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Making Your Buried Assets Last: Optimization of Buried Infrastructure

AMWA Executive Management Conf.
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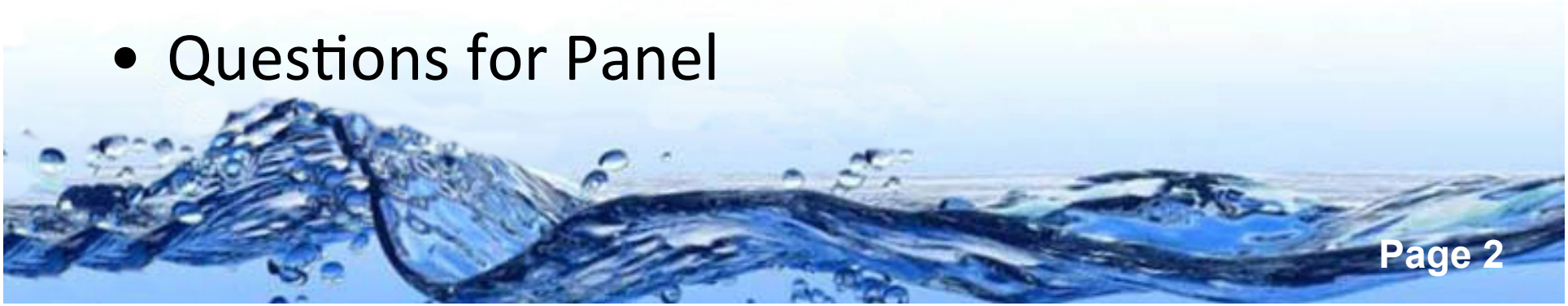
Director of Distribution
WaterOne

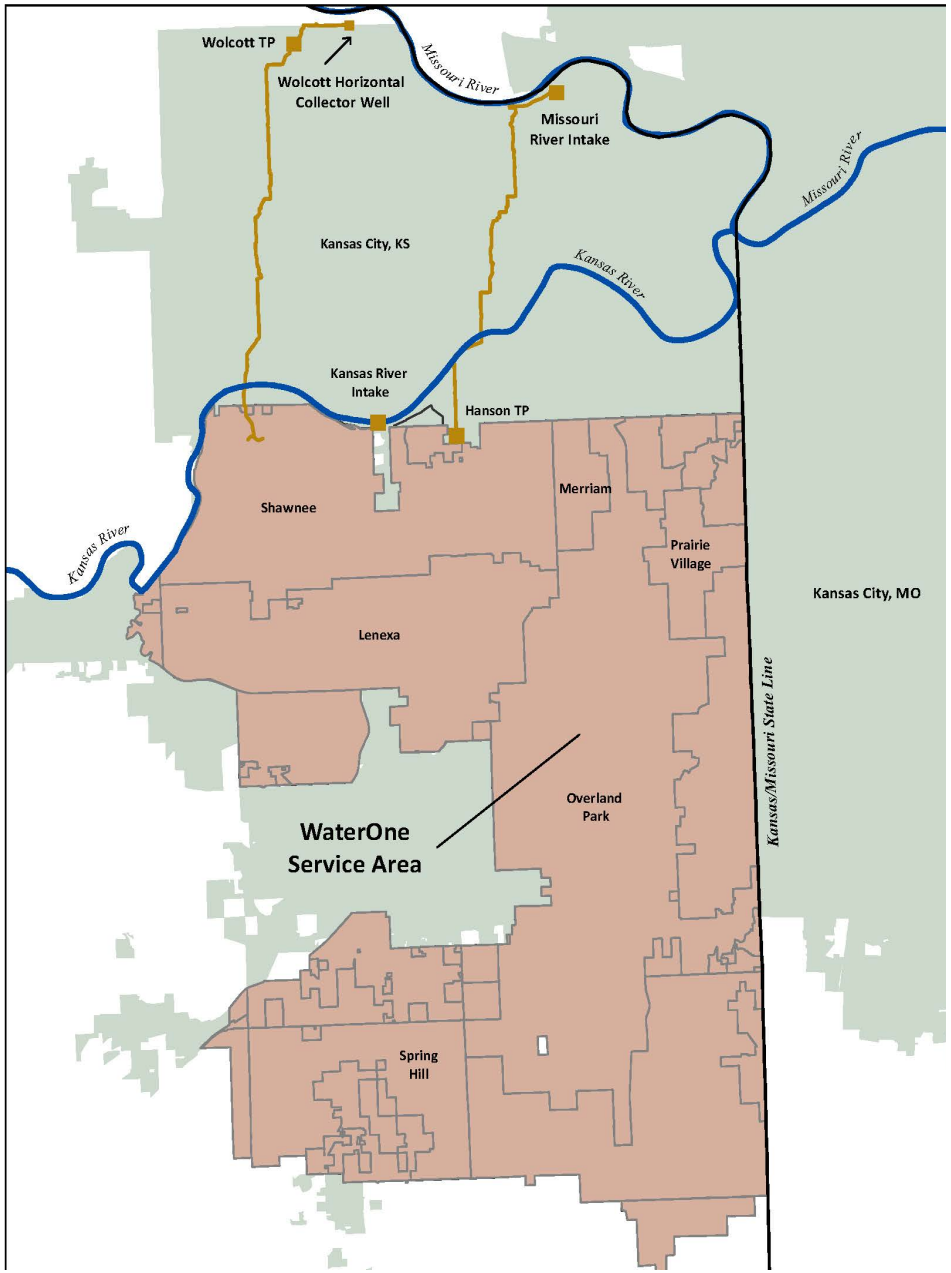
Outline

- Who is WaterOne
- Funding for buried infrastructure
- Transmission Pipe vs. Distribution Pipe
- Case Study
  - Distribution pipe
  - Transmission pipe
- Summary
- Questions for Panel

