



WOODLANDS DIVISION

CAPITAL IMPROVEMENTS PROJECTS

FY 2018 – FY 2027

Spring 2017

The Woodlands

Wastewater

- 3 wastewater treatment plants
- 30 lift stations
- >50 miles of sewer mains
- >1,100 manholes
- >20 miles of force main



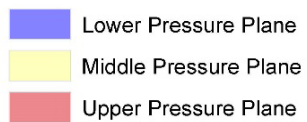
Water

- 5 water plants
- 38 water wells
- 6 elevated storage tanks
- 8 ground storage tanks
- >126 miles of water mains



Contents











- ⦿ Woodlands Systems
- ⦿ CIP Goals and Development
- ⦿ Proposed FY 2017 – FY 2027 CIP
- ⦿ Previous CIP Comparison

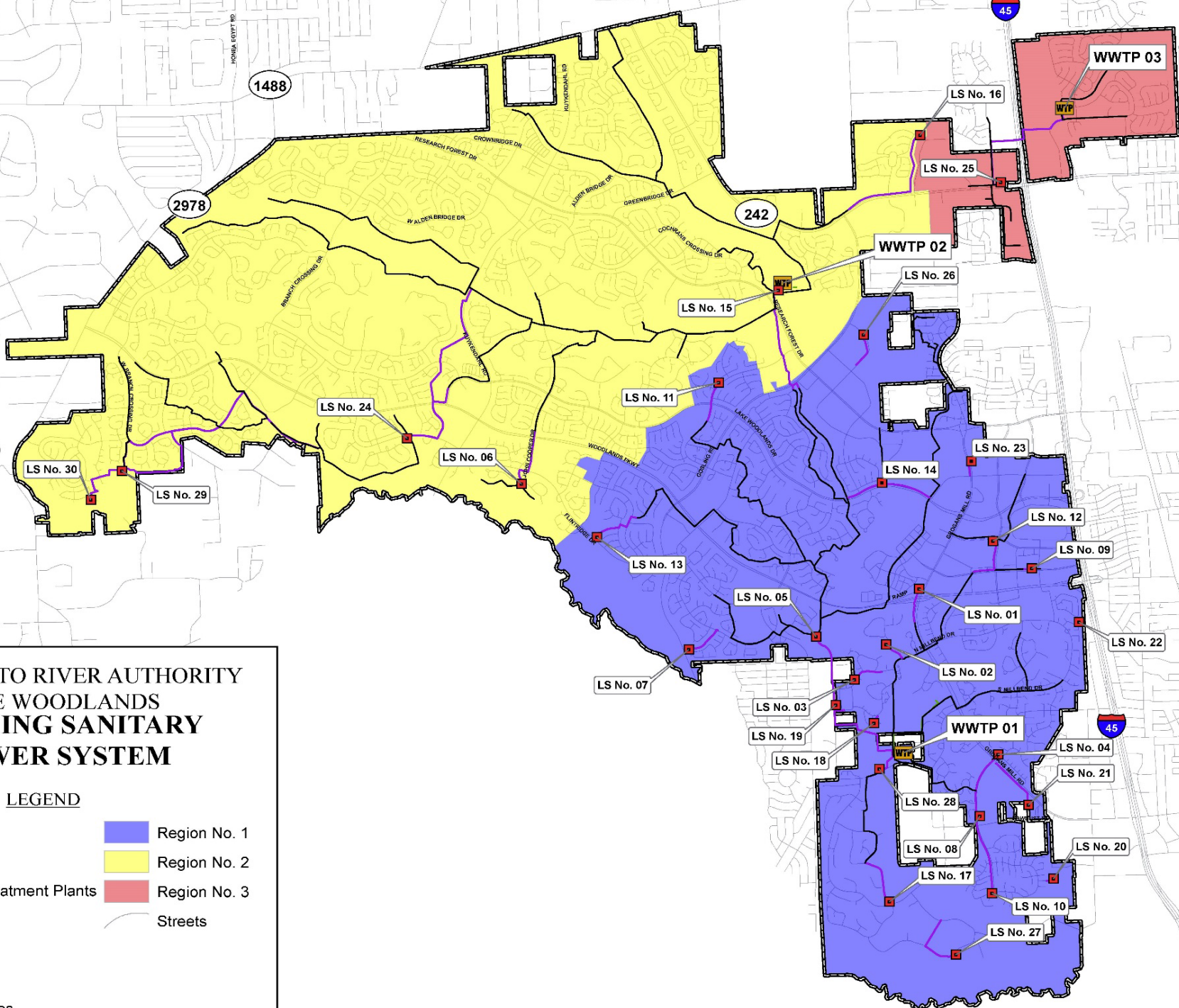


SAN JACINTO RIVER AUTHORITY THE WOODLANDS EXISTING SANITARY SEWER SYSTEM

LEGEND

Lift Stations

-  Lift Stations
-  Wastewater Treatment Plants
-  Effluent Outfall
-  Force Main
-  Gravity Main
-  SJRA Boundaries
-  Region No. 1
-  Region No. 2
-  Region No. 3
-  Streets



