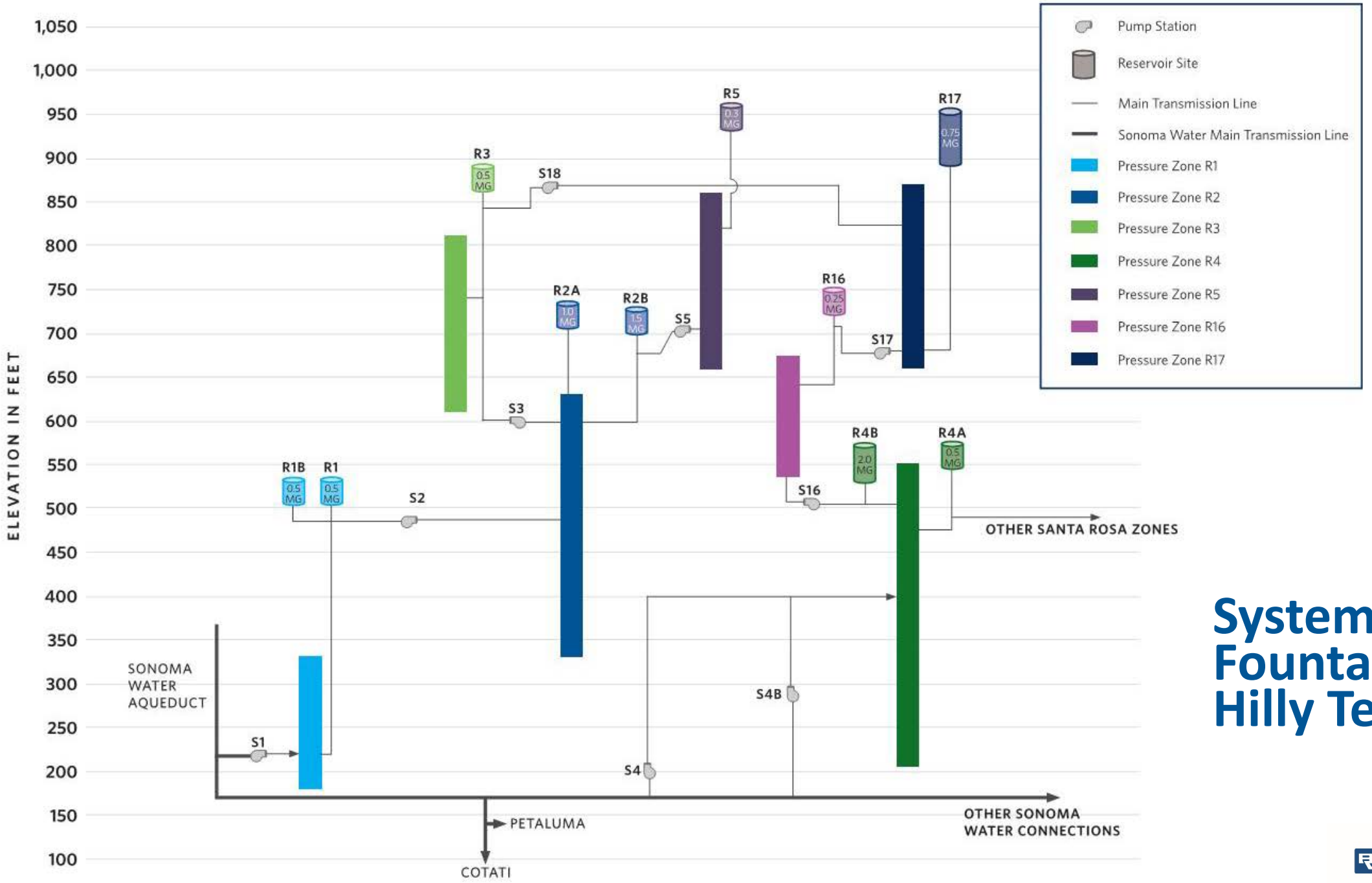
# Report Highlights

Karen Burgi
Regional Planning Leader
Black & Veatch Corporation

# Consultant Selected to Provide Third-party Review

- Black & Veatch is a global engineering, consulting and construction company
- Specializes in infrastructure-related projects in the water, energy, telecommunications markets
- Relevant experience in California and Colorado



