Tualatin Valley Water District

Balancing the Hydraulic Grade Line in a Large Pressure Zone

May 1, 2015

AWWA-PNWS 2015 Annual Conference

Bellevue, WA

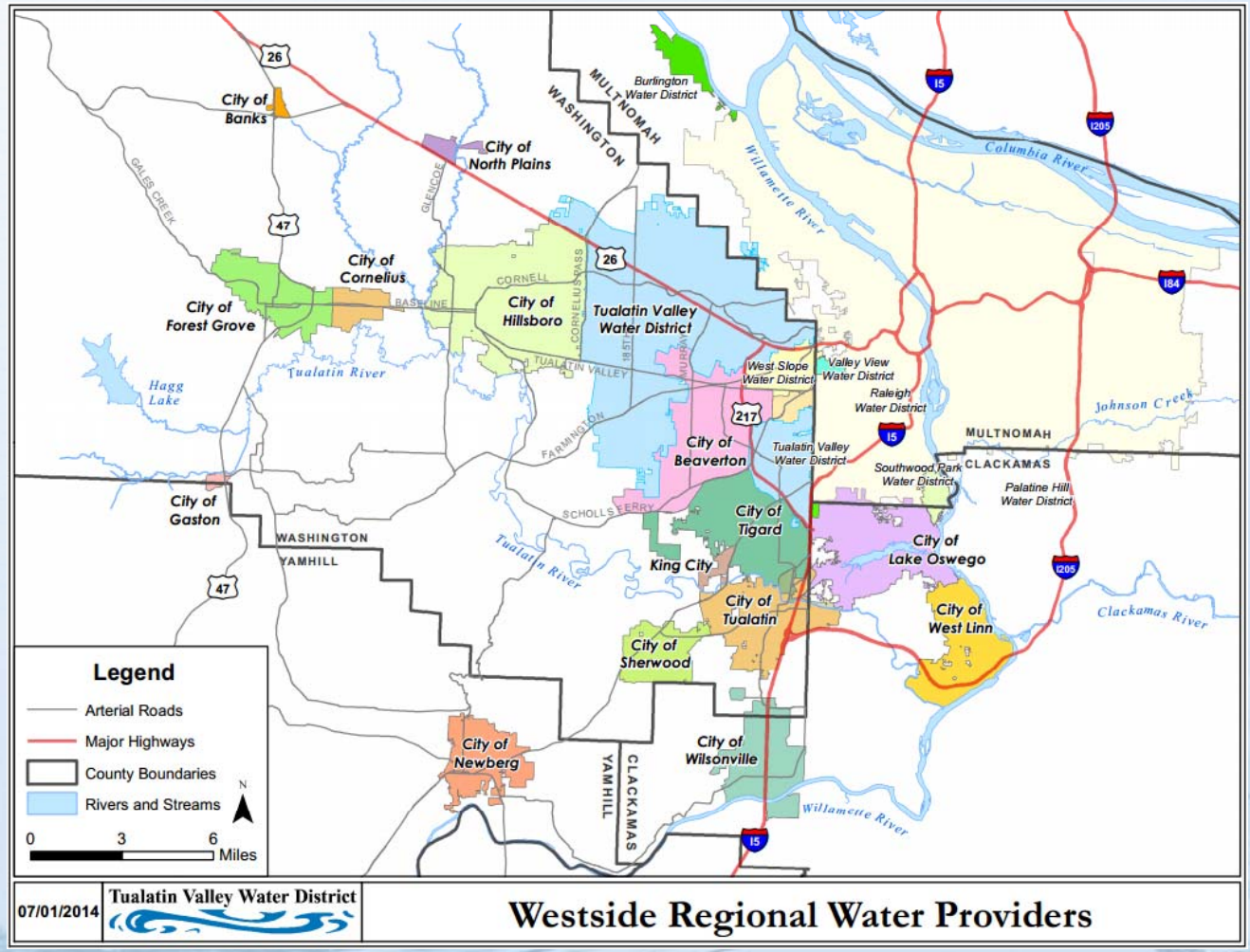
Outline

1. Orientation to TVWD And The 385 Pressure Zone
2. Results of Initial Study