Capital Improvement Program Goals

- ⦿ Meet service level expectations
- ⦿ Manage aging infrastructure
 - Extend useful life
 - Reduce risk of system failure
- ⦿ Provide Capacity
 - Meet needs of future growth
- ⦿ Meet regulatory requirements

How Projects are Determined

◉ Asset Management

- Risk of Failure = Likelihood of Failure x Consequence of Failure
- Age / Condition assessment
- Repair / rehabilitation history
- Staff inspections
- Study results

◉ New development

- Sixth & Final Accounting – Capacity projects
- Planned and unplanned development / redevelopment

◉ Upcoming regulatory changes

Asset Priority Based Risk Analysis

<i>Likelihood of Failure</i>	High	Repair/Replace on Failure	Programmed Rehab/Replace	Immediate Rehab/Replace
	Moderate	Monitor and Forecast	Proactive Assessment	Programmed Rehab/Replace
	Low	Monitor and Forecast	Opportunistic Assessment / Forecasting	Proactive Assessment
		Low	Moderate	High
<i>Consequence of Failure</i>				

Assets are Prioritized Based on Risk of Failure

$$\text{Risk of Failure} = \text{Consequence of Failure} \times \text{Likelihood of Failure}$$



How Severe Are the Consequences of Failure?

- Health & Safety
- Loss of service
- Regulatory compliance
- Environmental impact
- Community disruption
- Public image
- Workforce stress
- Damage to property
- Loss of revenue
- Repair costs



What is the Likelihood of Failure?

- Age
- Physical condition
- Repair history
- Capacity and utilization
- Material
- Weather exposure
- Corrosive environment
- Functionality

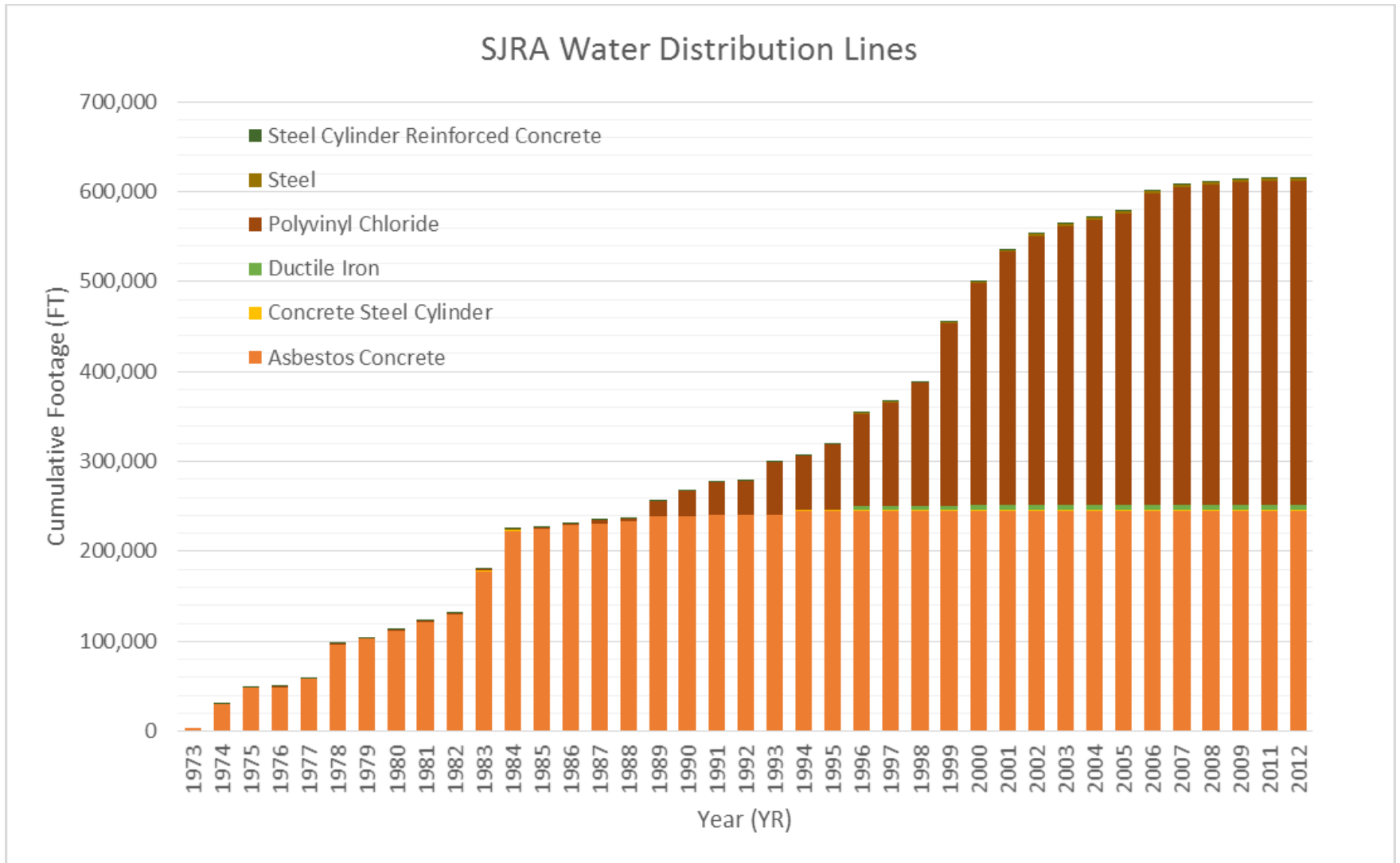
Sample Performance Evaluation Wastewater Collection System

