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Water Distribution System Asset Management Plan

PRESENTED BY

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SNL Water System Overview

System Map

- System Size – 56 miles
- Number Divisional Valves – 1,397
- Number of Active Fire Hydrants – 232

Executive Summary

Purpose: The Water System Asset Management Plan (AMP) creates an inventory, develops a ranking system, and prioritizes rehabilitation and replacement needs.

AMP Primary Components

- Condition Assessment (Probability of Failure)
- Asset Criticality (Consequences of Failure)
- Risk of Failure
- Replacement Schedule (Risk in Dollars)
- Conclusion and Recommendations

Condition Assessment (Probability of Failure)

- Pipe Material/Expected Design Life
- Pipe Age & Condition Score

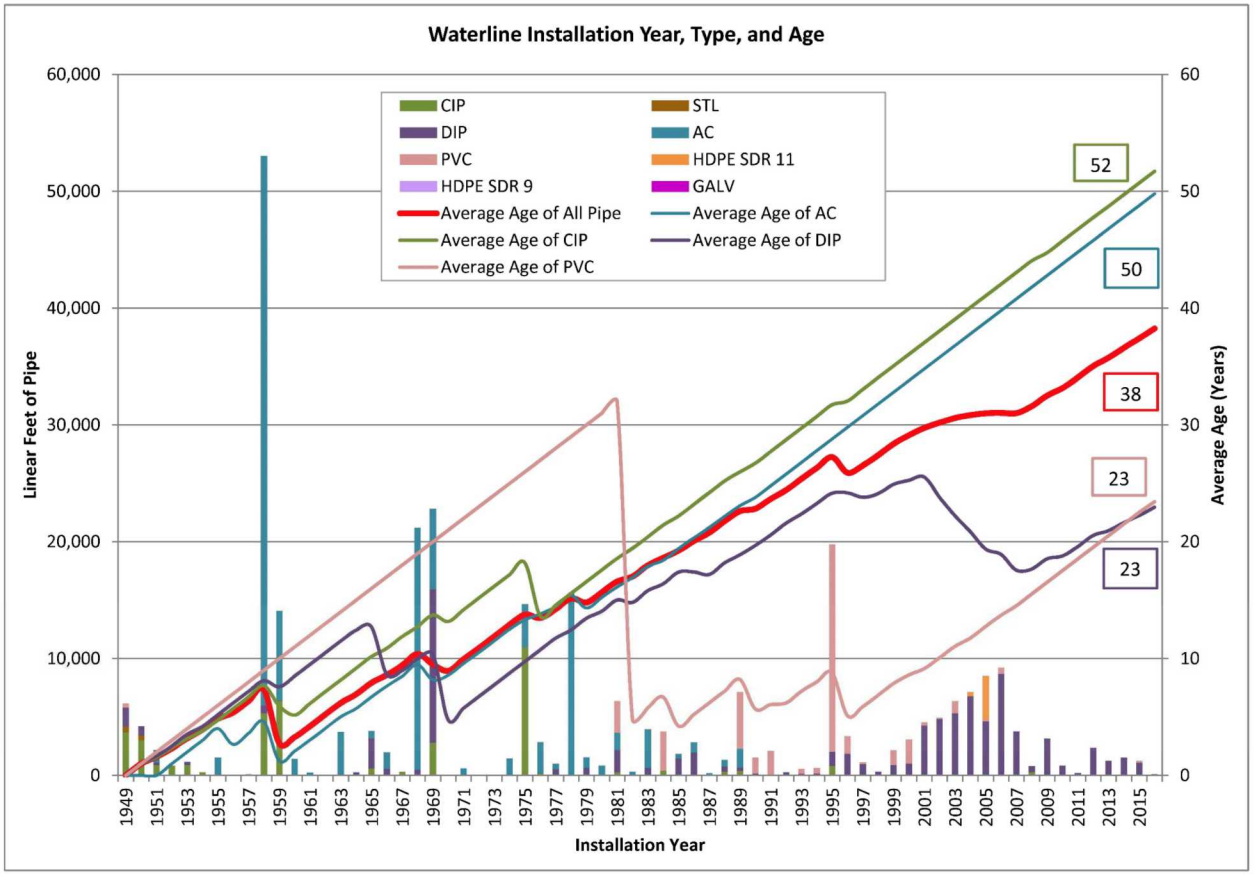
Pipe Material Expected Design Life
Condition Assessment (Probability of Failure)

