CITY OF Bloomington ILLINOIS
PUBLIC WORKS DEPARTMENT

City of Bloomington

Water Infrastructure Master Plan

City Council Presentation

July 20, 2020

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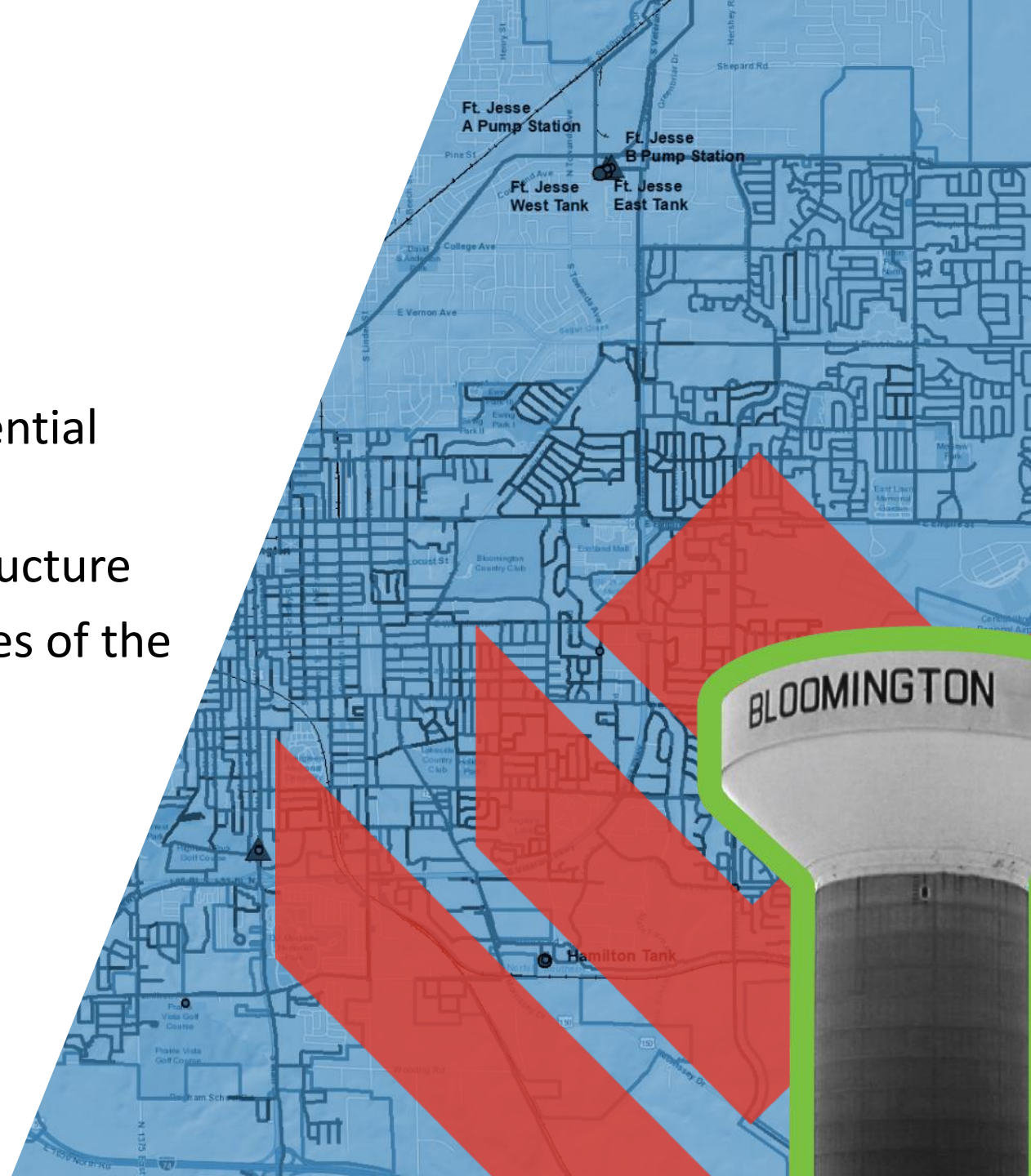
Agenda

- Project Goals and Objectives
- Water Demand Forecasting
- Water Quality and Regulations
- Water System Conditions Assessment and Recommendations
- Distribution System Evaluation and Recommendations
- Water Infrastructure Master Plan – Summary
- Questions and Discussion

Project Goals and Objectives

- Meet water demands
- Ensure compliance with current and potential future regulations
- Improve the resiliency of existing infrastructure
- Better understand the needs and priorities of the entire water system
- Identify capital improvements and estimates for the water system



Approach to Develop Water Infrastructure Plan

Demand Forecasting and Capacity Analysis

- Demand and Capacity Analysis
- Future Supply Needs

Water Quality and Regulations

- Nitrates
- New Groundwater Source Assessment
- Future Regulations
- Blending Impacts
- Taste and Odor