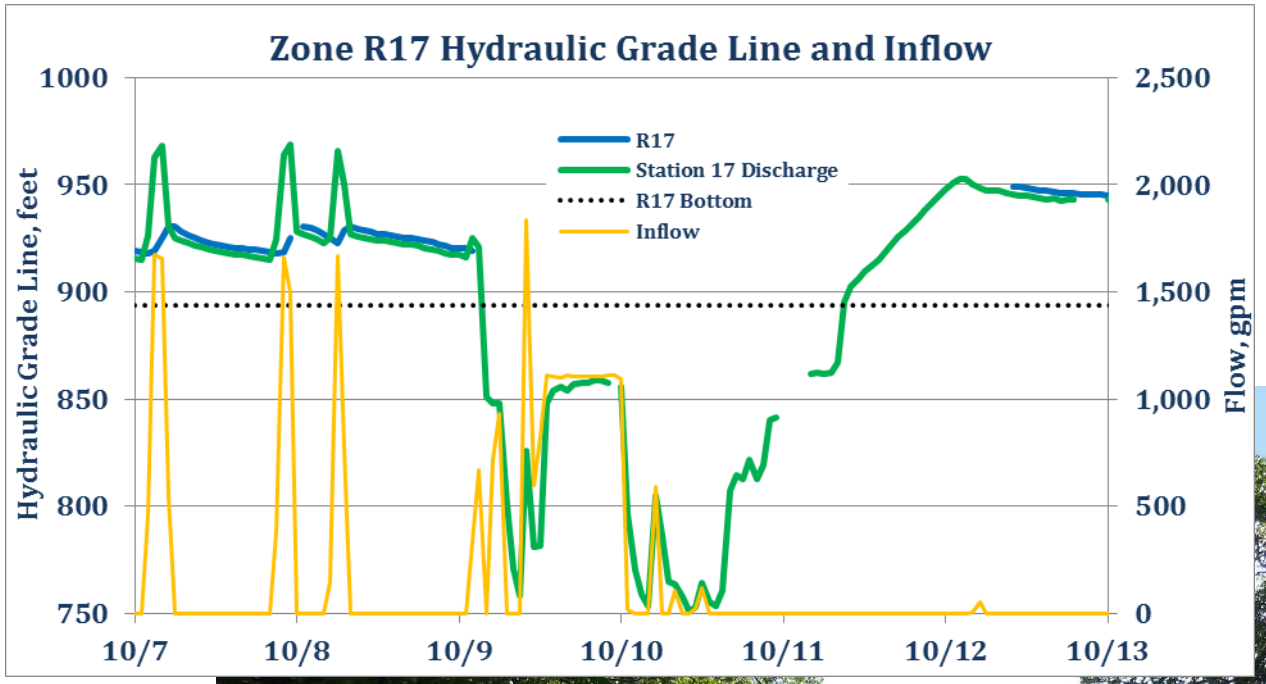



# System Serves Fountaingrove's Hilly Terrain

BLACK & VEATCH

# Data Mining

- Existing Hydraulic Model
- SCADA data
  - Pump Station Flows and Pressures
  - Tank Levels
- Reviewed pre-, during, and post-fire data




# Codes, Guidelines and System Review

- City's Fire Code based on California and international codes
- City's Fire Code is directed to specific structures.  To support this Fire Code, the water distribution system maintains a fireflow goal of 1,500 gpm at 20psi for 2 hours.
- Wildland-urban interface areas are not generally addressed in fire codes
- System's adequacy was evaluated as part of 2014 Water Master Plan
- All master plan recommendations for existing fireflow were implemented prior to Tubbs Fire
- Flow capacity was modeled based on operations prior to the fire

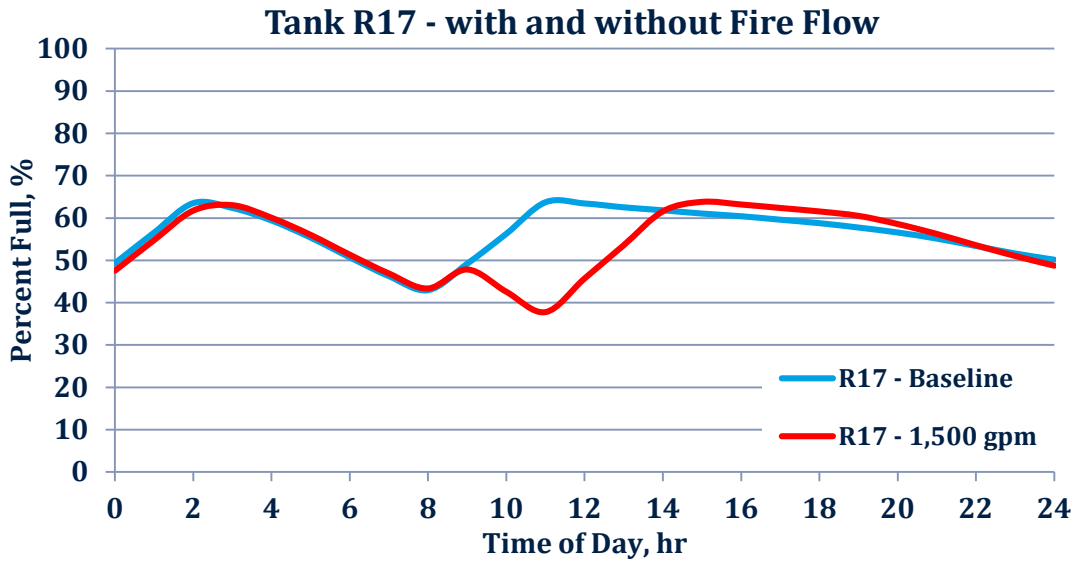
**Evaluation determined the system met City goals, with the pressure and storage capacity to deliver requisite fireflow.**

