

Seattle's Experience with Water Main Depressurization Events

PNWS AWWA - Bellevue

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Boil Water Order Issued for Some Communities

Those looking for more information can call 619-515-3525

“The advisory is the result of a major water main break Sunday evening, leaving customers with very low water pressure or no water.”



Protecting Public Health During a Loss of Pressure Event

A Guide for Large Water Systems



Effective Microbial Control Strategies for Main Breaks and Depressurization

Report #4307a

Subject Area: Water Quality



Boil-water advisory is issued for areas in upper Northwest D.C.

By Victoria St. Martin, Published: March 5 | Updated: Thursday, March 6, 3:24 AM E-mail the writer



Introduction

Response to water main depressurization where precautionary boil water advisory may be warranted.

- May be from main break or other event, such as pump station failure or accidental valve closure.
- Not talking about main break site.

Outline

- **Overview of 5 events in Seattle**
 - Dexter Ave, 2007
 - Beacon Hill, 2008
 - Graham Hill, 2012
 - University Village, 2013
 - Capitol Hill, 2013
- **Key issues in event response**
- **Effort to prevent pressure loss**

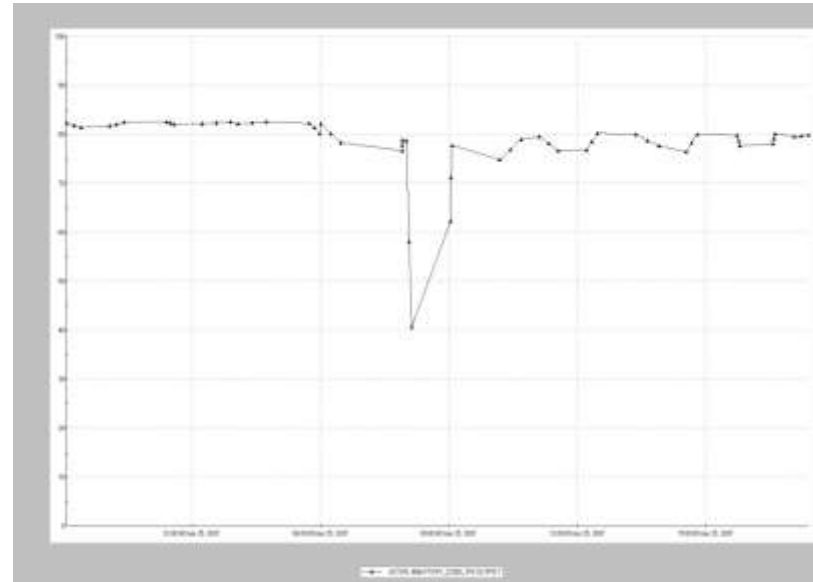
Dexter Ave (April 2007)

- Contractor broke 20-inch feeder
- River down the street, flooding some businesses



Dexter Ave (April 2007)

- Low pressure only
- No boil water advisory
- Extensive discolored water
- Press release about the event and discolored water
- Local Health Dept. notified restaurants – shutting down with discolored water



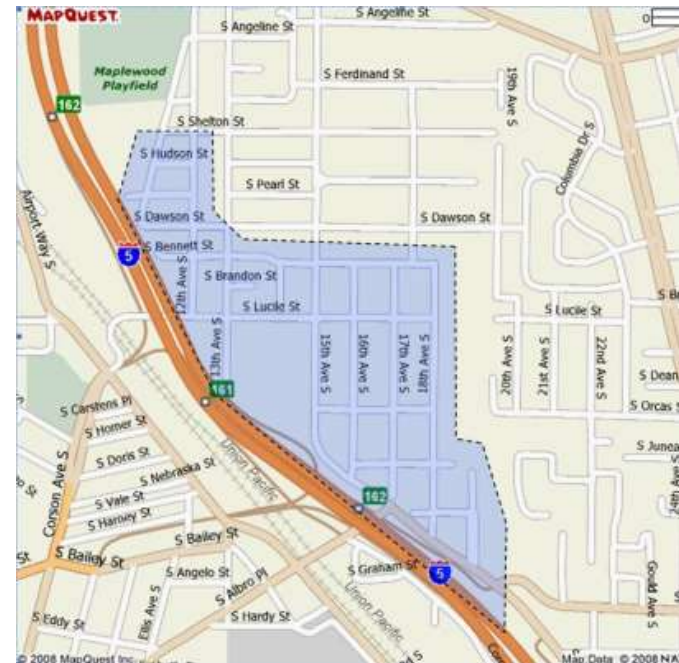
Beacon Hill (August 2008)

- Small sub-pressure zone on hillside (460 services)
- Two feeds to zone, one shutdown for planned maintenance, other shutdown for emergency repair
- Much of zone completely depressurized



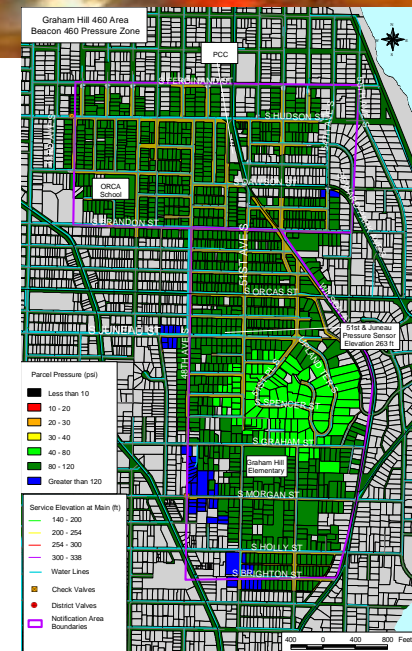
Beacon Hill (August 2008)

- Precautionary boil water advisory – decision by SPU drinking water director (consultation with Wash. DOH)
- Restored pressure, released air, sampled, flushed
- Prepare public notice templates and preparing communications staff
- Need to effectively communicate affected area



