



RIVERSIDE PUBLIC UTILITIES

# UTILITY 2.0

WATER INFRASTRUCTURE ROAD MAP

JULY 13, 2015

WATER | ENERGY | LIFE



PUBLIC UTILITIES

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# ROAD MAPS – INFRASTRUCTURE IMPROVEMENT – WATER

## Executive Summary

## Details

- System History/Background
- System Assessment
- Findings
  - Infrastructure
  - Technology
  - Workforce
- Investment Options
- Sample Recommendations



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# ROAD MAPS – INFRASTRUCTURE IMPROVEMENT - WATER

## INFRASTRUCTURE IMPROVEMENT EXECUTIVE SUMMARY

WORKFORCE DEVELOPMENT

—

THRIVING FINANCIALLY

ADVANCED TECHNOLOGIES

# ROAD MAPS – INFRASTRUCTURE IMPROVEMENT – WATER - GOALS



- Address aging infrastructure.
- Improve system safety and reliability.
- Increase the use of technology to inform future planning and increase conservation.
- Use financial pro forma to strike investment balance.





# Water Infrastructure Assessment

## Water System:

- Significant improvement have been made through the CIP process, but areas of criticality remain.
- Significant pipeline replacement needed.

## Technology:

- Leverage technology to realize increased efficiency and effectiveness.
- Improve SCADA and network communication to further enhance security.

## Workforce:

- Workforce needs training to have Utility 2.0 skill sets.
- Knowledge transfer needed for aging workforce.

## Financials:

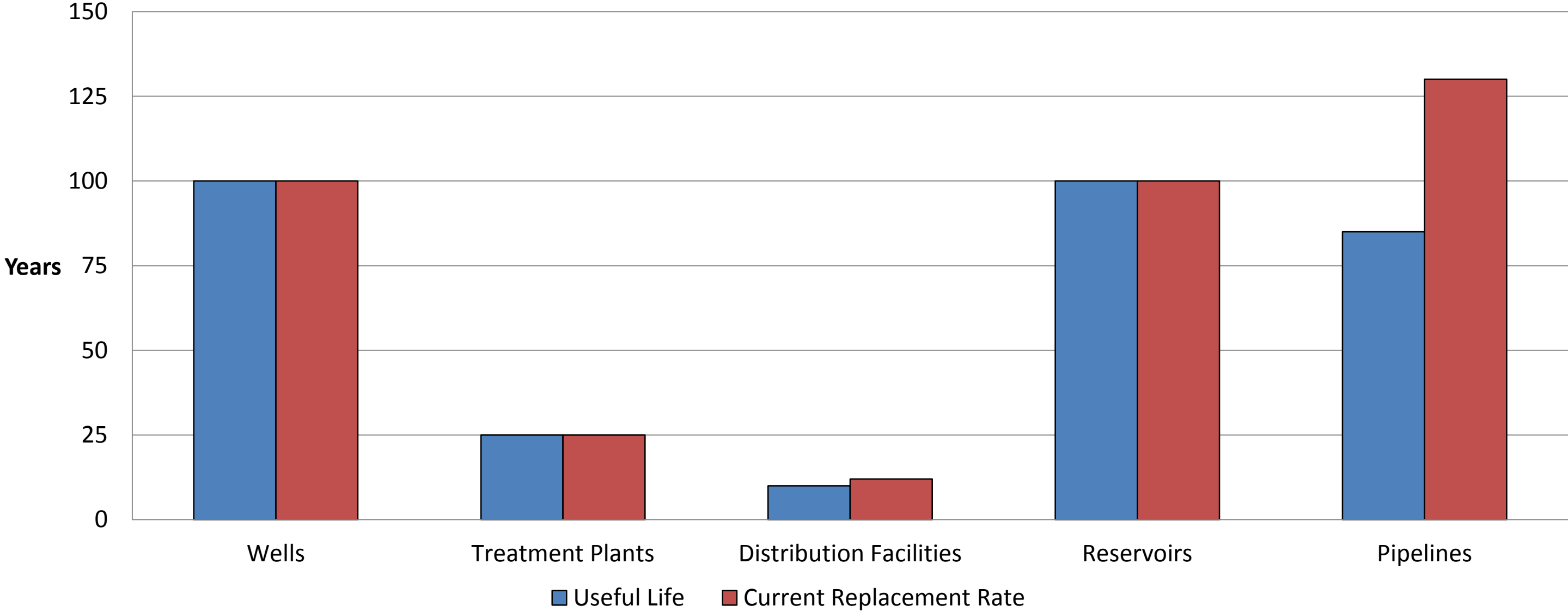
- Strong Financial Position
- Continue efficiency improvements

# Infrastructure Assessment

Asset	Criticality	Last 10 Years	Status	Next 10 Years
Wells		\$20 Million	On target	\$21-\$29 Million
Treatment Plants		\$30 Million	On target	\$19-\$27 Million
Distribution Facilities		\$15 Million	On target	\$6-\$10 Million
Reservoirs		\$45 Million	On target	\$5-\$7 Million
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Distribution Pipelines		\$90 Million	Deficient	\$107-\$198 Million
Technology		\$15 Million	Deficient	\$44-\$64 Million

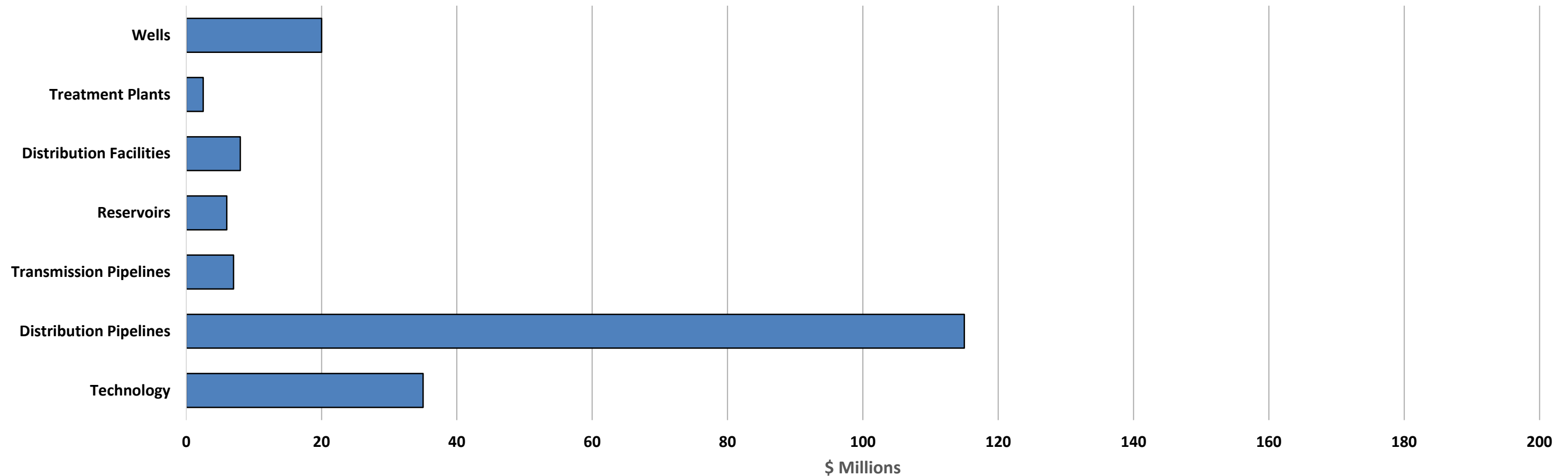


# Useful Life vs. Replacement Rate



# Option 1: Stay the Same (reactive mode), but fall behind as costs rise.

Option 1: Status Quo



**Option 1 = \$170-\$216 Million**

Option 2 = \$226-\$293 Million

Option 3 = \$279-\$357 Million

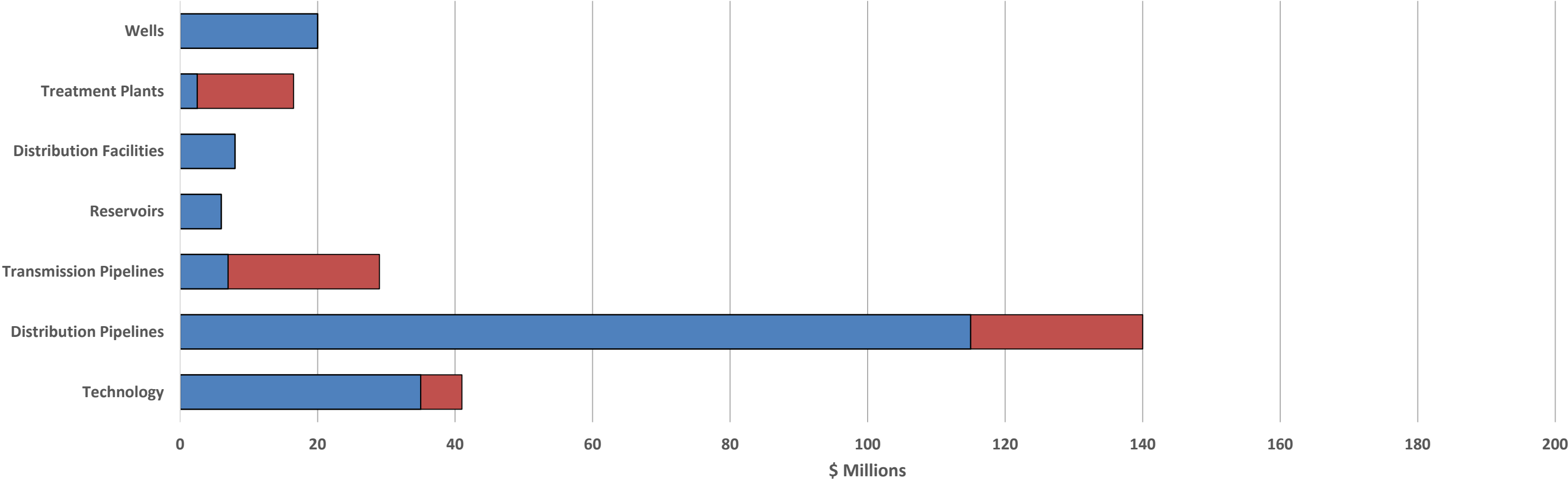
Option 4 = \$342-\$437 Million

**Option 1: Existing programs continue. Distribution pipeline at 130 year replacement cycle. Basic RPU technology improvements with ODMS and asset management.**



# Cost to Address Major Deficiencies

Option 2: Major Deficiencies



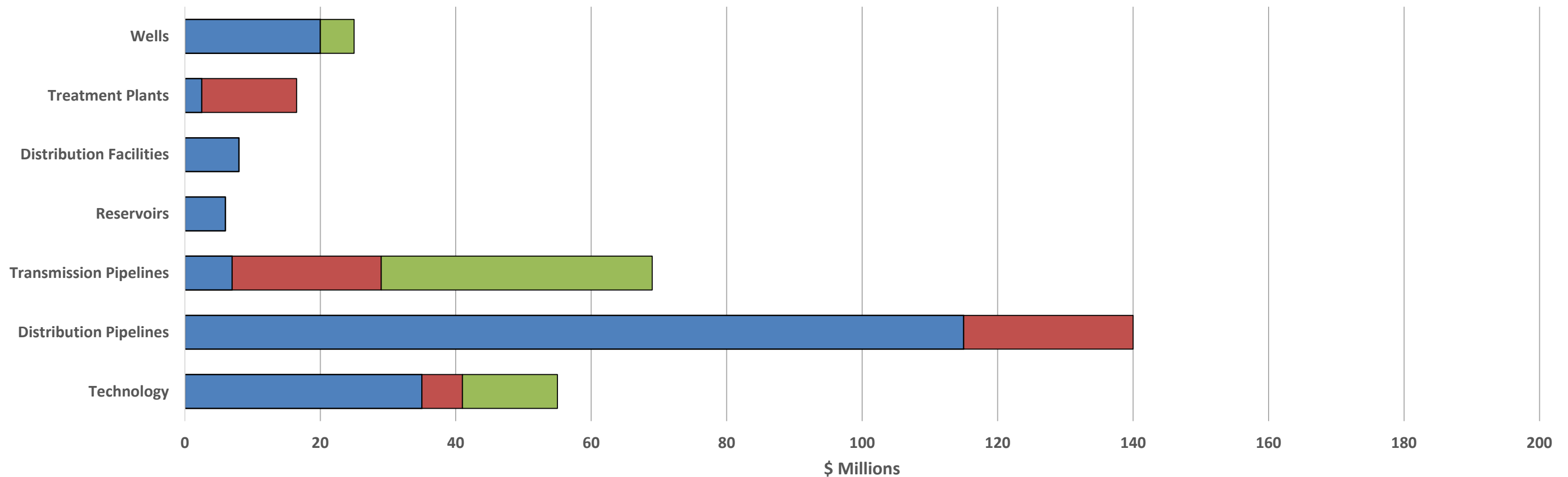
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# Cost to Address Operational Deficiencies