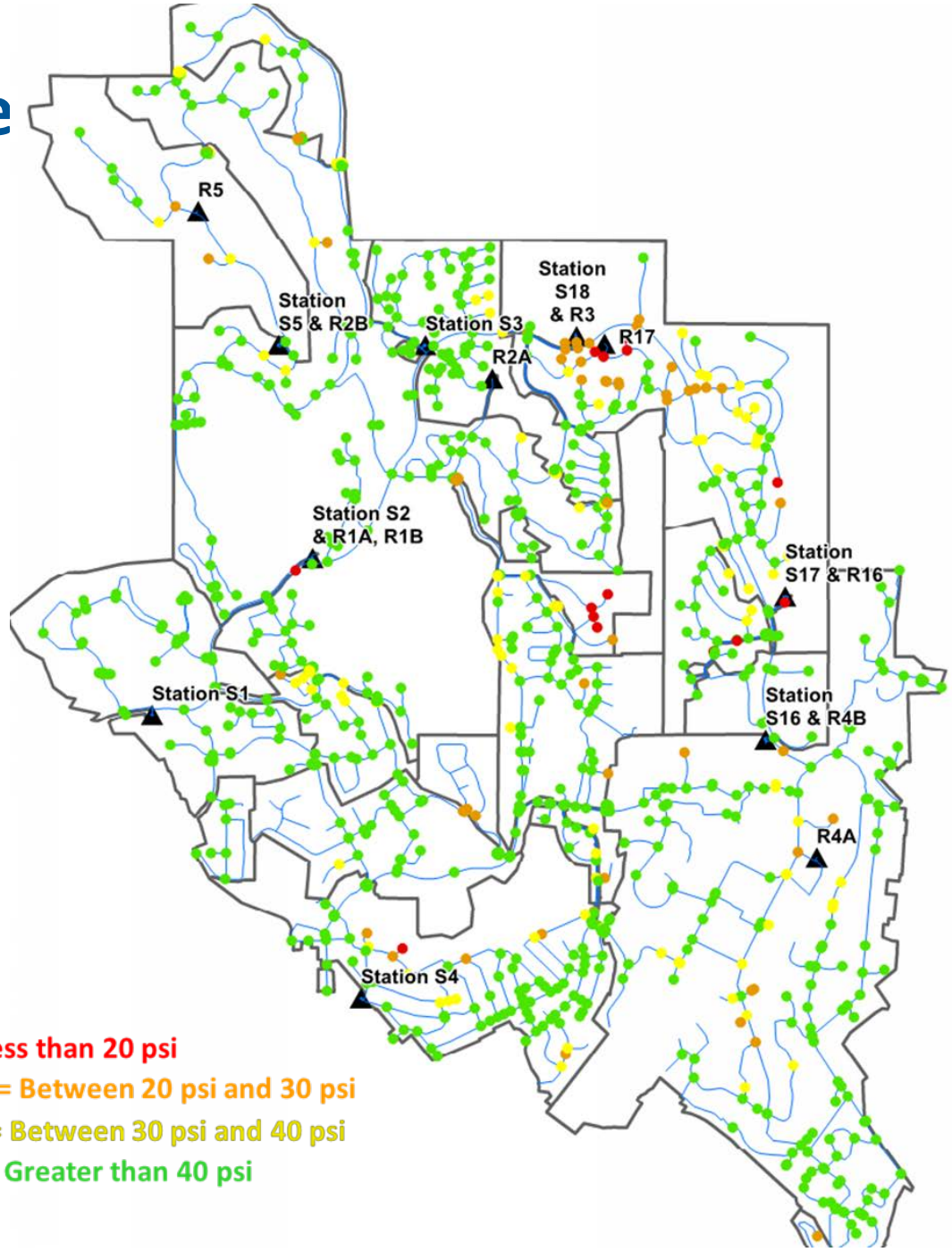
# Resiliency of Pumping, Pipeline and Storage Network