- ◉ Capacity to convey 2027 dry weather flows (utilization less than 90%)
- ◉ Capacity to convey 2027 flows resulting from a 5-year / 24-hour design storm
- ◉ Flow minimum 4-feet below the manhole cover is maintained during peak flows
- ◉ Lift station flows within 75% of available firm capacity
- ◉ Lift station wet well detention time < 30-minutes at average flows

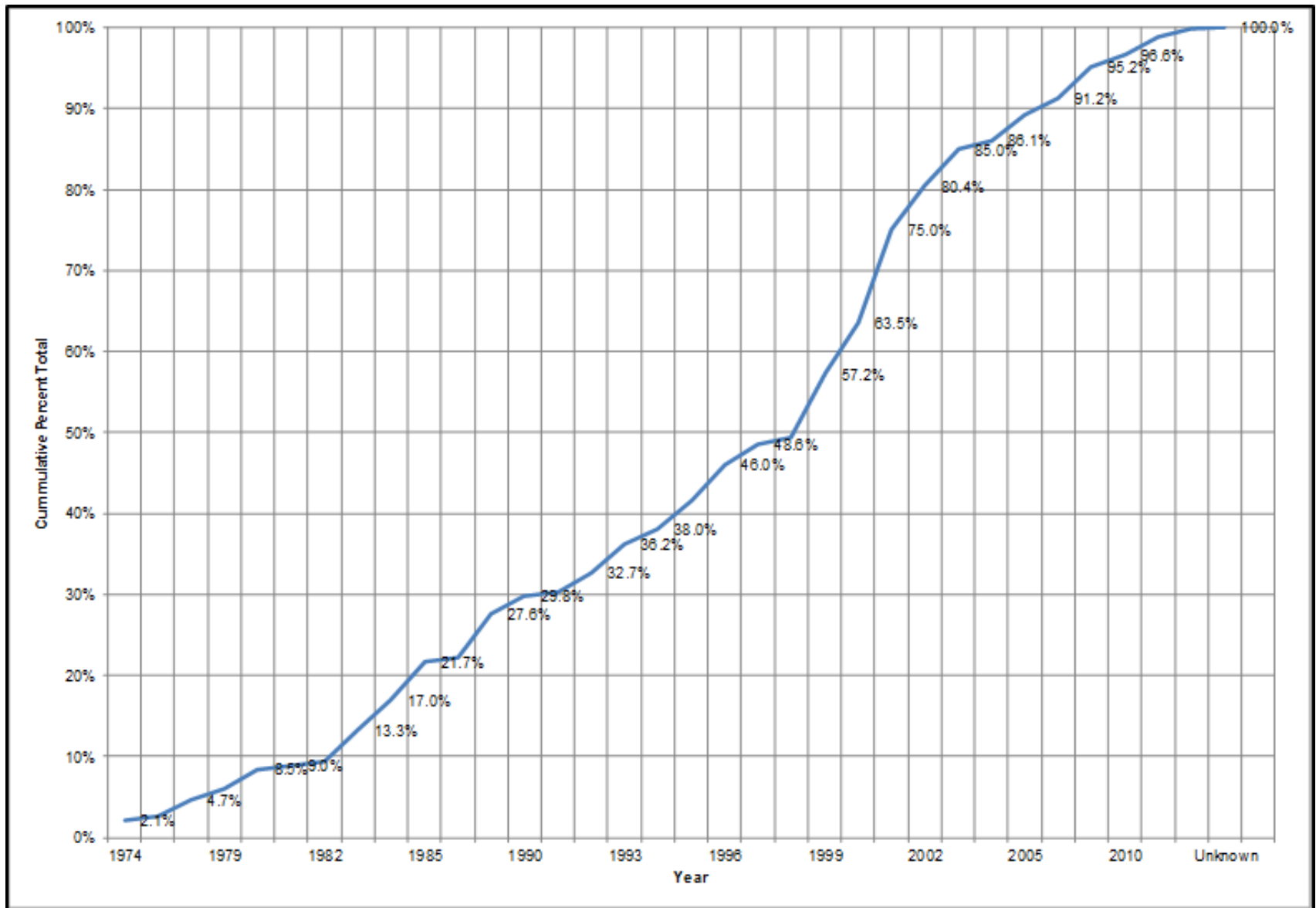
Other Performance Factors

- ⦿ Frequency of sanitary sewer overflows
- ⦿ Frequency of odor complaints
- ⦿ WWTF effluent quality data (Discharge Monitoring Report) incidences of below average performance
- ⦿ Number of corrective maintenance work orders issued per asset
- ⦿ Number of work orders issued per water and wastewater system asset group per year: Total, Corrective, and Preventative