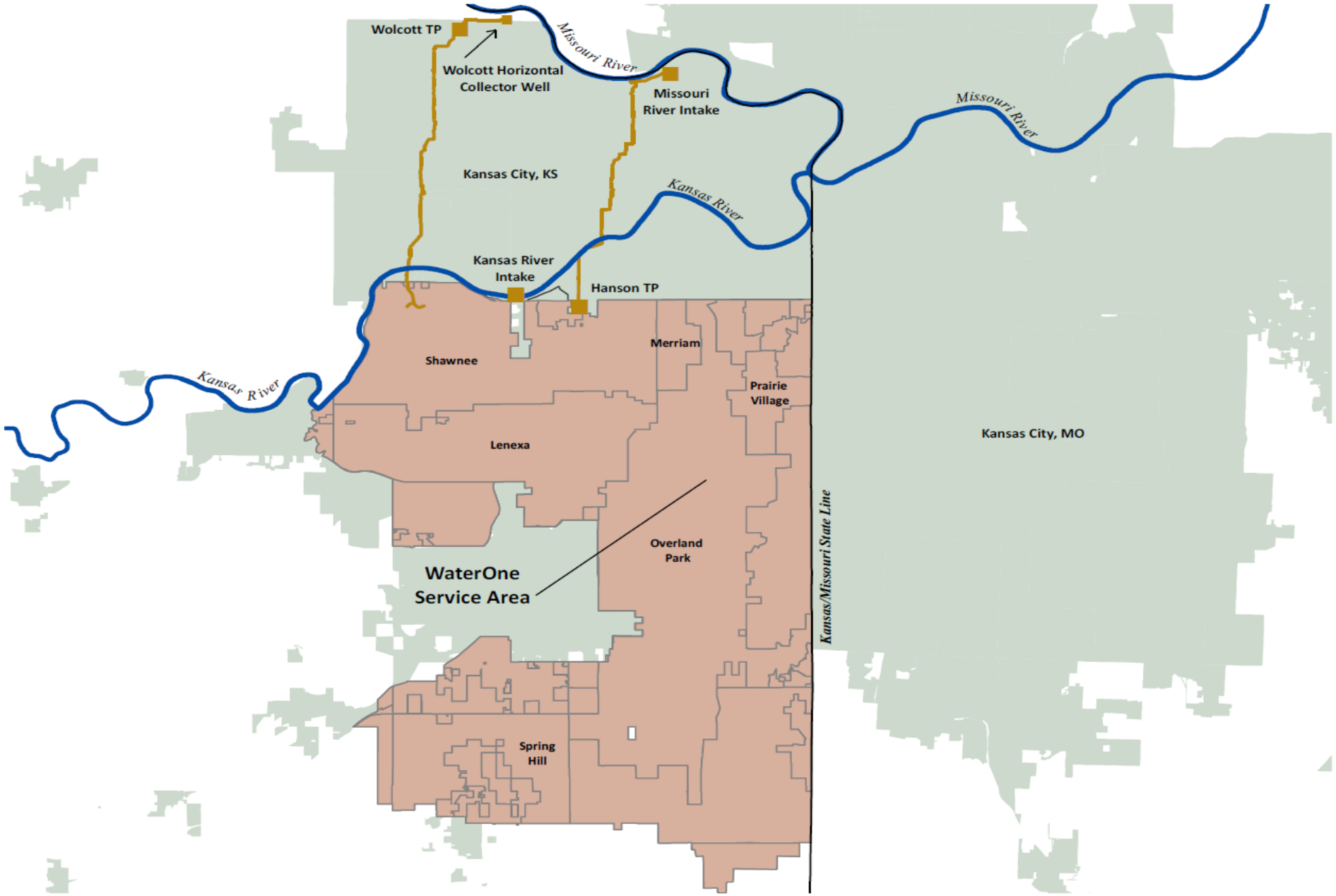


Who is WaterOne?

- Quasi-municipal Utility
  - Similar to a City Government
  - Seven member elected Board
  - Sole purpose is Drinking Water Supply
  - Serves most of Johnson County, Kansas
  - 410,000 people for 17 municipalities