- Emergency generator power was provided at all booster pump stations
- Pressure regulating valves are installed between pressure zones
- Storage provides extra capacity beyond what's required by City fire goals
- Water quality considerations limit the amount of storage that could be available
- City has operating procedures to support emergency operations

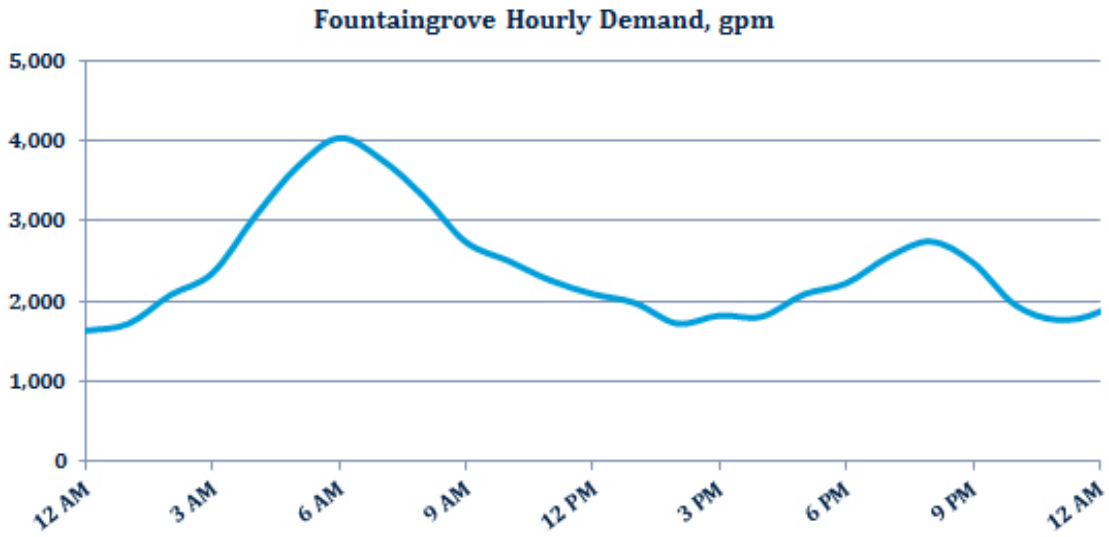
**Water system is sufficiently robust to allow for multiple operational combinations, to provide flow into specific areas, while maintaining overall water quality.**

# System has adequate capacity to mee requirements of City code



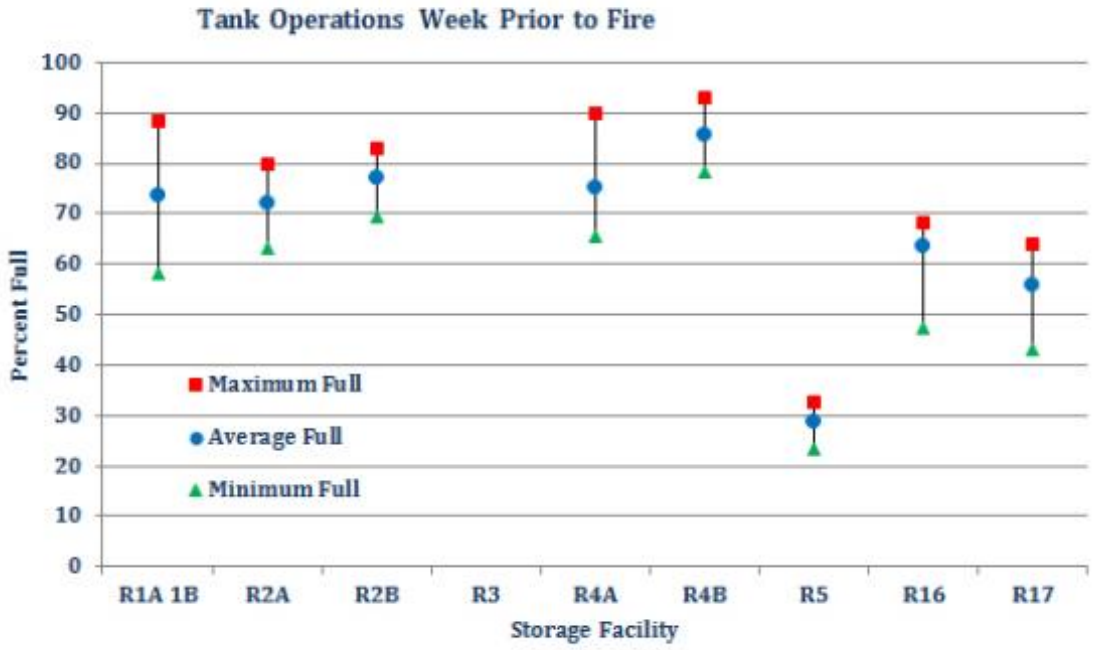



# System Demands Prior to the Tubbs Fire




- Peak demand: 4-9 a.m. daily
- Lowest demand: late night to early a.m. daily
- Increased use: 7-9 p.m. daily

