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# **Zephyr Water Utility District Preliminary Engineering Report (PER)**

## **HDR Engineering, Inc. and Douglas County Public Works**

March 09, 2017



# Overview

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1. Why are we here?
2. What is a Preliminary Engineering Report (PER)?
3. Need for Capital Improvements
4. Project Alternatives
5. Prioritized Recommendations
6. Short-term, Mid-term and Long-term Implementation Recommendations
7. Questions & Break Out Stations



# Why are we here?

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- October 16, 2014
  - Adopted Resolution No. 2014R-081 establishing water rates for the Zephyr Water Utility District Water System
  - Allow time to complete Preliminary Engineering Reports and develop a financing plan to implement future capital improvements
- January 15, 2015 – County awarded a contract with HDR Engineering to prepare Preliminary Engineering Reports
  - Zephyr Water Utility District, March 9, 2017
  - Cave Rock and Skyland, March 21, 2017
  - Uppaway, April 4, 2017
- Present information on the PER findings and recommendations



# What is a Preliminary Engineering Report (PER)?

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- Outline Follows USDA Bulletin 1780-2
  - Identify water system deficiencies
  - Develop and compare project alternatives to address those deficiencies
  - Identify and evaluate environmental impacts of the project alternatives
  - Prioritize recommended projects
  - Provide preliminary costs





# PER - Need for Capital Improvements

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- Deficiencies 1-8 - Fire Flow, Pressure, Velocity, Line Size Criteria and Line Leaks
- Deficiency 9 - Storage Tank Coating Condition
- Deficiency 10 – Supply Redundancy
- Deficiency 11 – Water Conservation
- Deficiency 12 – Lake Pump Station Intake Prime
- Deficiency 13 – Marla Bay Pump Station Piping Corrosion
- Deficiency 14 – Water Treatment Plant Electrical
- Deficiency 15 – Water Treatment Plant Controls/SCADA
- Deficiency 16 – Unstable Hypochlorite Residual



# Deficiencies 1 – 8 Fire Flow, Pressure, Velocity ...

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- NAC 445A.6673 Existing systems: Evaluation, justification and design of proposed water project
  - 2. Designed on the basis of historical data or other representative data that complies with accepted engineering judgment and practice, in such a manner that the proposed water project will ***enable the public water system to meet*** average day demand, maximum day demand, peak hour demand and requirements for ***fire flow and fire demand***.



# Fire Flow Requirements

- International Fire Code (IFC) Table B105.1
  - Building Size and Construction
  - Fire Flow Calculation Area



**0 -3,600 sf**  
**1,500 gpm,**  
**2 hours**



**3,601 - 4,800 sf**  
**1,750 gpm,**  
**2 hours**



**4,801 - 6,200 sf**  
**2,000 gpm,**  
**2 hours**



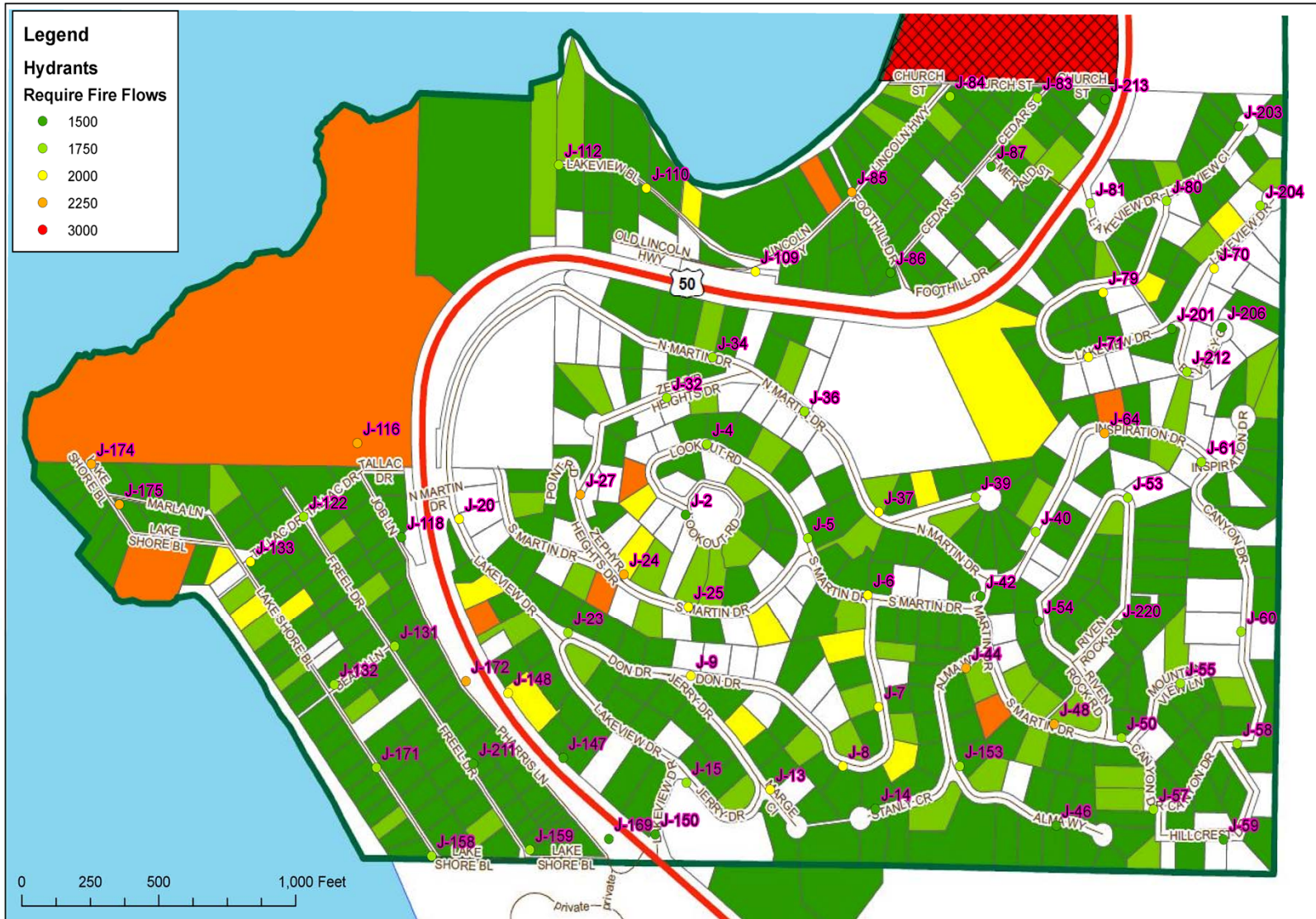
**6,201 - 7,700 sf**  
**2,250 gpm,**  
**2 hours**