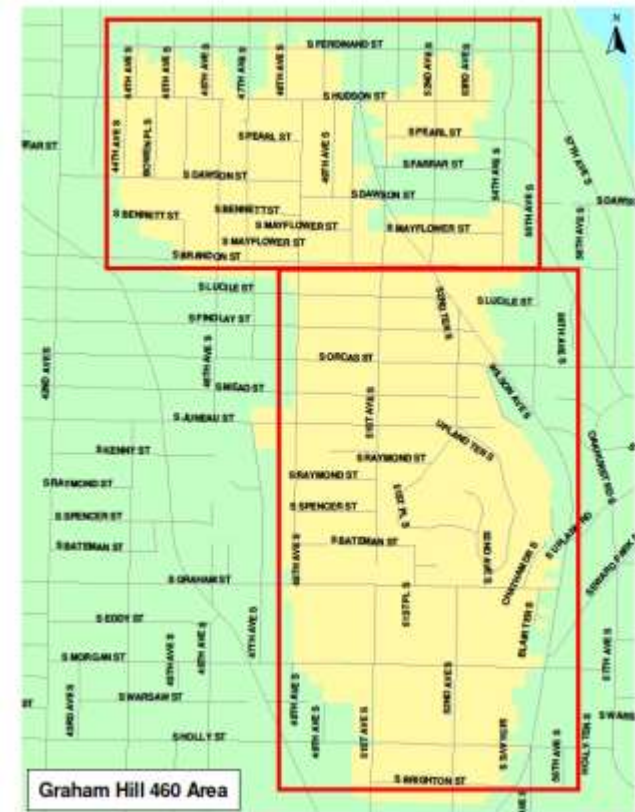
Graham Hill (January 2012)

- Break on primary supply to this upper pressure zone ~2:00 AM
- Top of pressure zone drained of water, others with low pressure (1,300 services)
- Precautionary boil water advisory – decision by SPU in consultation with Wash. DOH



Graham Hill (January 2012)

- Restoring pressure, sampling, flushing
- Internal communication
 - First press release issued in early AM
- Timeliness of notification:
 - Getting and assessing information
 - Mapping
 - Issuing boil notice
 - Outdialer not used



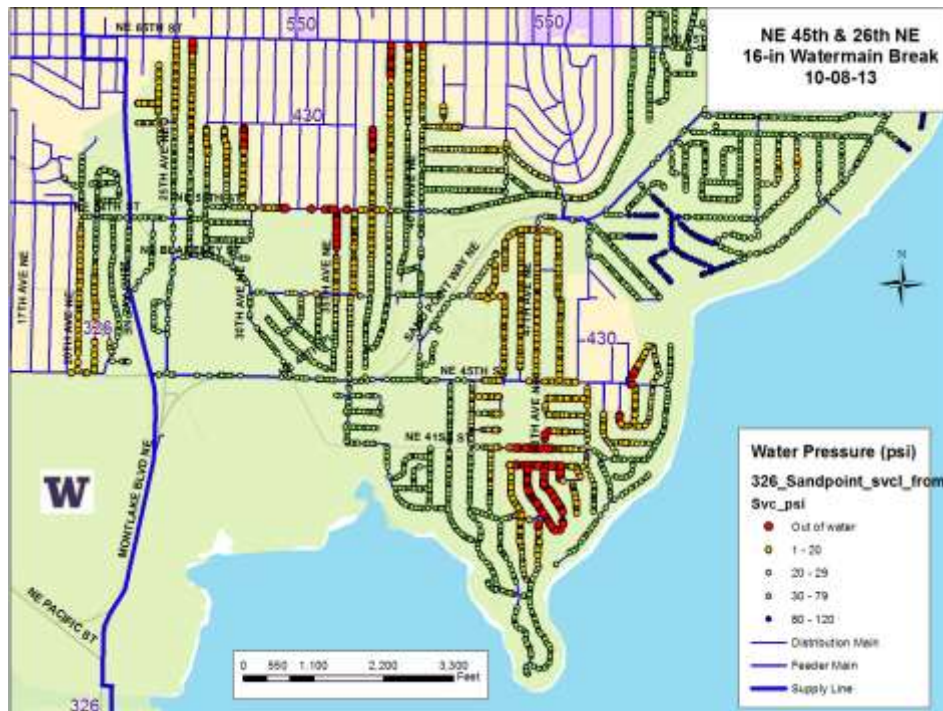
University Village (October 2013)

- Break on a 16-inch feeder line
- Concern for flooding, bridge pier, water pressure
- Several thousand customers in the zone
 - many with reduced pressure and discolored water
 - few with loss of pressure



University Village (October 2013)

- No boil advisory
- Collected samples for information – all results good
- Flushed high points



Capitol Hill (October 2013)

- Small part of pressure zone with a single feed
- Due to a main break, single feed closed
- Loss of pressure to 150 residences
- Boil water advisory
- Notified by auto-dialer and with door hangers, issued press release
- Sampled and flushed



Key Issues in Responding to Events

- Event awareness
- Assessing initial information
- Boil water decision
- Response coordination
- Communication
- Water quality testing

Becoming aware of the event:

- Concern about the risk to water quality with pressure loss is new for many folks.
- Front-line staff
 1. Field crews
 2. Customer service/customer calls
 3. SCADA operators
- Raise the issue internally