Pipe Type	Abbreviation	Useful Life (years)				
		SNL[1]	KAFB[2]	ABCWUA[3]	AWWA[4]	This AMP
Cast Iron	CIP	65-70	50	75	105	70
Steel	STL	-	75	50	95	50
Reinforced Concrete Pipe	RCP	-	-	75	75	75
Polyvinyl Chloride	PVC	70	50	100	70	70
Galvanized Steel	GALV	-	75	50	95	50
Ductile Iron	DIP	70-100	75	75	110 (Long Service Life) 60 (Short Service Life)	75
Copper	COP	-	-	50	-	50
Asbestos Cement	AC	65-70	40	100	105 (Long Service Life) 75 (Short Service Life)	70
High-Density Polyethylene, SDR 9	HDPE SDR 9	100	-	-	-	100
High-Density Polyethylene, SDR 11	HDPE SDR 11	100	-	-	-	100

Pipe Age & Condition Score

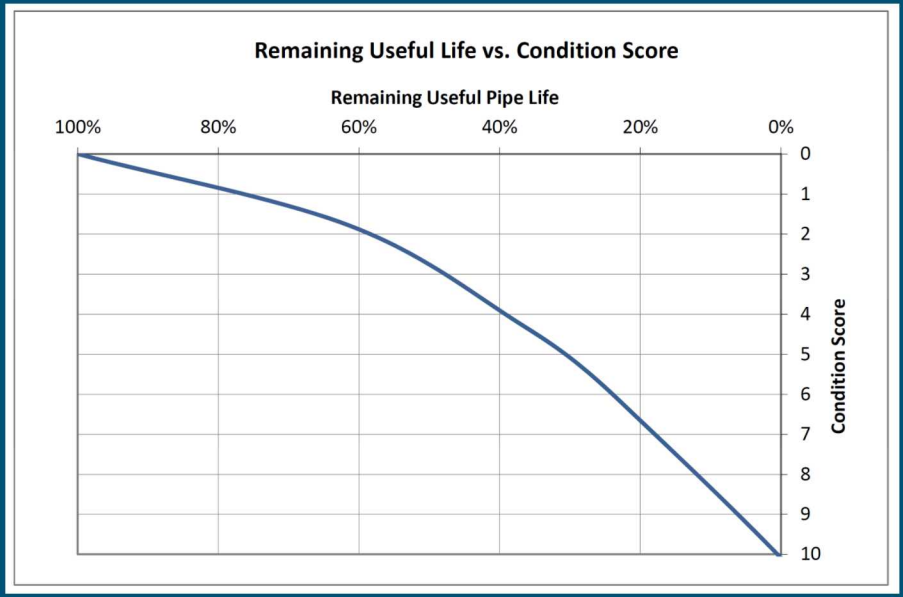
Condition Assessment (Probability of Failure)