Option 3: Operational Deficiencies



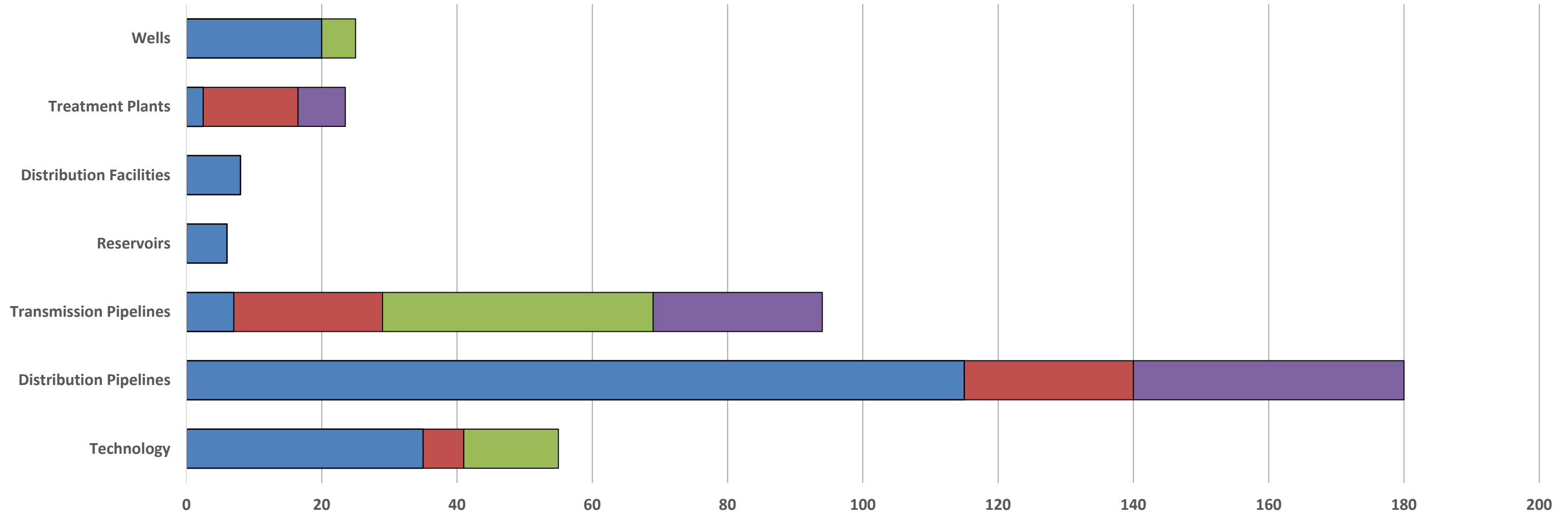
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# Cost for Aggressive Program

Option 4: Aggressive Program

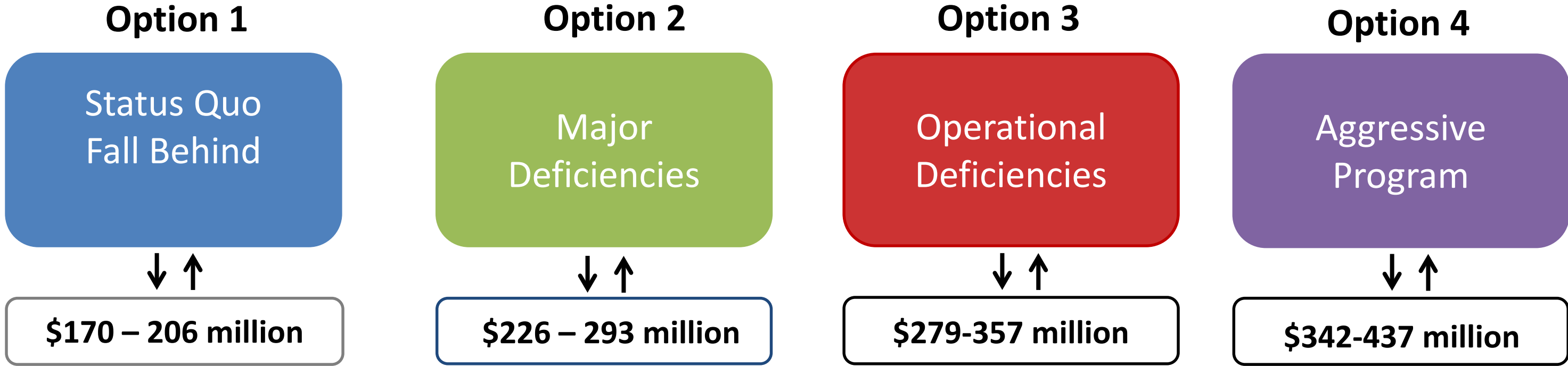


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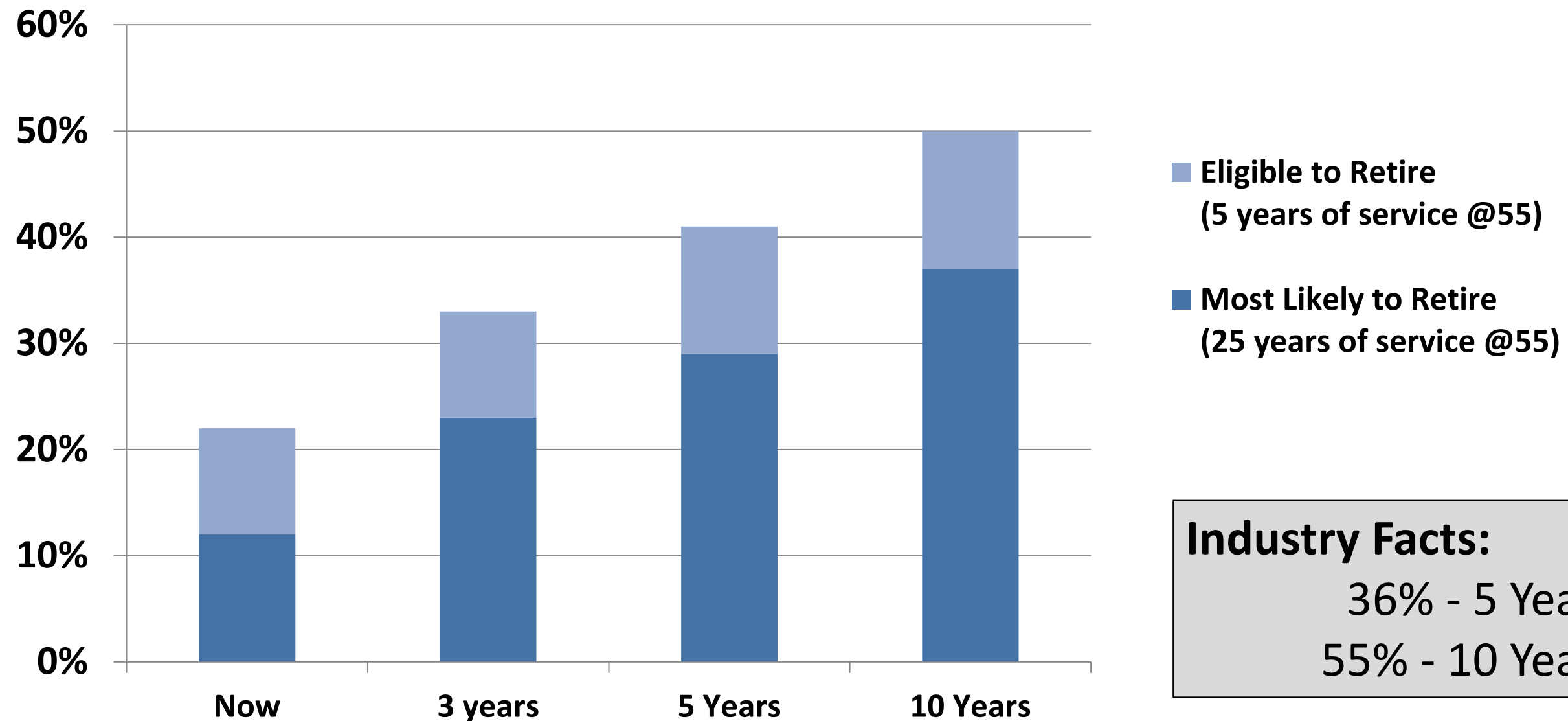
**Option 4: Replace old and undersized transmission mains. Replace distribution pipelines at 75-year life cycle. Construct the Riverside Canal Treatment Plant.**

# Summary of Investment Options

Additional financial investment is required to address current backlog and improve maintenance.



# RPU Retirement Projections



Employees eligible to retire now and future

**Industry Facts:**  
36% - 5 Years  
55% - 10 Years

# ROAD MAPS – INFRASTRUCTURE IMPROVEMENT - WATER

INFRASTRUCTURE IMPROVEMENT  
BACKGROUND

WORKFORCE DEVELOPMENT

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ADVANCED TECHNOLOGIES



# Background

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- City acquired water system in 1913
- Serve population over 300,000
- System replacement cost over \$2 Billion
- Annual revenues over \$60 Million







An Irrigating Canal

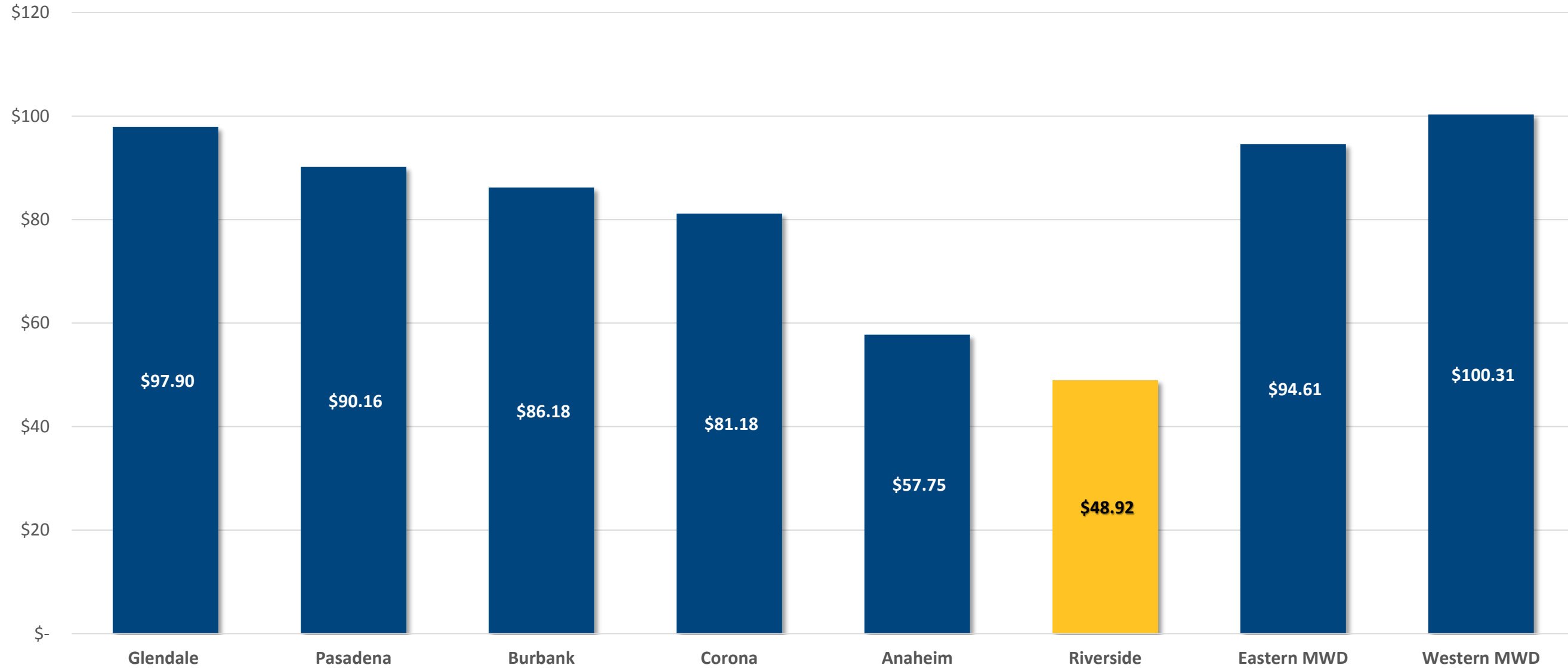


# Safe W.A.T.E.R. Plan (2006)

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- Invested \$250,000,000
- Age based replacement
- Last rate increase 2010
- Purchasing power has diminished
- Good work done / more needed

# Affordable Water Rates



**AVERAGE RESIDENTIAL RATE FOR 25 CCF PER MONTH  
(AS OF SEPT. 30, 2014)**

RiversidePublicUtilities.com



# ROAD MAPS – INFRASTRUCTURE IMPROVEMENT - ELECTRIC

INFRASTRUCTURE IMPROVEMENT  
ASSESSMENT

WORKFORCE DEVELOPMENT

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ADVANCED TECHNOLOGIES



# RPU Water System

- 49 active domestic wells
- 16 storage reservoirs (109 MG)
- 11 treatment plants
- 3 imported water connections
- 41 booster stations
- 8 emergency inter-ties
- 46 Hydraulic Zones (925–1750)
- 954 miles pipeline (4–72 inch)
- Riverside Canal and Gage Exchange system

# Estimated Replacement Value

Item	Quantity		Unit Price		Total
Water Supply Mains	180,000	ft..	\$ 810	/ft..	\$ 145,800,000
Transmission Pipelines	516,900	ft.	\$ 650	/ft.	\$ 335,985,000
Distribution Pipelines	4,342,300	ft.	\$ 250	/ft.	\$ 1,085,575,000
Service Laterals	67,500	ea.	\$ 2,000	ea.	\$ 135,000,000
Meters	67,500	ea.	\$ 250	ea.	\$ 16,875,000
Reservoirs	109	MG	\$ 1,000,000	/MG	\$ 108,500,000
Pump Stations	10,860	HP	\$ 4,000	/HP	\$ 43,440,000
Domestic Wells	49	ea.	\$ 3,000,000	ea.	\$ 147,000,000
Pressure Stations	60	ea.	\$ 300,000	ea.	\$ 18,000,000
Treatment Plants	6	ea.	\$ 12,000,000	ea.	\$ 72,000,000
Chlorination Facilities	6	ea.	\$ 1,200,000	ea.	\$ 7,200,000
Riverside Canal Facilities	14	miles	\$ 2,000,000	mi.	\$ 28,000,000
Control Systems		LS	\$10,000,000	LS	\$ 10,000,000
<b>Total System Valuation</b>					<b>\$ 2,153,375,000</b>