Facilities Condition Assessment

- Plant and Pump Station Condition Assessments
- Pump Testing
- Tank Inspections

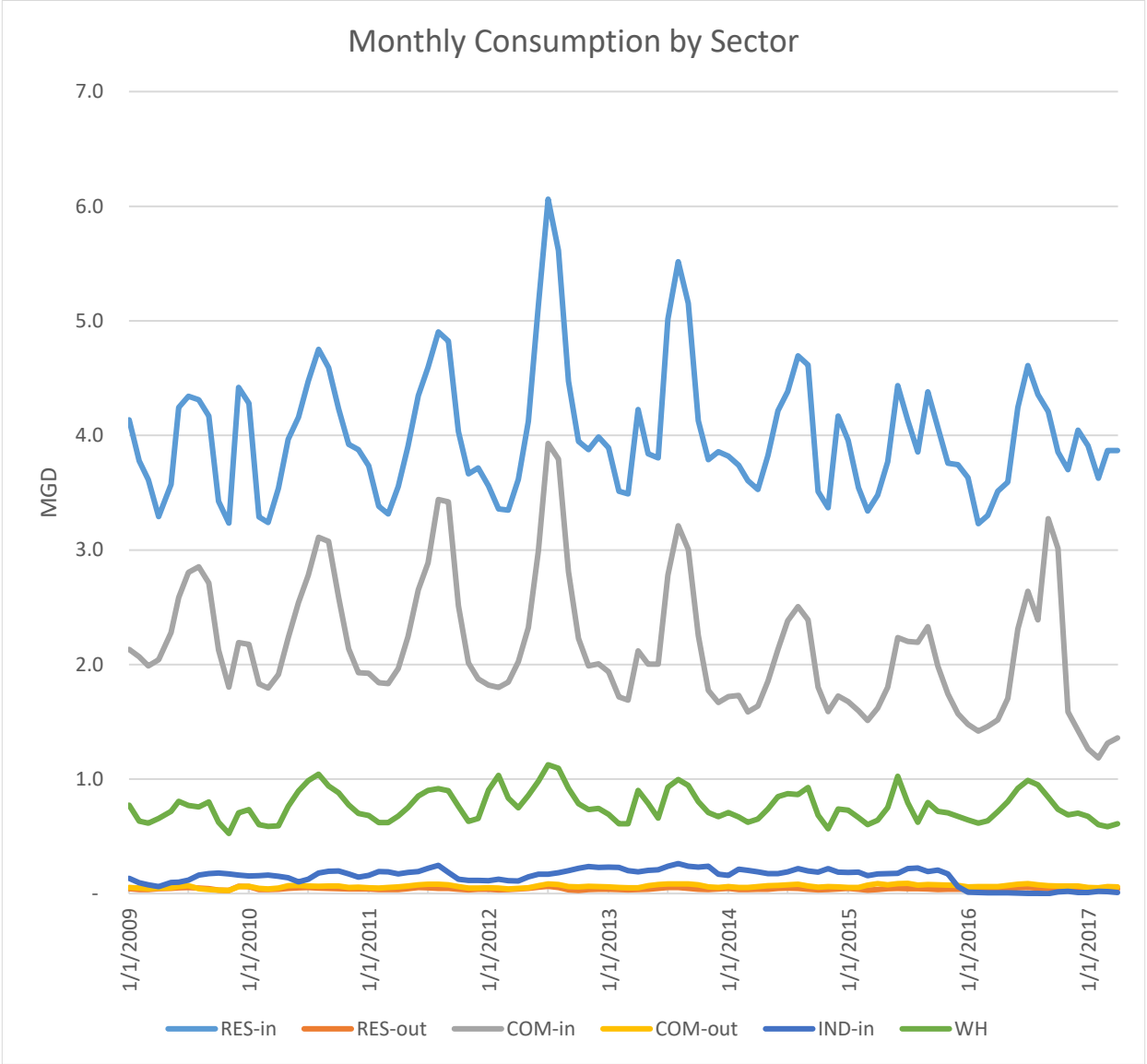
Distribution System Assessments

- Water Main Prioritization and Replacement Program
- Hydraulic Analysis
- Storage Needs

Water Demand Forecasting

Water Supply and Demand

- ✓ Residential usage is relatively constant at 3.5 MGD in winter months
- ✓ Commercial usage shows a steady decline in winter months
- ✓ Wholesale use is modest and relatively consistent