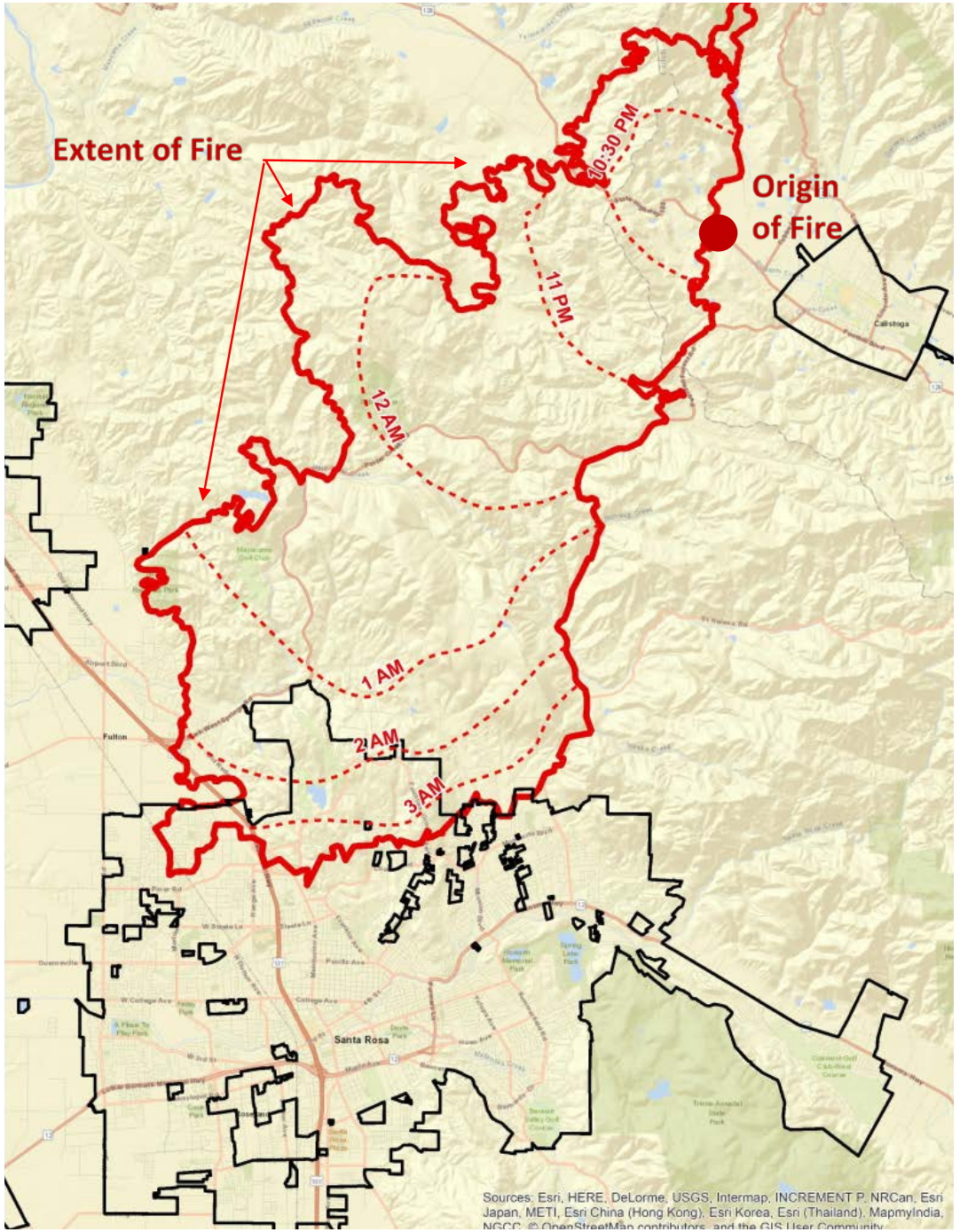
# System Operations and Facilities Prior to the Fire




- Most tanks operate at 3/4 of volume, which is standard practice
- Maintaining tanks at less than full
  - Allows tanks to support normal operations
  - Maintains water quality
- City uses large-volume pumps to offset lower storage volumes
- Tank R3 was out of service for seismic retrofit