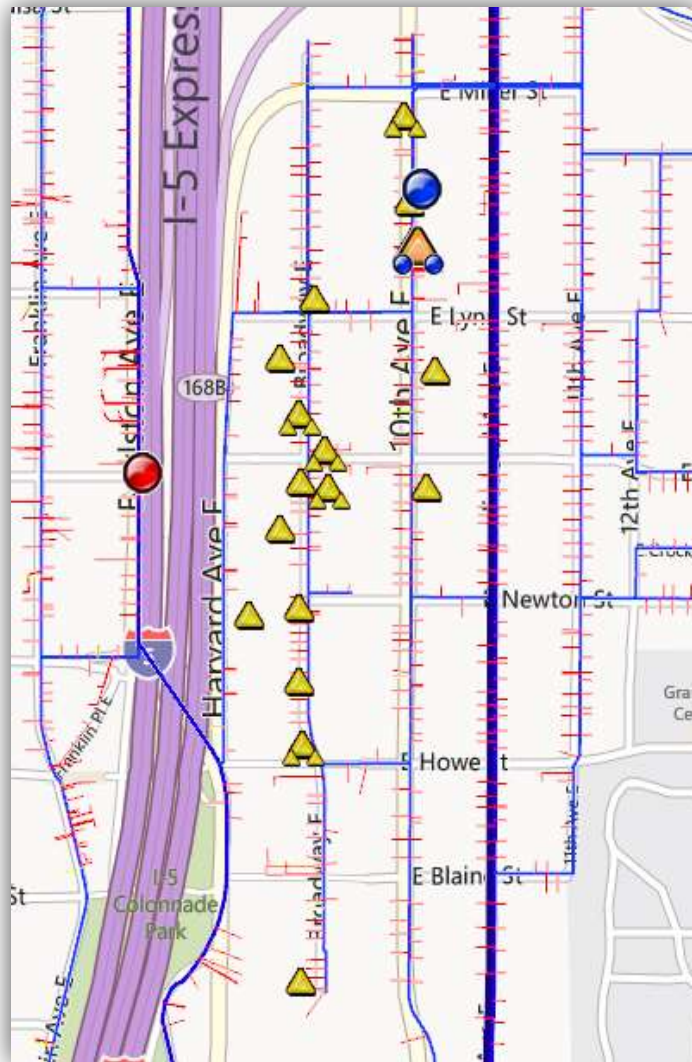
Obtaining and Assessing Initial Information

- Is pressure lost or just reduced?
 - Where is pressure lost? What area is affected?
-
- Customer calls
 - Field reports
 - SCADA

Initial Information – Customer Calls

- Logging and tracking calls
 - Database entry of customer calls
 - Quality of call information (low vs. no pressure, location)
- Mapping customer calls
- Timeliness of data entry
- Access to information after hours

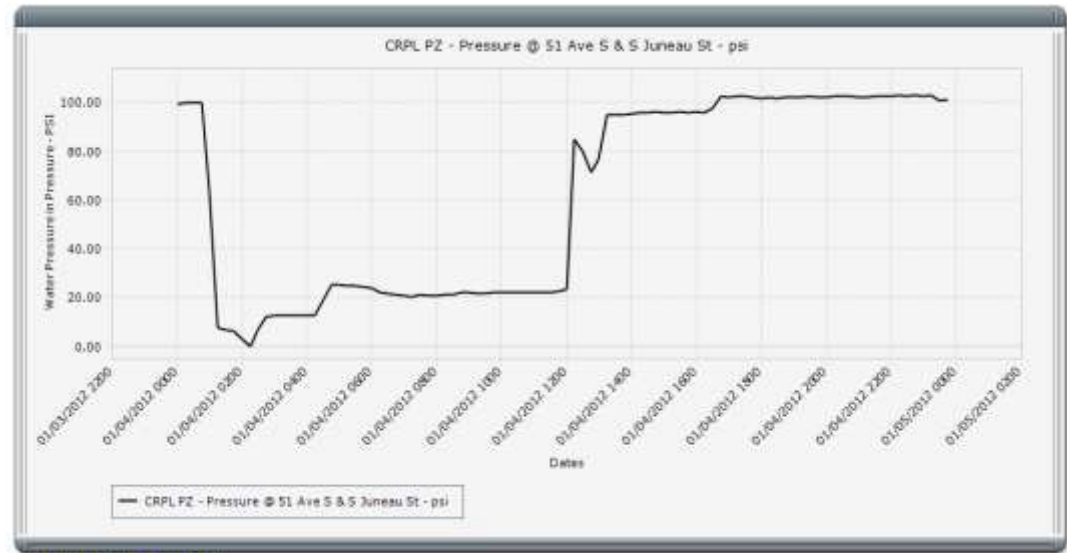
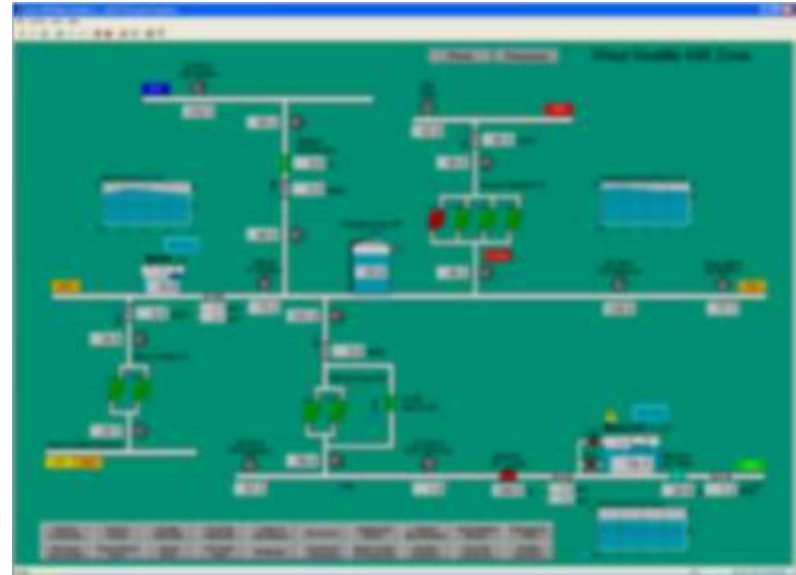
Initial Information: Mapping Customer Complaints of Low Pressure