3. Recommended Strategy

ORIENTATION TO TVWD AND THE 385 PRESSURE ZONE

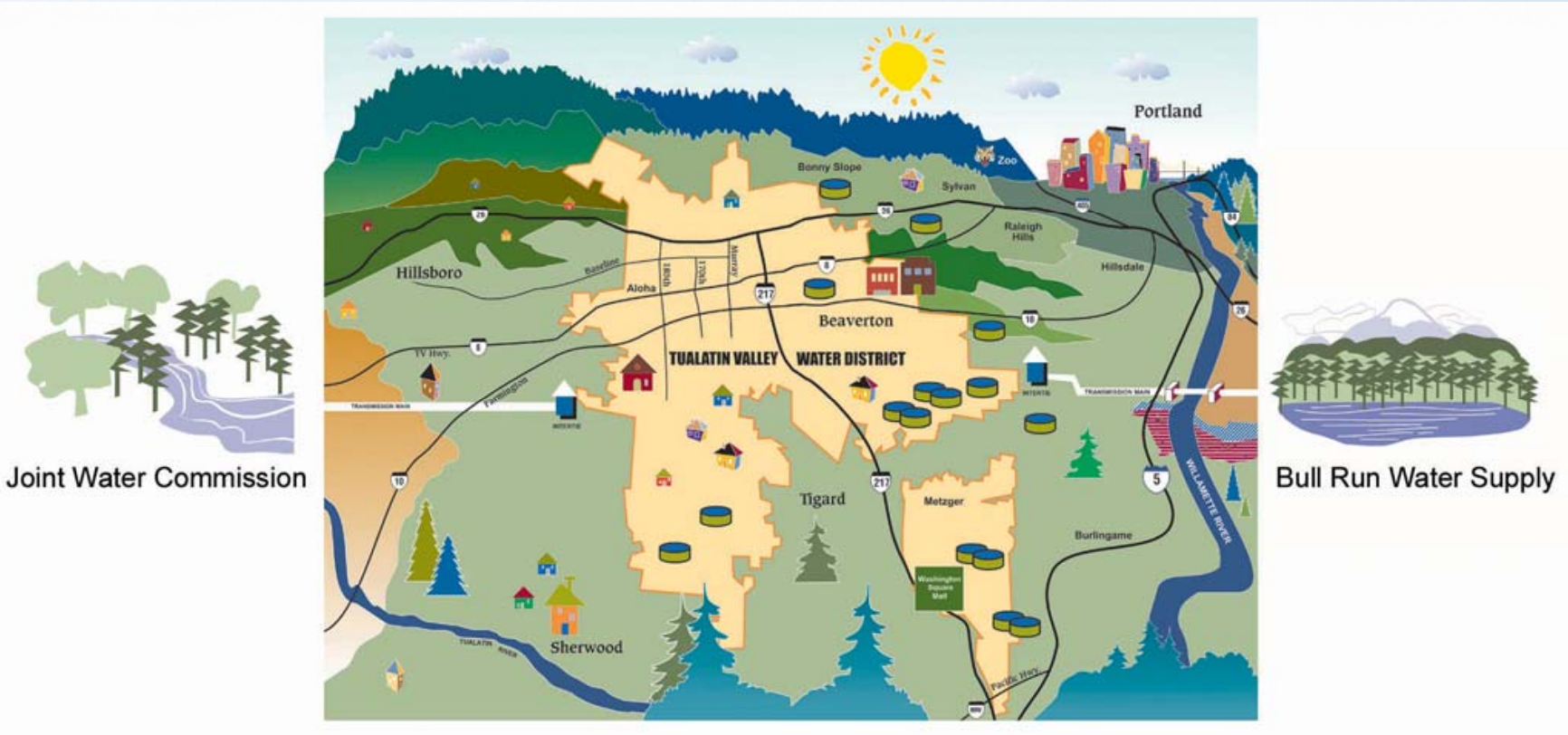
Tualatin Valley Water District

- Second largest water provider in the Portland Metro Area



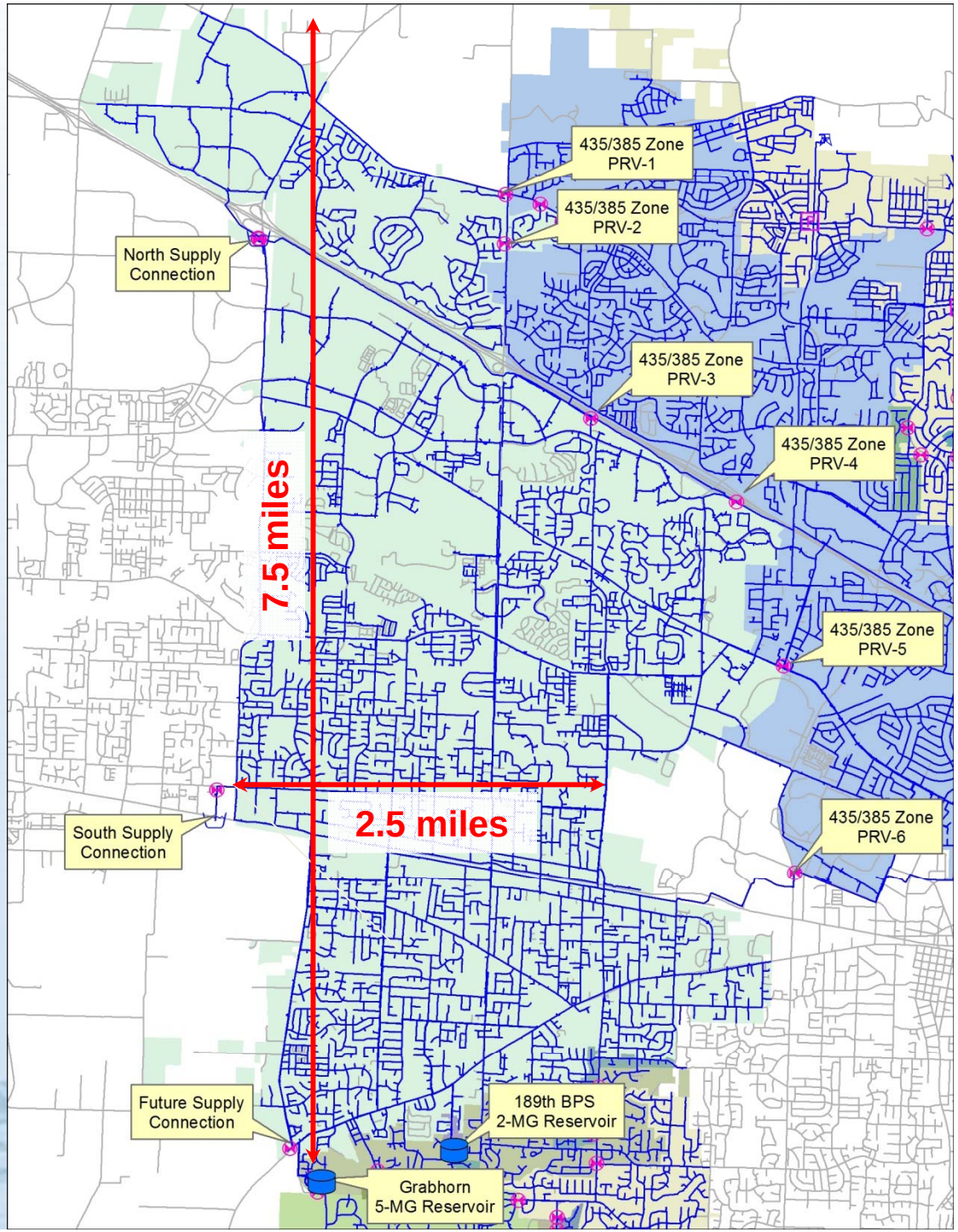
About TVWD

- Population of 211,360