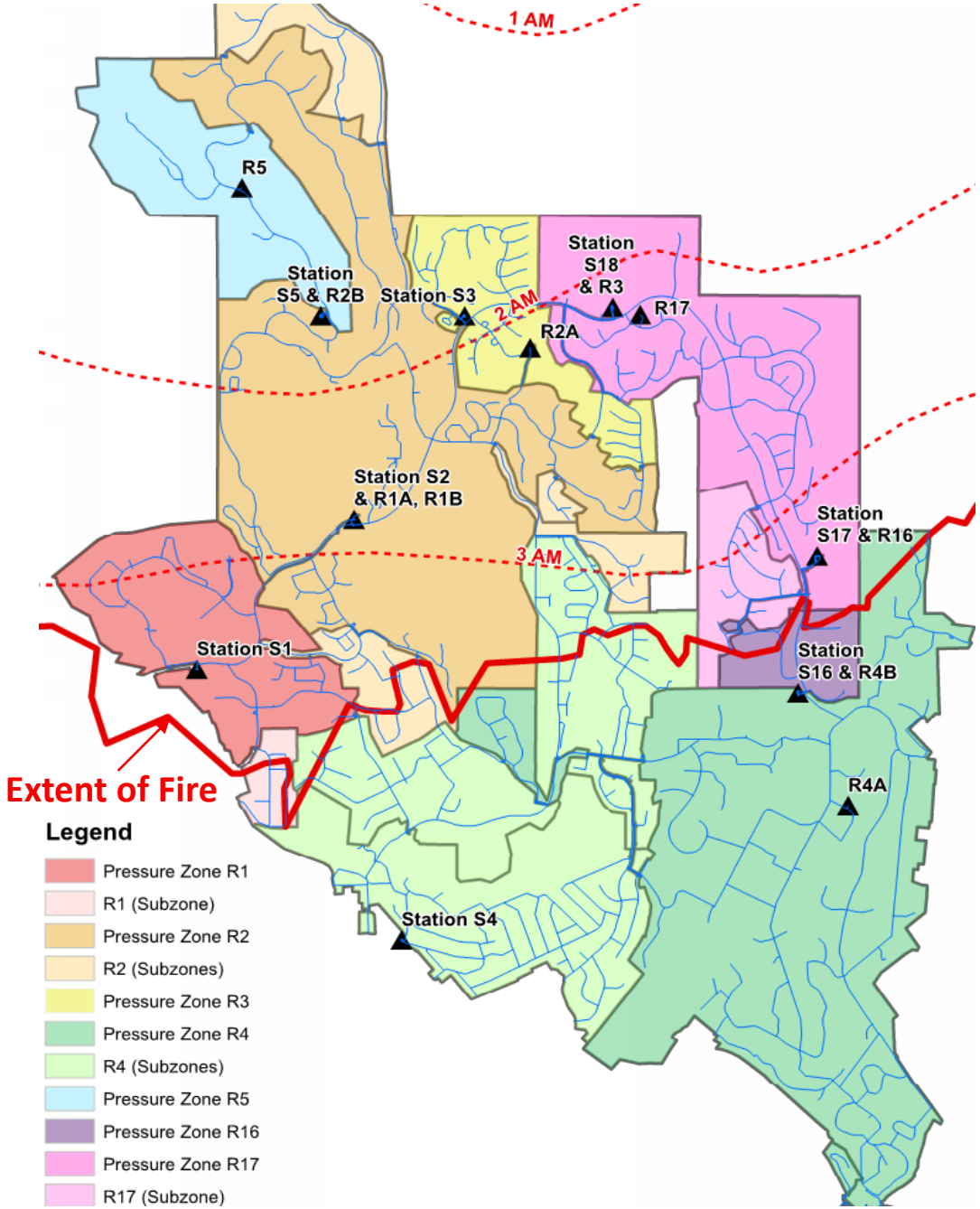
# Tubbs Fire Progression

- Single-digit humidity, strong and sustained winds, and plentiful fuel stemming from years of drought then record rainfall were key factors behind the fire's incredible speed, magnitude and intensity
- Fire estimated to have spread 12 miles in the first three hours