WaterOne Water System



Funding - Nessie Curve

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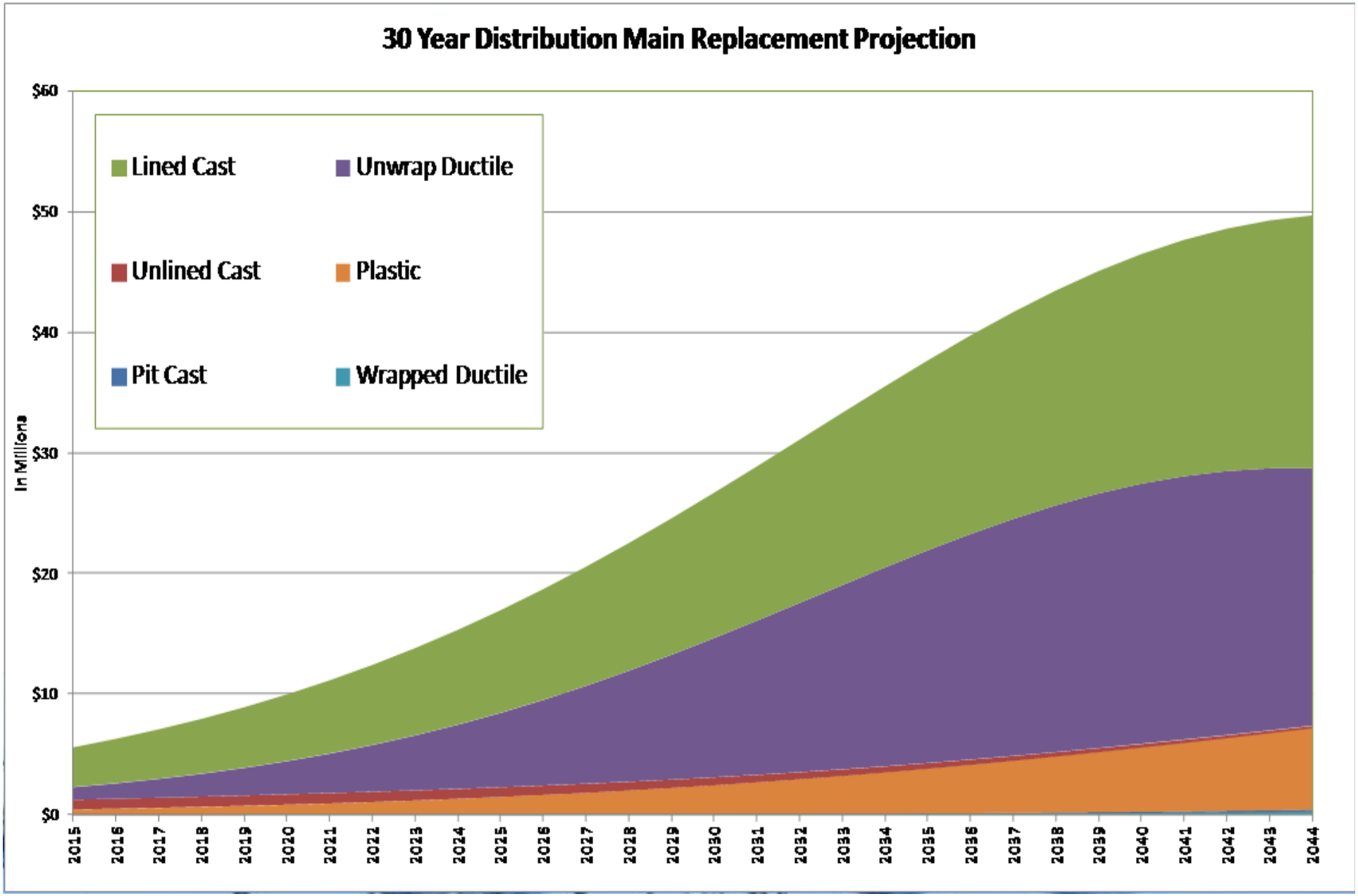

Transmission & Distribution Budget History

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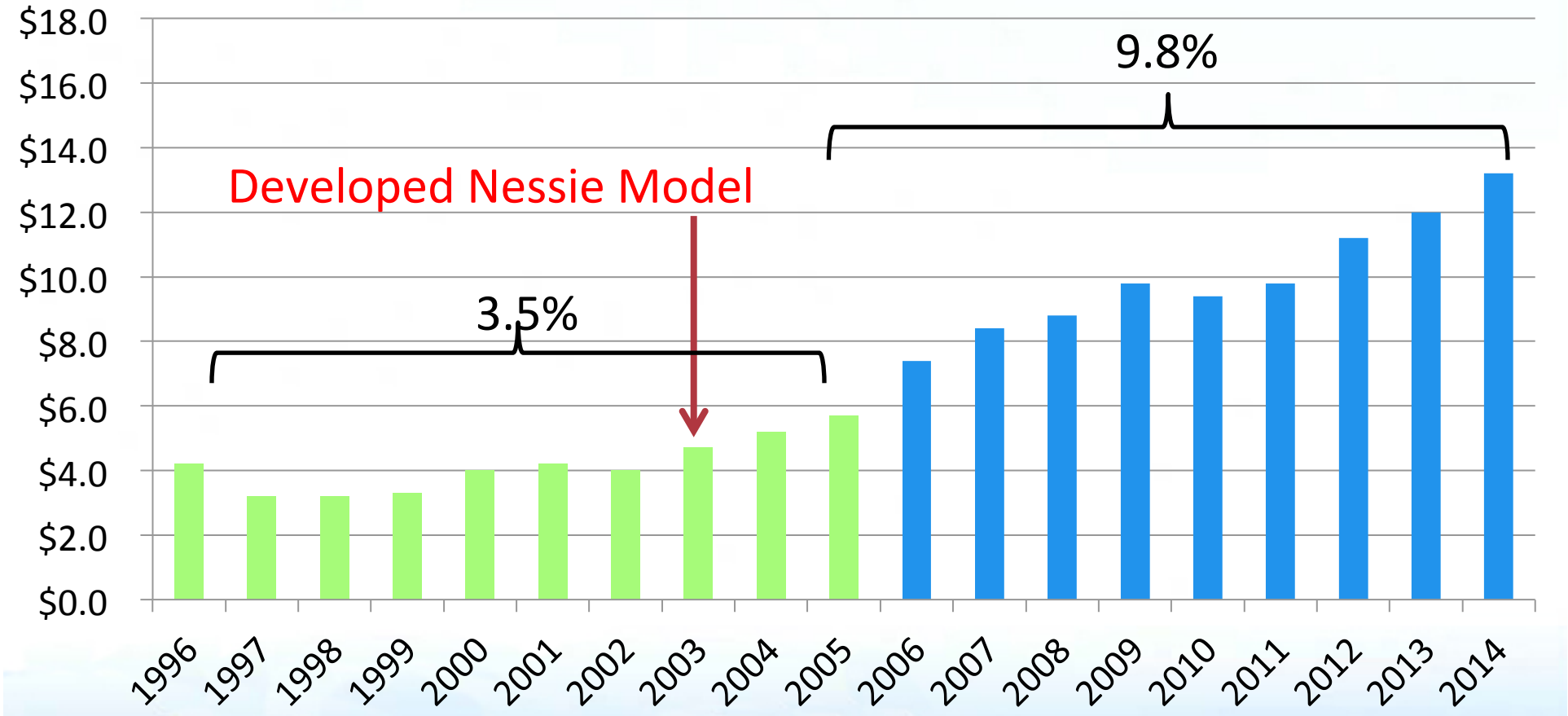