**11,301 - 13,400 sf**  
**3,000 gpm,**  
**3 hours**

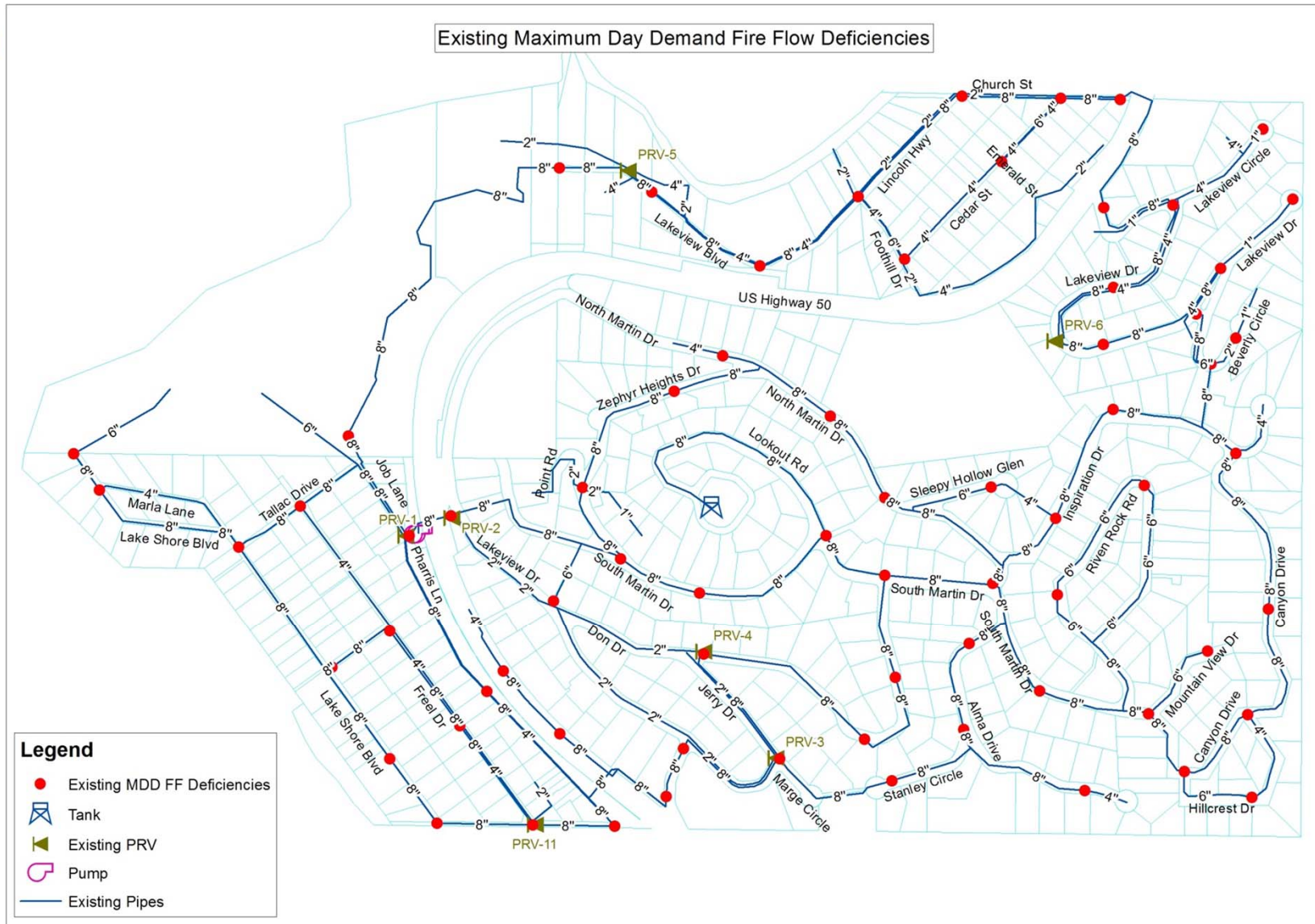


# Fire Flow Requirements by Parcel

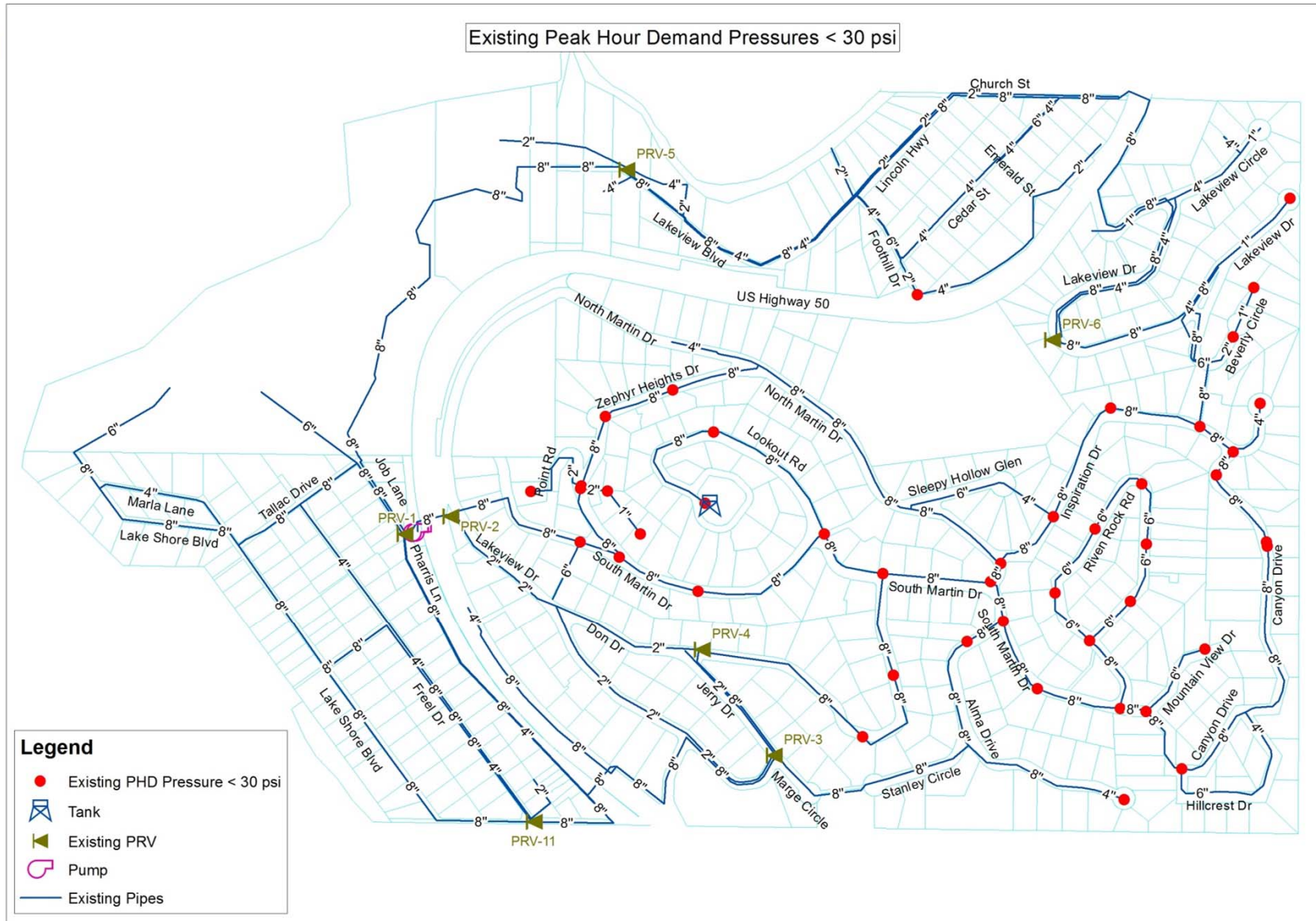




# Fire Flow Deficiencies

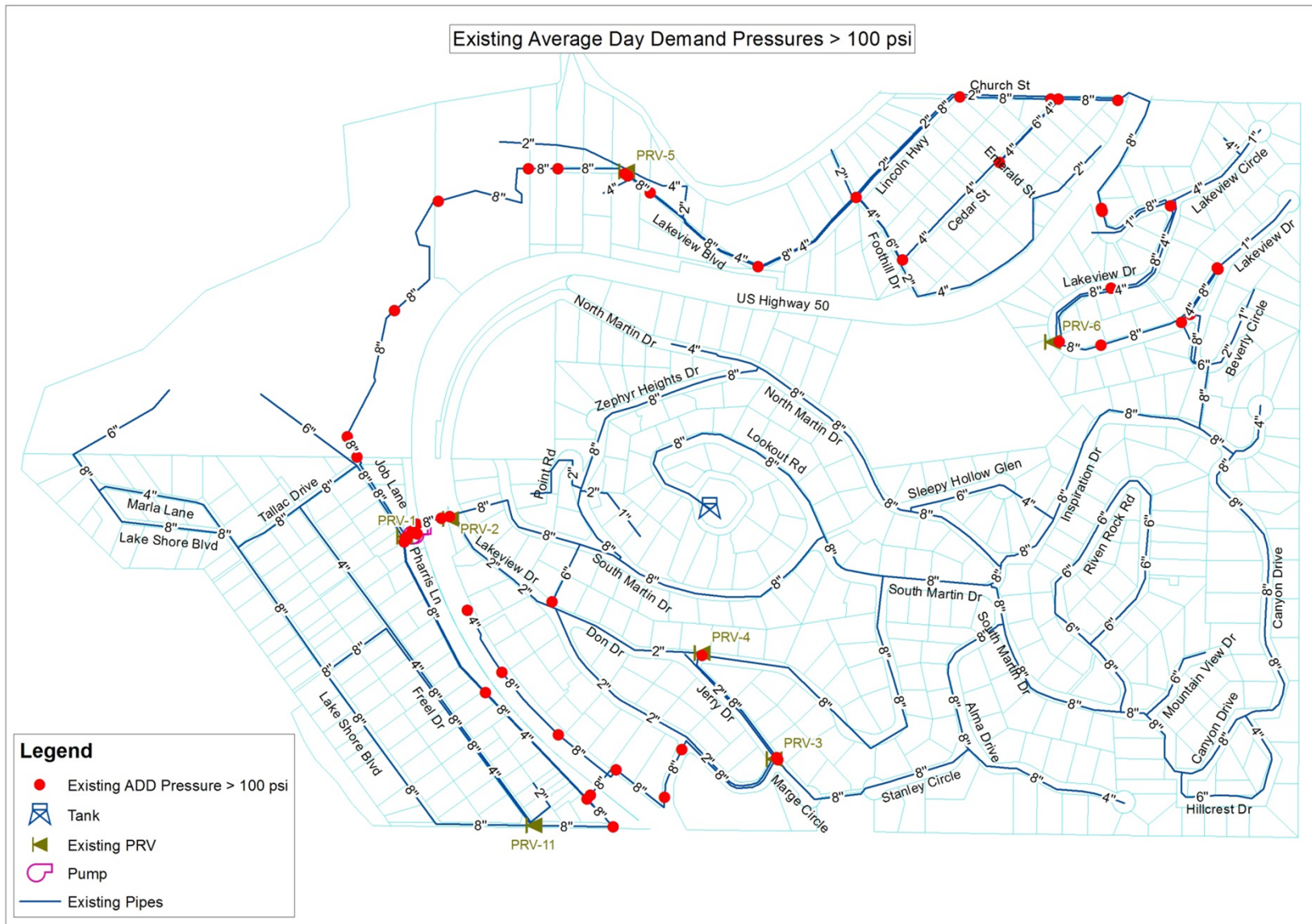


# Peak Hour Pressure Deficiencies

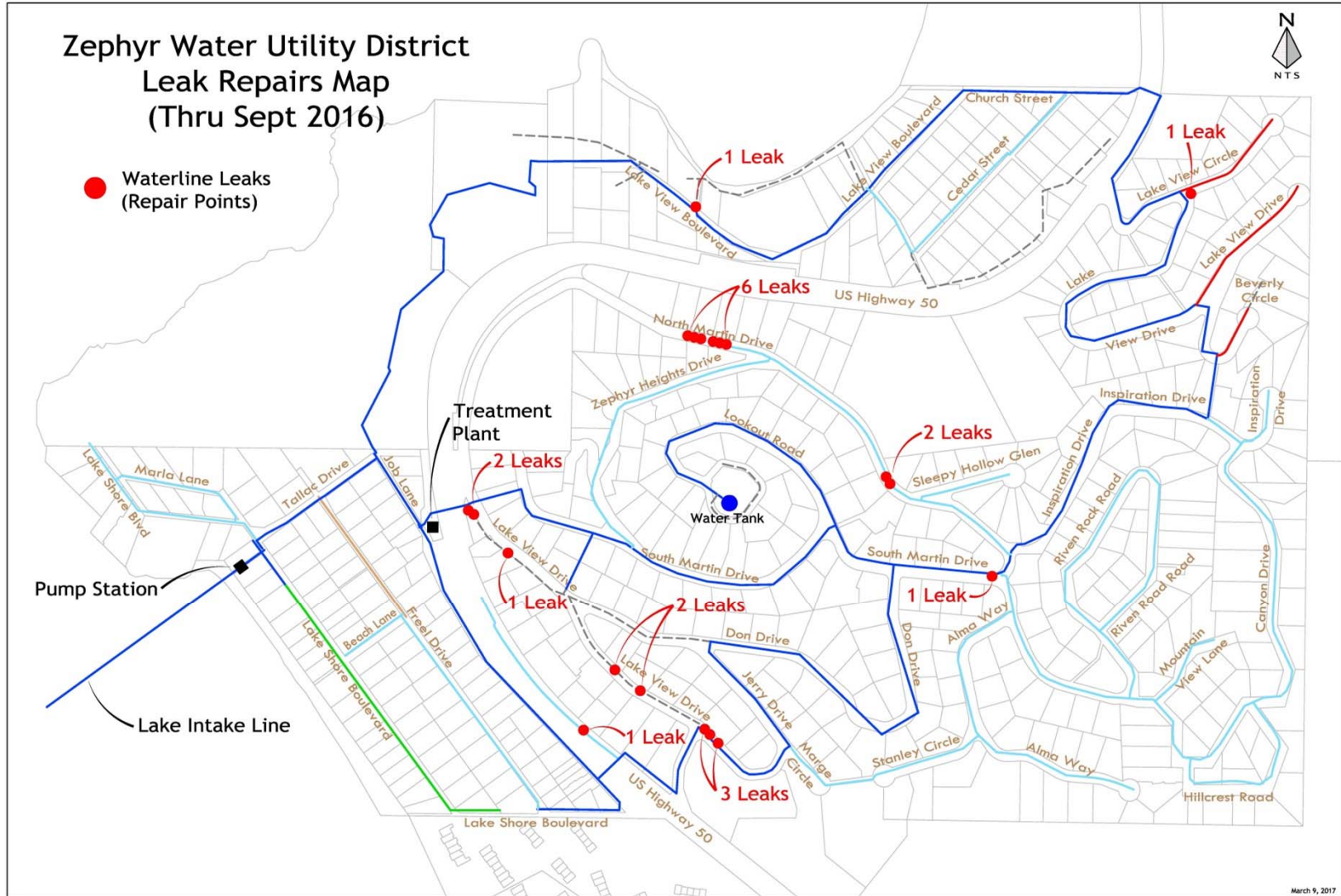




# Average Day Demand Pressure Deficiencies



# Leak Repairs (through Sept. 2016)





# Deficiency 9 – Storage Tank Coating

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**Inlet/Outlet**



**Ceiling**



# Deficiency 10 – Water Supply Redundancy

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- Single Source of Water
- NAC 445A.6678 Requires a Backup Source



# Deficiency 11 – Water Conservation

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- Just 8% of services are Metered
- NRS 540.131 Requires a Water Conservation Plan
  - “Metering of all water services is an essential element of a water conservation plan.”