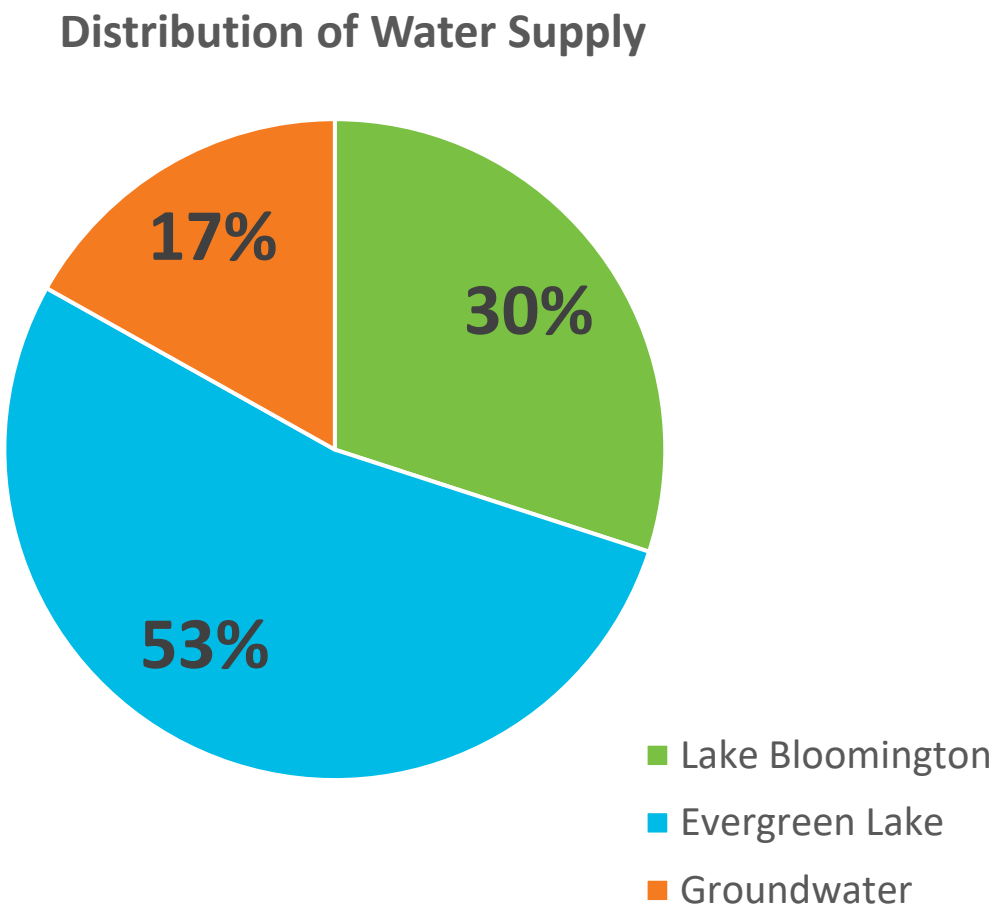


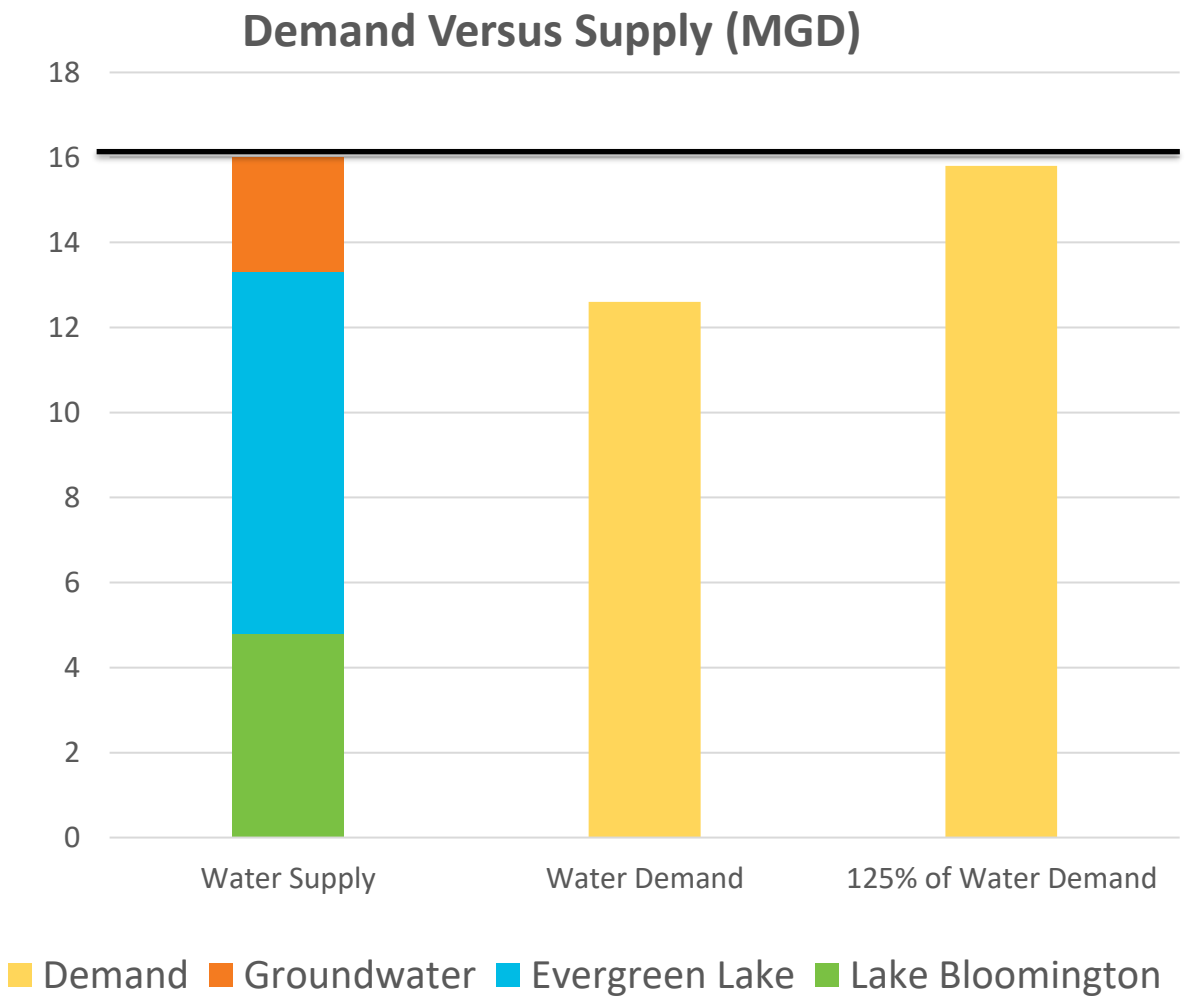
Water Supply and Demand – Forecast Methodology and Results

- ✓ Projected population growth (Comprehensive City Plan)
- ✓ Water demand projected to year 2040
- ✓ Model includes estimate of non-revenue water
- ✓ Alternative forecasts developed for historic high growth and slow growth trends
- ✓ Assuming a peaking factor of 1.7, the maximum day demand is approx. 21 MGD (average annual maximum day ratio between 1990 and 2016 was 1.54)

Scenario	Base Period ('09-'17)	2020	2025	2030	2035	2040
Historic Growth Trend (High)	10.4	11.0	11.5	12.1	12.6	13.0
Economic Development	10.4	10.7	10.9	11.3	11.9	12.5
Slow Growth (Low)	10.4	10.5	10.5	10.4	10.3	10.0

Water Supply and Demand



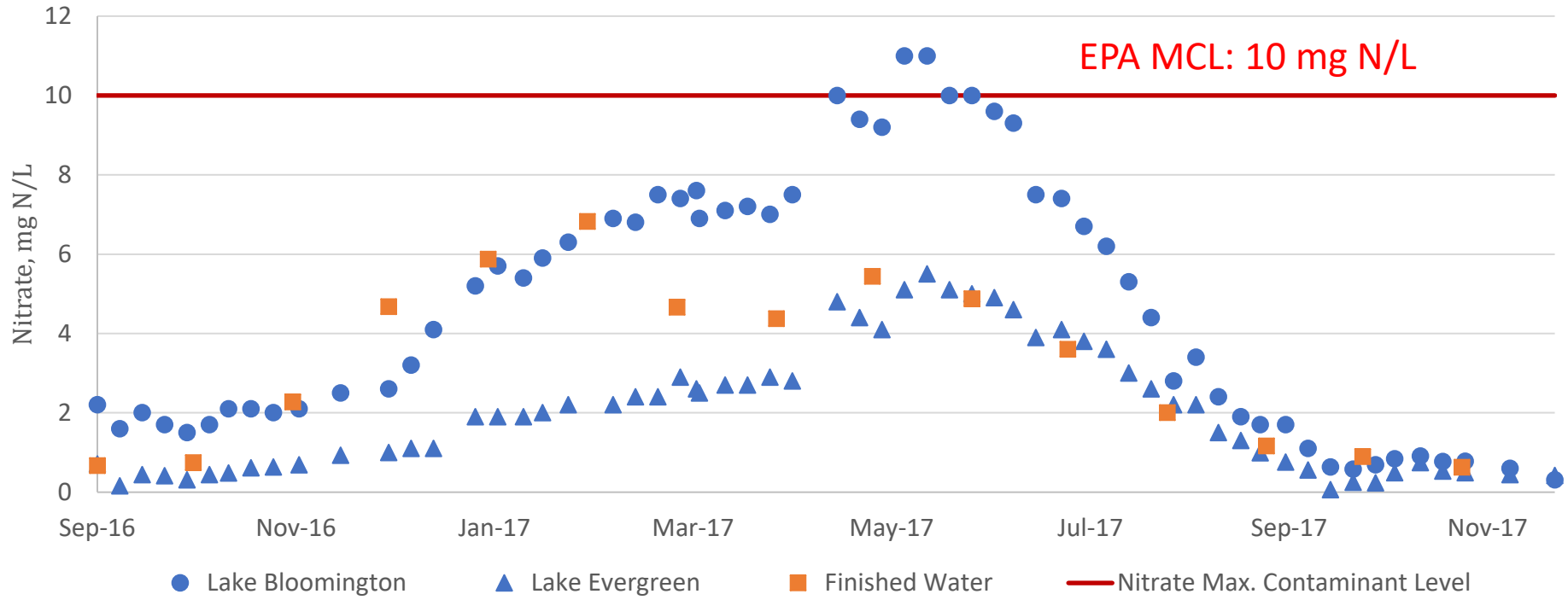


Notes: (1) Safe yield values based on 2010 Wittman 2010 Report
(2) Assumes three wells at 0.9 MGD (additional wells will be required to further reduce nitrate levels)