Transmission Pipe vs. Dist. Pipe

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- Initially both transmission and distribution pipe included in Nessie Model
- Behave differently
- Pipe divided into two major categories
  - Distribution pipe 16” and smaller
  - Transmission pipe 20” and larger
- Getting your arms around buried pipe

Transmission Pipe - 20” and Larger

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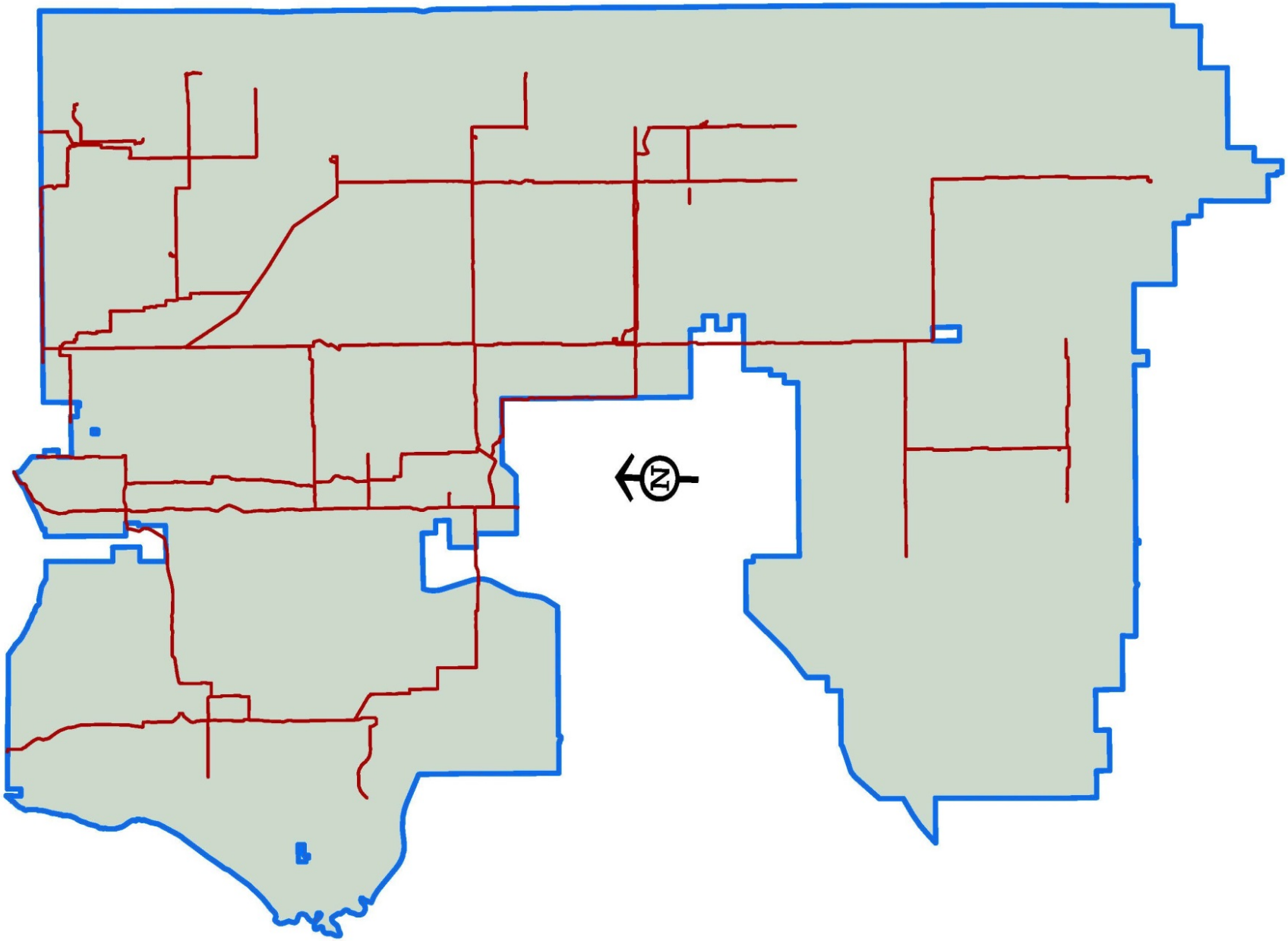
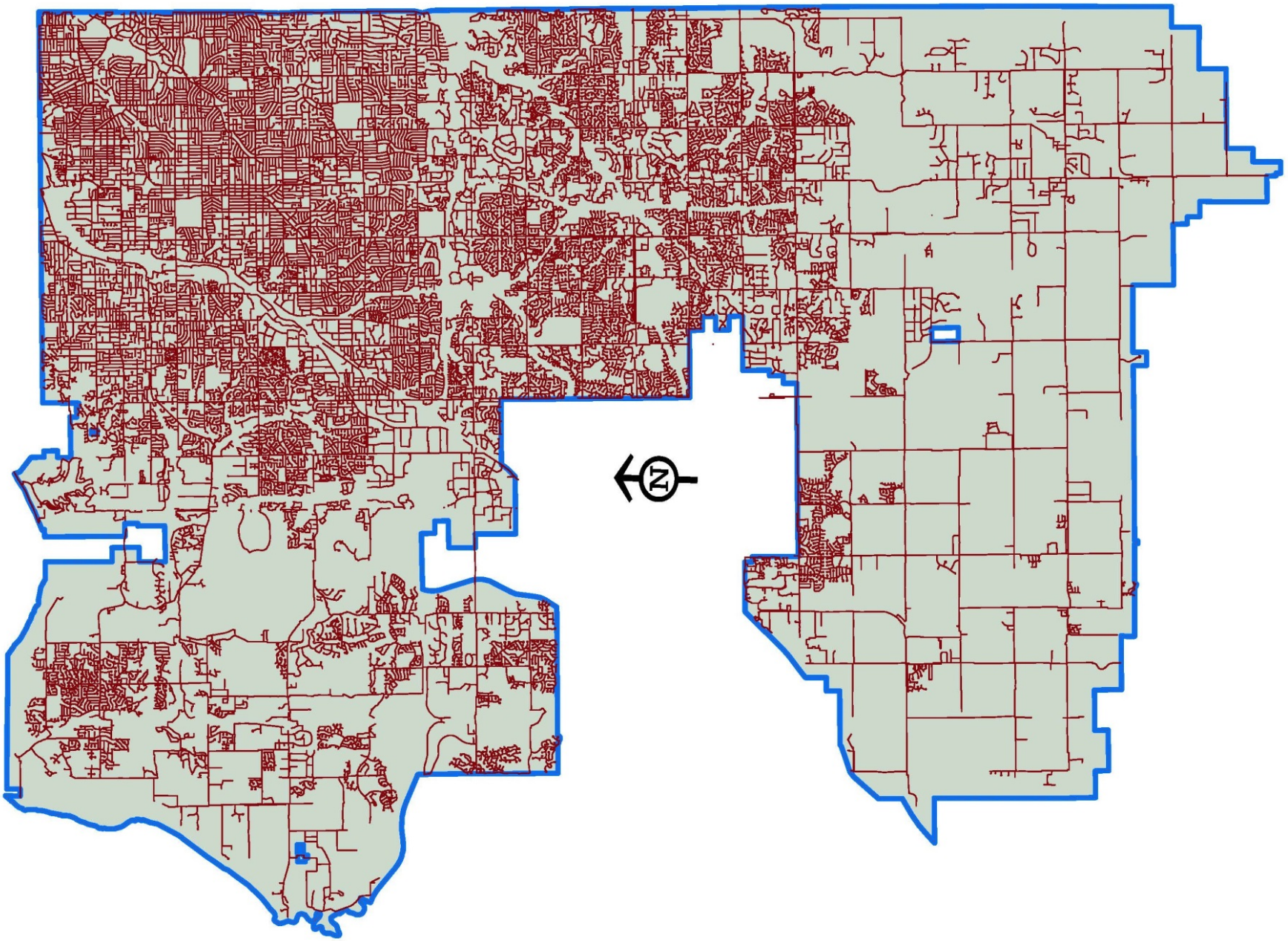