- Covers 23,000 acres
- 778 Miles of pipe
- 68 Million Gallons of Reservoir Storage

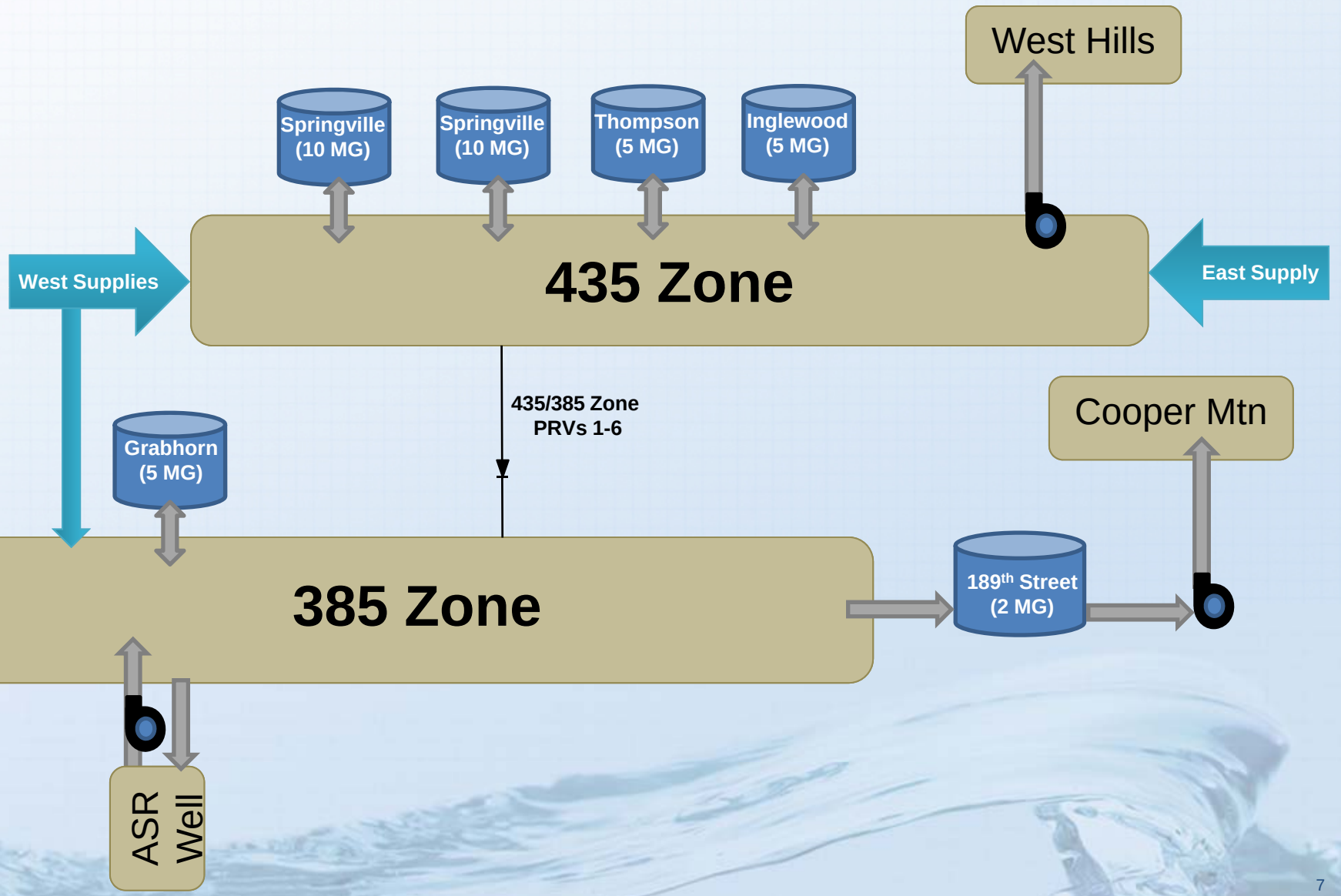


Overview of the 385 Zone

- Two Reservoirs, 7-MG total
- Mix of Supply
  - JWC NTL/STL
  - 6 Large PRVs
  - ASR Well
- 2014 MDD: ~16.5 mgd