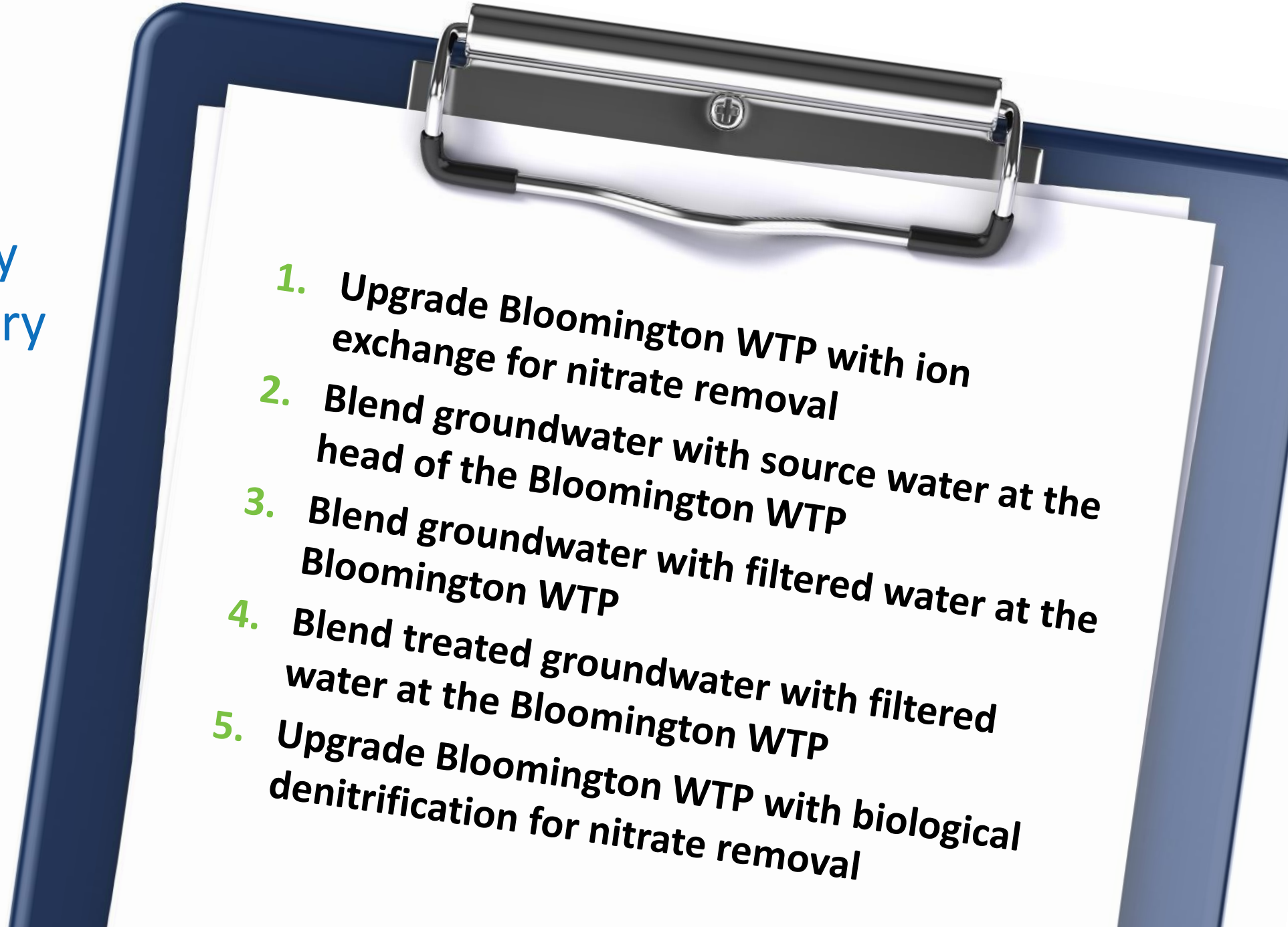
Water Quality and Regulations

Water Quality and Regulatory Review

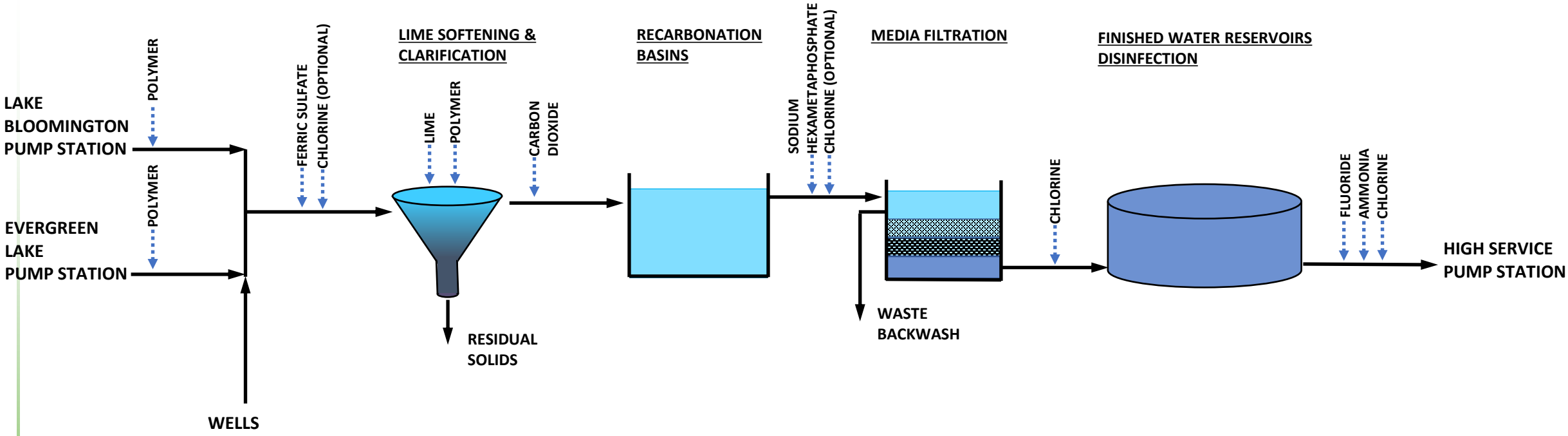
- City is in compliance with current federal and state regulations
- Nitrates in Lake Bloomington can be a challenge and can exceed MCL
- Radium in new groundwater wells is above MCL
- New revisions to Lead and Copper Rule