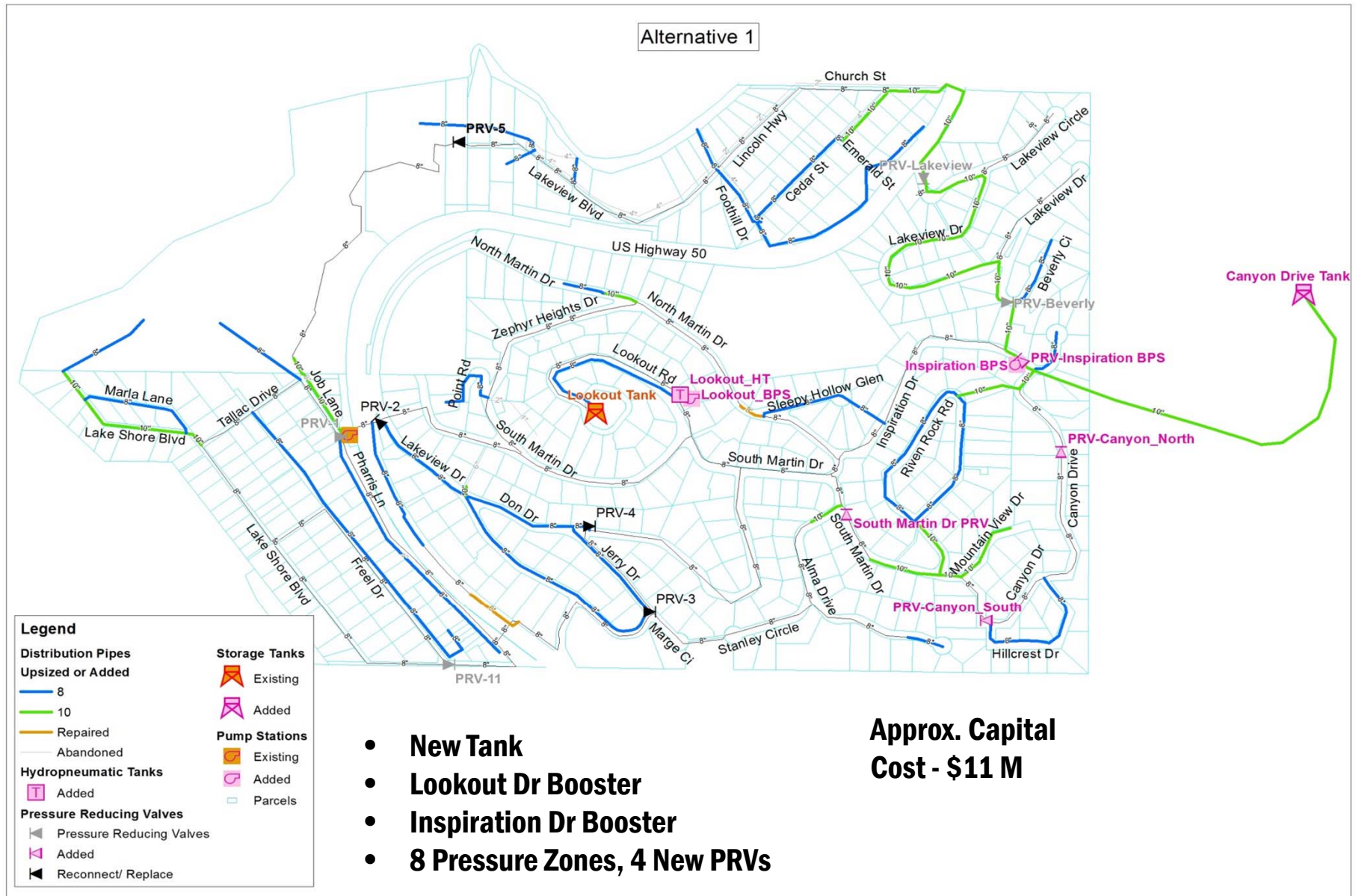


# Deficiencies 12-16 Lake Pump Station and WTP

- Lake Pump Station
  - Loss of Intake Prime
  - Reduced Pump Flow
  - Failing Coatings
- WTP
  - Aging Electrical and SCADA/Controls
  - Unstable Hypochlorite Residual