385 Zone Schematic

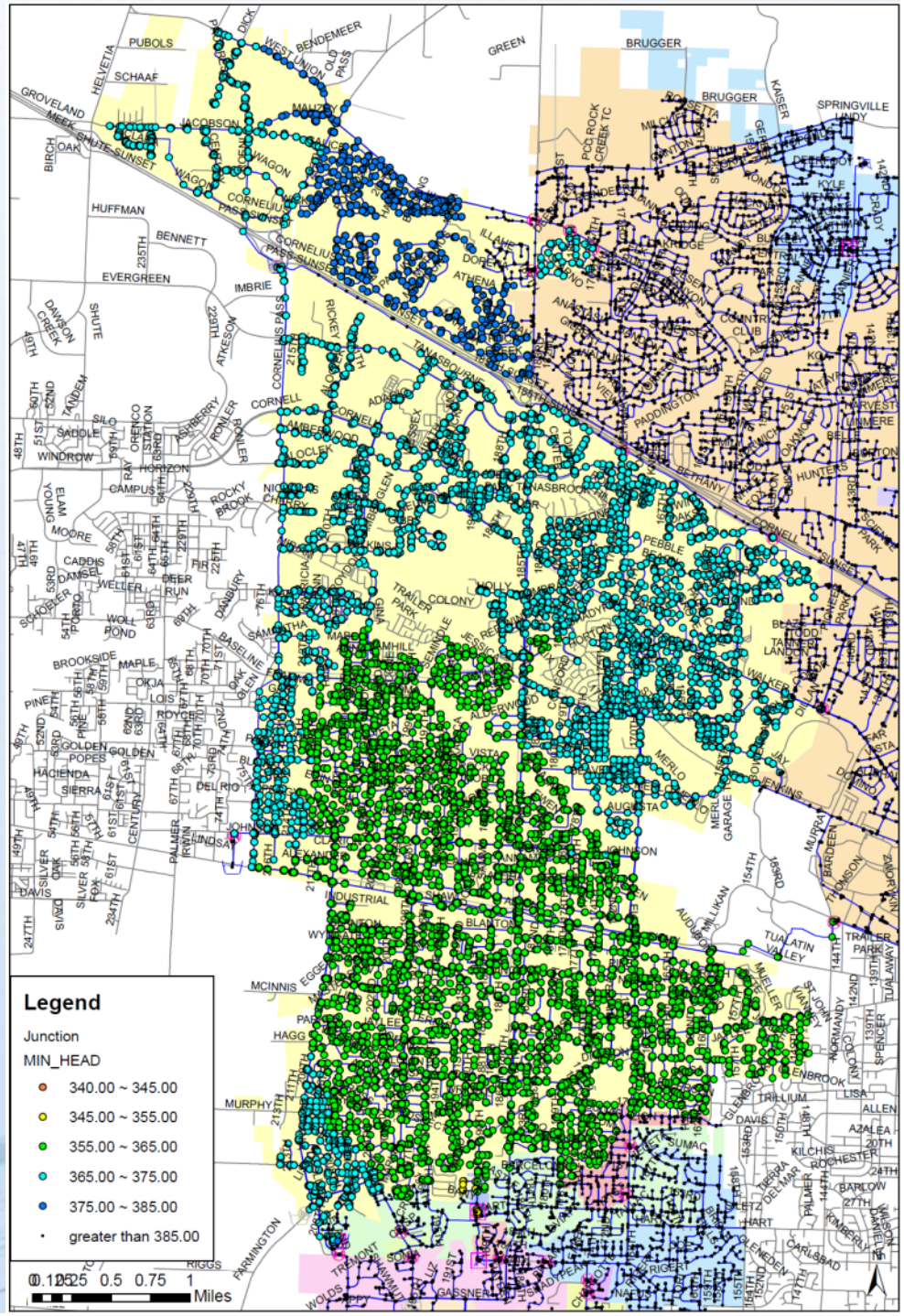


STUDY OVERVIEW

Study Overview

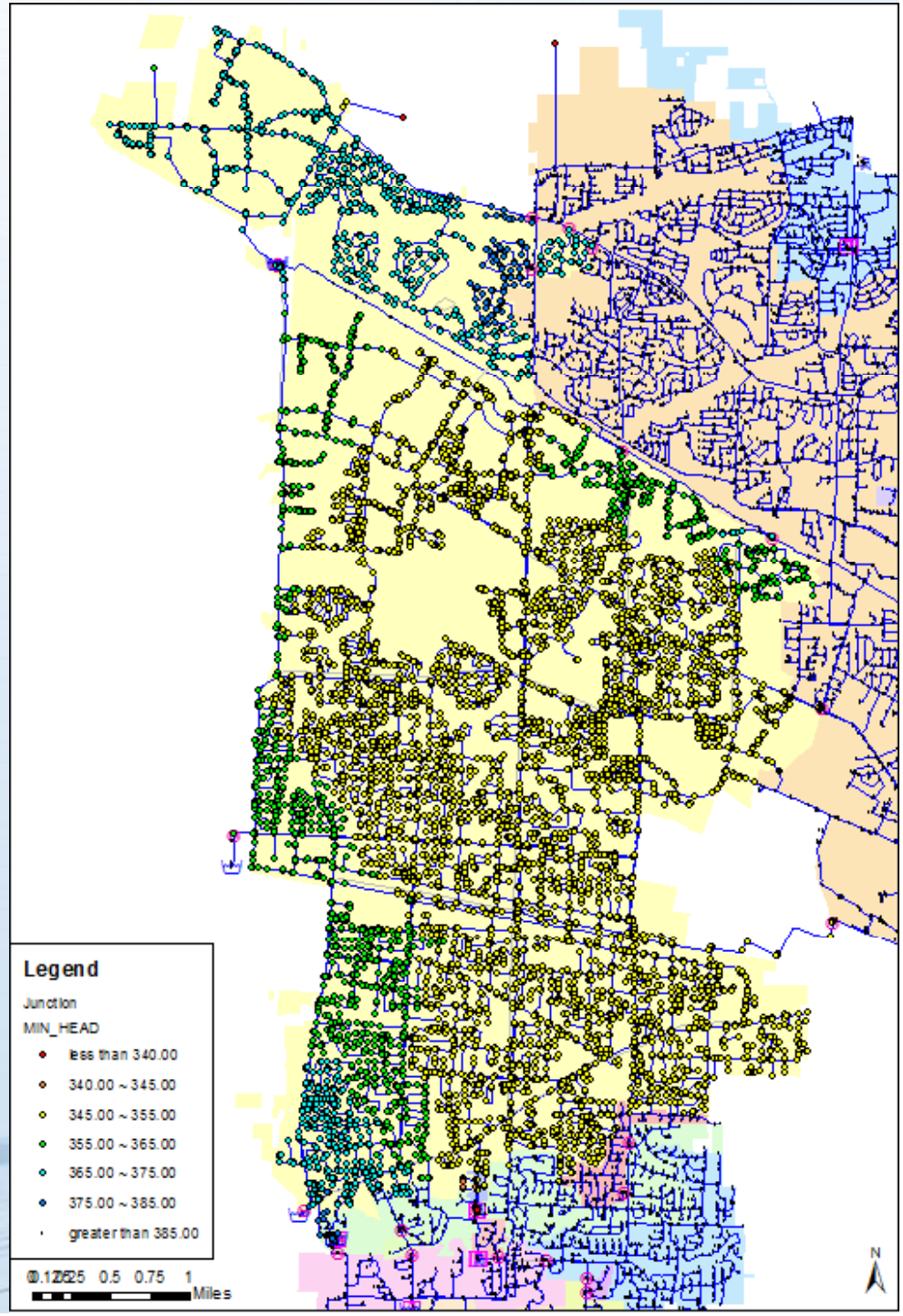
- Goals
  - Achieve cycling in the Grabhorn Reservoir
  - Balance the HGL across the zone
  - Resolve low pressure areas
    - Corrected by the District through PRV adjustment
- Method
  - Evaluate the following for each scenario:
    - Reservoir cycling
    - Zone pressure/head
    - Supply flow and head
    - 435-385 PRV flow and head