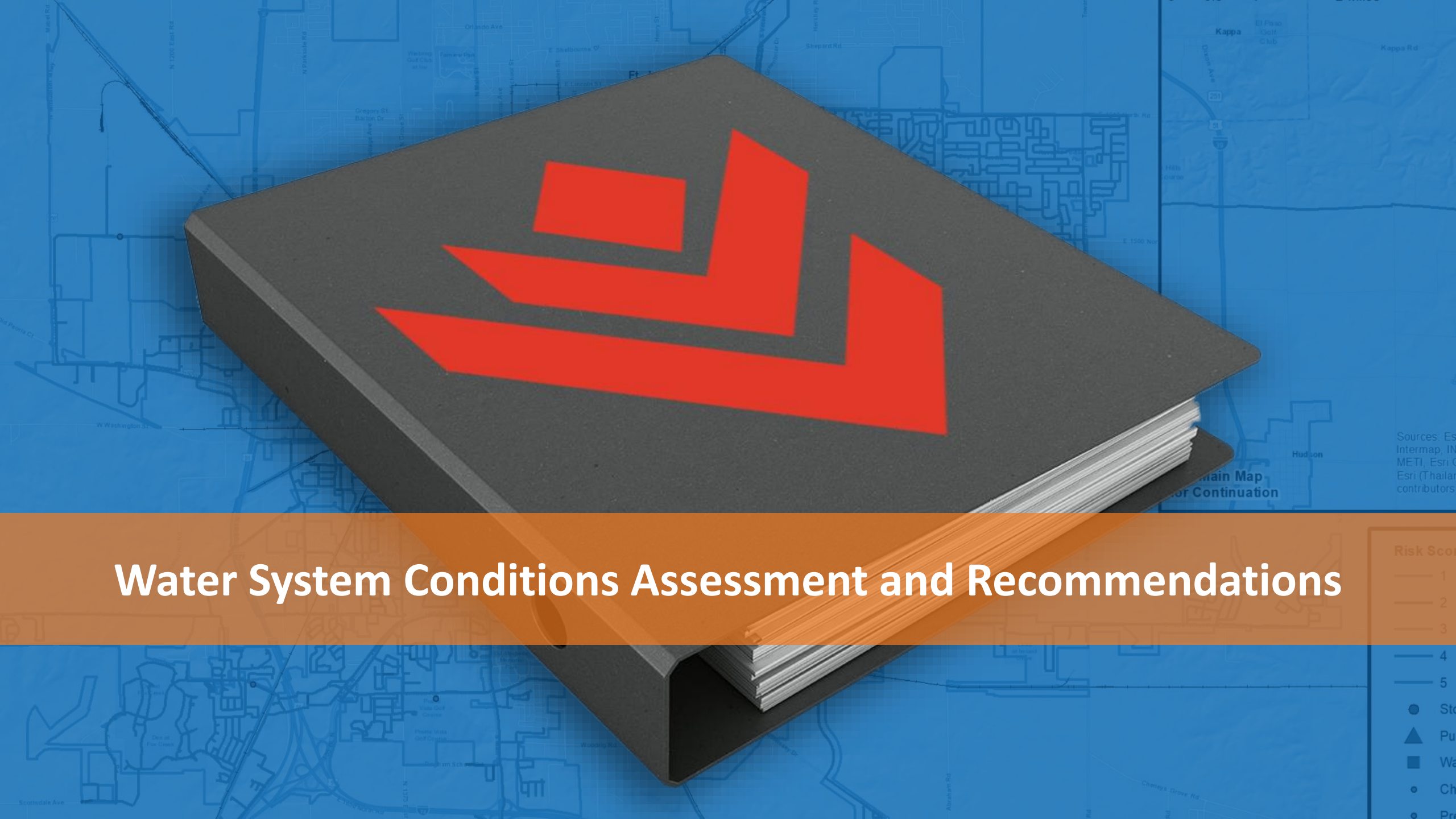
Water Quality and Regulatory Review – Long-Term Nitrate Compliance Strategies



Water Quality and Regulatory Review – Selected Alternative
Blend Groundwater and Source Water at Head of WTP

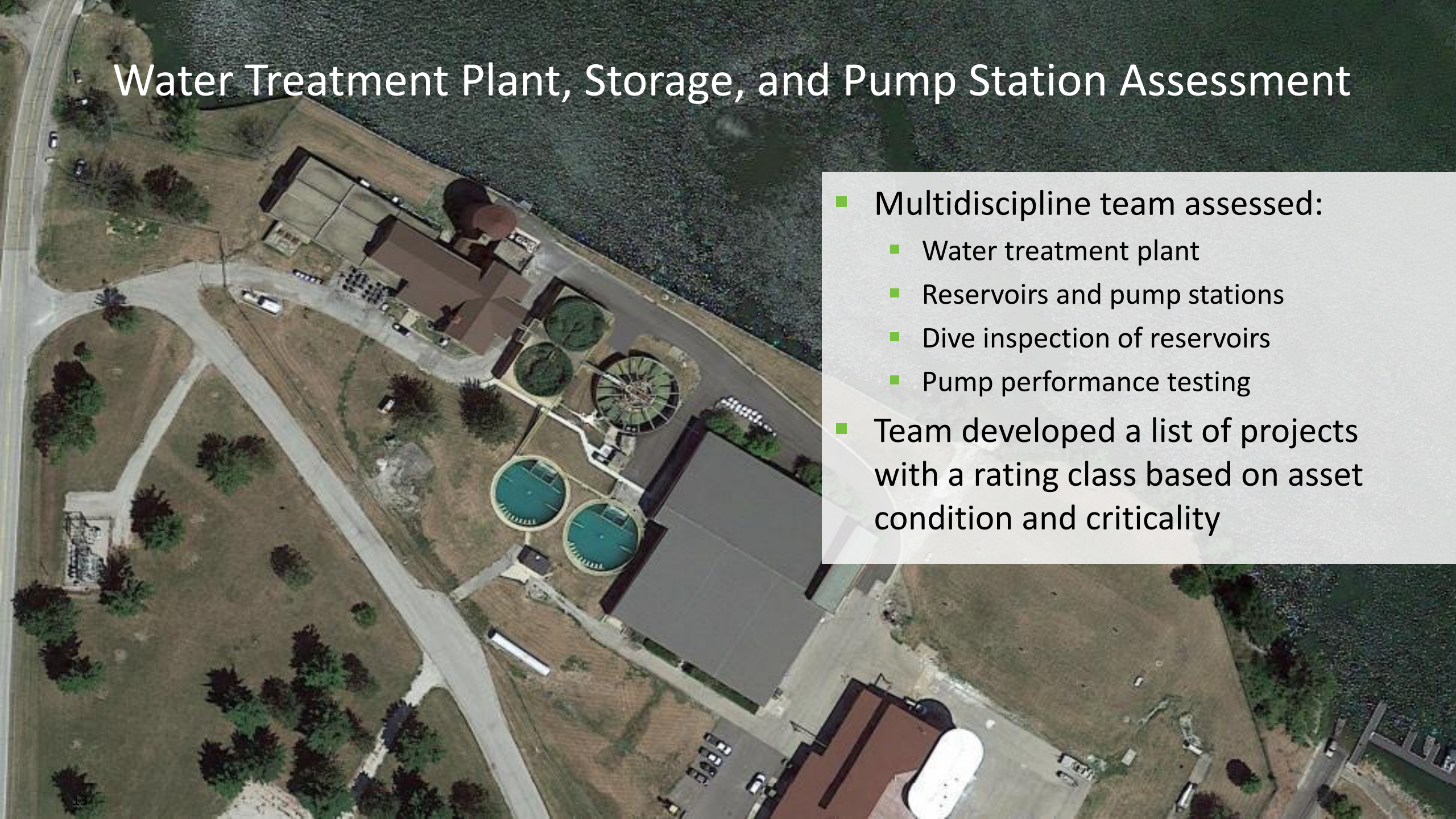


- Approximately 1/3 of water from wells to meet nitrate levels – additional wells and transmission piping = $10M
- $1M in additional water quality related improvements