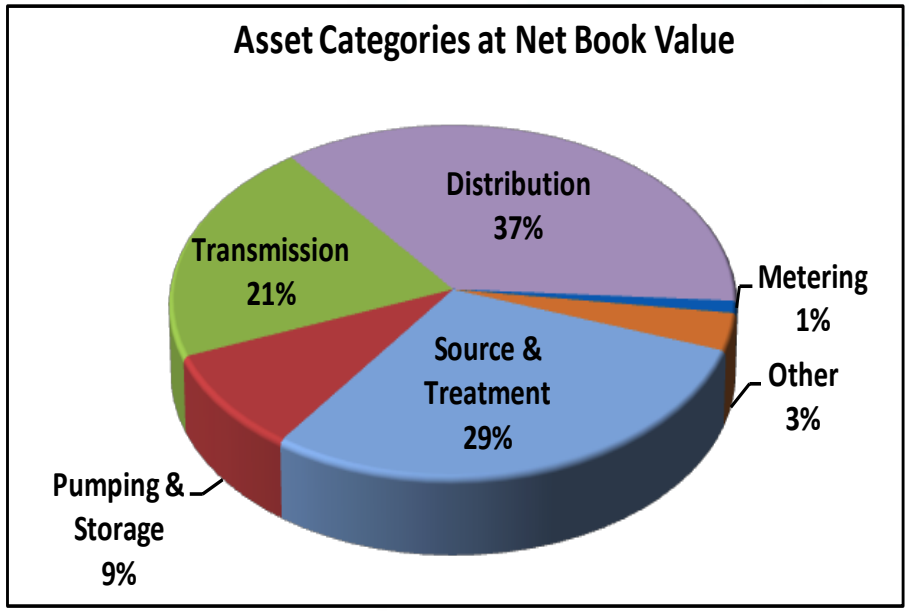
Distribution Pipe - 16” and Smaller



Pipe Inventory

Material	Miles of Transmission Pipe, 20” and larger	Miles of Distribution Pipe, 16” and smaller
Cast iron	13	748
Ductile iron	71	1,354
Steel	18	0
PVC	0	291
PCCP	56	0
HDPE	0.25	32.75
AC	0	12
Total	158.25	2,437.5

Optimizing Distribution Mains?