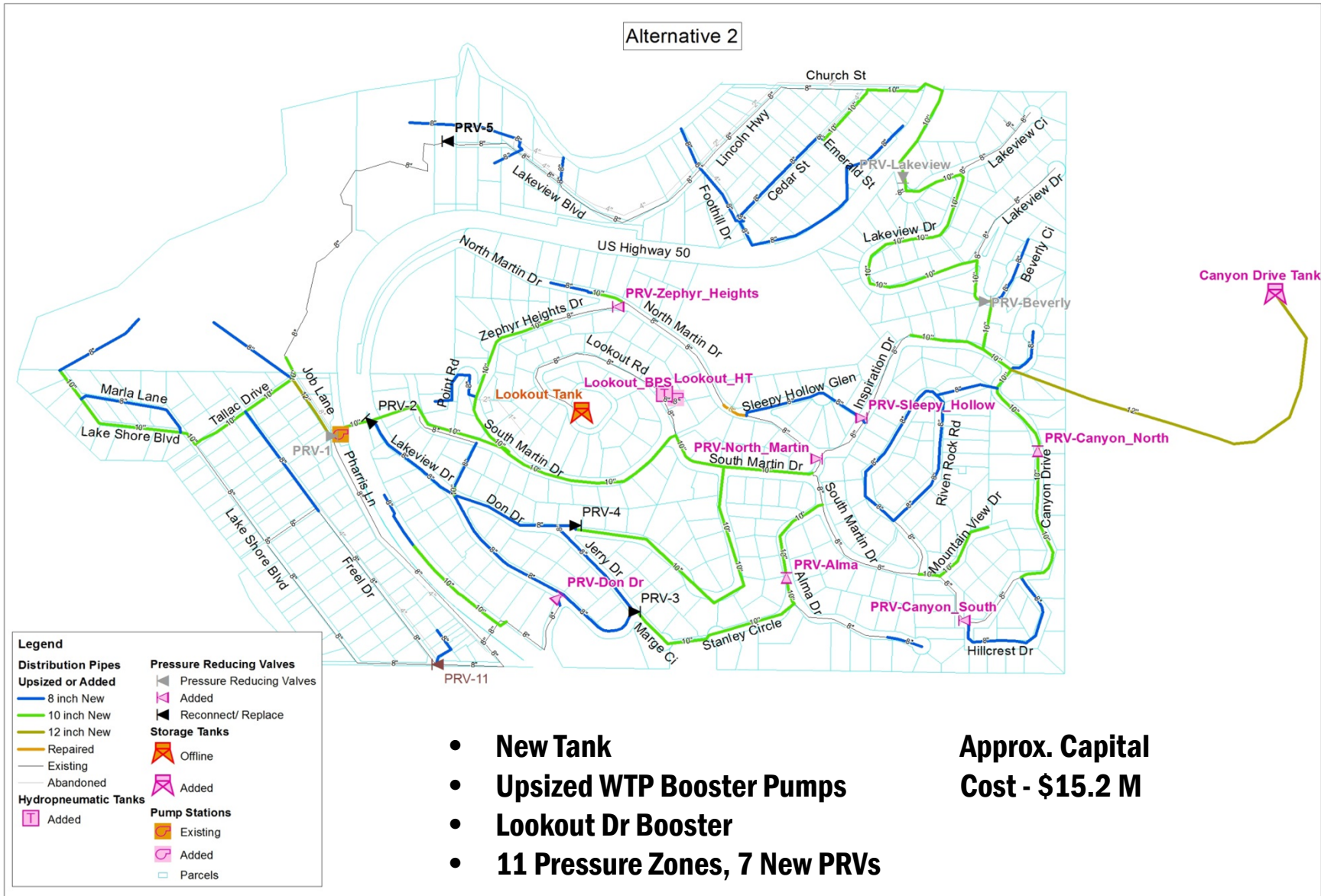


# Deficiencies 1-8 Alternative 1

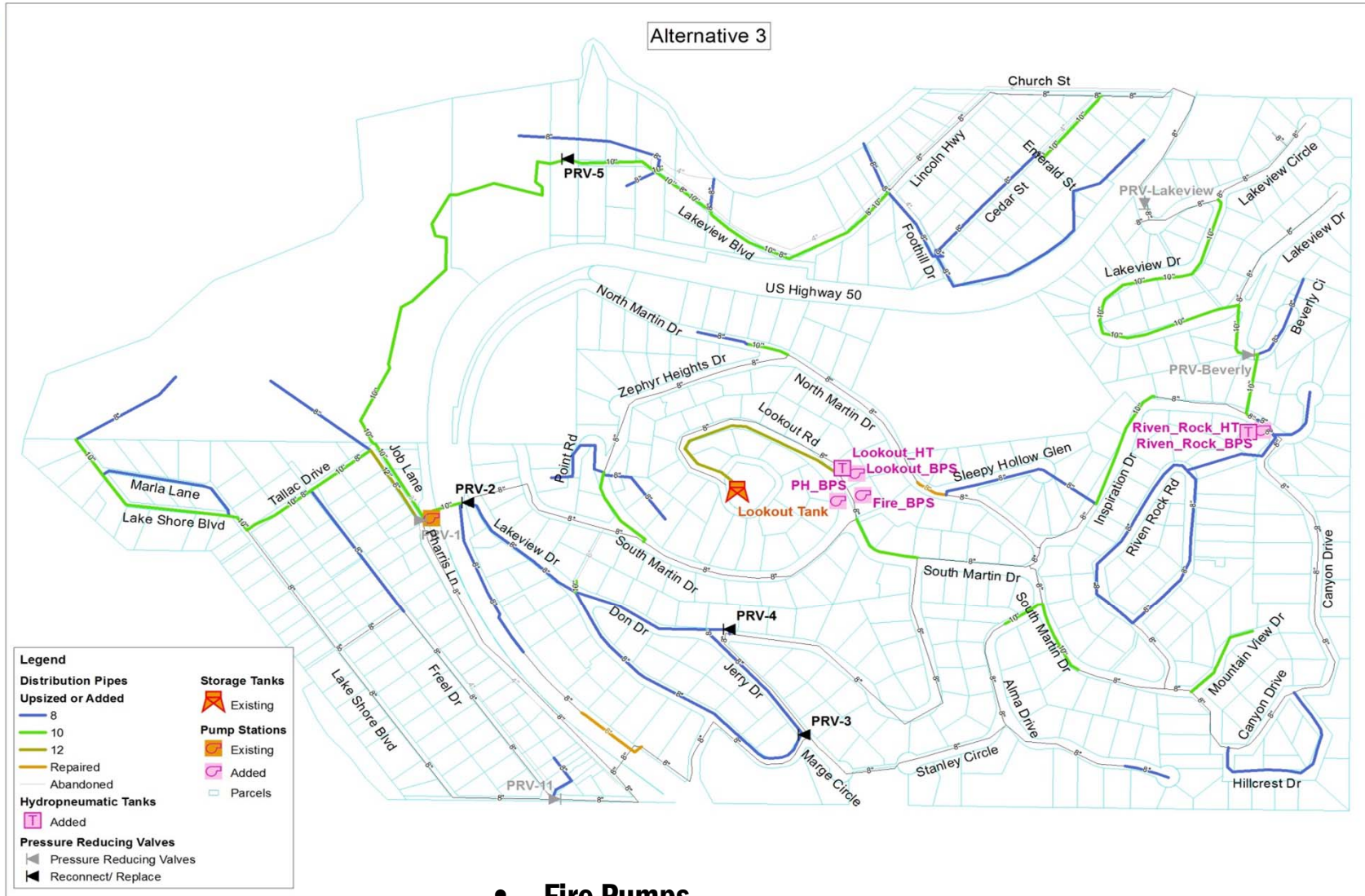




# Deficiencies 1-8 Alternative 2



# Deficiencies 1-8 Alternative 3



- **Fire Pumps**
- **Lookout & Riven Rock Dr Booster Pumps**
- **7 Pressure Zones, No New PRVs**

**Approx. Capital Cost - \$10.7 M**



# Alternative Ranking Criteria

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- Implementation (20%)
  - Is the alternative feasible to implement?
  - Is the alternative constructible?
- Reliability (25%)
  - Will the alternative provide reliable results?
- Operation /Maintenance (40%)
  - Does the alternative require a large operator time commitment?
  - Does it require ongoing contract maintenance?
- Environmental / Permitting (15%)
  - Can TRPA thresholds be met?
  - Are there short-term and long-term effects on the environment?
  - Will the alternative be difficult to permit?





# Alternative Ranking Summary

Deficiency	Alternative	Score	Rank
1 – 8 Fire Flow, Pressure...	1 – New Tank, Inspiration & Lookout Dr. Boosters, 7 Pressure Zones	2.4	3
1 – 8 Fire Flow, Pressure...	2 – New Tank, High Pressure WTP Booster, Lookout Dr. Booster, 11 Pressure Zones	2.3	2
1 – 8 Fire Flow, Pressure...	3 – Riven Rock Dr. Booster, Lookout Dr. Fire & Booster, 6 Pressure Zones	2.0	1
12 – Loss of Intake Prime	1 – Self Priming Pumps	1.0	1
12 – Loss of Intake Prime	2 – Submersible Pumps	2.9	2
16 – Unstable Hypochlorite Residual	1 – Move Injection Point	0.9	1
16 – Unstable Hypochlorite Residual	2 – Mechanical Mixer	1.4	2



# Project Priorities

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- Priority 1
  - Address public health and safety risks.
- Priority 2
  - Address temporary disruption of water service or compliance, but generally minimal public health and safety impacts.
- Priority 3
  - Increase operational efficiencies, but are not likely to cause loss or disruption of service or compliance.
- Priority 4 Projects
  - Provide further gains in efficiency from Priority 3, but are not needed for operations.
  - Represent “wants” more than “needs”.