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**Buried Assets = 80%**

# Infrastructure Assessment

Asset	Criticality	Last 10 Years	Status	Next 10 Years
Wells		\$20 Million	On target	\$21-\$29 Million
Treatment Plants		\$30 Million	On target	\$19-\$27 Million
Distribution Facilities		\$15 Million	On target	\$6-\$10 Million
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Transmission Mains		\$35 Million	Deficient	\$84-\$102 Million
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# Well Production Assessment

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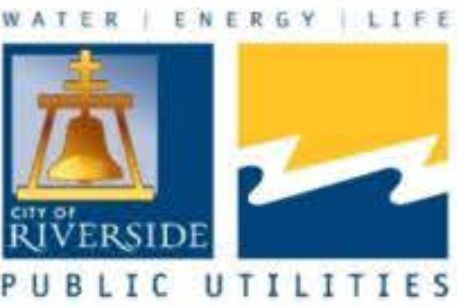
- \$20 Million Invested
  - 10 wells in last 10 years (20% of capacity)
  - 5 built or financed by others
- \$21-29 Million Needed
  - Replace 1 well every other year
  - Rehab 5 wells per year
  - Replace 2 irrigation wells
- On Target

# Treatment Assessment



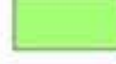

- \$30 Million Invested
  - JW North
  - Gas  $\text{Cl}_2$  to sodium hypochlorite conversion
- \$19-\$27 Million Needed
  - Maintain JW North
  - Build North Waterman Treatment Plant (Perchlorate)
  - Build Riverside Canal Treatment Plant
- On Target



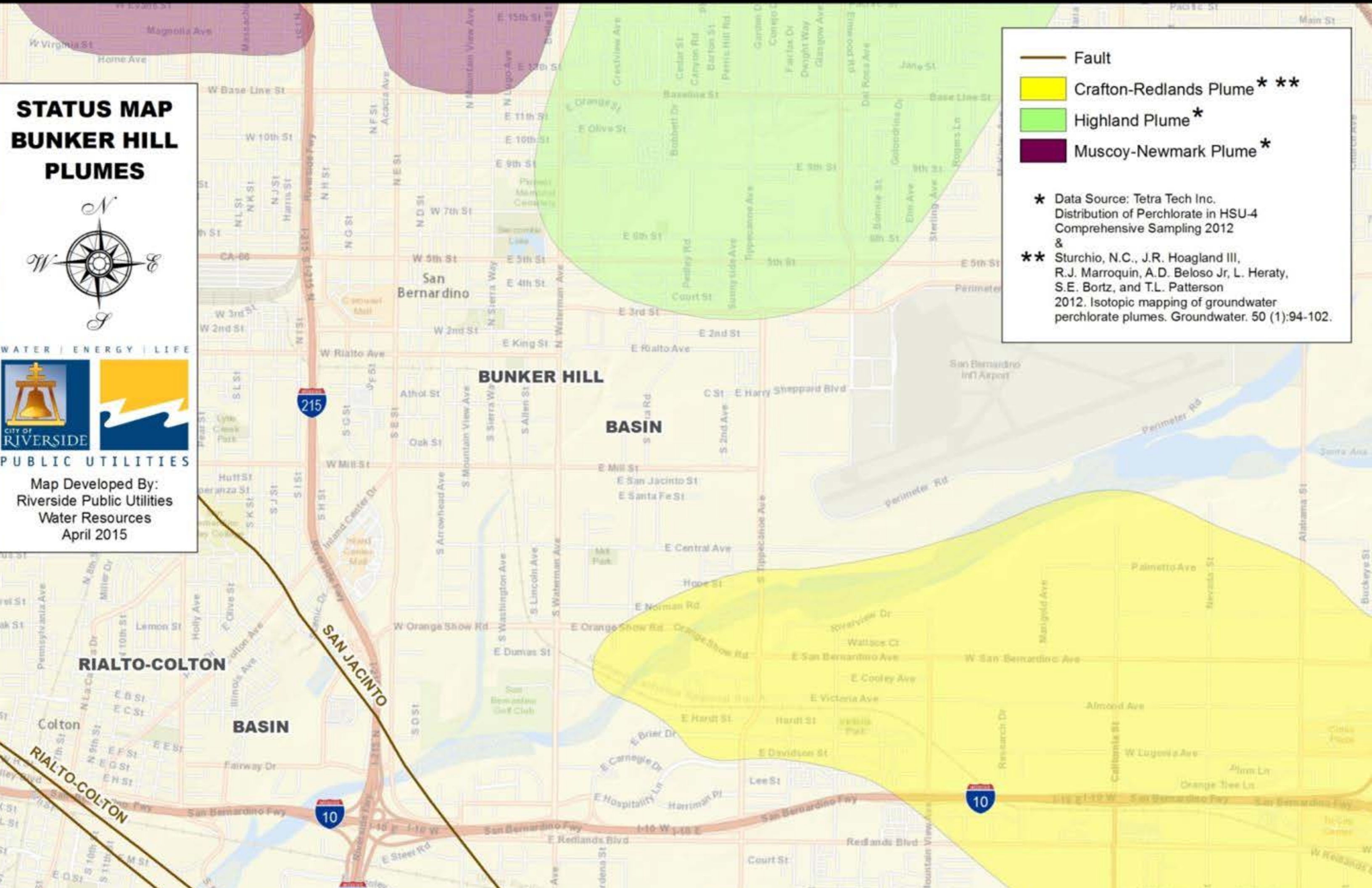
# STATUS MAP BUNKER HILL PLUMES



Map Developed By:  
Riverside Public Utilities  
Water Resources  
April 2015

-  Fault
-  Crafton-Redlands Plume \* \*\*
-  Highland Plume \*
-  Muscoy-Newmark Plume \*

\* Data Source: Tetra Tech Inc. Distribution of Perchlorate in HSU-4 Comprehensive Sampling 2012 &  
\*\* Sturchio, N.C., J.R. Hoagland III, R.J. Marroquin, A.D. Beloso Jr, L. Heraty, S.E. Bortz, and T.L. Patterson 2012. Isotopic mapping of groundwater perchlorate plumes. Groundwater. 50 (1):94-102.



# Distribution Facilities Assessment

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- \$15 Million Invested
- Booster Stations
  - 18 of 38 stations are new or rebuilt
- Pressure Reducing Stations
  - 14 of 27 stations are new or rebuilt
- Meters
  - 35,000 of 64,000 replaced
- On Target

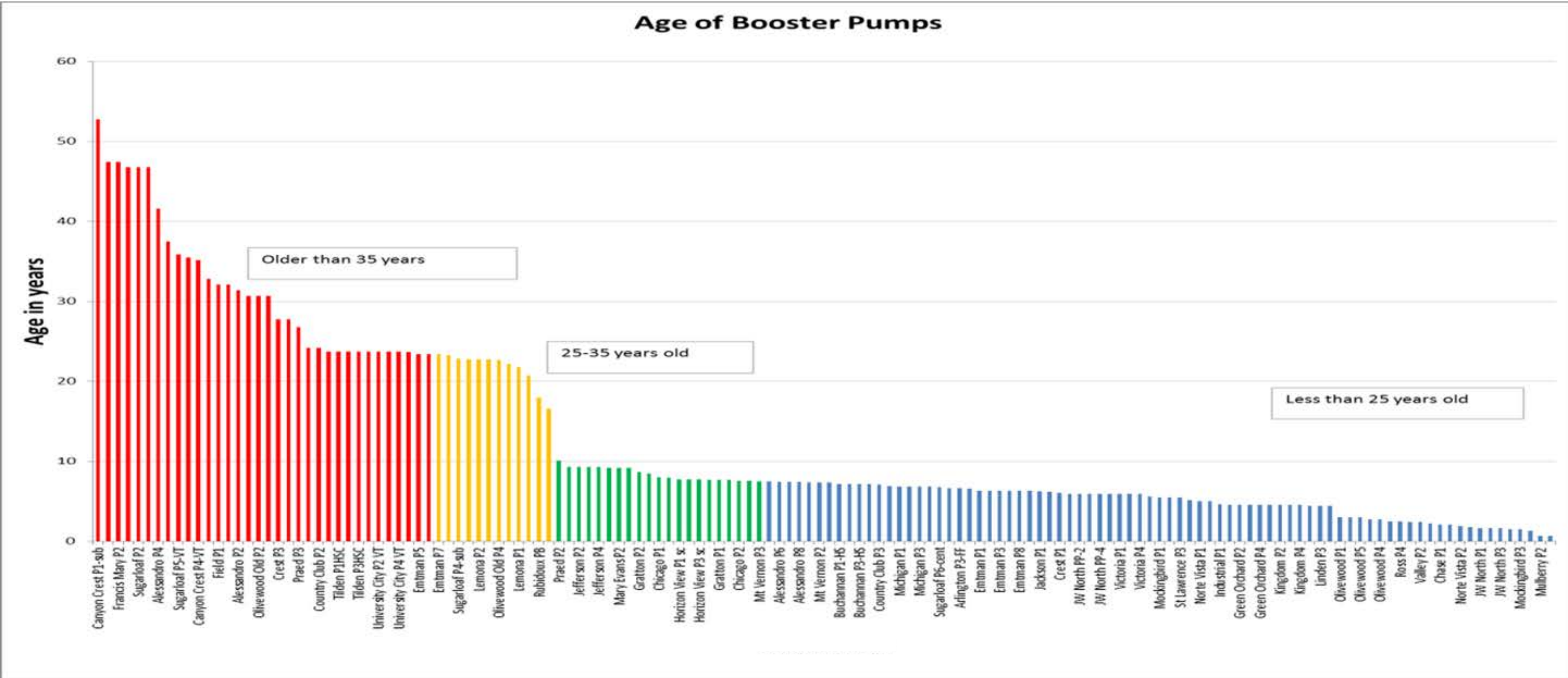


# Distribution Facilities Assessment

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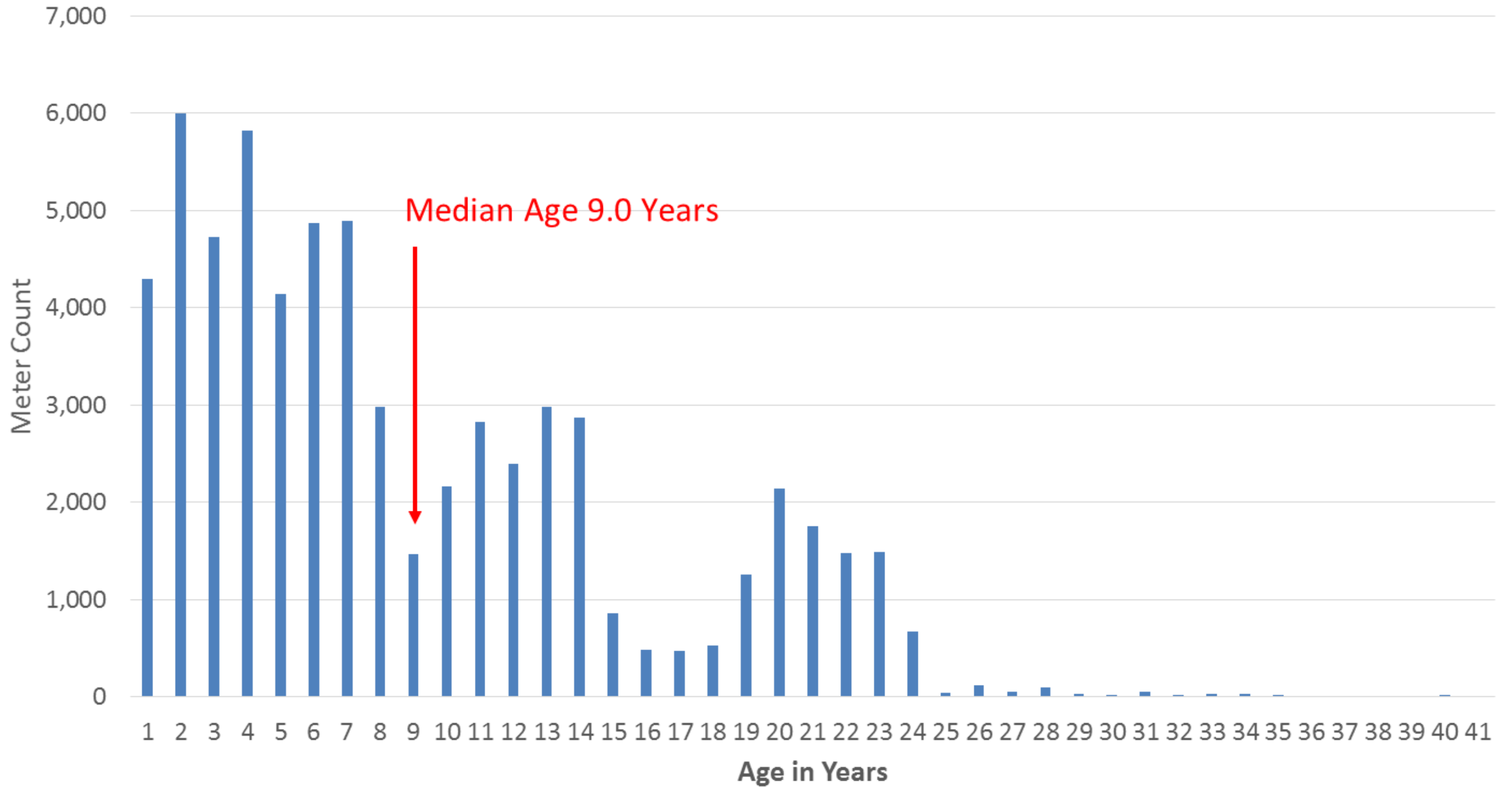
- \$6-\$10 Million needed
  - 2 booster station replacements
  - 1 pressure reducing station replacement
  - 4,500 meter replacements / year