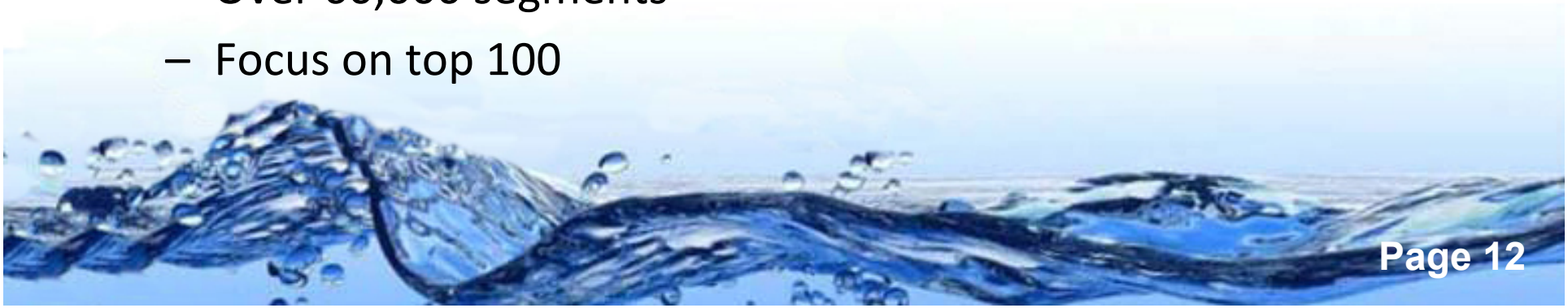


Total net book value, $2.25 billion +/-

- T&D represents 58% of the entire book value of the utility or $1.3 billion.
- Transmission pipe is $0.47b
- Distribution pipe $0.83b
- Sheer magnitude of the value of the distribution piping is very consequential
- Optimizing the distribution system might be worthwhile.

WaterOne - Pipe Risk Management Strategy

- Transmission Pipe
  - Condition Assessment is used extensively
    - Electromagnetic and leak detection for PCCP and DI
- Distribution Pipe
  - Prioritized pipe replacement (No Condition Assessment, pilot PWA attempted)
  - Five point rating system
  - Ten criteria
  - Use GIS to help assign points & SAP to track break history
  - Over 60,000 segments
  - Focus on top 100



Distribution - Pipe Risk Mngmt. Strategy

- The 10 criteria are as follows:
  1. Pipe Age
  2. Pipe Material, unwrapped ductile iron scores high
  3. Pipe Diameter, the larger the diameter the higher the rating
  4. Break History, break rate per mile or increasing break rate
  5. Large or Critical User (Hospitals or Industrial)
  6. Soil Type (Corrosiveness) – From USGS
  7. In a City Project Area (ex. Street Projects)
  8. Financial Break Even Formula (WRF #90892)
  9. Pressure
  10. Master Plan system upgrade mains

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Why would anyone want to invest in condition assessment???

Consequential?

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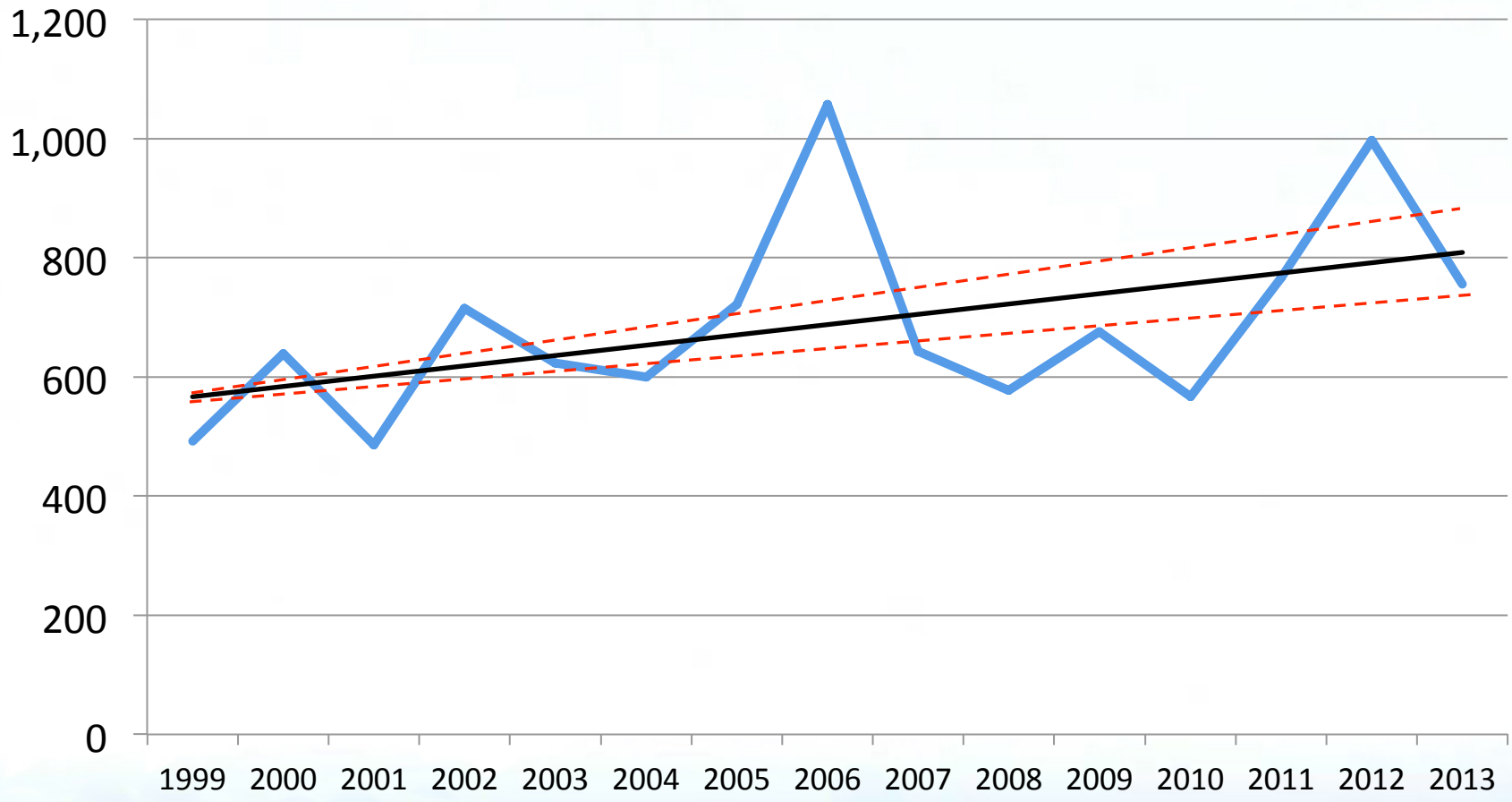
Main Break History