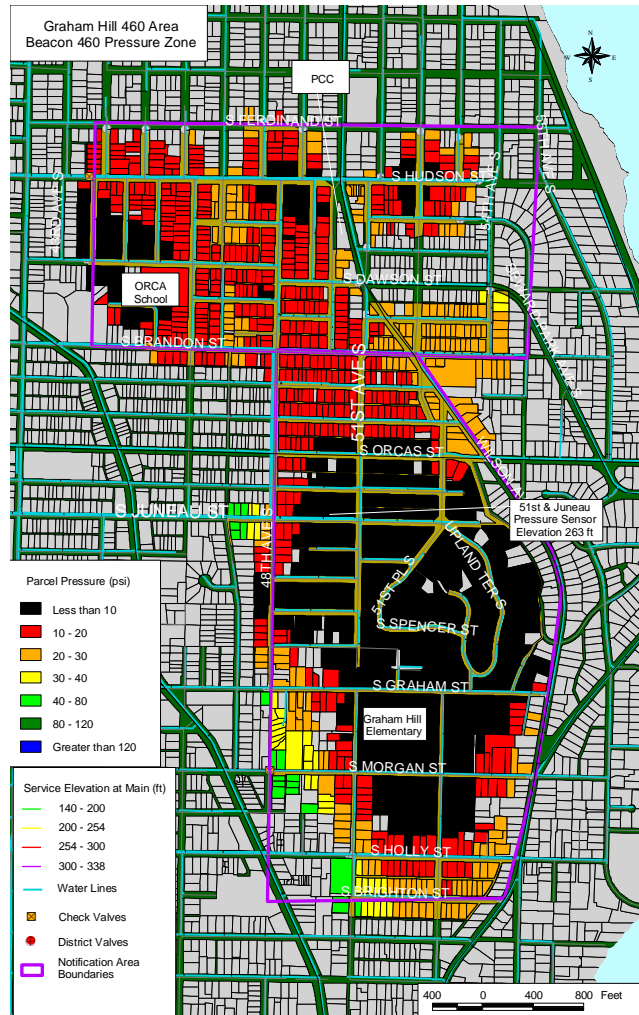
Initial Information - SCADA

Remote pressure sensors, level, & flow sensors:

- Location of sensors
- Interpretation of sensor information
 - Elevations

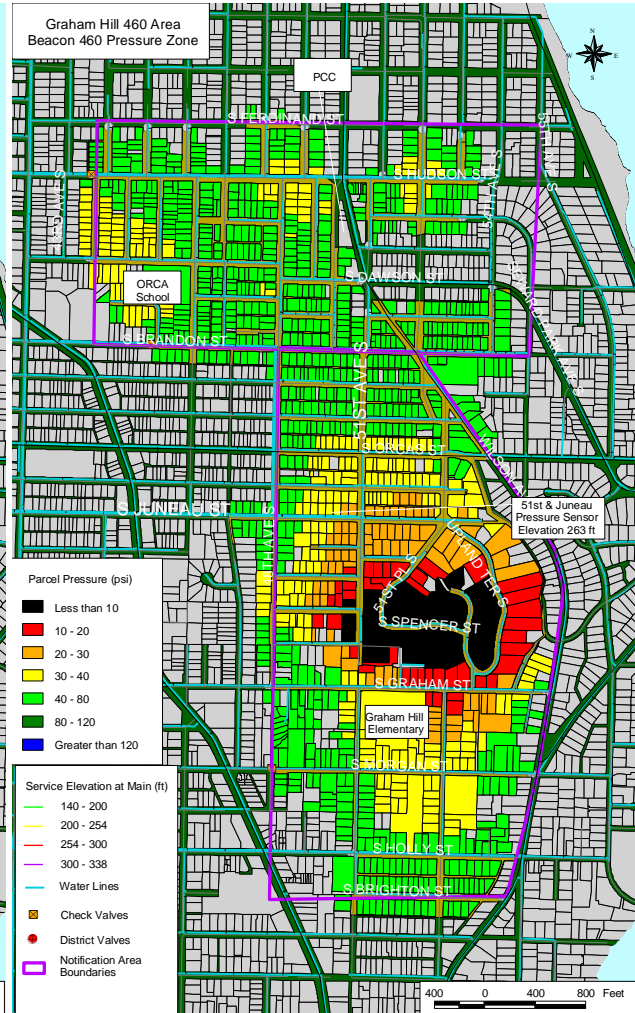
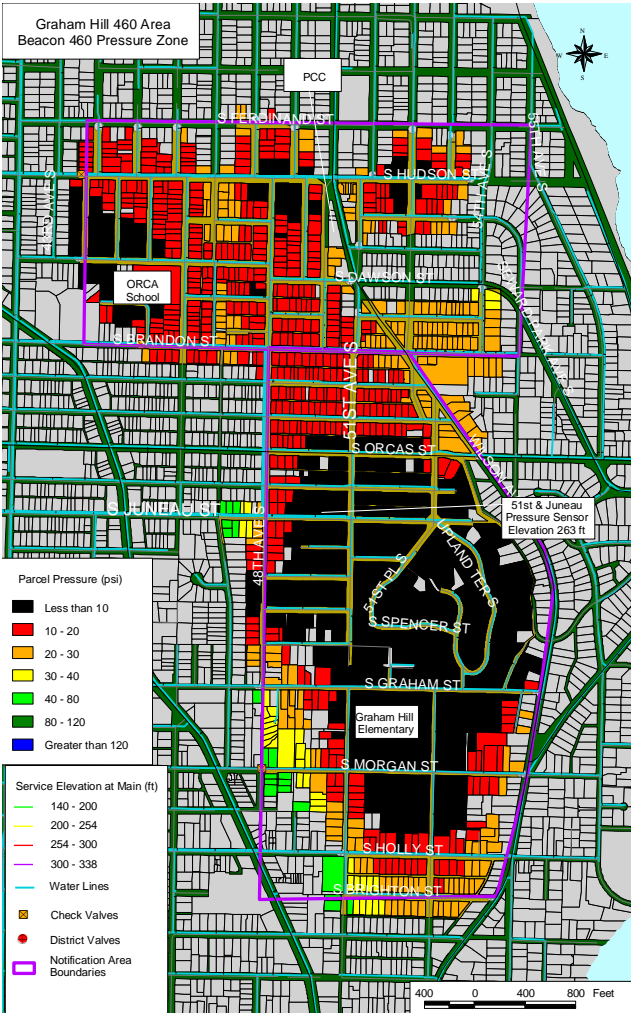


Pressure sensor at zero psi.



Pressure sensor at zero psi.