# Booster Pumps by Year



# Meters by Age

Meter Count by Age (3/4" – 2")



# Storage Reservoir Assessment

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- \$45 Million Invested
  - Evans, Whitegates I and Whitegates II rebuilt
  - Linden Roof replacement
- Most reservoirs are in good condition
- \$5-\$7 Million needed
  - Maintenance
- On Target



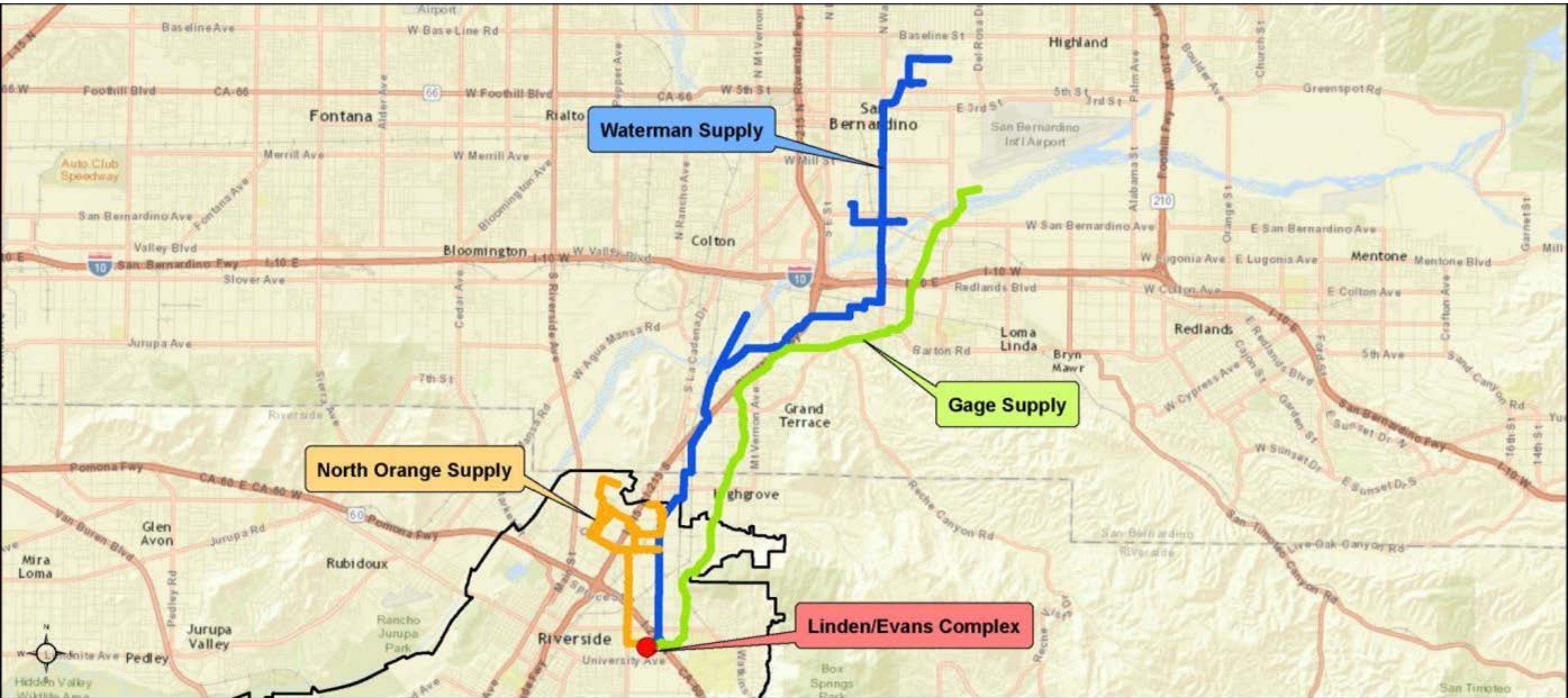
# Transmission Mains Assessment

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- \$35 Million Invested
  - San Bernardino TM replacements (9 projects)
  - Short segment of Cross town feeder (SR-91 widening)
- \$84-\$102 Needed
  - Techite Pipe should be replaced
  - Old and undersized pipelines
  - Operational deficiencies
- Deficient