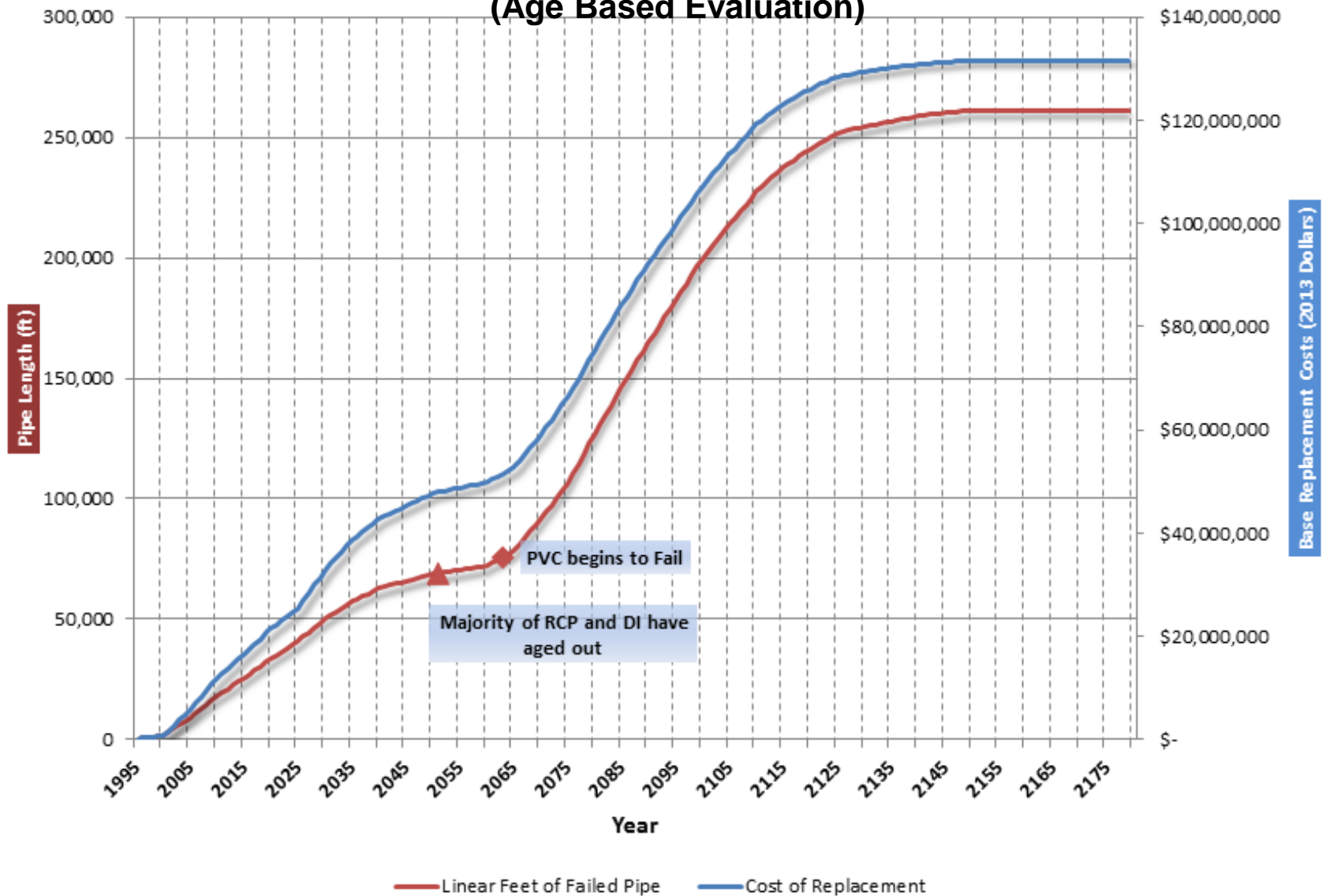
Water Main Pipe Material / Age Profile



Gravity Sewer Main Pipe Age Profile

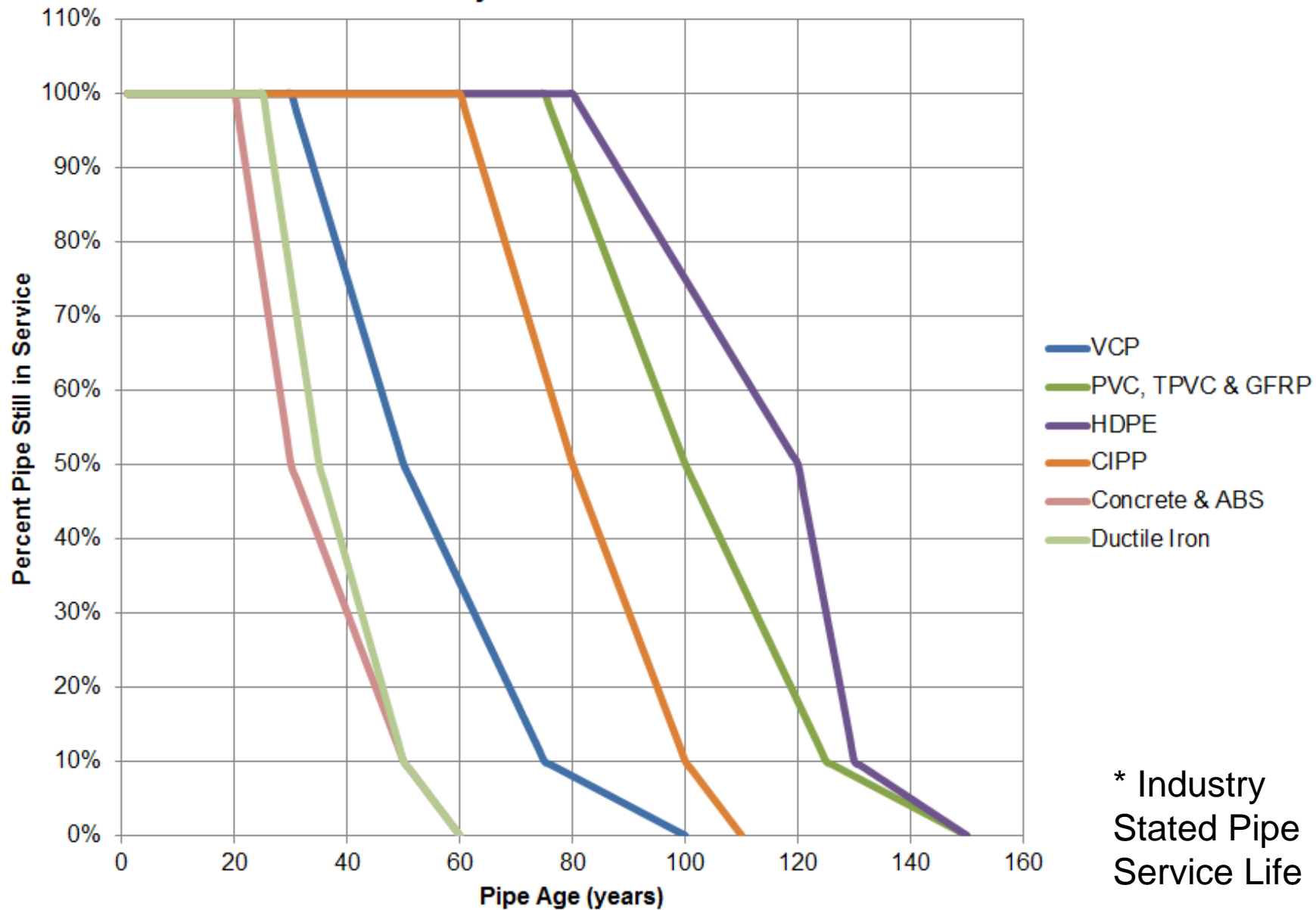