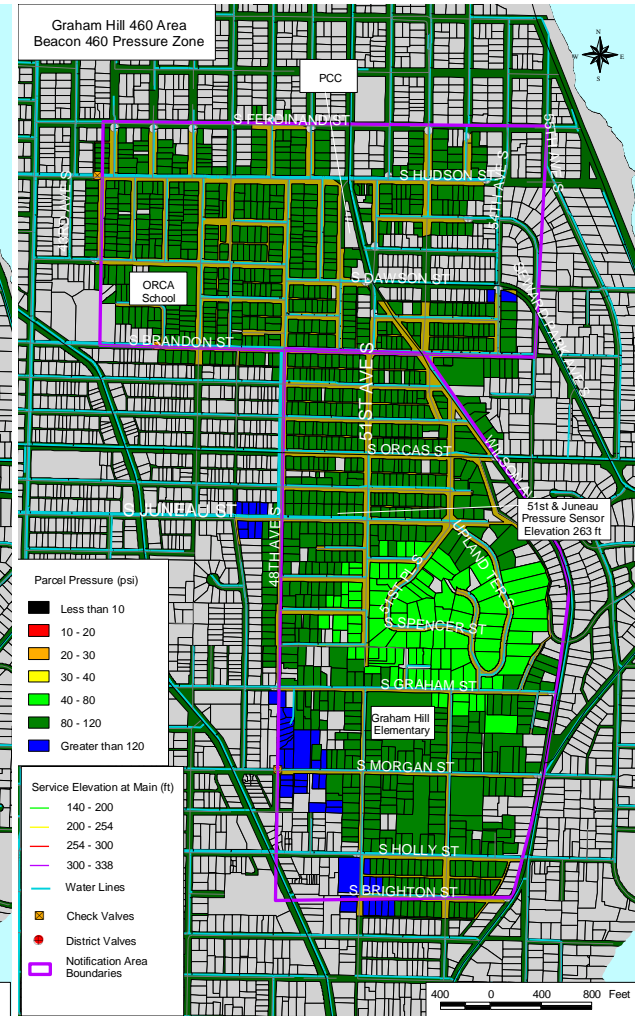
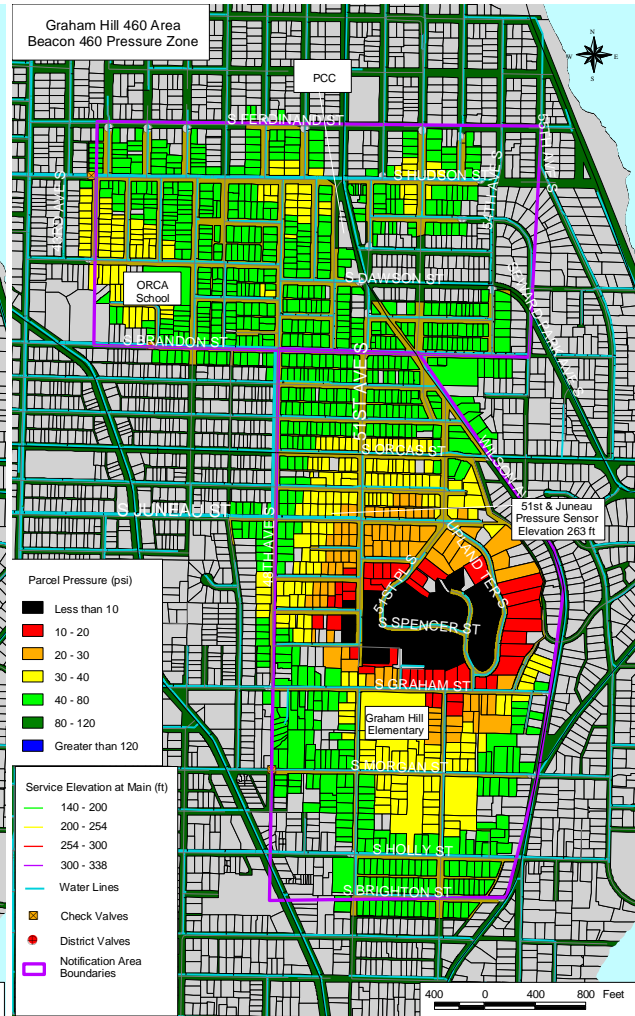
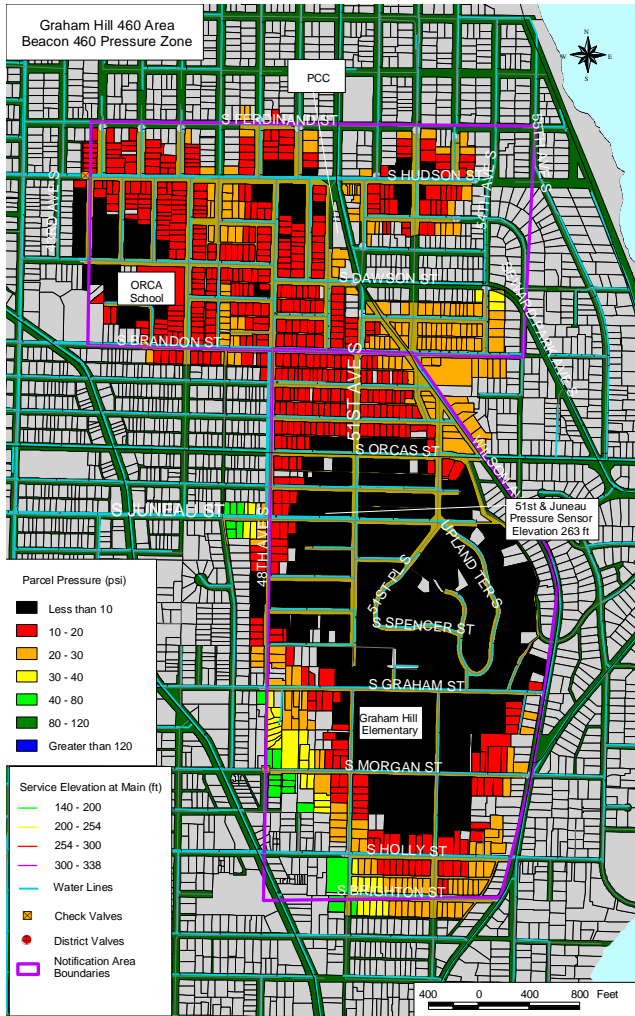
Pressure sensor at 30 psi.



Pressure sensor at zero psi.

Pressure sensor at 30 psi.