Water System Conditions Assessment and Recommendations

Water Treatment Plant, Storage, and Pump Station Assessment



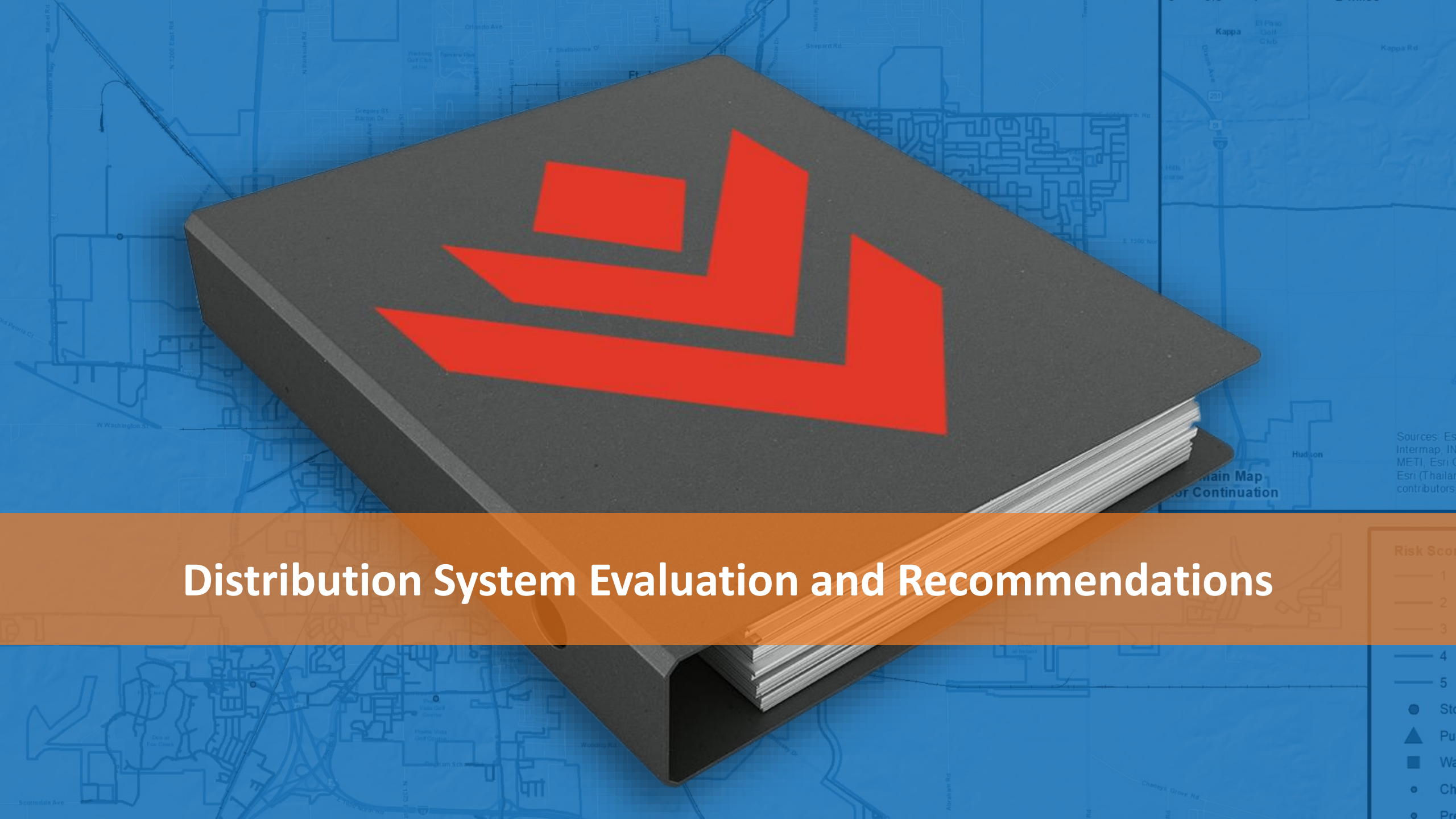
- Multidiscipline team assessed:
  - Water treatment plant
  - Reservoirs and pump stations
  - Dive inspection of reservoirs
  - Pump performance testing
- Team developed a list of projects with a rating class based on asset condition and criticality

Enterprise Pump Station

Water Treatment Plant

Water Treatment Plant, Storage and Pump Station Assessment – Recommended Projects

Projects	Reason	Estimated Cost
Water Treatment Plant Improvements (New Intake & Pump Station; New Filters and Other Plant Improvements)	Facilities at end of useful life; pump station does not meet industry standards	$36M
Water Treatment Plant Electrical Improvements	Equipment is 20 to 40 years old and parts may be difficult to obtain	$10M
Water Treatment Plant Chemical and Hydraulic Improvements	Safety, efficiency, and reliability	$13M
Division Street and Enterprise Pump Station Replacement	Age, condition, and reliability	$10M
Other Pump Stations and Remote Facilities Improvements	Condition, security, and reliability	$10M
Total		**$79M**