2013 MDD Minimum HGL



Minimum HGL Goal

2064 MDD
Minimum HGL



Legend

Junction

MIN_HEAD

- 340.00 ~ 345.00
- 345.00 ~ 355.00
- 355.00 ~ 365.00
- 365.00 ~ 375.00
- 375.00 ~ 385.00
- greater than 385.00

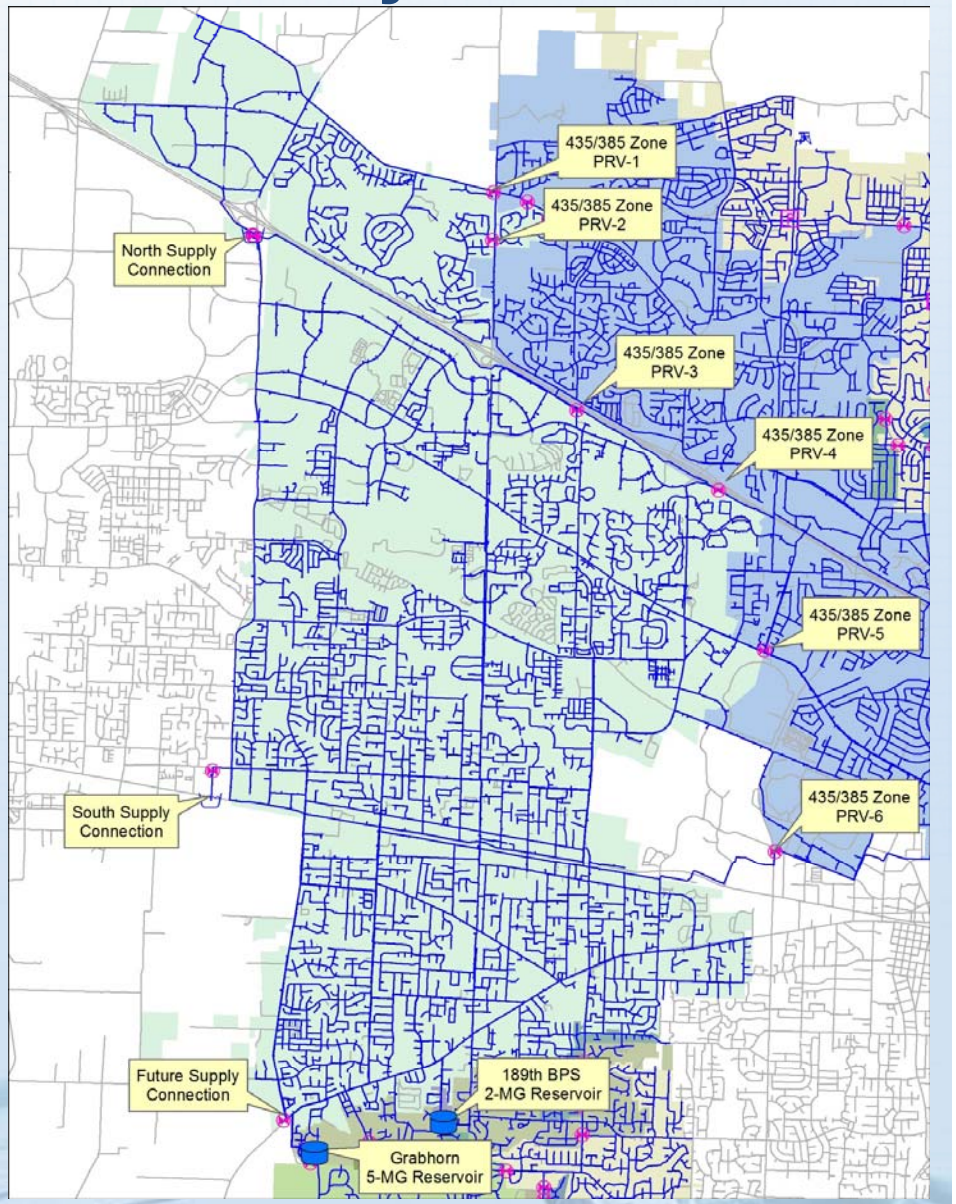
Minimum HGL Goal

Proposed Alternatives

- Alternative 1: Adjust controls of 435/385 PRVs
- Alternative 2: Improve transmission capacity in the 385 zone
- Alternative 3: Raise the overflow elevation of the new Grabhorn Reservoir
- Alternative 4: Isolate a new “Grabhorn” zone
- Alternative 5: Eliminate the Grabhorn reservoir