Failure Projections for All Gravity Pipe Materials (Age Based Evaluation)



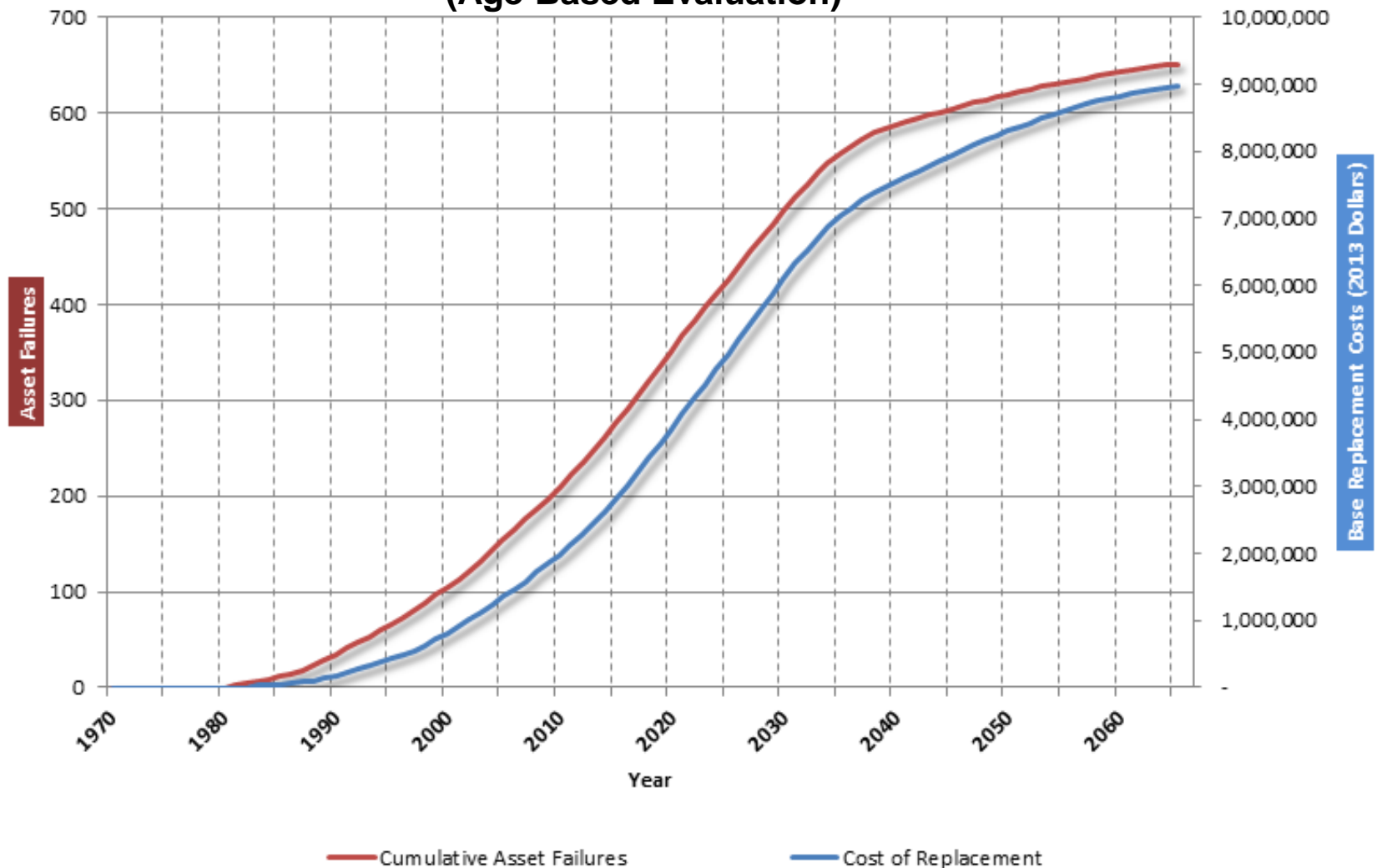
RCP – Reinforced Concrete Pipe
DI – Ductile Iron