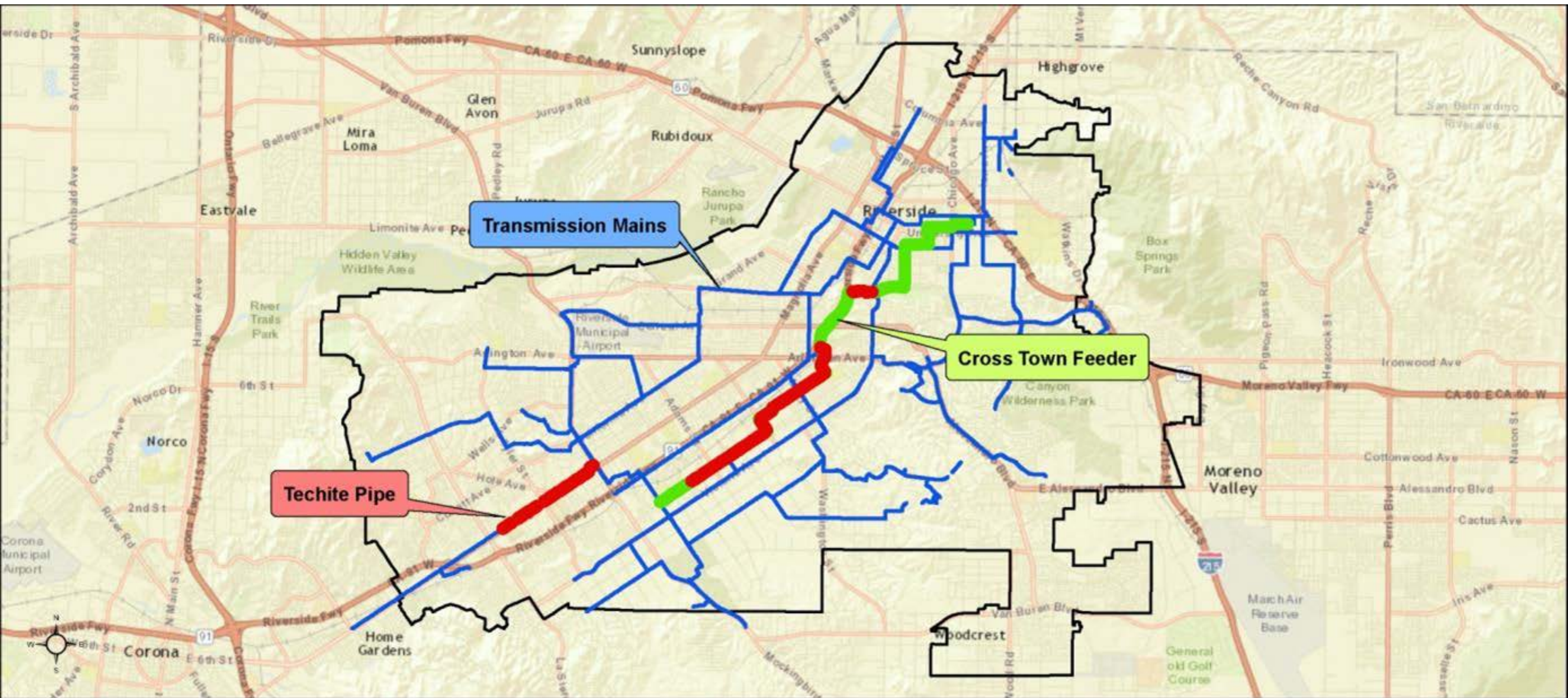


# Supply Transmission Mains Map



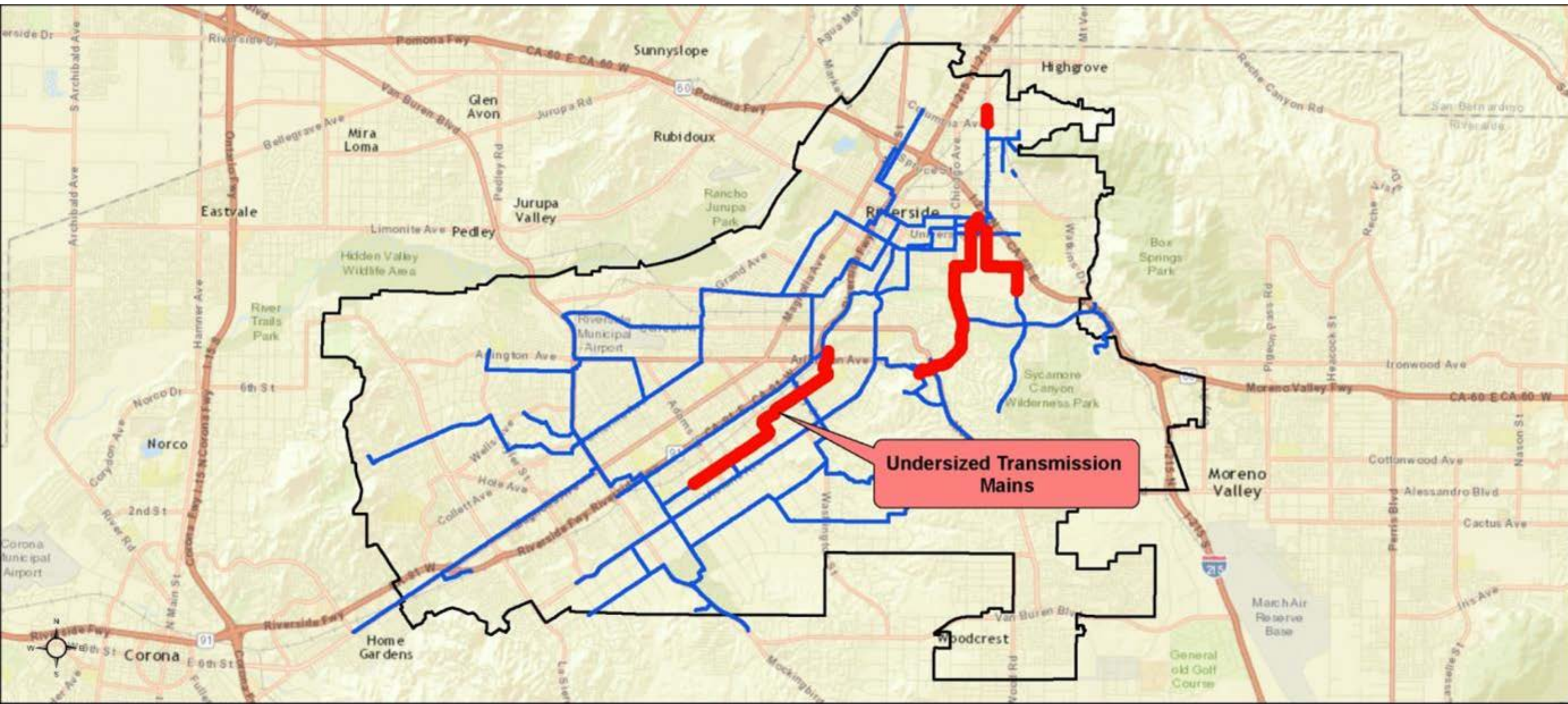


# Distribution Transmission Mains Map





# Distribution Transmission Mains Map (undersized)





# Techite Pipe



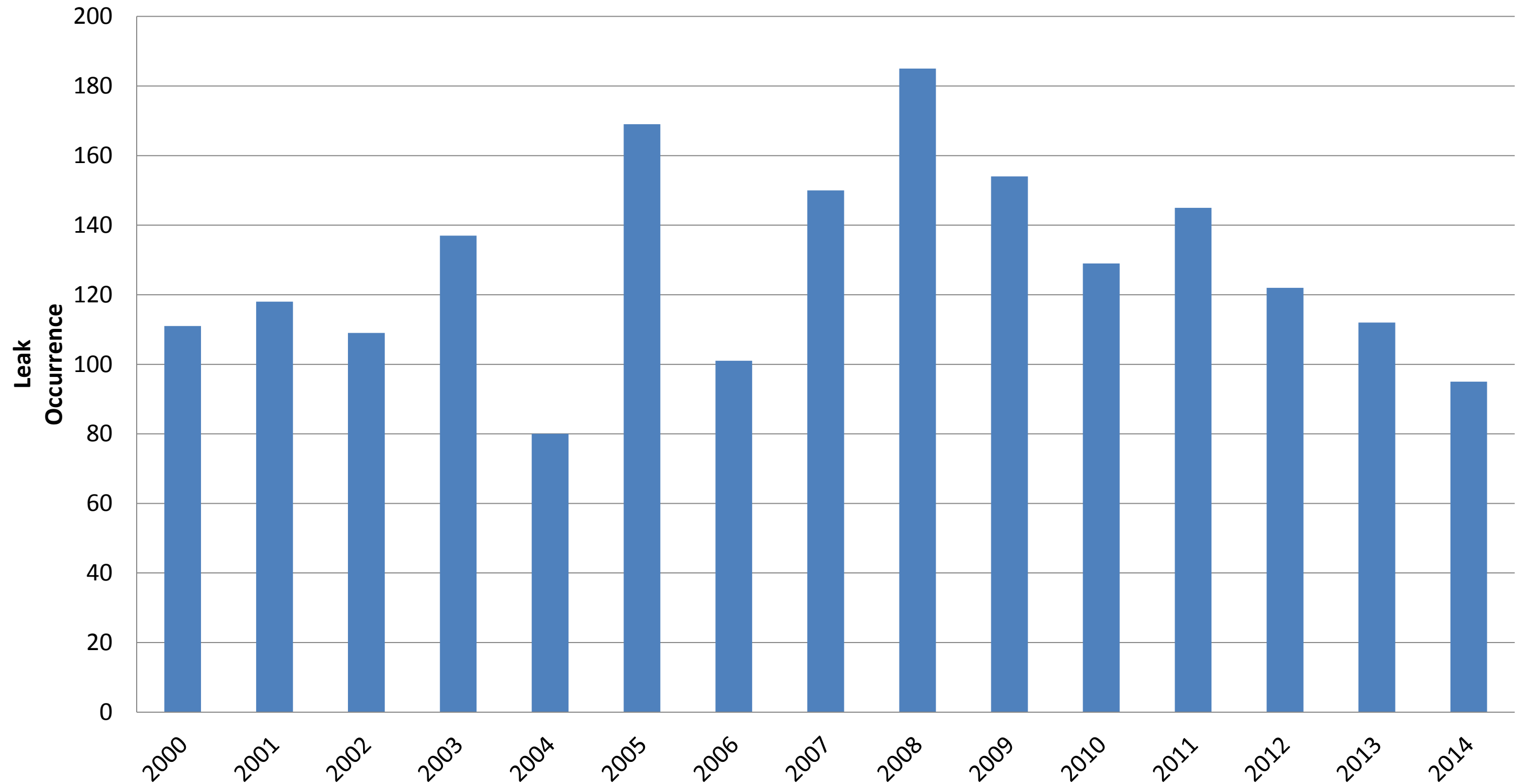


# Distribution Pipelines Assessment

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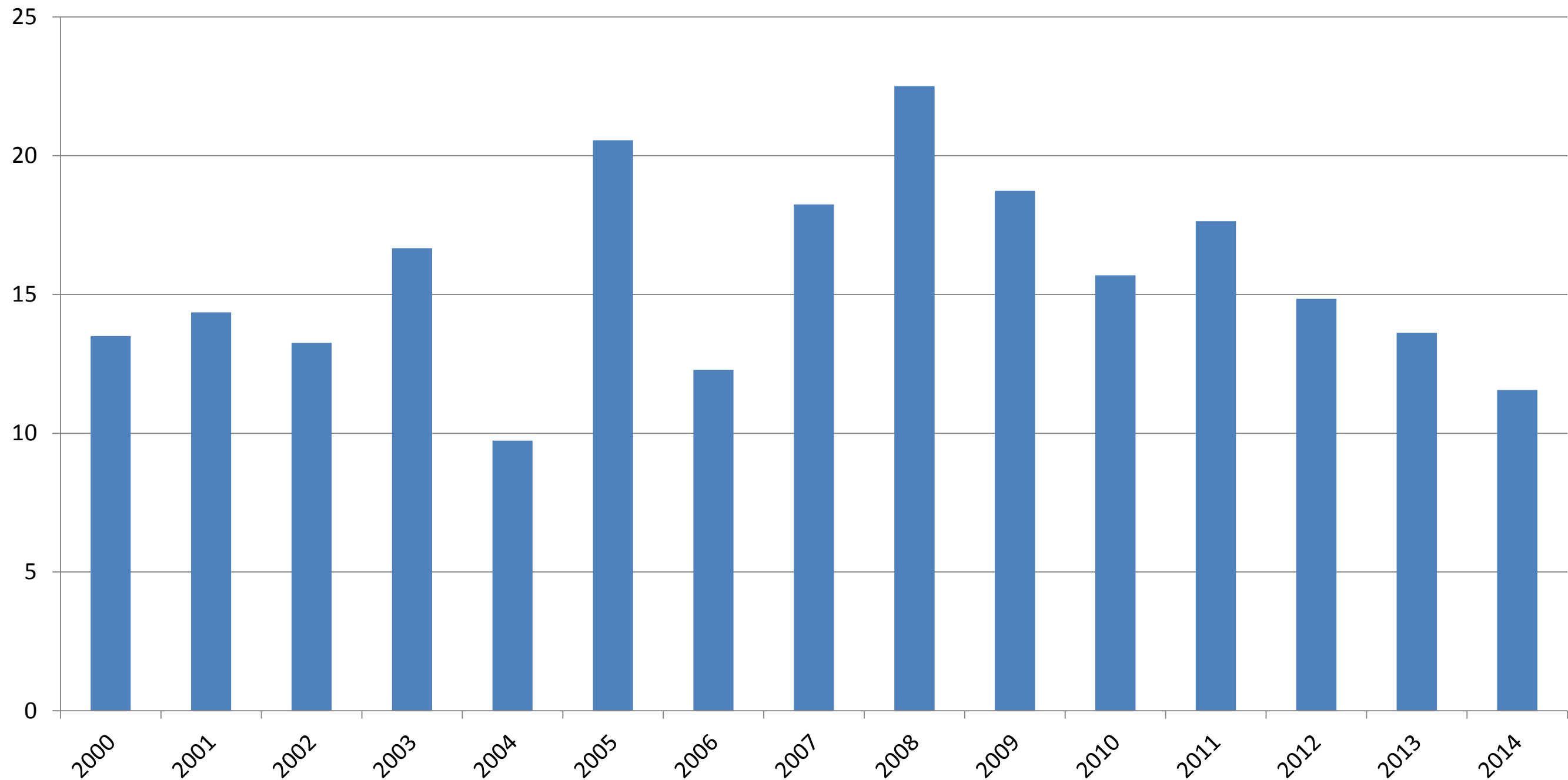
- \$90 Million Invested
  - 60 Miles replaced (\$63 Million)
    - 130 year replacement cycle
  - System expansion, Public Works projects
- \$107-\$198 Million needed
  - Approaching “Tsunami” of Cast Iron pipe
  - Develop improved assessment methods
- Deficient

# Annual Distribution Line Leaks



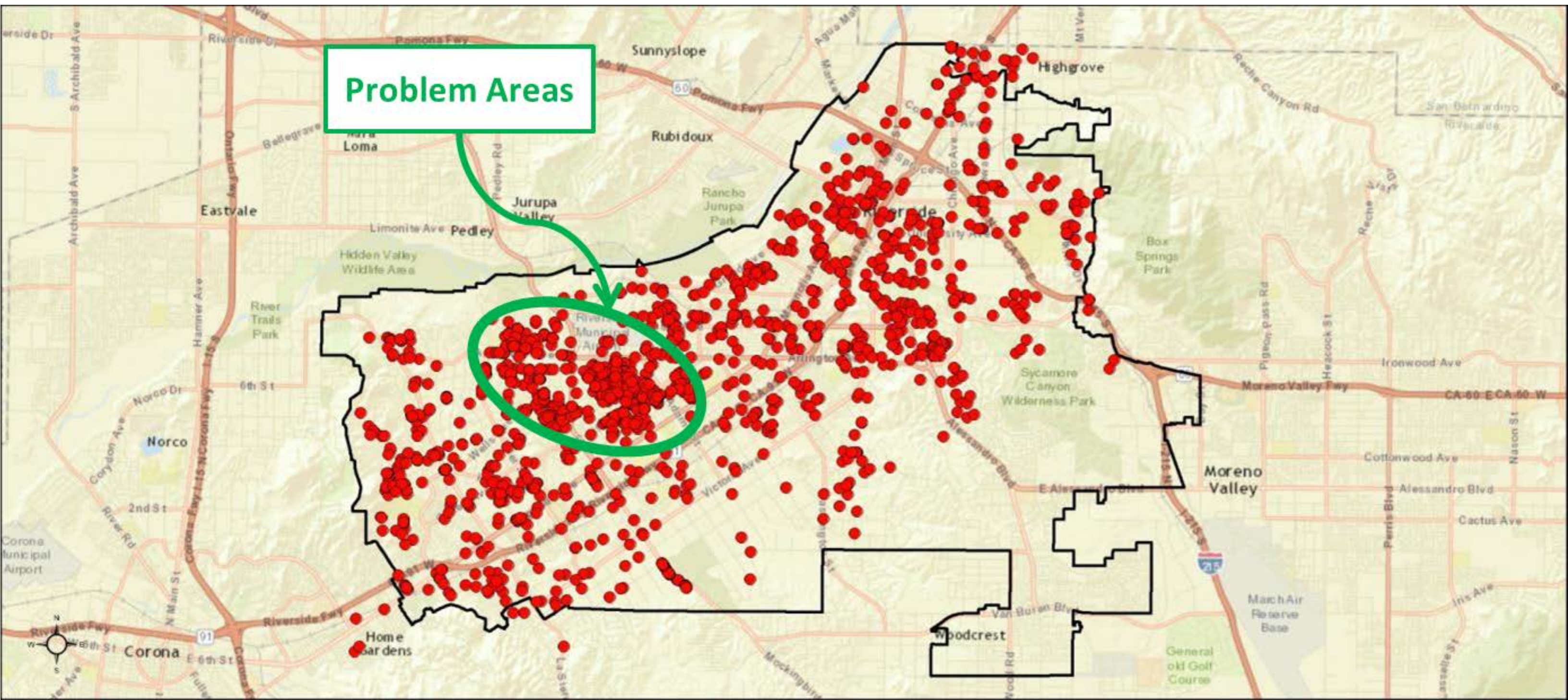
# Normalized Leak Rating

Distribution Line Leaks per 100 miles of pipeline per year





# Active Leaks Map



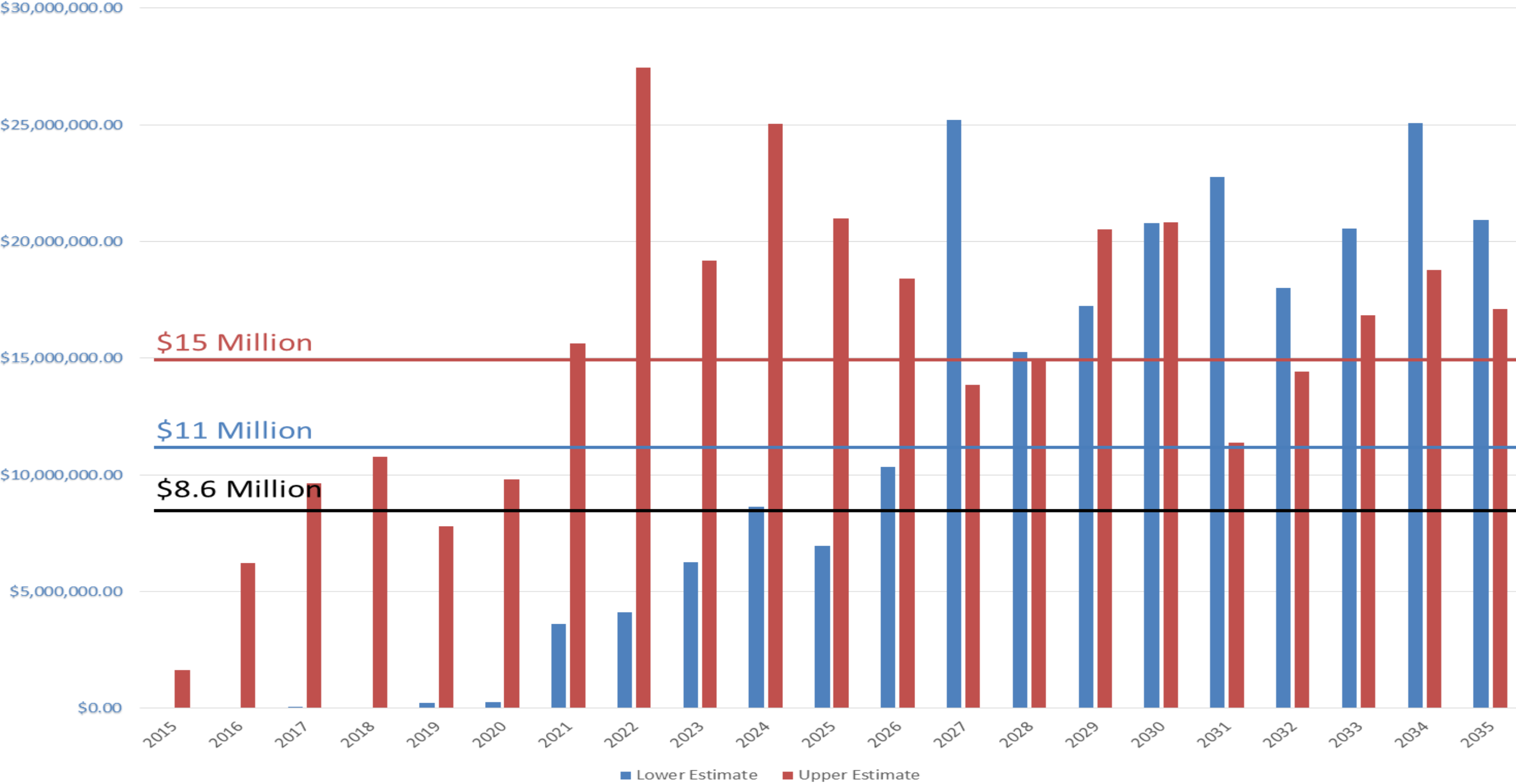


# Premature Distribution Pipeline Failure



**Failed Cast Iron Distribution mains removed from service December 2014. Installed c. 1950.**

# Distribution Pipeline Replacement Needs



# Distribution Main Replacement Rate

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- \$8.6 Million/year
  - 6.5 Miles (130-year cycle)
- \$11 Million/year
  - 8.5 Miles (100-year cycle)
- \$15 Million/year
  - 11 Miles (75-year cycle)