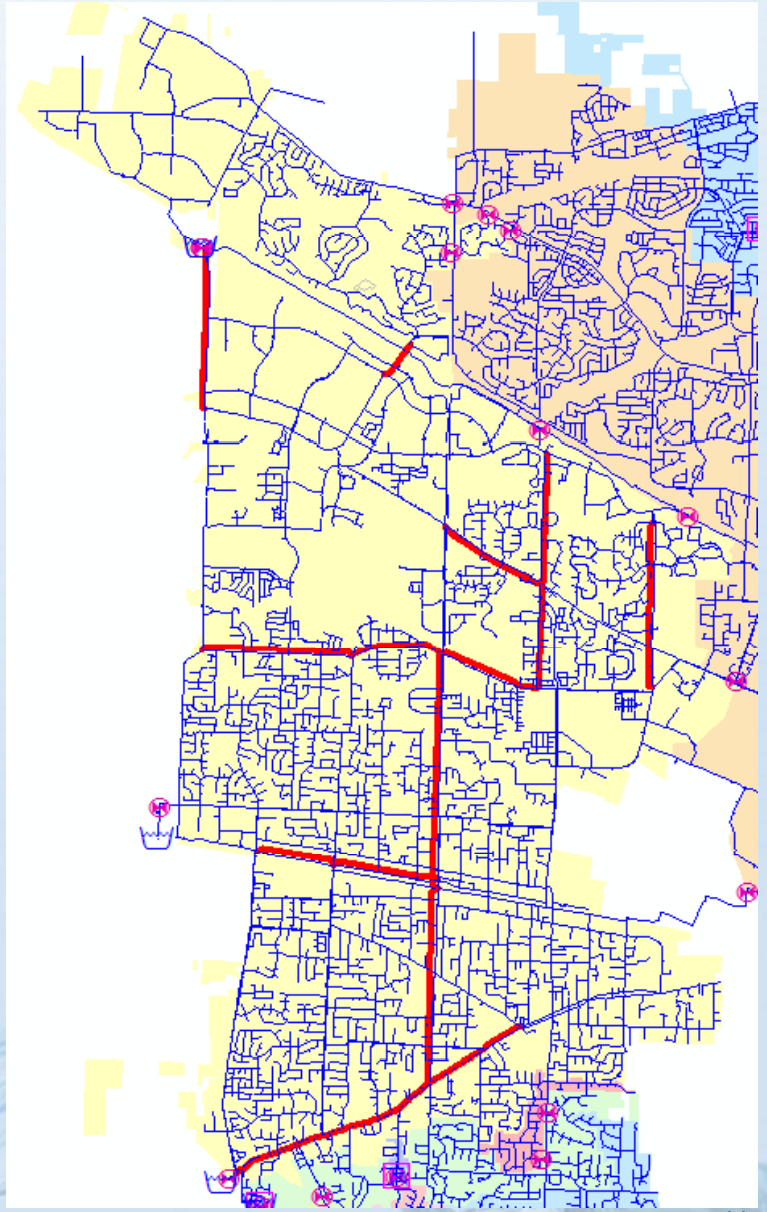
Summary of Findings: PRV Adjustments

- Method:
  - Adjust 435/385 Zone PRV Controls
  - Adjust Supply flows
- Lessons:
  - Limiting the supply from the west forces the zone to pull more water from the east
  - Headloss is too high to rely on Grabhorn Reservoir level for controls
- Decision:
  - Additional study recommended



Summary of Findings: Pipe Improvements

- Method:
  - Create new “grid” of 24-inch transmission mains
- Lessons:
  - Large transmission improvements are needed to even out the HGL and improve zone “floating”
  - May be better to rely on multiple supply sources for even HGL
- Decision:
  - Additional study recommended