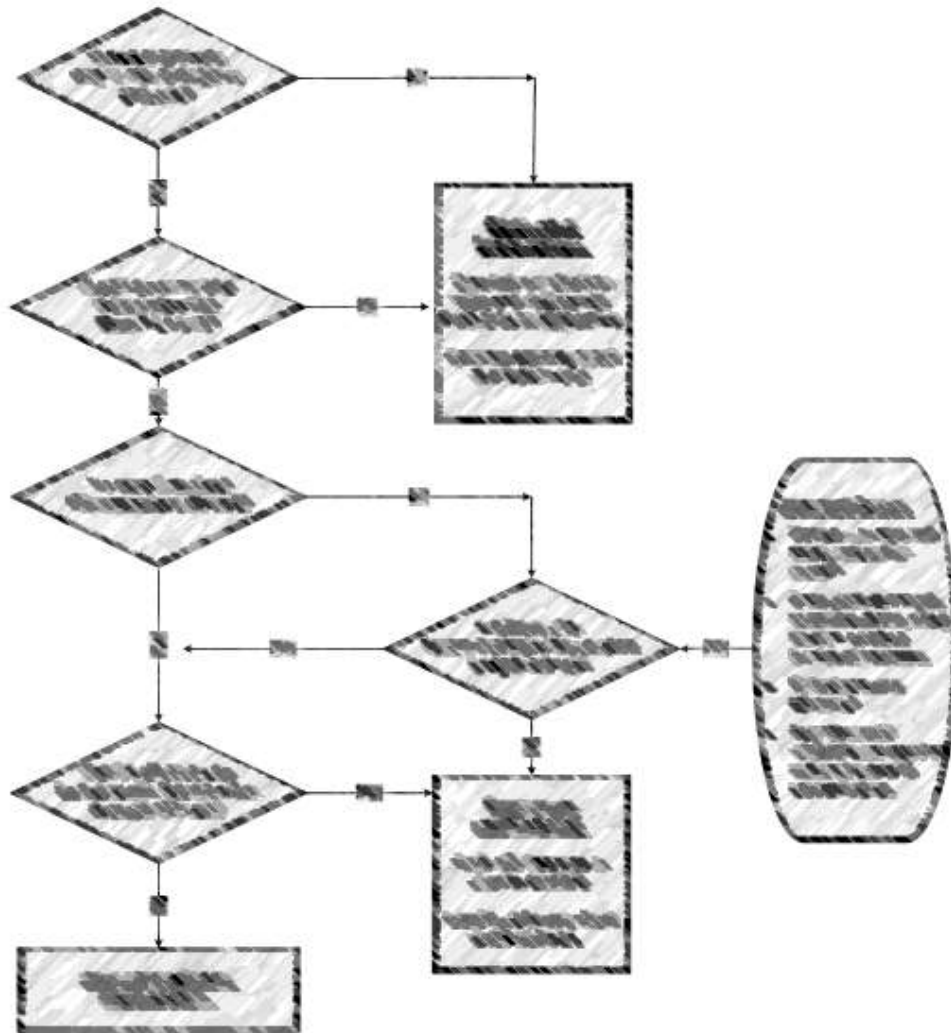
Pressure sensor at 80 psi.



Boil Water Decision with Pressure Loss

- Yes, No, Maybe
- Working with whatever limited data are available
- Who makes the decision?
- What criteria are used to make the decision?

Decision Criteria – SPU Chart



Decision Criteria – WaterRF 4307

Type I Break	Type II Break	Type III Break	Type IV Break
<ul style="list-style-type: none"> Positive pressure maintained during break 	<ul style="list-style-type: none"> Positive pressure maintained during break 	<ul style="list-style-type: none"> Loss of pressure at break site/ depressurization elsewhere in system 	<ul style="list-style-type: none"> Loss of pressure at break site/ depressurization elsewhere in system
<ul style="list-style-type: none"> Pressure maintained during repair 	<ul style="list-style-type: none"> Pressure maintained until break exposed 	<ul style="list-style-type: none"> Partially or uncontrolled shutdown 	<ul style="list-style-type: none"> Widespread depressurization
<ul style="list-style-type: none"> No signs of contamination intrusion 	<ul style="list-style-type: none"> No signs of contamination intrusion 	<ul style="list-style-type: none"> Possible contamination intrusion 	<ul style="list-style-type: none"> Possible/ actual contamination intrusion



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Decision Criteria – Wash. DOH

Washington State Department of Health

Office of Drinking Water

Water Main Break Response Protocols for Chlorinated Systems

(In Development - Version 4.30.14)



Steve Deem, P.E.

PNWS AWWA May 2014

Eugene, Oregon



Washington State Department of Health

Office of Drinking Water

See attachments

Type III Main Break Procedures

- Assess environmental impacts – respond accordingly
- Call Washington 811
- Provide generic water main break notification and customer response steps on utility website asap (or directly to customers)
- Evaluate possible contamination including consideration of CCC Program
- Call DOH and local health jurisdiction – decide appropriate public notification message / methods
- Issue BWA – update utility website (System wide or pressure zone specific).
- Isolate / shut off customer services at the break site (if practical)
- Excavate to below break
- Disinfect repair parts, swab or spray repair site w/ 1% chlorine solution
- Make repair
- Post repair disinfection may be needed if an uncontrolled break has allowed contamination to enter the system (Refer to *(new)* AWWA Std C651 Section 4.11)



Utilities

Response Coordination

Establish Incident Command sooner than later

- ❑ Leap from routine water main break repair to managing a boil water advisory
- ❑ Several groups to coordinate: operations, water quality, communications, customer service, executives

Communication with health/regulatory authority

- ❑ Do it soon, but have the pertinent information ready

Coordinating with local health department

- ❑ Local drinking water program
- ❑ Restaurants
- ❑ Sensitive customers (health care, schools, etc.)

Notifying the Public

Timeliness – customers want to know now

Preparation

- Prepare staff
- Templates and canned messages
- Map making for boil water area

Notification Methods

- Press release, outdialer, website, door hangers, social media, signs
- Languages

Coordination with health authorities

Provide event updates

Water Quality Testing

Know what you want to test for:

- Chlorine, coliform, temperature
- Turbidity, pH, conductivity, etc.