Gravity Sewer Main Survival Functions*

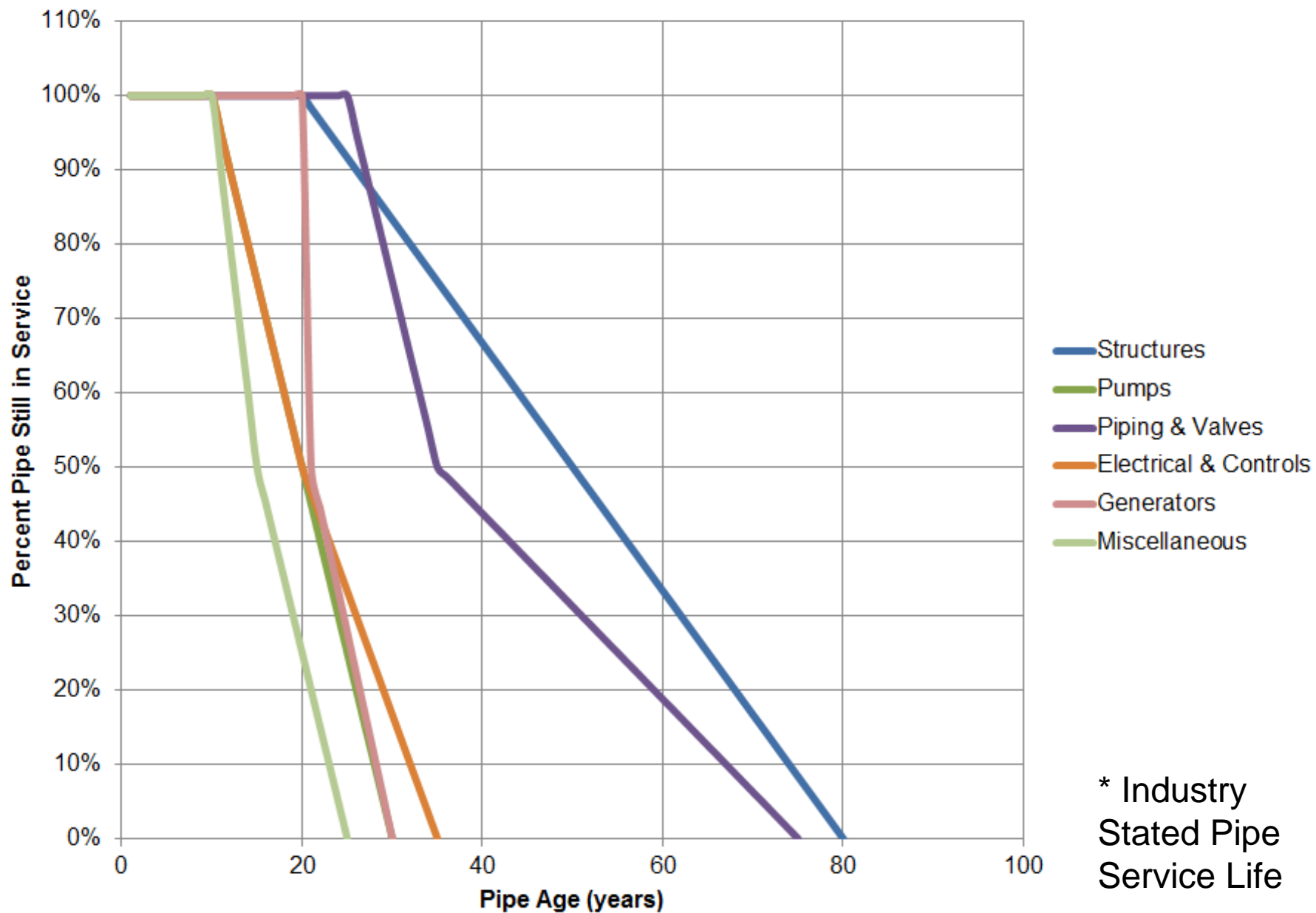


* Industry
Stated Pipe
Service Life

Failure Projections for Lift Station Assets (Age Based Evaluation)