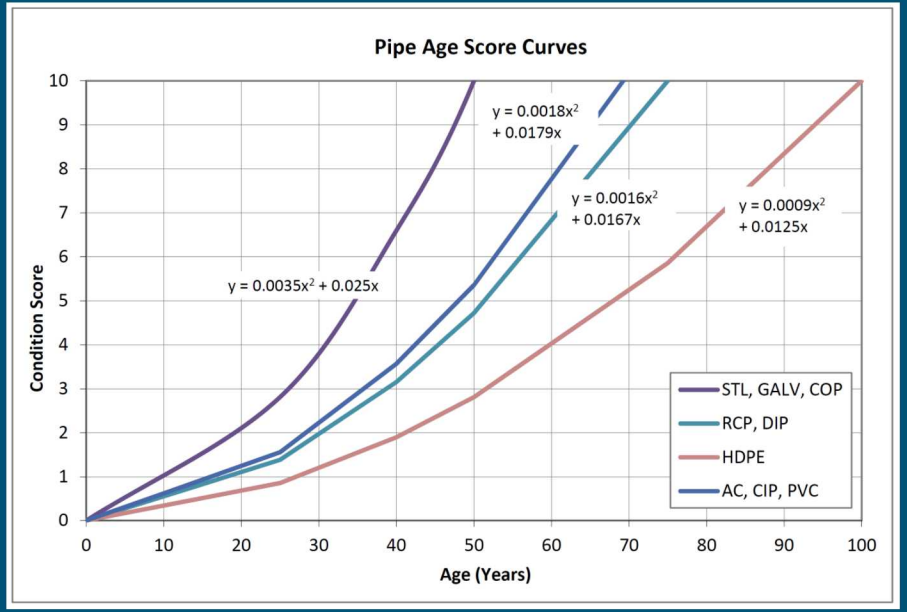
Figure 3: Waterline Installation Year, Material, and Age Summary



Pipe Age & Condition Score

Condition Assessment (Probability of Failure)



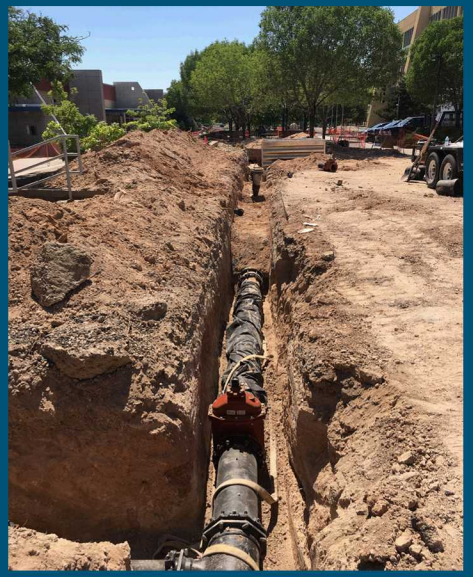


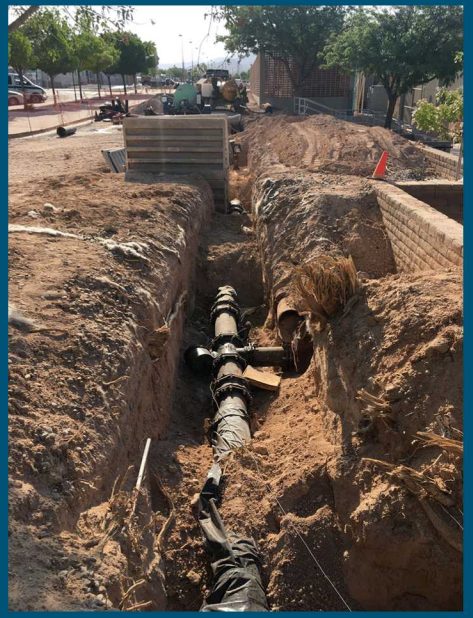
Asset Criticality (Consequences of Failure)

- Location
- Mission Dependency Index (MDI)
- Pipe Size
- Pipe Material
- Critical System Component Feed / Thru Environmental Restoration Site

Asset Criticality (Consequences of Failure)