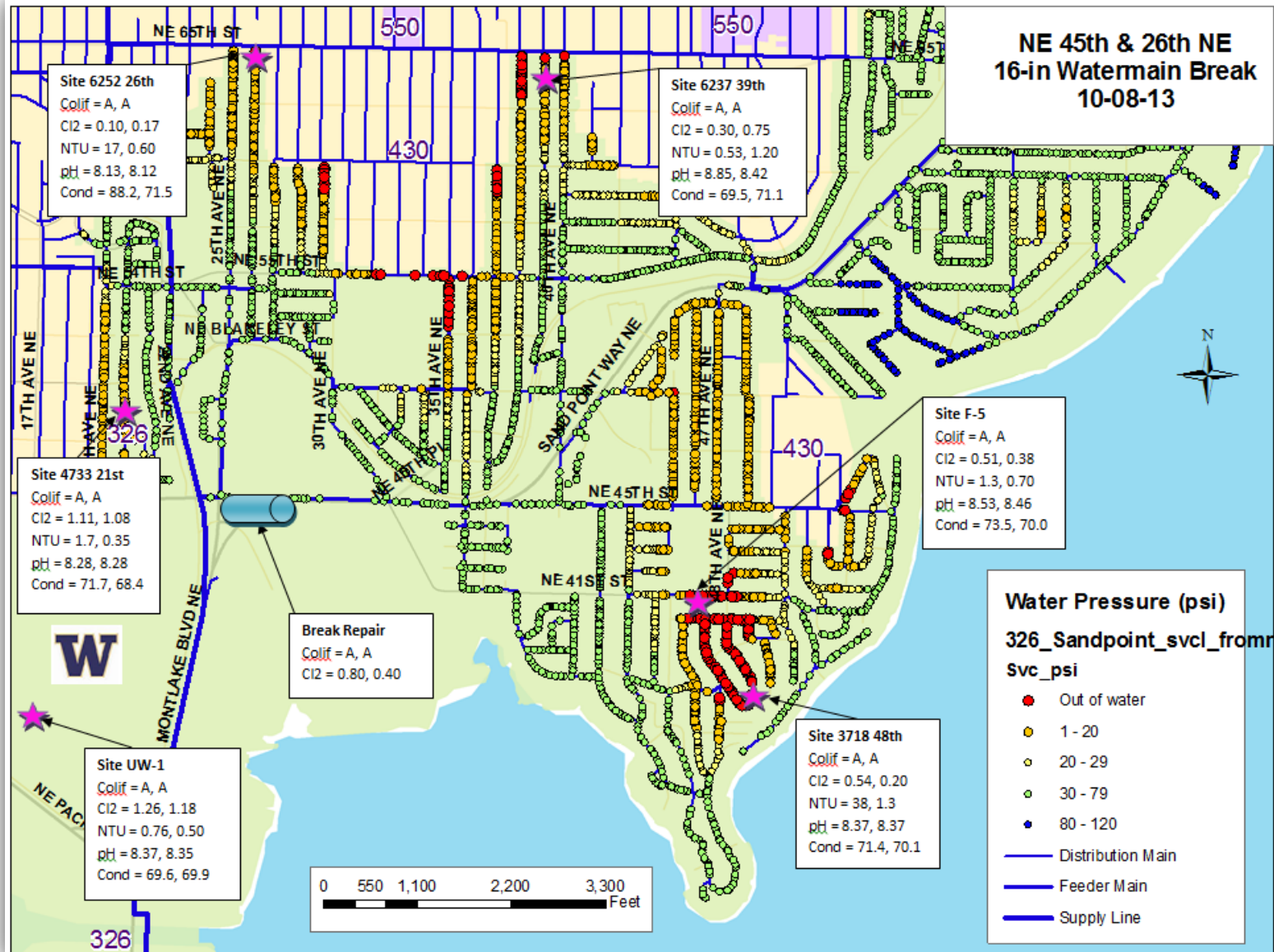
Determine number of samples and where to sample