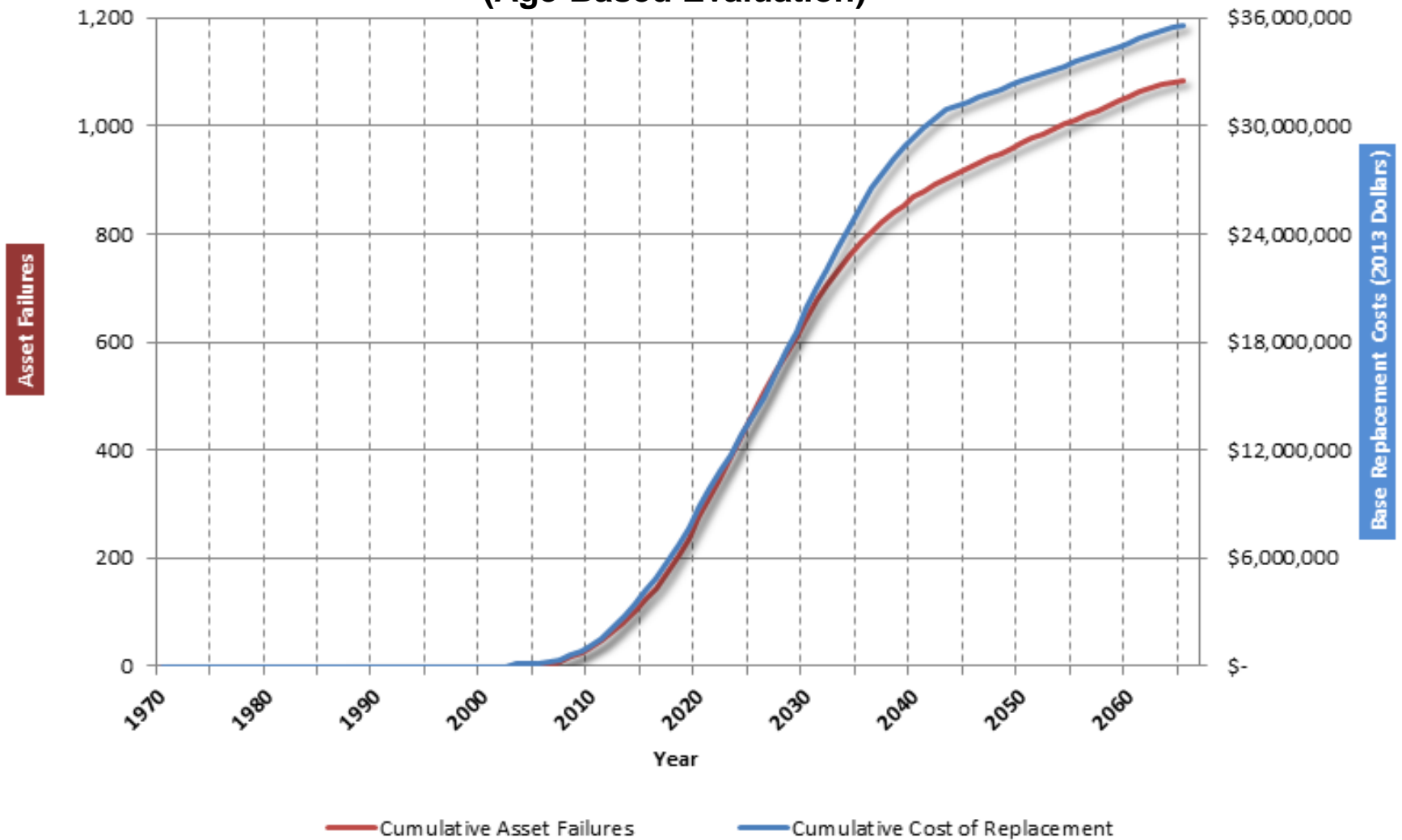


Lift Station Survival Functions *

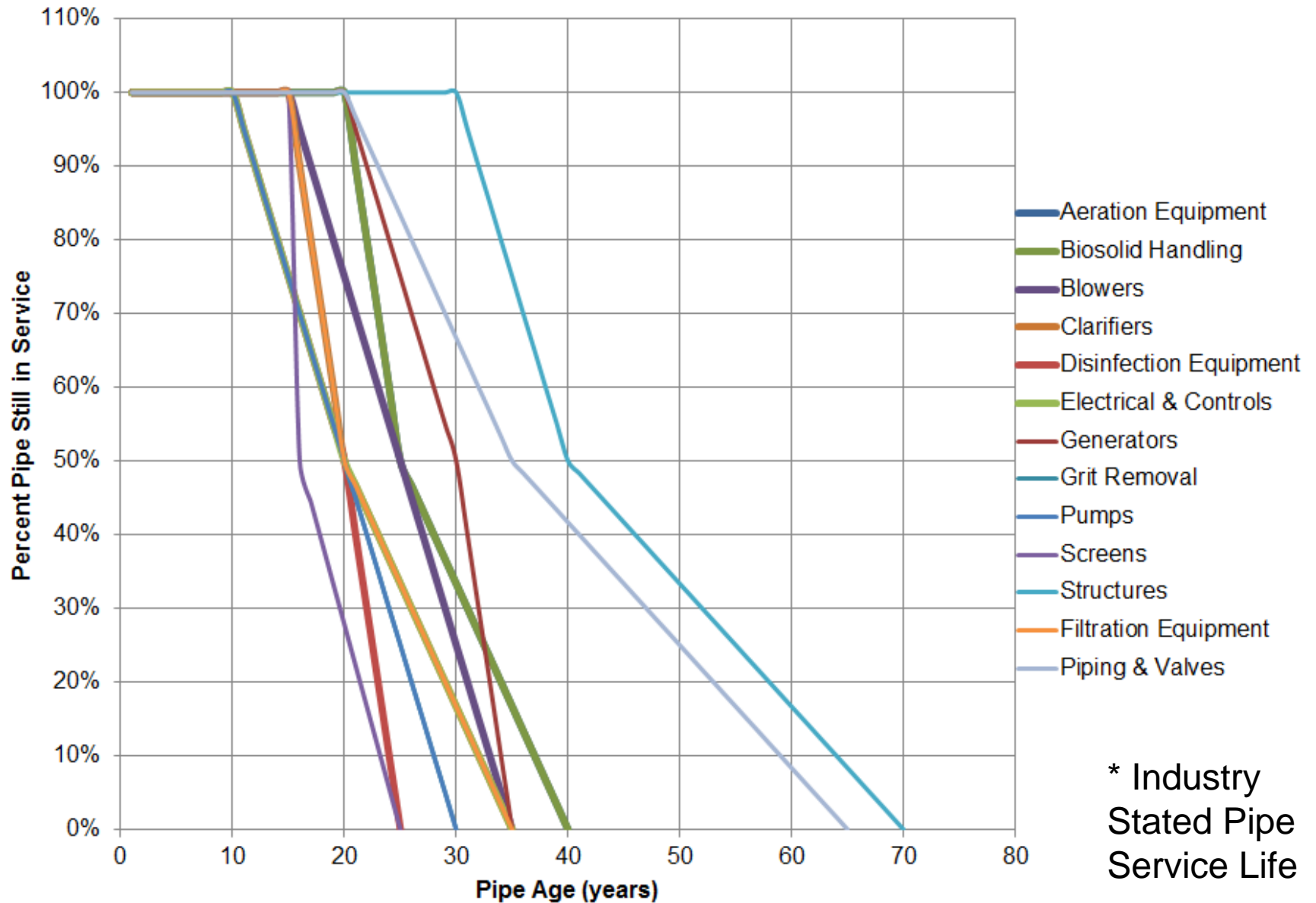


* Industry
Stated Pipe
Service Life

Failure Projections for WWTP Assets (Age Based Evaluation)



Treatment Plant Survival Functions*



* Industry
Stated Pipe
Service Life

Sample Risk Assessment

SJRA Woodlands Wastewater Program Risk Assessment - Treatment Plants

LIKELIHOOD OF FAILURE COMPONENTS

		100
	Component	Weight
1	Condition (rating via direct inspection)	5
2	Staff opinion of condition	10
3	Reactive Repair History (Work orders / year)	10
4	Age (yr)	10
5	Performance	10
6	Plant Area/ subarea	5
7	Enclosure Protection	5
8	Corrosive Environment	10
9	Capacity (current & Future)	5
10	Equipment Service	10
11	Maintenance Requirements (WO)	5
12	Reliability	10
13	Electrical Efficiency	5


CONSEQUENCE OF FAILURE COMPONENTS

		100
		Weight
1	Public health and safety	10
2	Utility employees health and safety	10