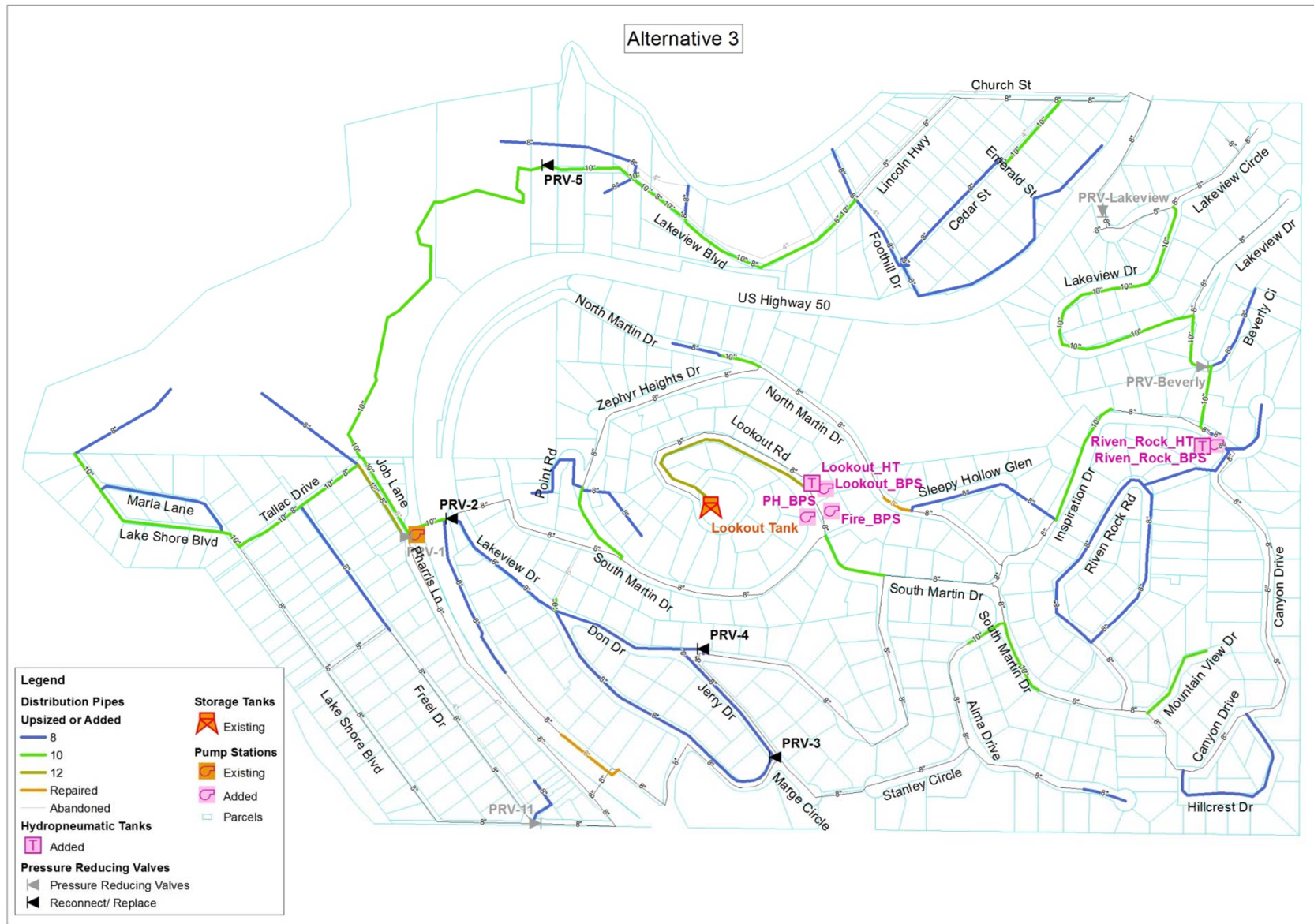
# Project Priority Summary and Costs

**Table 7-1. Project Priority Summary and Costs**

Deficiency No.	Description	Priority	Recommended Alternative	Capital Cost (x\$1,000)
1-4	Fire Flow, & Pressure Criteria	1	3 - Fire & Booster Pumps	\$1,643
8	Line Leaks	2	Replace Lines	\$195
14	WTP Electrical	2	Surge Protection & UPS	\$66
15	WTP SCADA & Controls	2	UPS & SCADA PAK & SCADA LOG	\$124
16	Unstable Hypochlorite Residual	2	1 - Dose Pace & Move Injection Point	\$28
12	Lake Intake Prime	3	1 - Self-Priming Pumps	\$143
9	Storage Tank Coating	3	Recoat Tank	\$358
11	Water Conservation	3	Water Meters & Dedicated Services	\$1,563
10	Water Supply Redundancy	4	Cave Rock Intertie & Booster Station	\$1,723
13	MBPS Piping & Building Coatings	4	Recoat Piping & Building	\$29
5, 6	Max Velocity Criteria	4	Upsize Lines	\$8,239
<b>Total</b>				<b>\$14,111</b>