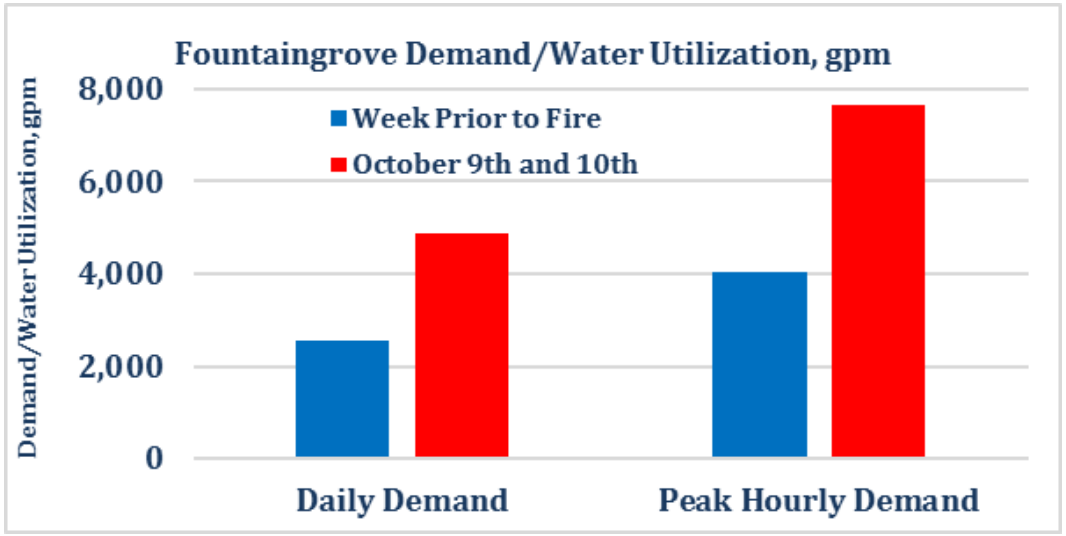


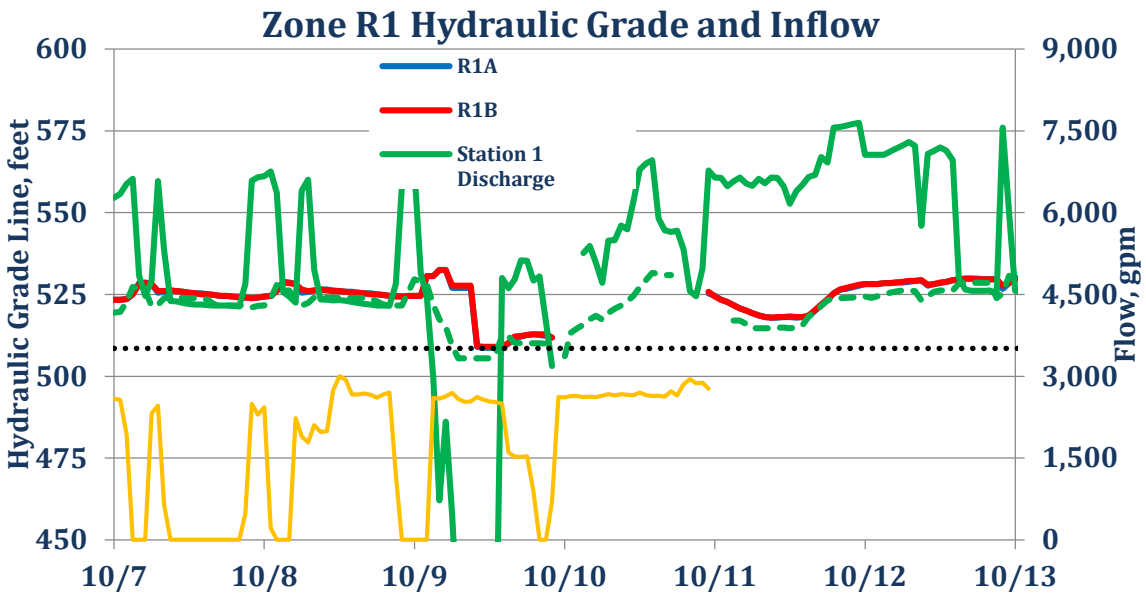
# System Impacts in Fountaingrove

- Even before the fire entered the City, widespread electrical power outages created the need for several facilities to rely on backup generator power. This included Station S2, where staff delivered a portable generator.
- Booster Pump Station S3 became inoperable around 3 a.m. because the water pressure in Pressure Zone R2 became too low to provide suction pressure
- Power outages and burned infrastructure caused SCADA system to freeze at some facilities, or report incorrect or no data at others



# Impact on Distribution System




- Demand skyrocketed beyond the normal and continued for hours, causing storage to drain quickly
- Demand came from firefighting efforts, including by residents, plus supply flowing freely from damaged lines, taps, connections
- In most cases the pumps continued to pump but could not maintain normal system pressures
- Supply could not recover until freely flowing services could be identified and closed

# Conclusions

- Water distribution system operated as designed and meets fire flow goals
- System was pumping, where there was suction head, but could not regain tank levels until flowing pipes were shut-off