# Infrastructure Assessment Summary

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## Significant Progress with CIP

- Most areas are making good progress
  - Wells, Treatment Plants, Distribution Facilities, Reservoirs

## Some areas need attention (10 years)

- Transmission Mains (\$84-\$102 Million)
- Distribution Pipelines (\$107-\$198 Million)

ROAD MAPS – INFRASTRUCTURE IMPROVEMENT -  
ELECTRIC

INFRASTRUCTURE IMPROVEMENT  
TECHNOLOGY ASSESSMENT

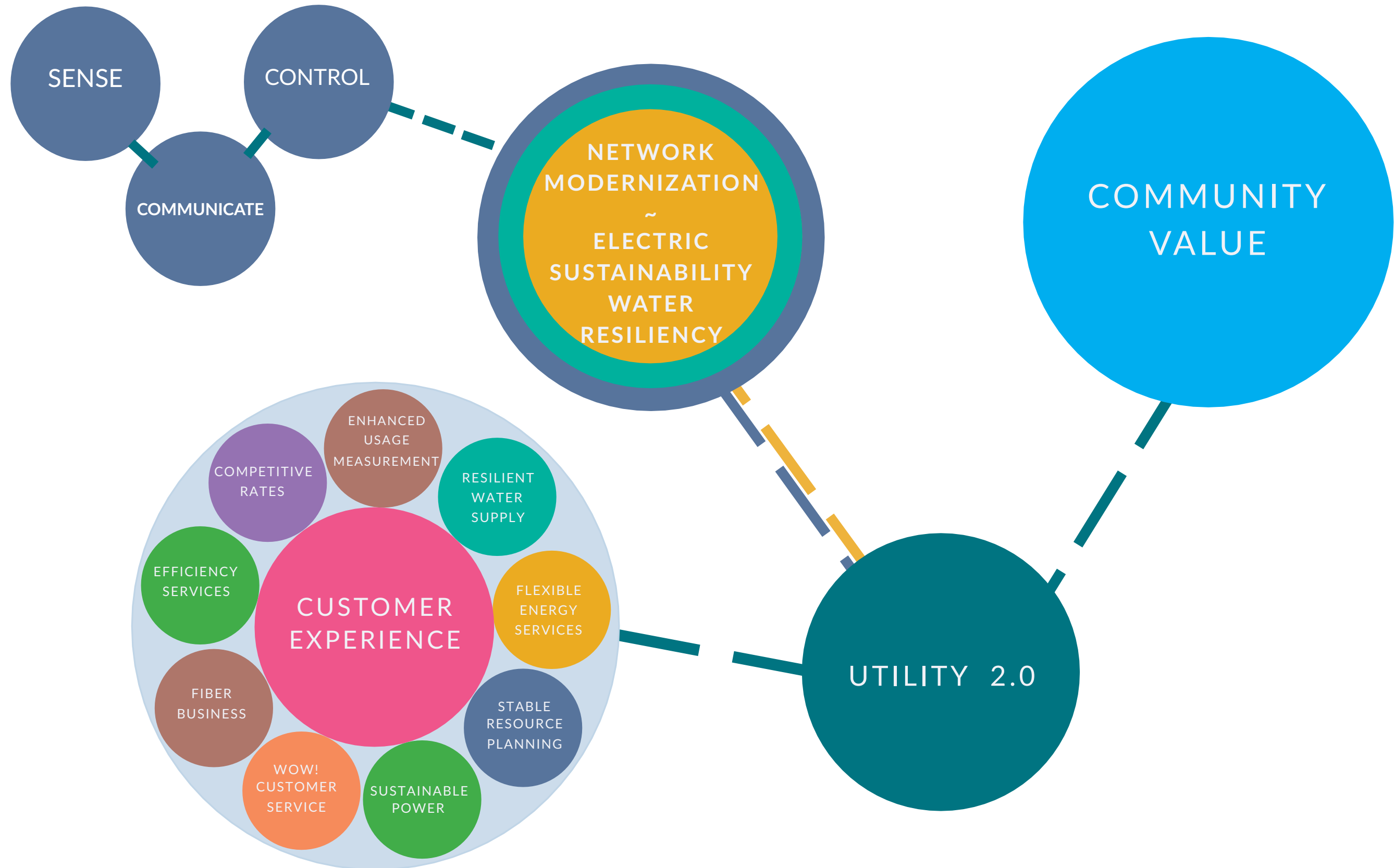
WORKFORCE DEVELOPMENT

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# HOW TECHNOLOGY HELPS THE WATER INFRASTRUCTURE REACH 2.0



# Technology Assessment

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- \$15 Million Invested
  - Replaced SCADA system (10 years old)
  - Well automation/SCADA expansion
  - ODMS
- \$44-\$64 Million needed
  - Information gathering/storage/extraction/analysis
  - Real time and efficient system operation



# Technology Master Plan

## CUSTOMER FOCUSED

Directly influence customer experience and provide customer interaction

- Customer Information System (CIS)
- Customer Relationship Management (CRM)
- Customer Web Portal (CWP)
- Interactive Voice Recognition (IVR)

## INFORMATION BASED

Decision and analysis, data management and process implementation based primarily on large databases

- Meter Data Management (MDM)
- Geographic Information Systems (GIS)
- Operational Data Management System (ODMS)
- Work Management System (WMS)
- Asset Management System (AMS)
- Warehouse Inventory System (WIS)

## REAL-TIME OPERATIONAL

Used in real-time operations and control of water and energy delivery systems

- Advanced Metering (AMI)
- Automated Vehicle Loading (AVL)
- Network Communications System (NCS)
- Land Mobile Radio (LMR)
- Distribution Automation (DA)
- Substation Automation (SA)
- Outage Management System (OMS)
- Distribution Management System (DMS)
- Supervisory Control and Data Acquisition System (SCADA)

# Technology Assessment

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- ODMS
  - Underway
  - Store operational data
  - Interact with multiple databases
  - Platform for dashboards
  - Segue way for advanced analysis and decision making
- Asset Management
  - Underway
  - Fully utilize existing software
  - Automate gathering of field data
  - Streamline maintenance
  - Refine CIP program

# Technology Assessment

- Communication Upgrade
  - Remote facilities
  - High failure rate
  - Low bandwidth
- Distribution Automation
  - Optimize system operation
  - Added level of reliability
  - Reduce energy costs
- Advanced Metering Infrastructure (AMI)
  - Enhance customer service
  - Leak detection
  - Real time monitoring of system
  - Non-revenue water detection
  - Advanced meters

ROAD MAPS – INFRASTRUCTURE IMPROVEMENT -  
ELECTRIC

INFRASTRUCTURE IMPROVEMENT  
WORKFORCE ASSESSMENT

WORKFORCE DEVELOPMENT

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# Workforce Assessment

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- RPU has strong competency for today's needs
- Improved processes may require new skillsets
  - Changes in workforce make-up?
- Retiring employees
- Onboard/train incoming staff
- Continuous education

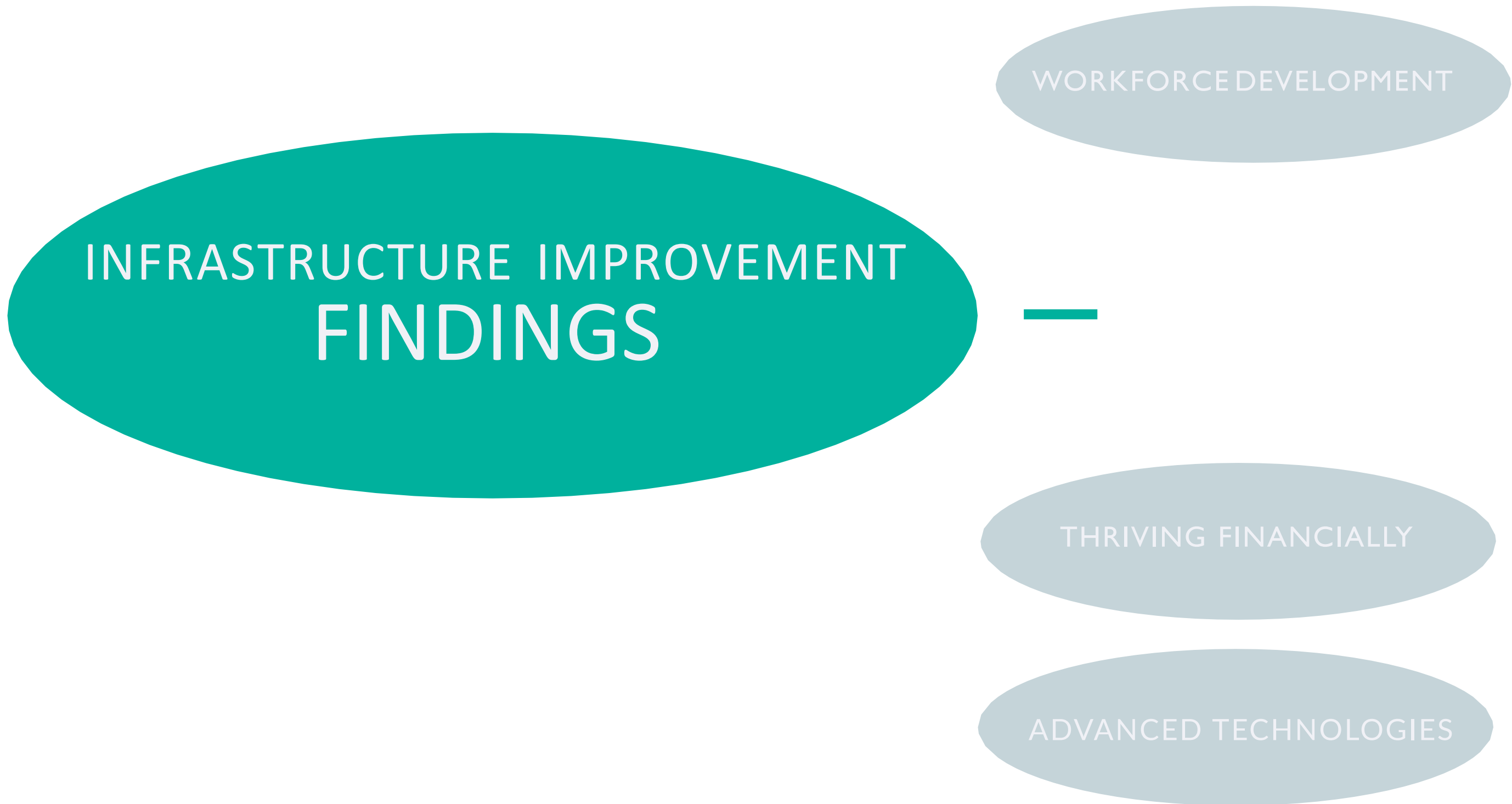
# Workforce Assessment Summary

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- Participate in Utility 2.0 development
- Provide continuous training
  - Water University (technical staff)
  - Soft skills development (supervisors, managers)
  - Technology utilization skills
- Increased CIP?
  - Reduce 20% vacancy rate