CRITERIA	CONSEQUENCE							SCORE
	Social			Environmental		Operational	Economic	
	Disruption of Water Service	Disruptions to Traffic	Safety Impacts	Harmful Effects on Ecosystem	Permitting	Mission Schedule Impacts	High Repair/ Restore Cost	
Location								
TA-I		XX	XX				XX	2
TA-II		X	X				X	1
TA-III		X	X				X	1
TA-IV		XX	XX				XX	2
TA-V		X	X				X	1
Coyote Test Field		X	X				X	1
Mission Dependency Index								
Low (0-25)						X		1
Medium (25-50)						XX		2
High (50-75)						XXX		3
Very High (75-100)						XXXX		4
Pipe Size								
3 to 4 in.	X					X	X	1
6 to 8 in.	XX					XX	XX	2
10 to 12 in.	XXX					XXX	XXX	6
14 in. +	XXXX					XXXX	XXXX	9
Pipe Material								
Steel							X	2
Reinforced Concrete Pipe								1
Polyvinyl Chloride								1
Galvanized Steel								1
Ductile Iron								1
Cast Iron								1
Copper								1
Asbestos Cement			X	X	X		X	3
High-Density Polyethylene, SDR 9								1
High-Density Polyethylene, SDR 11								1
Miscellaneous								
Through Environmental Restoration Site				X	X			1
Feeds Tanks	X		X			X		2





Risk of Failure

- Risk based approach allows both consequences and probability of failure to be considered.

	Consequence	Probability	Risk
Low	Lowest possible consequence score – no added consequence	50% or more of design life remaining	Risk is equal to the product of consequence and probability.
Medium	1-2 added consequence points	50% to 0% of design life remaining	
High	2 to 5 added consequence points	0% to 50% past design life	
Extreme	More than 5 added consequence points	More than 50% past design life	

	Consequence	Probability*	Risk
Low	4	0 – 5	0 – 20
Medium	>4 - 6	>5 – 10	>20 – 60
High	>6 - 9	>10 – 15	>60 – 135
Extreme	>9	>15	>135

Present, 10 Years, and 20 Years

Risk of Failure

App F1 (link)

App F4 (link)

App F5 (link)

App F6 (link)

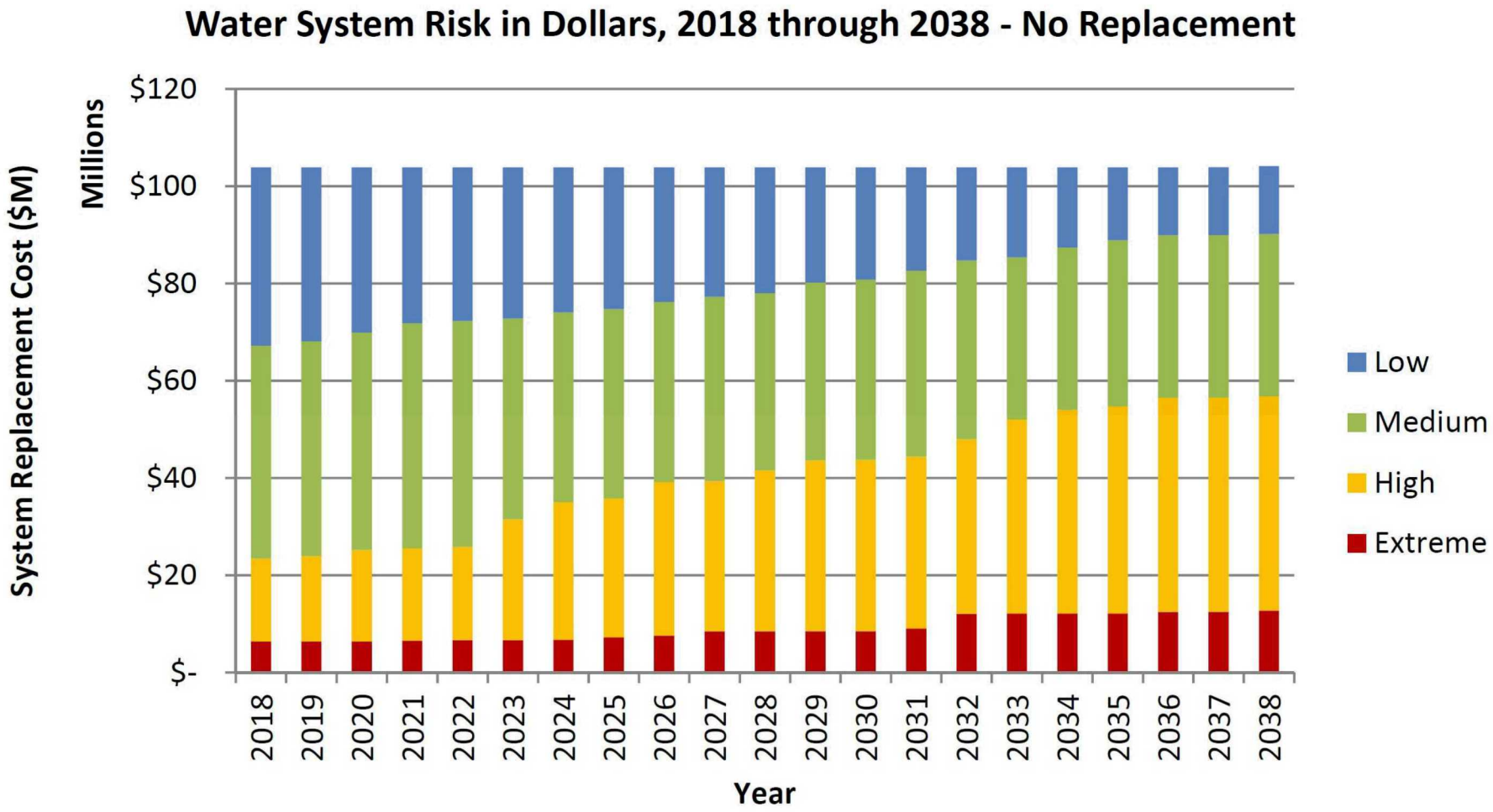
Replacement Schedule (Risk in Dollars)