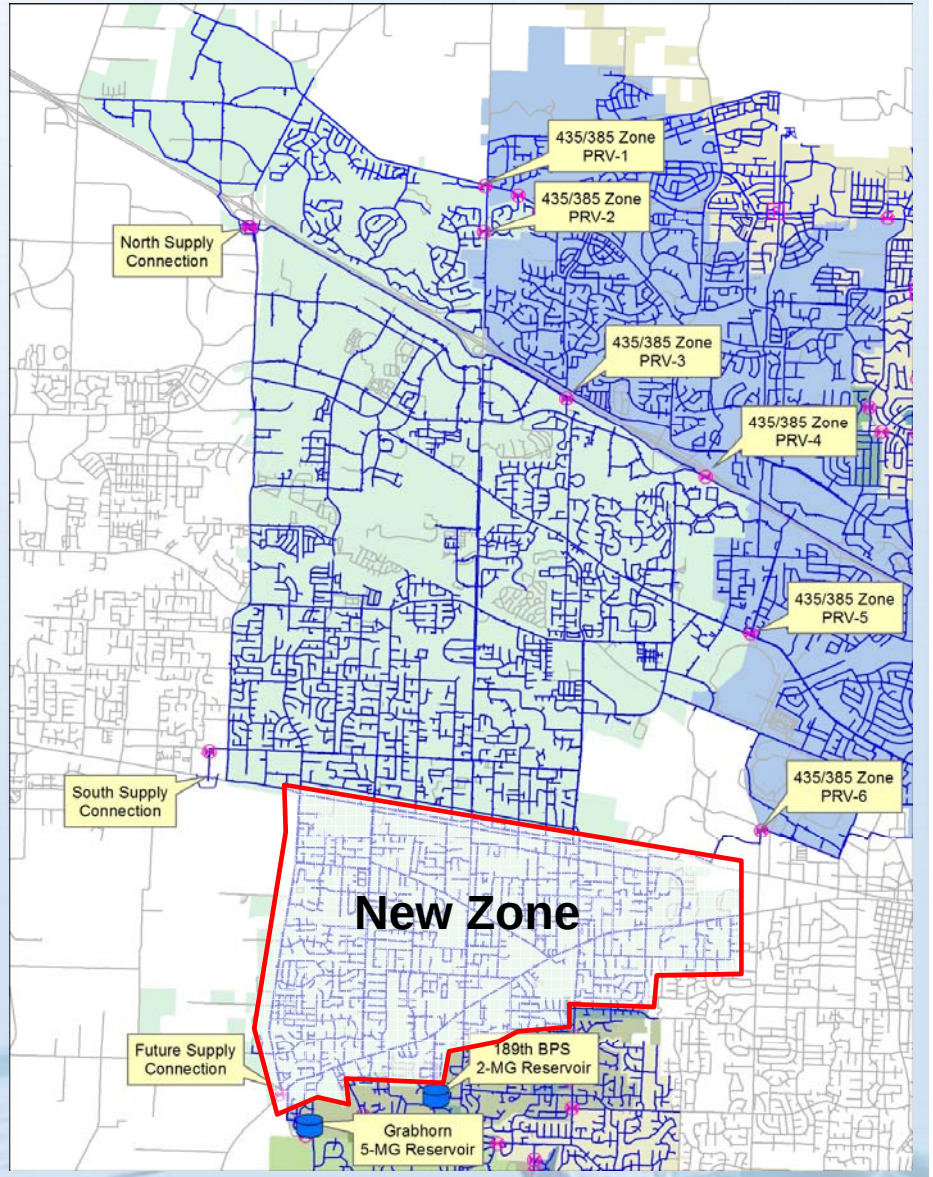


Summary of Findings: Raise Grabhorn Overflow

- Method:
  - Increase storage overflow elevation by 10 feet
- Lessons:
  - Improved Grabhorn Cycling
  - Increased pressures in nearby area
  - Limited area of impact
- Decision:
  - Alternative not pursued

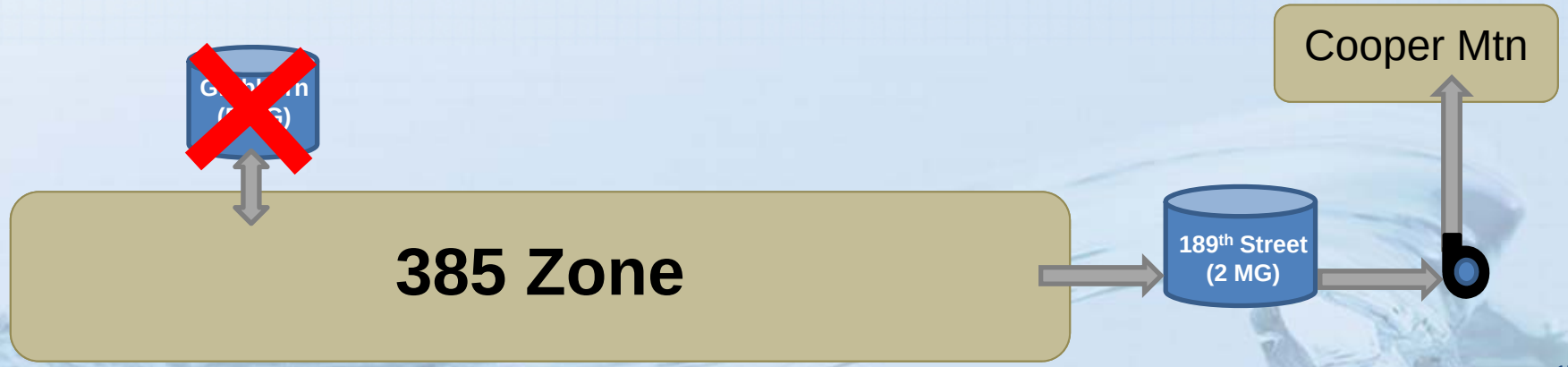
Summary of Findings: New Pressure Zone

- Method:
  - Close system valves to isolate the area shown
- Lessons:
  - Same challenges in balancing supply and tank cycling in lower 385 Zone
  - 435/385 Zone PRV-6 flow is limited to ~2,500 gpm due to hydraulic constraints
- Decision:
  - Alternative not pursued



Summary of Findings: No Grabhorn Reservoir

- Method:
  - Remove the Grabhorn Reservoir
- Lessons:
  - With no tank, no concern about cycling
  - 435/385 PRVs 5 and 6 can be set as PRVs
- Decision:
  - Alternative not pursued