# Recommendations – Distribution System Improvements

- Investigate ways to increase pumping reliability in the higher-pressure zones
- Examine adding additional interconnections and pressure regulating valves
- Study technical solutions to prevent openly flowing appurtenances
- Study feasibility of providing off-line storage
- Study feasibility of using large-diameter pipes or looping in dead-end areas
- Evaluate improvements to increase SCADA system reliability
- Perform a similar evaluation for Coffey Park area
- Update Master Plan to include lessons learned and follow recommendations identified

# Recommendations – Fire Flow Availability Modifications

- Evaluate system with fire flow goals based on land-use designations, zoning or structure type
- Weigh cost and water quality impacts of any modifications

**The goal is to provide a cost-effective system to meet both normal and emergency operating conditions**

# Recommendations – Emergency Response Considerations

- Formalize and document communications structure between the Water Department and Fire Department during red flag conditions
- Investigate and develop procedures that identify:
  - Available flows and pressures in various areas
  - Emergency operating plans for critical facilities
  - Communication protocols
  - Mobilization plan during fire events to turn off openly flowing appurtenances

# Moving Forward

Joe Schiavone

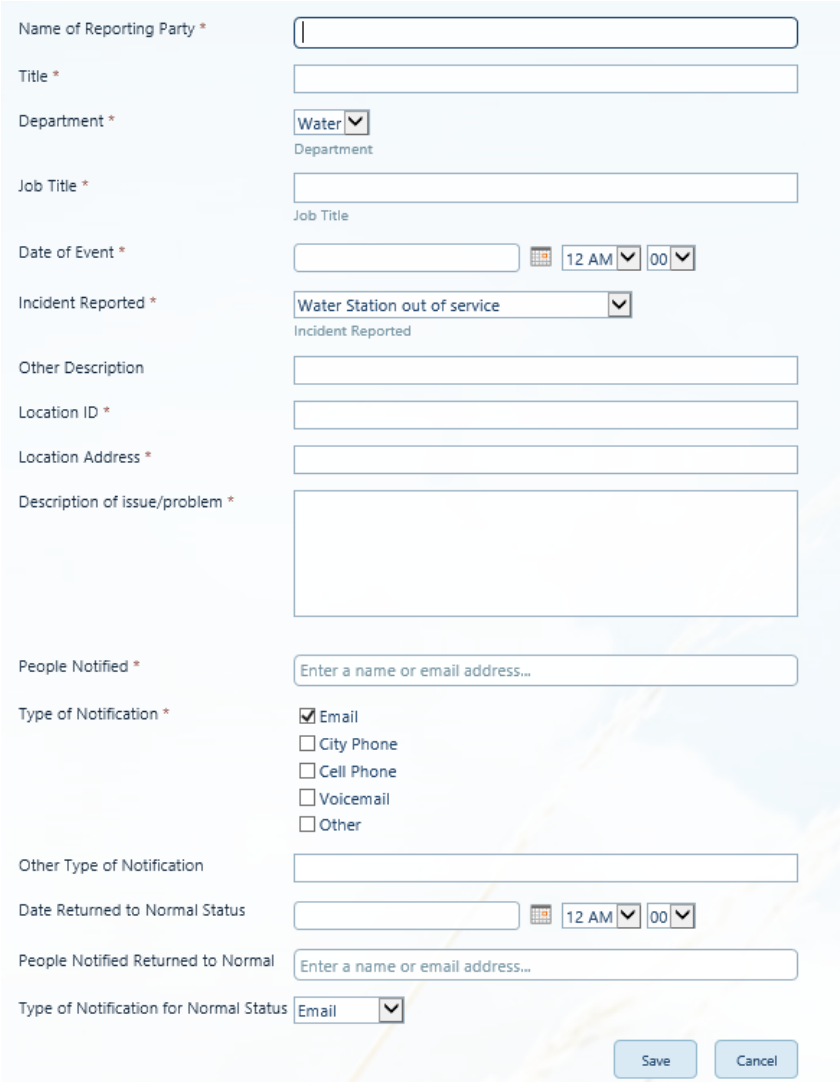
Deputy Director – Water and Sewer Operations
Water DOC Incident Commander

# Moving Forward -

- Value of Report Findings
- Recognize areas that could be improved
- Valuable tool for the department

# Progress Toward Recommendations– Planned Items for future analysis -

- Formalize and document communications structure between the Water Department and Fire Department during red flag conditions



# Progress Toward Recommendations– Planned Items for future analysis -

- Hardening of our infrastructure
- Advanced Communications (SCADA/Telemetry)
- Additional System Modeling/Further Review Of our Water Distribution System