2018					
Risk Category		Replacement Value	Percentage of Total Replacement Value	Length of Pipe (LF)	Percentage of Total Length
Extreme	$	6,340,934.29	6%	12,552	4%
High	$	17,066,204.02	16%	47,467	16%
Medium	$	43,785,740.64	42%	145,247	49%
Low	$	36,665,954.78	35%	91,606	31%
Total	**$**	**103,858,833.73**	**100%**	**296,872**	**100%**
2028					
Risk Category		Replacement Value	Percentage of Total Replacement Value	Length of Pipe (LF)	Percentage of Total Length
Extreme	$	8,437,408.90	8%	16,800	6%
High	$	33,099,742.95	32%	100,302	34%
Medium	$	36,498,866.49	35%	116,074	39%
Low	$	25,822,815.40	25%	63,695	21%
Total	**$**	**103,858,833.73**	**100%**	**296,872**	**100%**
2038					
Risk Category		Replacement Value	Percentage of Total Replacement Value	Length of Pipe (LF)	Percentage of Total Length
Extreme	$	12,721,689.46	12%	25,616	9%
High	$	47,733,475.24	46%	157,668	53%
Medium	$	32,094,494.09	31%	83,632	28%
Low	$	11,309,174.95	11%	29,956	10%
Total	**$**	**103,858,833.73**	**100%**	**296,872**	**100%**

Note: These costs are hard construction costs only. General conditions costs (mobilization, traffic control, surveying, etc.) and SNL loads are not included.