Case Study – Dist. Main

- 2,700 ft. , 6” CI pipe, installed in 1940
- Based on 10 point criteria, should be replaced.
- But should we???

- Condition Assessment of pipe using PICA See Snake
- WRF #4437 Assess & Fix

Case Study – Dist. Main

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- Average cost to replace $130 per foot
- Project cost $351,000
- CA indicates only half the length needs to be replaced, reduces cost by $175,500
- CA cost ~$26,000 (Includes WD1 labor and discounted mobilization)
- CA cost w/o discount $36 to $41k
- Total savings ranges from $134.5k to $155k

Optimization of Dist. Mains

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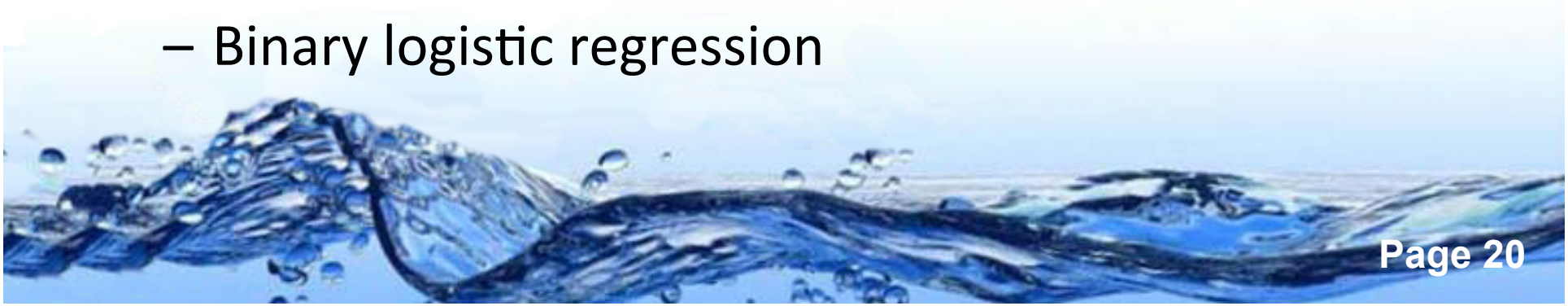
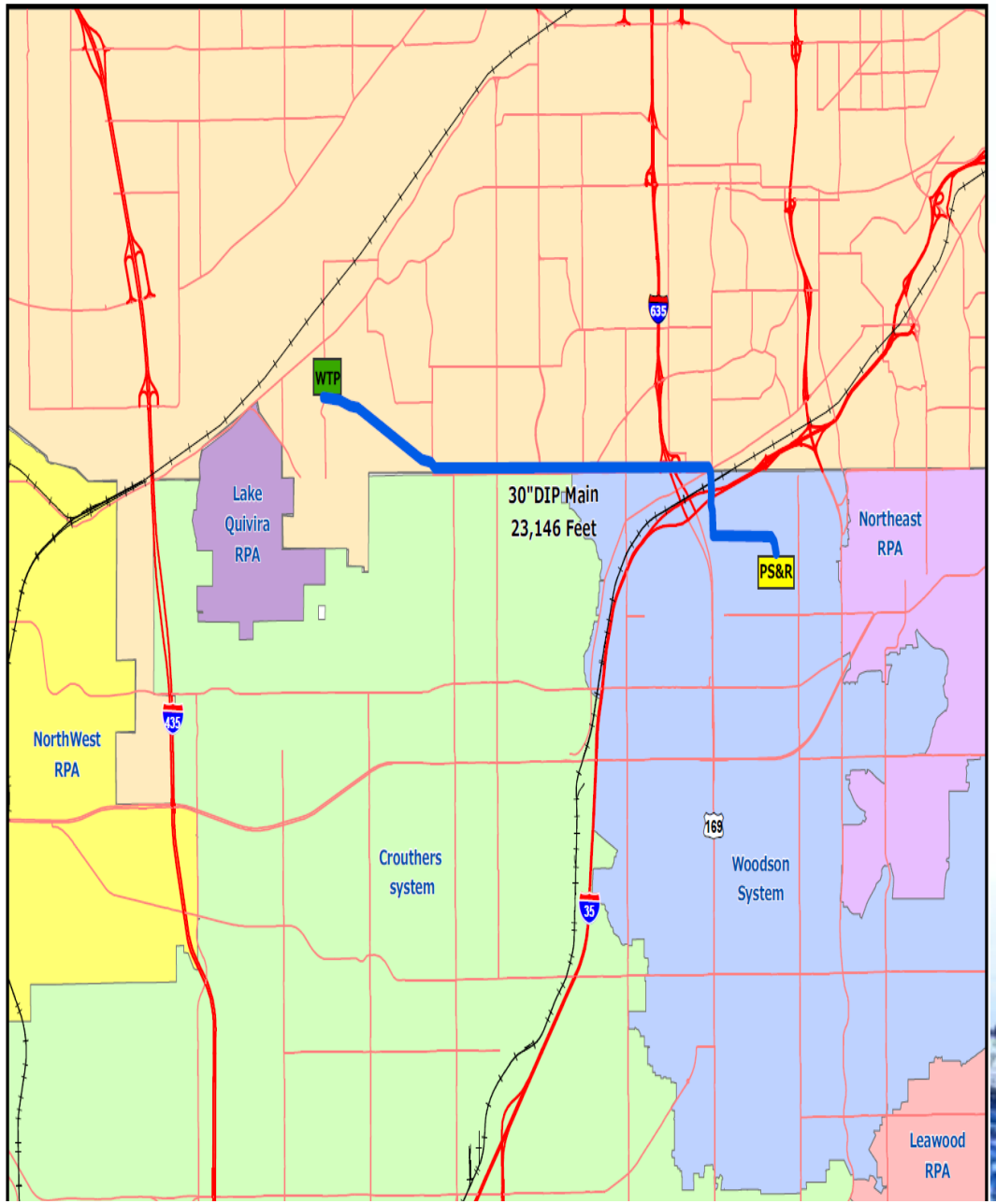
- Condition assessment??
- Leak detection programs
- Pressure reduction
- Anode installation on all main break repairs
- Pilot anode retrofit in certain areas
- Statistical pipe failure prediction models
  - Weibull distribution
  - Binary logistic regression