Short-Listed Alternatives for Additional Study

- Alternative 1: Adjust controls of 435/385 PRVs
- Alternative 2: Improve transmission capacity in the 385 zone
- ~~Alternative 3: Raise the overflow elevation of the new Grabhorn Reservoir~~
- ~~Alternative 4: Isolate a new "Grabhorn" zone~~
- ~~Alternative 5: Eliminate the Grabhorn reservoir~~
- Alternative 6: Combination of Alternatives 1 & 2

Summary of Findings: Short Listed Alternatives

- Alternative 1: PRV Adjustments
  - Confirmed control settings for 435/385 Zone PRV-5 and 435/385 Zone PRV-6
  - Determined that this alternative alone was insufficient to resolve all issues

Summary of Findings: Short Listed Alternatives

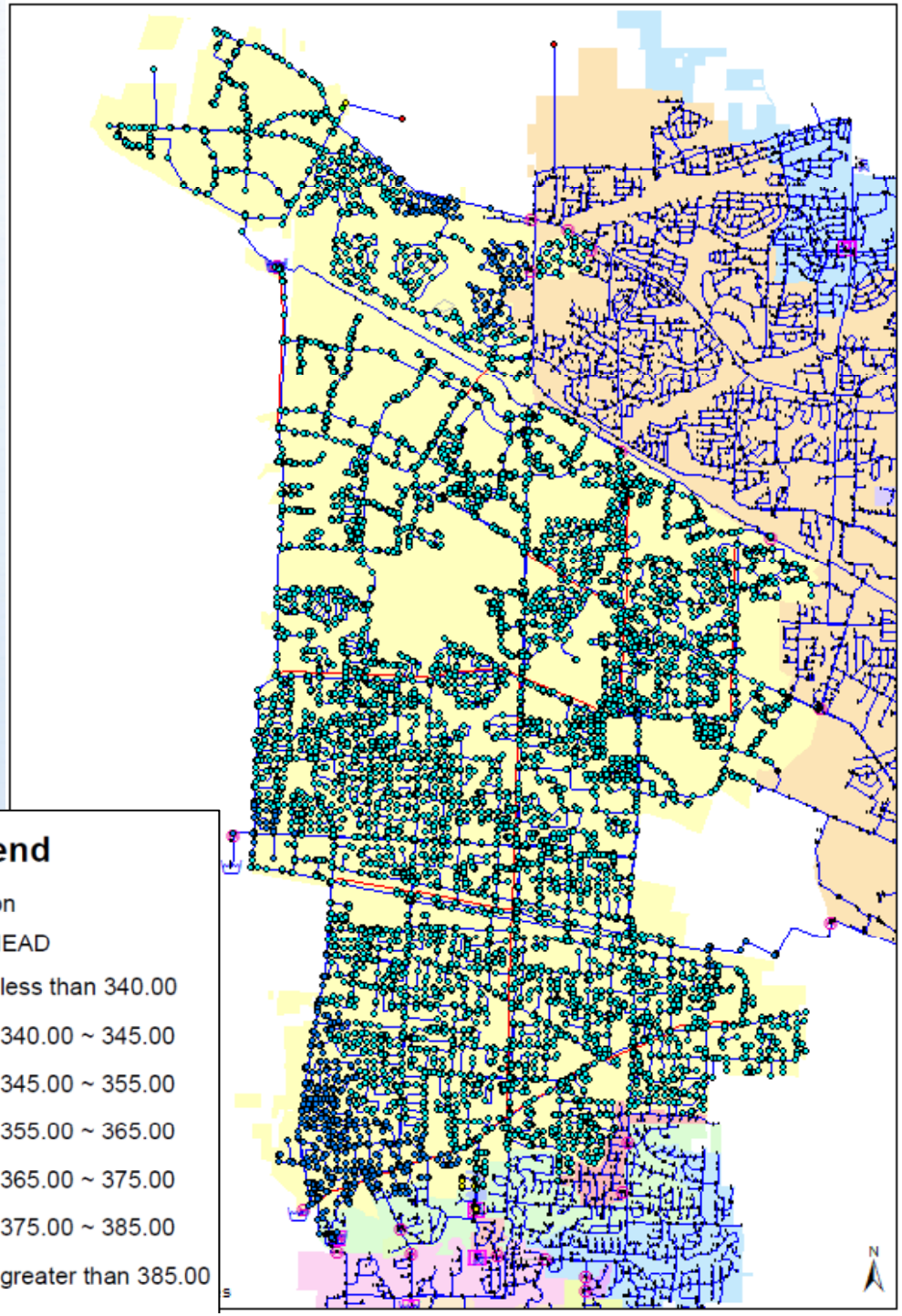
- Alternative 2: Pipe Improvements
  - Confirmed and finalized sizing of pipes
  - Determined that this alternative alone was insufficient to resolve all issues

Summary of Findings: Short Listed Alternatives

- Alternative 6: PRV Adjustments and Pipe Improvements
  - Combined PRV setting recommendations from Alt 1 with transmission grid of Alt 2
  - Used time-lapse animation of minimum HGL to optimize controls and piping projects
  - A combination of pipe improvements, supply controls, and valve adjustments are recommended for the zone to “Float”

Minimum HGL

- HGL across the zone is fairly good.
- Head is the highest near supply connections



Minimum HGL Goal

RECOMMENDED STRATEGY

Summary and Recommendations

- Balanced East and West sources of supply are important for an even HGL within the 385 Zone.
  - Operate 435/385 Zone PRV-6 as a PRV to maintain downstream HGL of 385 ft (apx 89 psi)
  - Operate 435/385 Zone PRV-5 as a PRV to maintain downstream HGL of 385 ft (apx 75 psi)
- Transmission improvements allow the zone to “float” and raise the HGL within the Zone.

QUESTIONS?