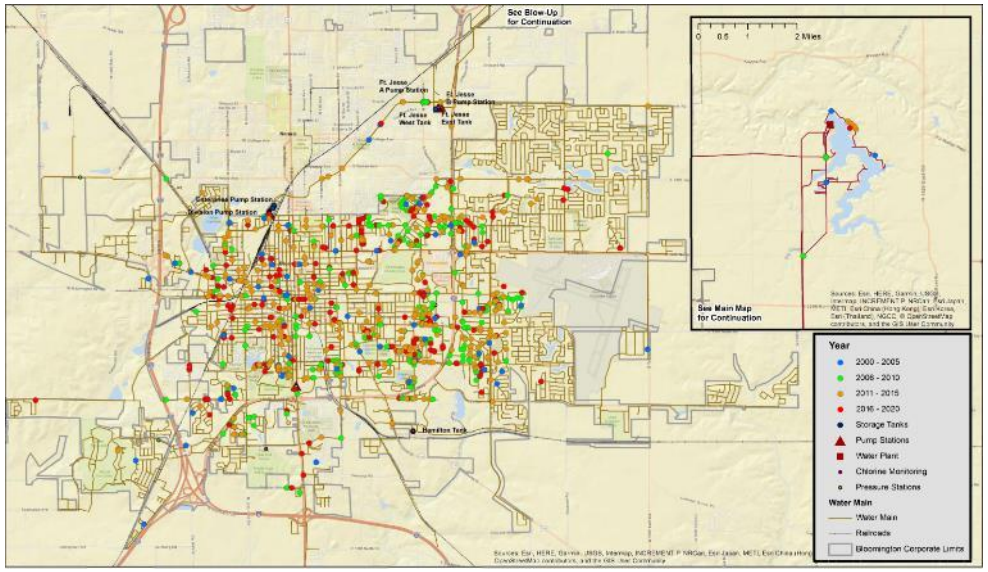


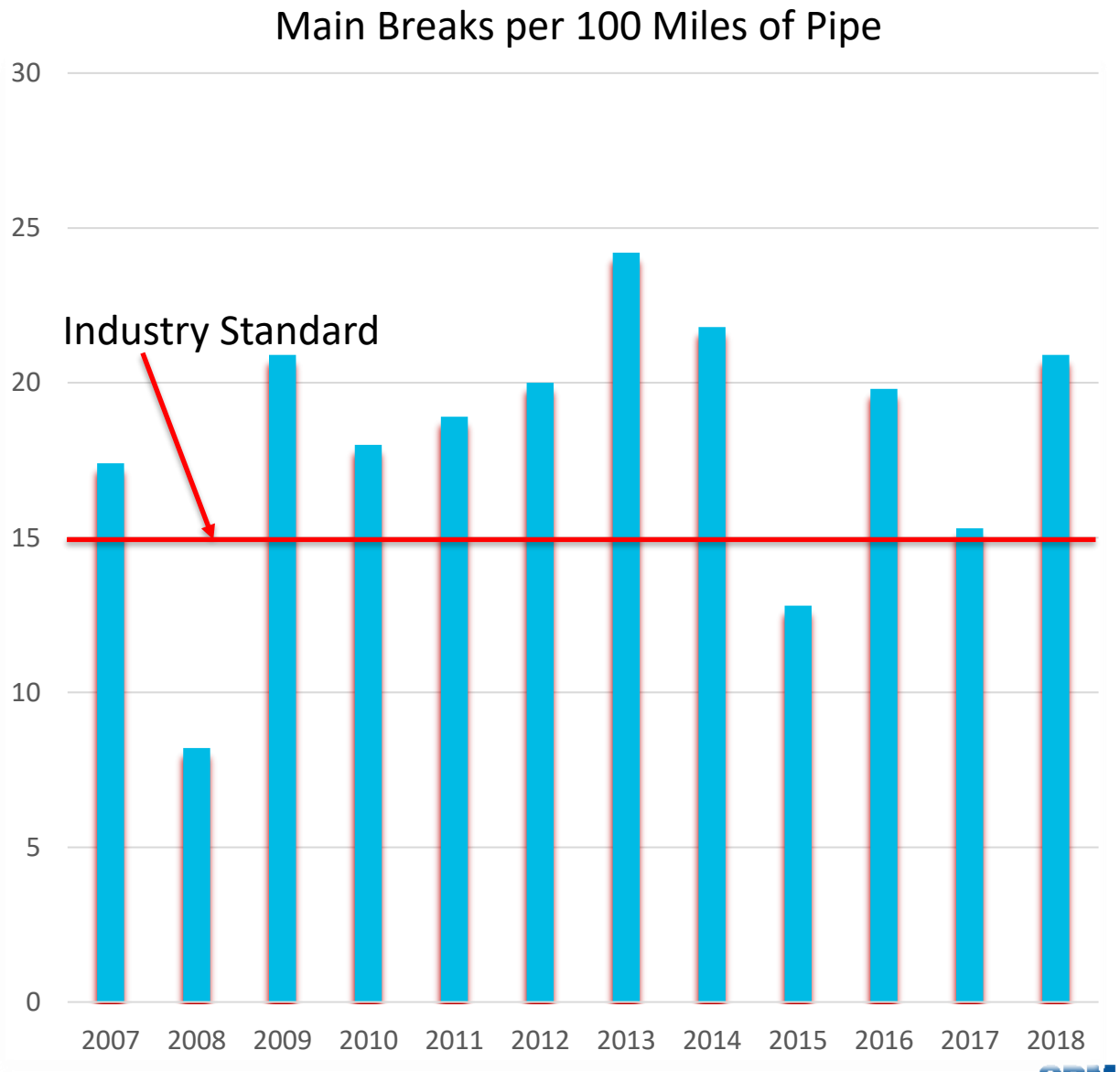
Distribution System Evaluation and Recommendations

Distribution System Analysis

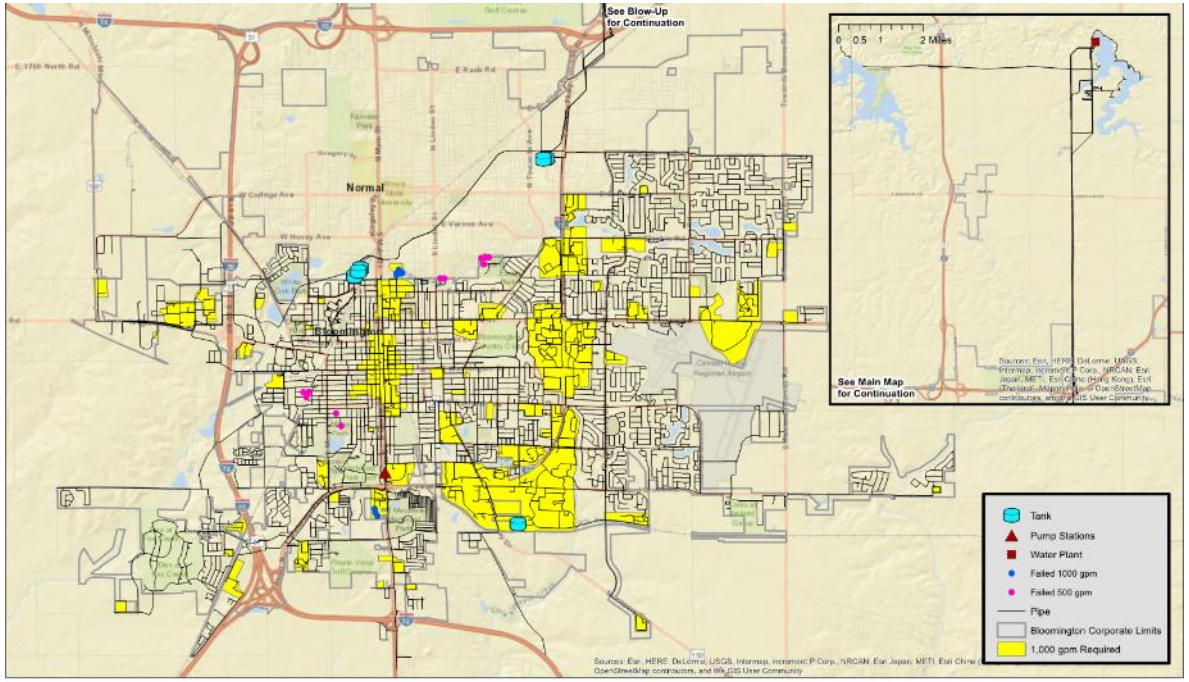
Goals

- Meet pressure (35 psi)
- Meet fire flow criteria (500 or 1000 gpm)
- Reduce water age and monitor water quality
- Reduce water main breaks