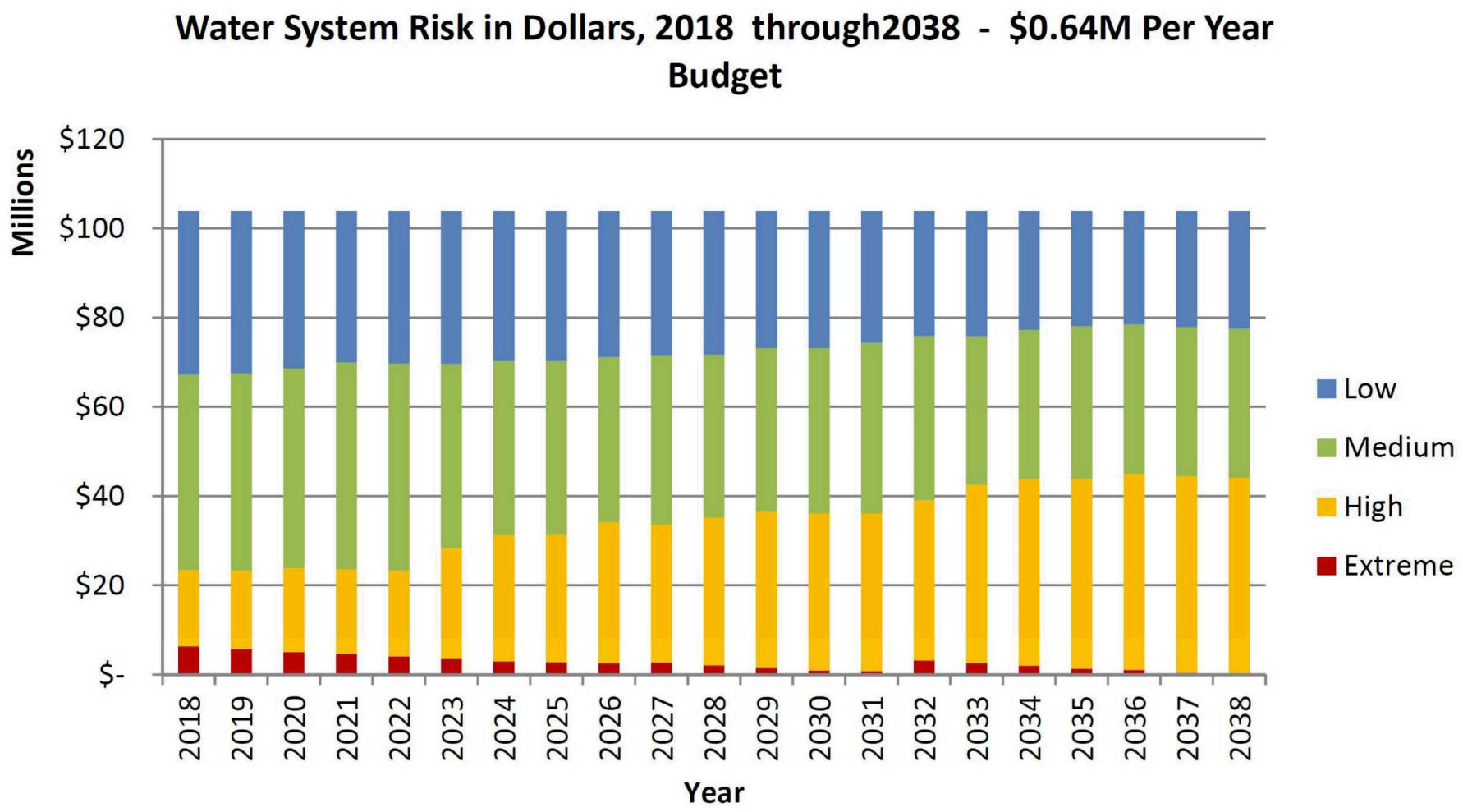
$0 Budget

Replacement Schedule (Risk in Dollars)