- Non-routine sampling sites

Number of sampling rounds

- Plan for lifting boil water advisory
- SPU: 2 rounds at least 6 hours apart

Sampling from U-Village Break

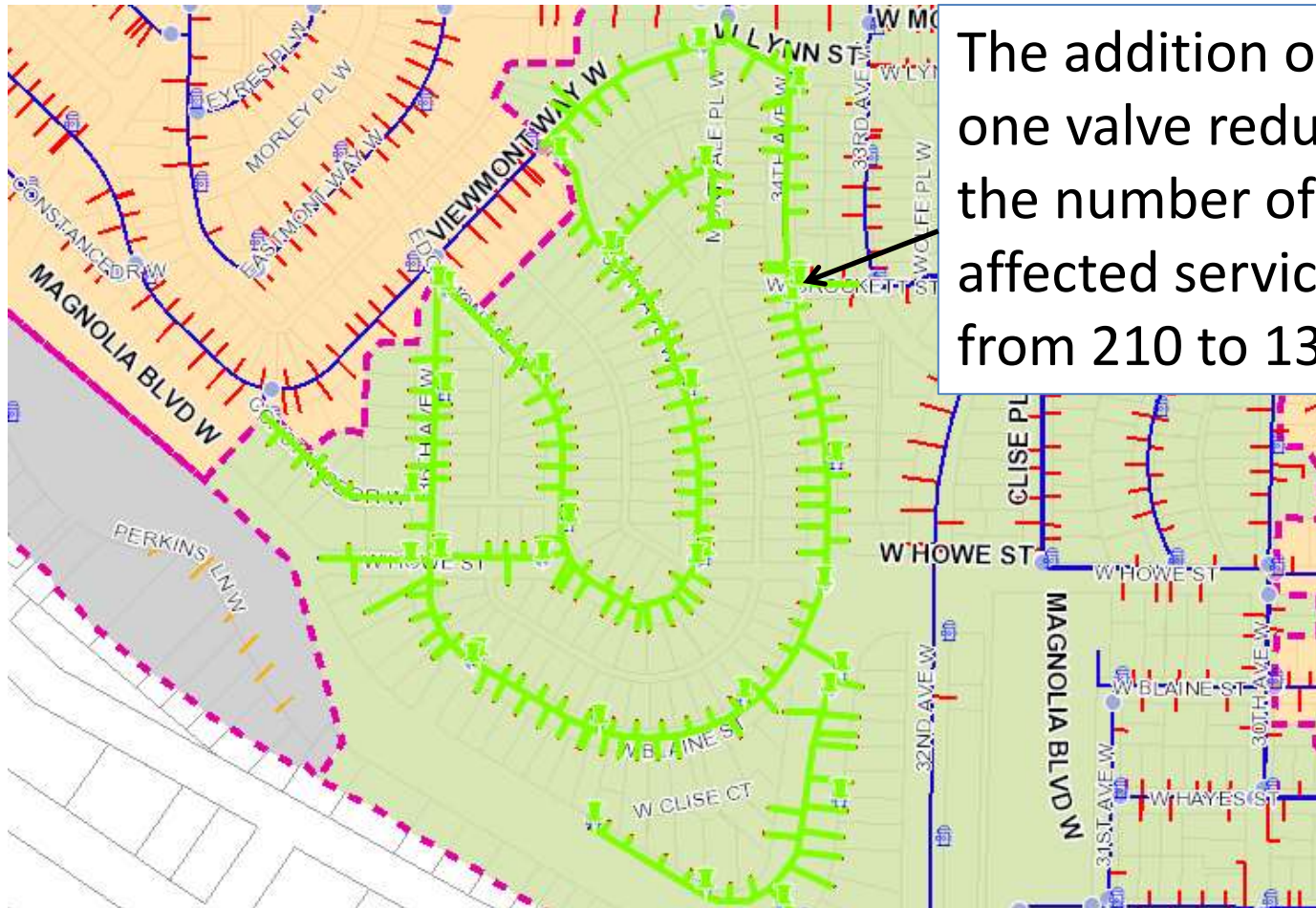


Effort to Prevent Depressurization

High Impact Shutdown Blocks

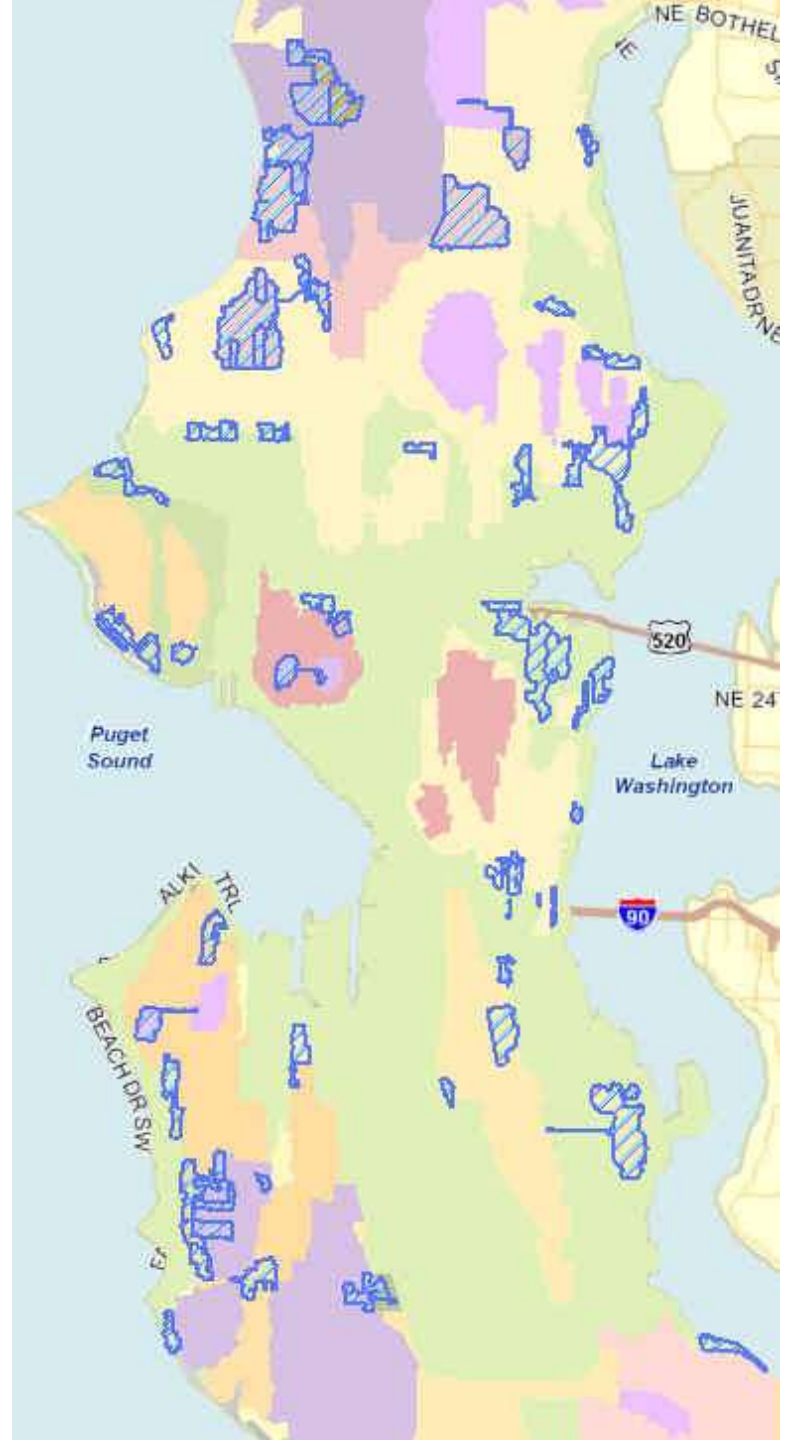
- ❑ Reviewed distribution system for areas with single pipeline feed or where pipe shutdown affects large area
- ❑ Identified areas based on a few factors (e.g., number of services affected, sensitive customers)
- ❑ Added to GIS system as operational information
- ❑ Developed capital improvements
 - ❑ For example, add second pipeline feed or bypass or valving
 - ❑ Reduces impact of planned shutdowns and reduces the potential for depressurization events

Example Shutdown Block



The addition of one valve reduces the number of affected services from 210 to 13.

Mapping these Shutdown Blocks



Takeaway Points

- Early communication to customers
- Early event information is limited
- Preparation is key:
 - Staff awareness
 - Decision making on boil or no boil
 - Pre-planned notification messages and methods
- Health protection and customer confidence are primary drivers

Questions?