Case Study - 30-inch DI Tran. Main



- 50 yr. old unwrapped DI
- 5 miles (1 mile replaced)
- Supplies water to 2 separate pump stations and reservoirs
- Serves approximately 73,000 people or 31,000 service connections
- Crosses 2 major highways, railroad, creek, goes through a neighborhood, runs alongside roadways

Condition Assessment Technologies

- RFP issued , received two proposals
  1. Pure Technologies
     - Magnetic Flux Leakage (MFL) provides high resolution data
     - PipeDiver tool provides baseline condition
  2. PICA Corporation
     - Free swimming See Snake uses electromagnetic Remote Field Technology (RFT) to determine the Remaining Wall Thickness (RWT)
     - Tethered See Snake

Removal of CA Tool

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- 30-inch TM was in fairly poor condition, but with areas of useful life
- RFT provided detailed locations of wall loss
- 3 worst wall loss locations in each pipe section were reported

Verification of PICA Data continued

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Repairs Made in Worst Locations

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Costs & Potential Savings

30" DI Transmission Main
Cash Flow with Delayed Staggered Replacment

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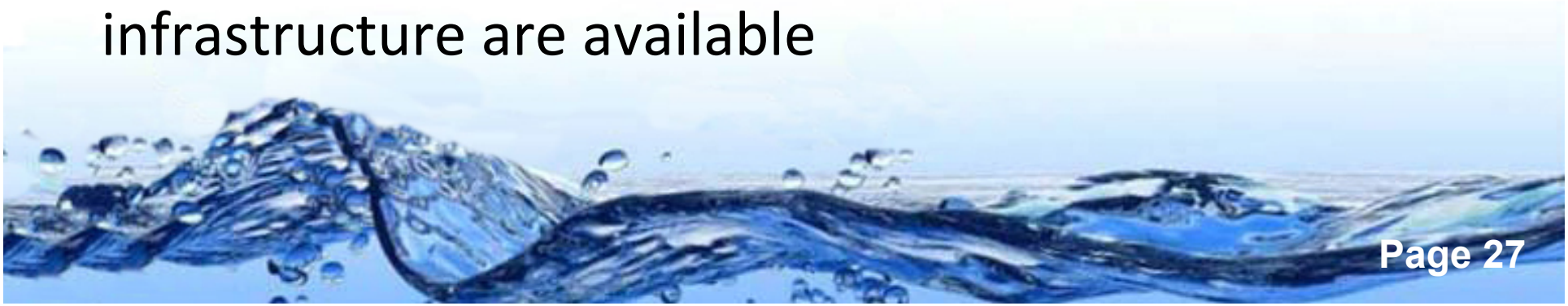
Discount Rate = Cost of Capital = 4.0%

Year	Full Replacement 100% - 2014	Delayed Staggered Replacement	Delayed Staggered Replacement Present Value
2015	9,700,000	970,000	970,000
2016			
2017			
2018			
2019		970,000	829,160
2020			
2021			
2022			
2023			
2024			
2025		7,760,000	5,242,378
Total Cost	$ 9,700,000	$ 9,700,000	$ 7,041,538

Savings from Delay	$ 2,658,462
Condition Assessment Cost to Contractor	$ 324,000
Preparation Costs for Condition Assessment	$ 408,000
Repair Costs	$ 125,000
Savings from Delay - Costs of CA and Repairs	$ 1,801,462

Summary

- Funding is critical, governing body buy-in is required
- Transmission and distribution main behave differently
- CA of transmission mains is very beneficial
- Distribution pipe is monetarily, very consequential
- CA of distribution pipe may be advantageous
- Technology is continuously improving for CA
- A number of techniques to optimize buried infrastructure are available



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Questions for Panel?

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