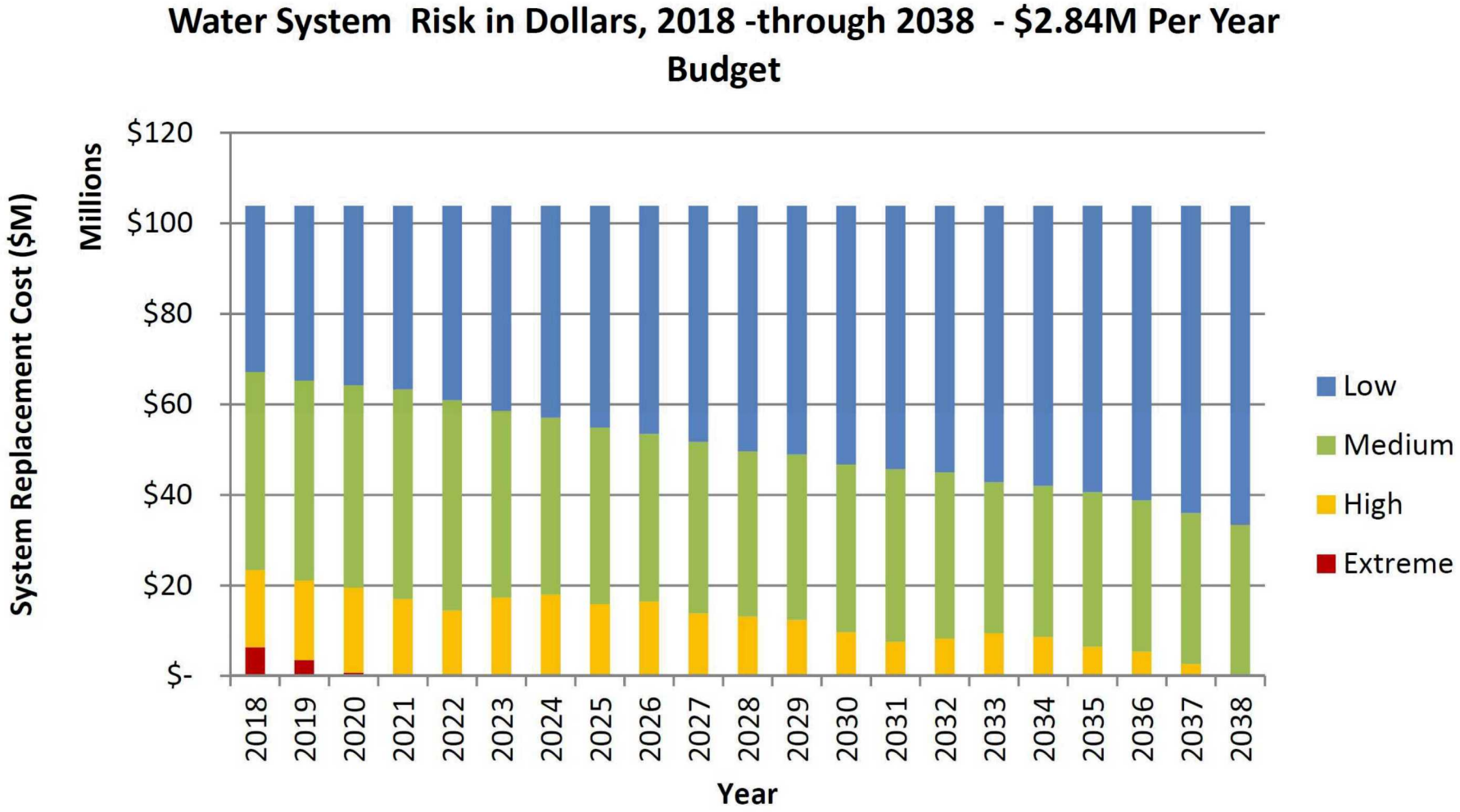
$0.64M Per Year Budget

Replacement Schedule (Risk in Dollars)



$2.84M Per Year Budget

Replacement Schedule (Risk in Dollars)



Conclusion and Recommendations

- Majority of water distribution system will reach the end of its useful life within 20 years
- Replace highest risk pipes first – $2.84M/year to reduce extreme/high risk
- If no action is taken, $60.5M replacement costs in extreme/high risk categories by 2038

Water System AMP

Questions?