# Line Replacements & Fire/Booster Pumps

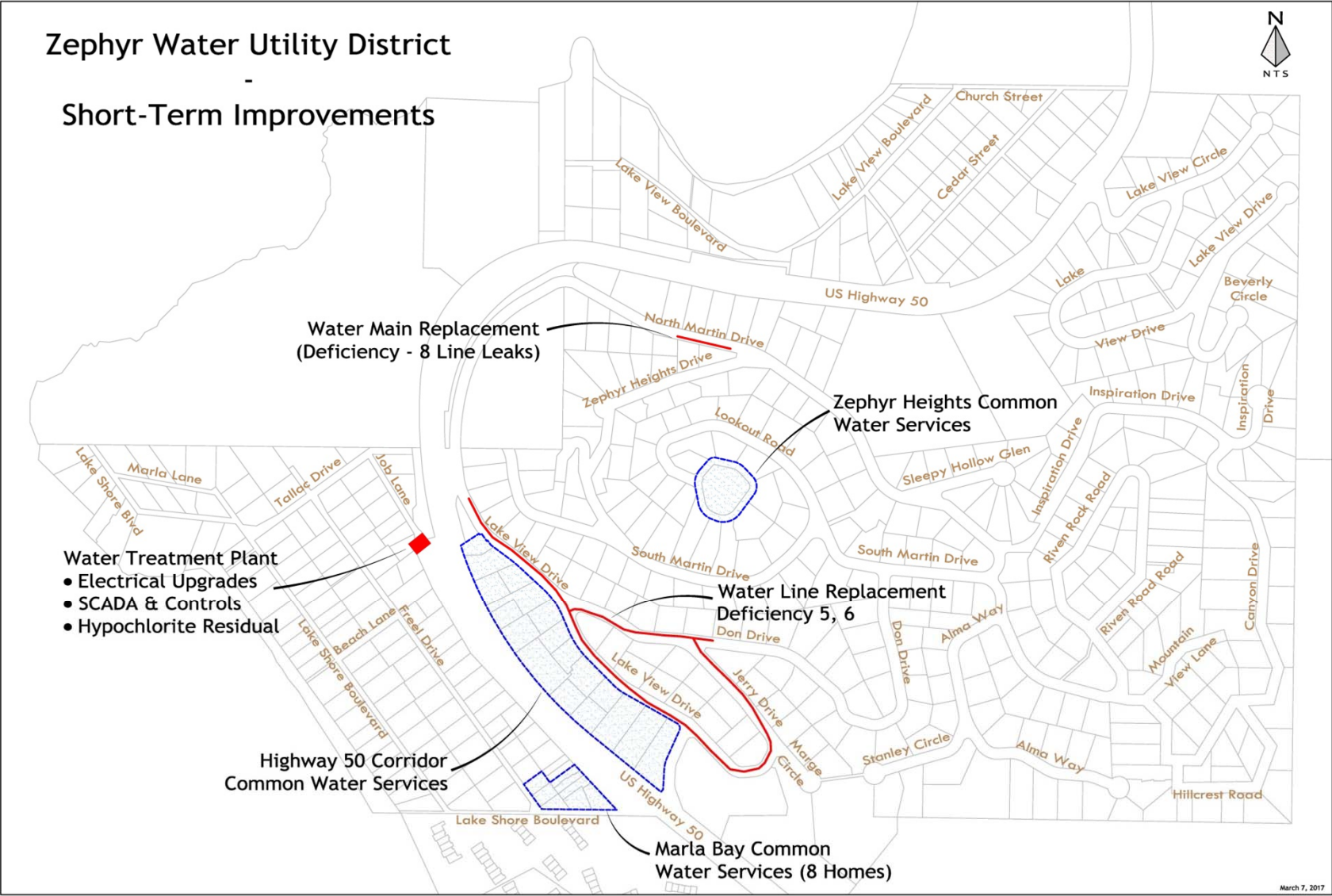


# Short-term Implementation Recommendations

Deficiency No.	Recommended Alternative	Priority	Capital Cost	Estimated Monthly Rate per Customer	
				SRF Loan (20 yrs)	USDA Loan (40 yrs)
8	Line Leaks	2	\$ 195,000	\$ 2.07	\$ 1.55
14	WTP Electrical	2	\$ 66,000	\$ 0.70	\$ 0.53
15	WTP SCADA & Controls	2	\$ 124,000	\$ 1.32	\$ 0.99
16	Unstable Hypochlorite Residual	2	\$ 28,000	\$ 0.30	\$ 0.22
11	Water Conservation - Dedicated Water Services	3	\$ 366,563	\$ 3.89	\$ 2.92
13	MBPS Piping & Building Coatings	4	\$ 29,000	\$ 0.31	\$ 0.23
5, 6	Max Velocity Criteria - Lake View Drive, Jerry and Don Water Lines	4	\$ 1,105,000	\$ 11.72	\$ 8.81
<b>Total</b>			\$ 1,913,563	\$ 20.30	\$ 15.26
			<b>Available Monthly Debt</b>	\$ (15.73)	\$ (15.73)
			<b>Annual Debt to Finance</b>	\$ 4.57	\$ (0.47)
<b>Notes:</b>					
<b>1. Deficiency 13 - MBPS Piping &amp; Building Coatings at a cost of \$29,000 to be paid for out of the operating budget</b>					



# Short-term Implementation Recommendations





# Medium-term Implementation Recommendations

Deficiency No.	Recommended Alternative	Priority	Capital Cost	Estimated Monthly Rate per Customer	
				SRF Loan (20 yrs)	USDA Loan (40 yrs)
12	Lake Intake Prime	3	\$ 143,000	\$ 1.52	\$ 1.14
9	Storage Tank Coating	3	\$ 358,000	\$ 3.80	\$ 2.85
<b>Total</b>			<b>\$ 501,000</b>	<b>\$ 5.31</b>	<b>\$ 3.99</b>



# Long-term Implementation Recommendations

Deficiency No.	Recommended Alternative	Priority	Capital Cost	Monthly Rate per Customer	
				SRF Loan	USDA Loan
1-4	Fire Flow, & Pressure Criteria	1	\$ 1,643,000	\$ 17.43	\$ 13.10
11	Water Conservation - Meters	3	\$ 1,196,437	\$ 12.69	\$ 9.54
10	Water Supply Redundancy	4	\$ 1,723,000	\$ 18.28	\$ 13.74
5, 6	Max Velocity Criteria (Not including Lake View Drive, Don and Jerry)	4	\$ 7,134,000	\$ 75.68	\$ 56.89
<b>Total</b>			<b>\$ 11,696,437</b>	<b>\$ 124.08</b>	<b>\$ 93.27</b>





# Questions & Break Out Stations

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- Distribution System & WTP
- Fire Flows
- Financial



# Public Comments

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- Written comments can be submitted to:  
[publicworks@douglasnv.us](mailto:publicworks@douglasnv.us)
- ZWUD PER Available on Public Works website at:  
<http://www.douglascountynv.gov/DocumentCenter/View/5931>
- Ron Roman
  - 775-782-6239
  - rroman@douglasnv.us