# ROAD MAPS – INFRASTRUCTURE IMPROVEMENT - WATER

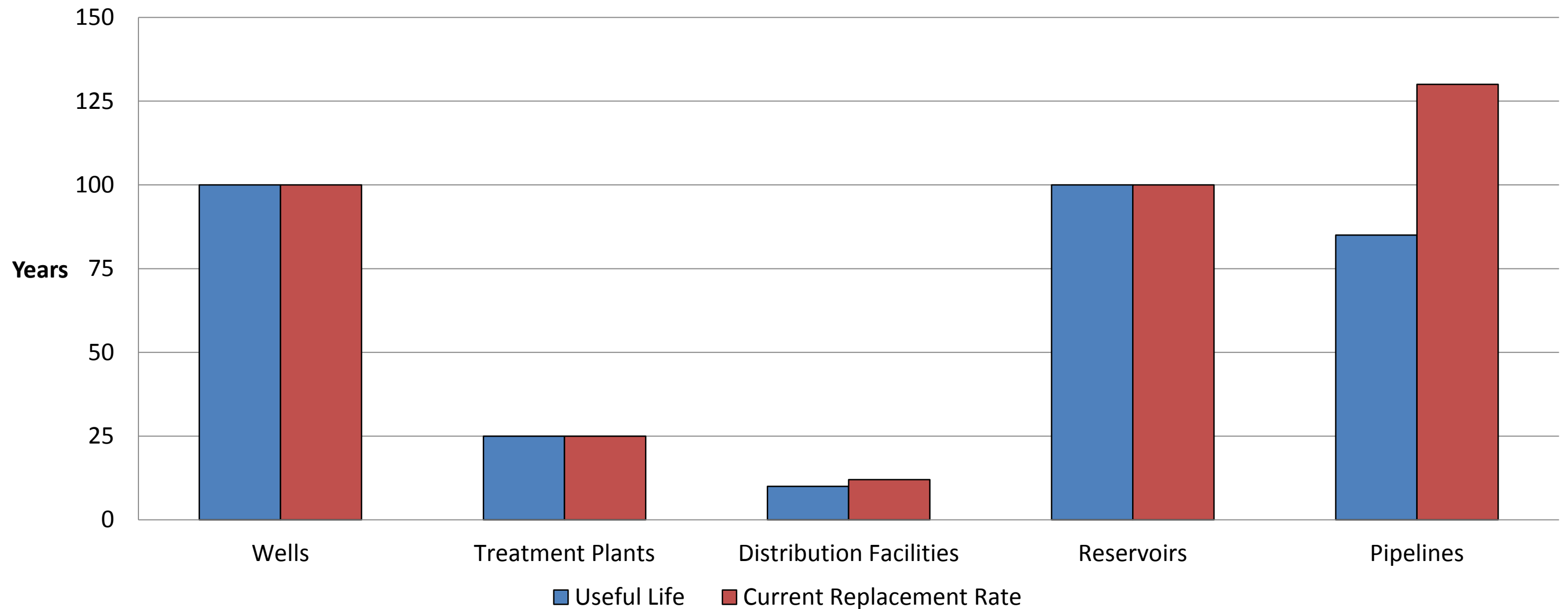


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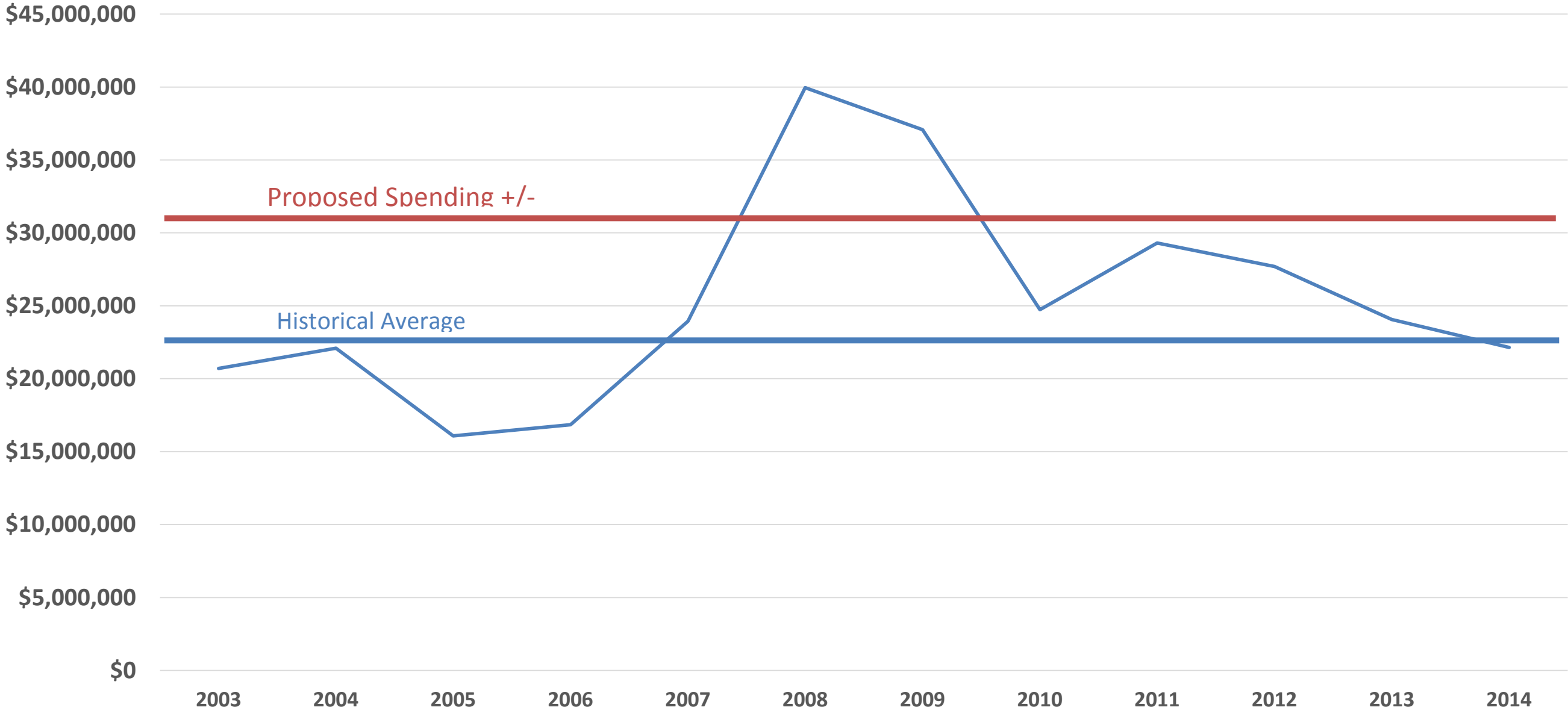
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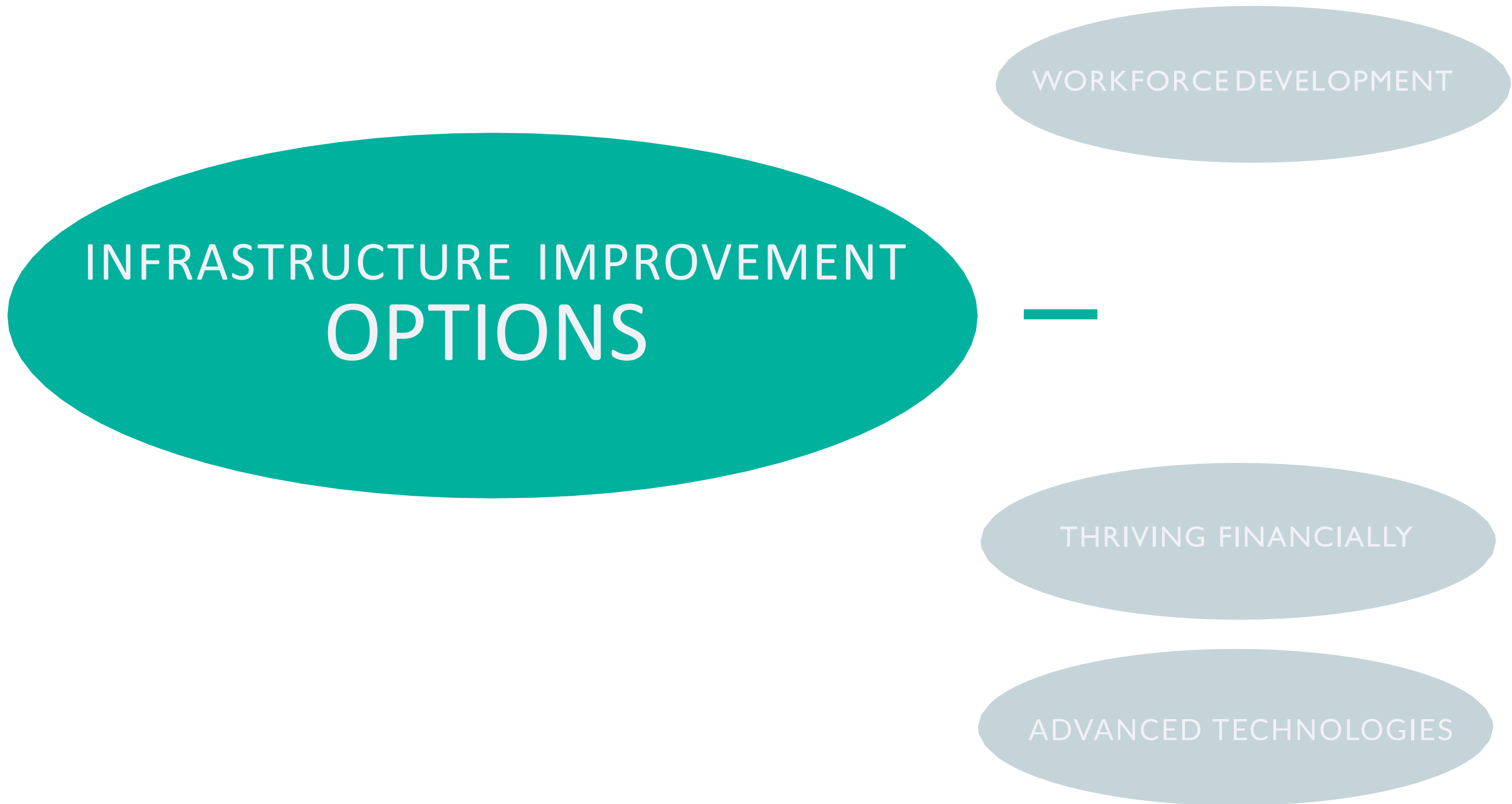
# Useful Life vs. Replacement Rate



# Historical and Proposed CIP Spending



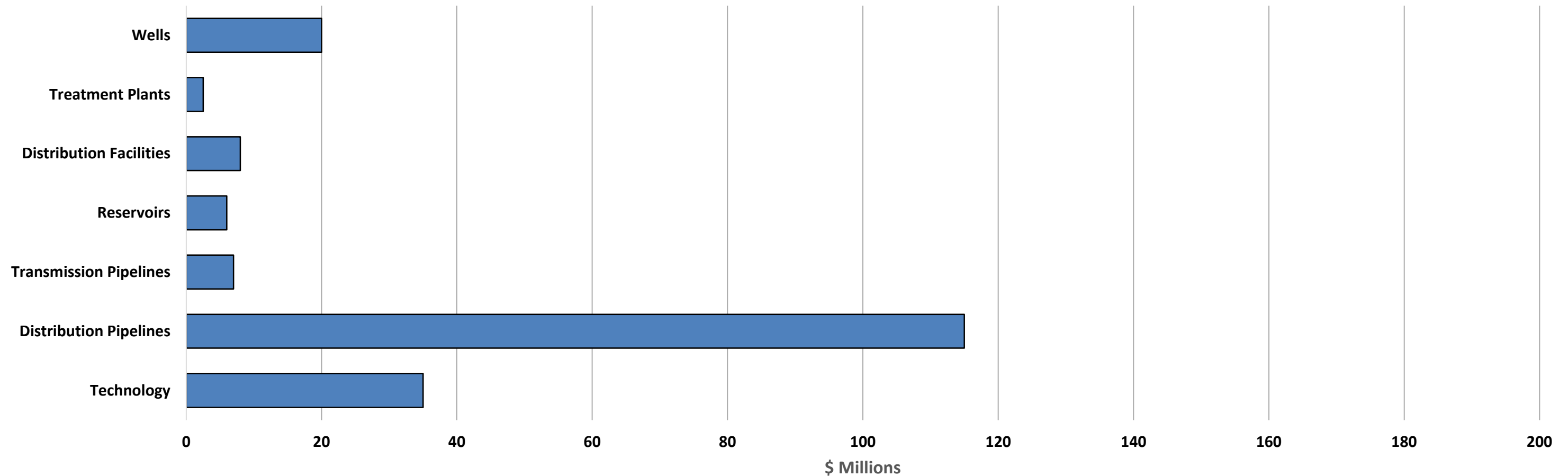
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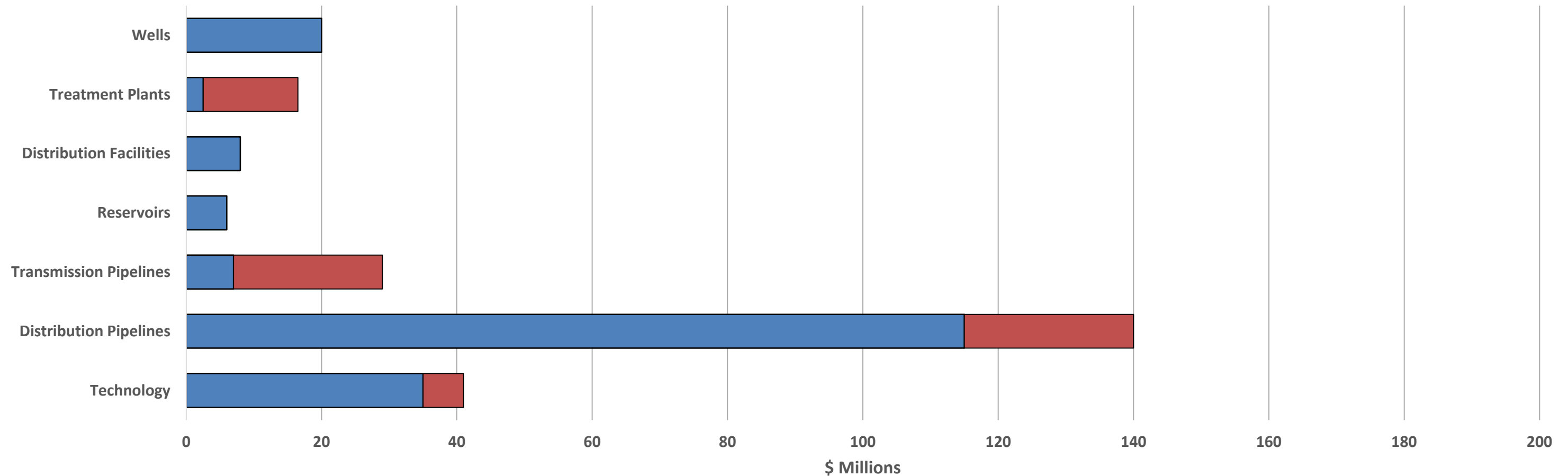
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Option 2: Major Deficiencies