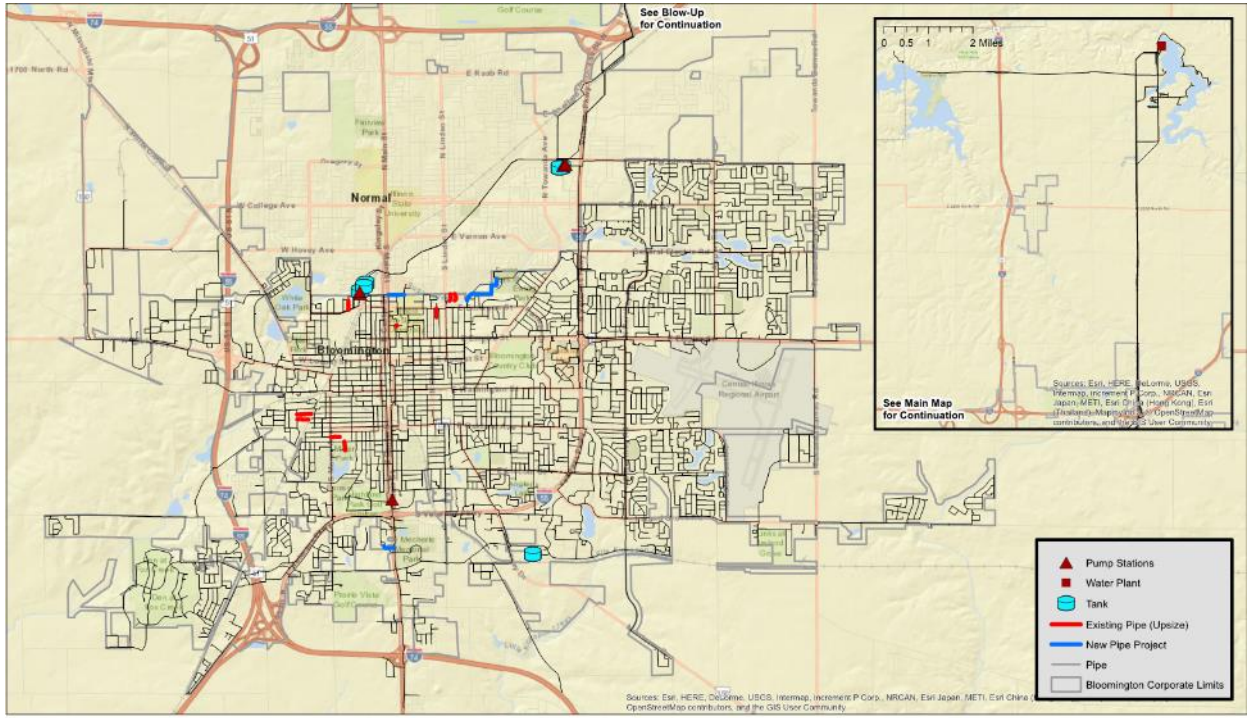




Address Fire Flow Deficiencies



$3M in fire flow related improvements



Distribution System Evaluation and Assessment – Risk Assessment

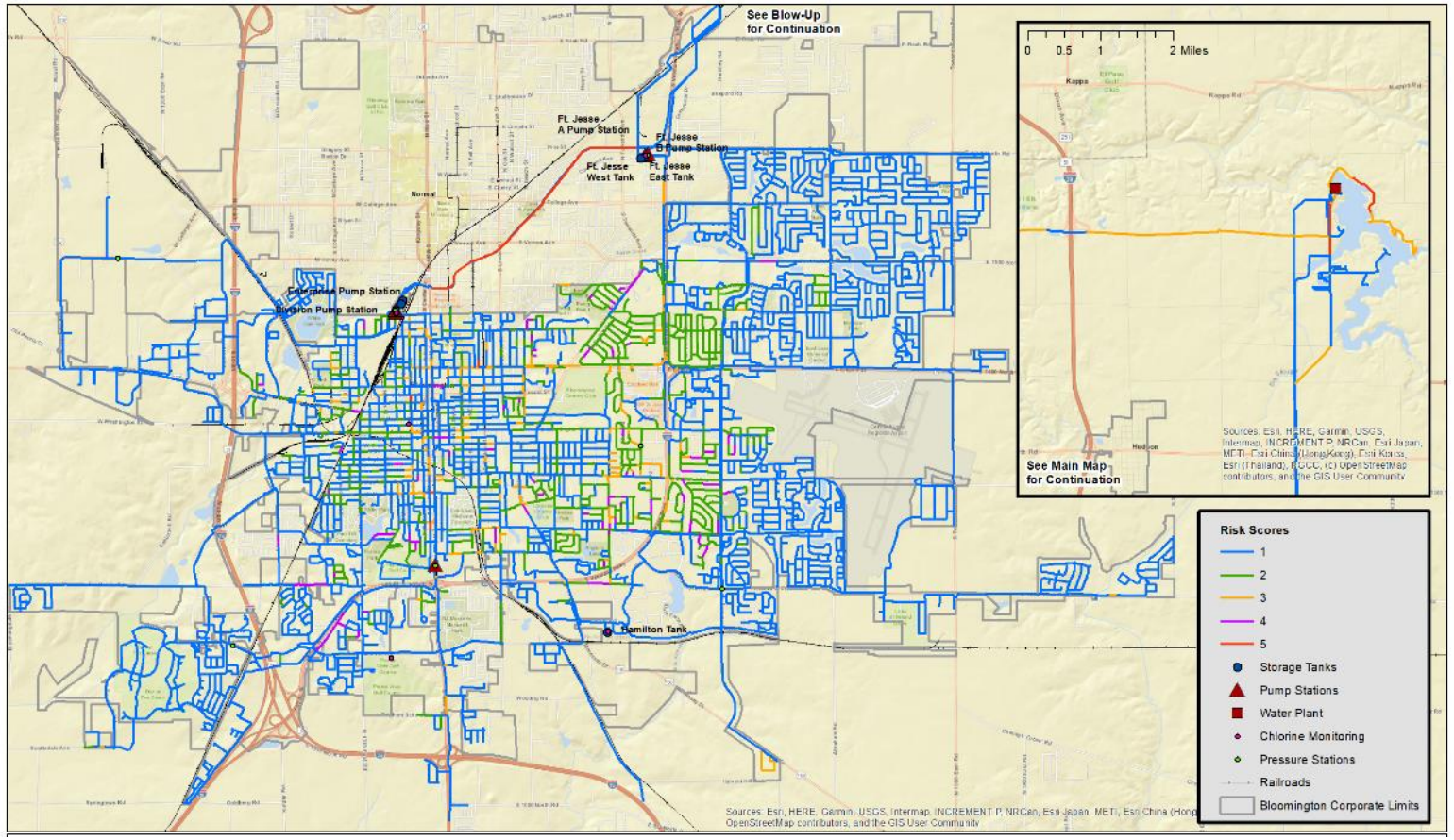
Risk assessment considered:

- Probability of Failure
- Consequence of Failure

Risk	Length (Miles)	% of System
1 – Negligible	355.8	78.9%
2 – Low	62.6	13.9%
3 – Medium	21.4	4.7%
4 – High	6.9	1.5%
5 – Extreme	4.1	1.0%
Total	450.8 miles	100%

Water Main Risk Prioritization and Summary of Costs

- $6M for water main replacement in extreme risk of failure (4 miles)
- $11M for water main replacement in high risk of failure (7 miles)
- $33M for water main replacement in medium risk of failure (21 miles)
- Approximately 7% of system
- Total DS improvements (with fire flow improvements — $53M)



Water Infrastructure Master Plan – Summary

Project Description	Estimated Cost
Water Quality and Regulatory Improvements	$11 million
Facilities Improvements	$79 million
Water Distribution System Improvements (prioritized over 20 years)	$53 million
Staff/Services for Implementation of Improvements	$9 million
Non-Revenue Water Reduction and Smart Cities Technology	$20 million
Total (Rounded)	**$172 million**

Questions and Discussion