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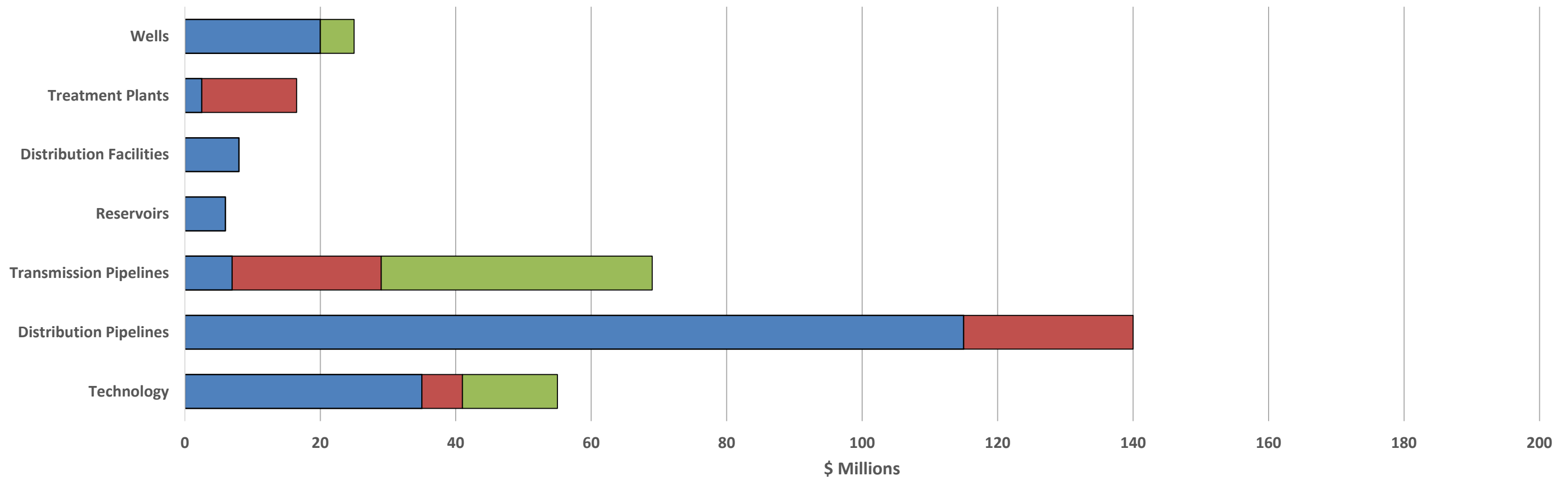
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# Cost to Address Operational Deficiencies

Option 3: Operational Deficiencies



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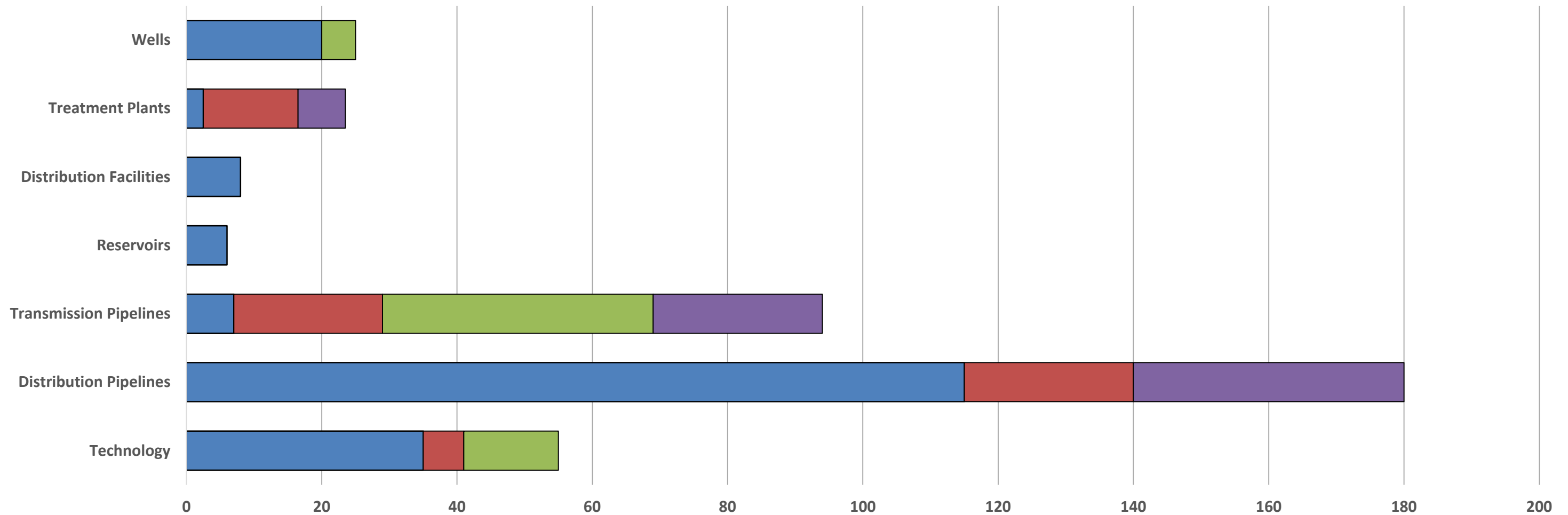
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# Cost for Aggressive Program

Option 4: Aggressive Program



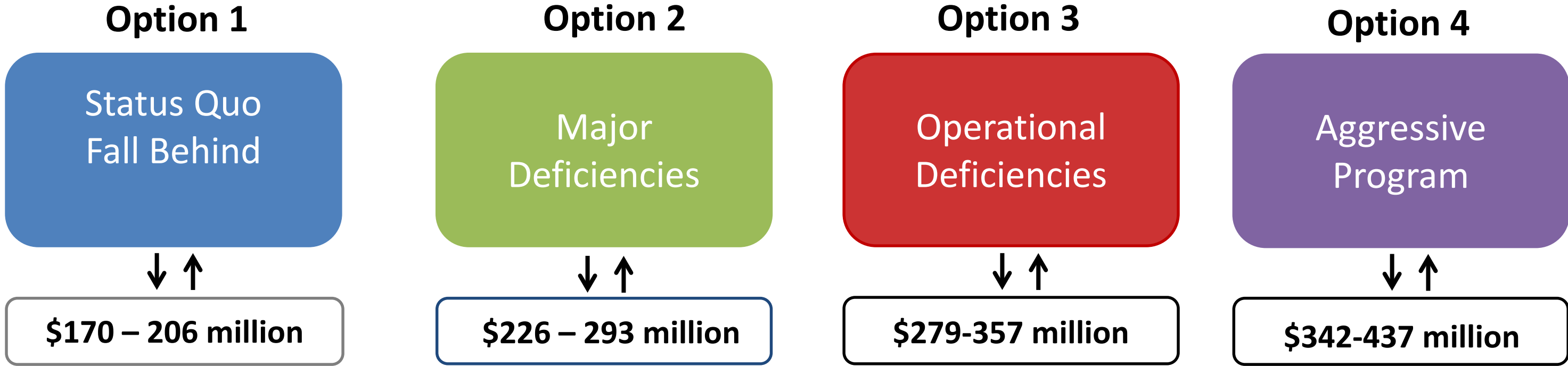
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# Summary of Investment Options

Additional financial investment is required to address current backlog and improve maintenance.





# ROAD MAPS – INFRASTRUCTURE IMPROVEMENT - WATER

INFRASTRUCTURE IMPROVEMENT  
RECOMMENDATIONS

WORKFORCE DEVELOPMENT

—

THRIVING FINANCIALLY

ADVANCED TECHNOLOGIES

# Sample Short-Term Recommendations – Year 1

<b>Water Infrastructure</b>	<ul style="list-style-type: none"><li>• Continue with current asset replacement program</li><li>• Finalize plans and rollout timing of Recycled Water System</li><li>• Rubber Dam EIR and permitting process</li></ul>
<b>Technology Infrastructure</b>	<ul style="list-style-type: none"><li>• Initial ODMS rollout</li><li>• Initiate SCADA and communications upgrades</li><li>• Input facilities into OWAM and begin automated capturing of field data</li><li>• Refine and implement five dashboards</li></ul>
<b>Workforce</b>	<ul style="list-style-type: none"><li>• Assess personnel needs to implement Water Utility 2.0</li></ul>

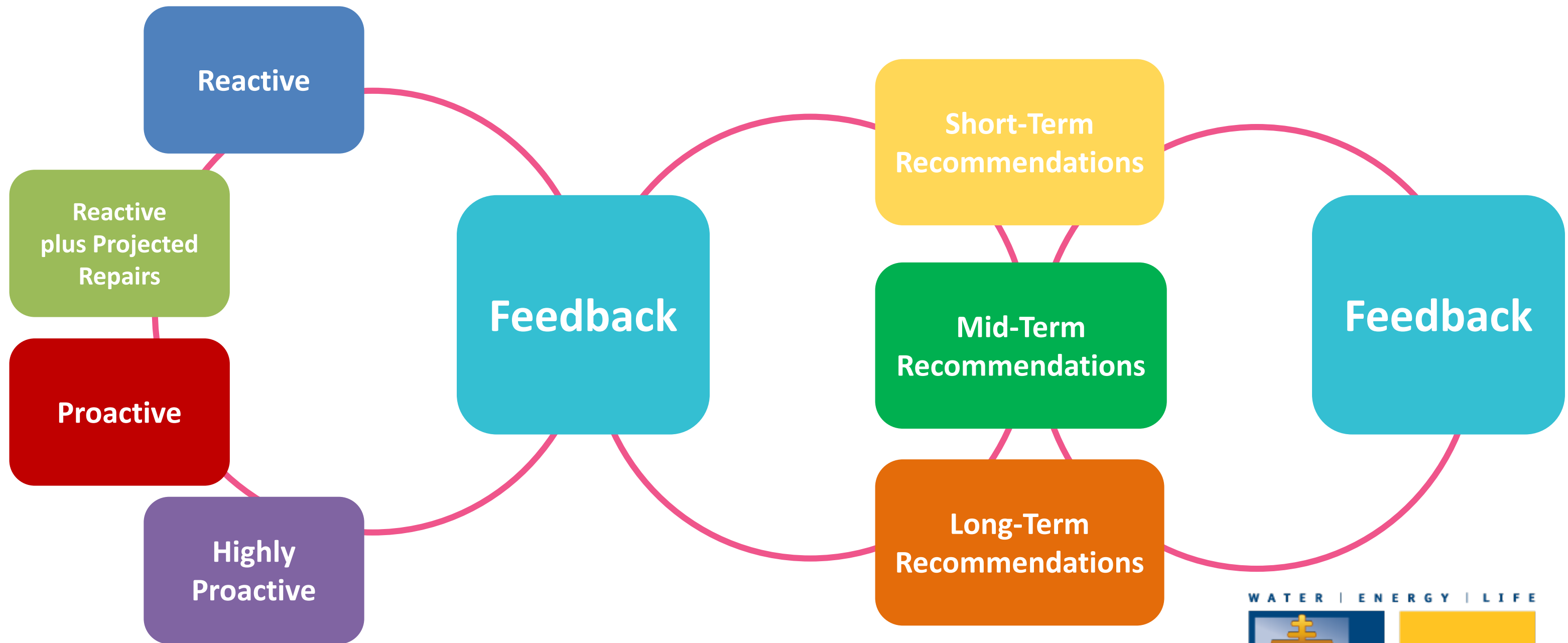
# Sample Mid-Term Recommendations – Years 2-5

<p><b>Water Infrastructure</b></p>	<ul style="list-style-type: none"> <li>• Identify and utilize advanced pipeline characterizations to refine replacement program</li> <li>• Replace and upsize Crosstown Feeder and Magnolia Main (Techite)</li> <li>• Complete phase I of recycled water program.</li> <li>• Complete Rubber Dam</li> <li>• Study and pilot test the North Waterman Treatment Plant</li> </ul>
<p><b>Technology Infrastructure</b></p>	<ul style="list-style-type: none"> <li>• Rollout AMR/AMI system</li> <li>• ODMS to interface with all major systems</li> <li>• Complete GIS and SCADA and communication upgrades</li> <li>• Fully implement automated field data gathering</li> <li>• Fully operational asset management system</li> <li>• Automate production/distribution system</li> </ul>
<p><b>Workforce</b></p>	<ul style="list-style-type: none"> <li>• Implement continuous technical, technological and soft skills training</li> <li>• Revise job classifications and employee allocations for Utility 2.0</li> </ul>

# Sample Long-Term Recommendations – Years 6-10

<b>Water Infrastructure</b>	<ul style="list-style-type: none"><li>• Reassess and refine asset management program for the next 10 year timeframe</li><li>• Review/revise all planning studies</li></ul>
<b>Technology Infrastructure</b>	<ul style="list-style-type: none"><li>• Databases to become more connected</li><li>• Prepare for Utility 3.0</li></ul>
<b>Workforce</b>	<ul style="list-style-type: none"><li>• Expand training provided to staff on advanced technology equipment and software</li></ul>

# Options & Recommendations Decided from Feedback



# Next Steps

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- Incorporate Comments
- Formulate Detailed recommendations
- Review
- Report Back