3	Customers - Loss of service (commercial impact)	10
4	Utility - Repair cost	10
5	Utility - Inhouse Repair Capability	10
6	Number of customers affected (service interruption)	10
7	Loss of service to critical Subarea	10
8	Number of MUDs affected	10
9	Effluent quality	10
10	TPDES Violation	10

Sample Results Gravity Mains

Asset ID	LOF	COF	Risk Score	Risk Rank	Length (ft)	Comments	RIM
01.05.36.RCP.050	7.45	5.47	4.07	1	731	Line A - TV/Rehab	R
02.00.72.RCP.016	6.98	5.77	4.03	2	8,008	Bear Branch- TV	I
02.00.48.RCP.009	6.30	5.95	3.75	3	1,658	Bear Branch - TV	I
01.05.42.DI.048	6.52	5.35	3.48	4	3,487		I
02.00.21.RCP.019	6.90	4.78	3.30	5	6,344	Line C - TV/Rehab	R
01.00.24.VCP.042	6.13	4.99	3.06	6	2,607		I
02.00.42.RCP.007	5.80	5.24	3.04	7	3,337	Bear Branch - TV	I
01.00.18.RCP.073	6.00	5.00	3.00	8	97		Check
01.00.18.RCP.049	7.45	3.93	2.93	9	1,336	Line B - TV/Rehab	R
01.28.18.RCP.035	7.05	3.97	2.80	10	5,414	Line E - TV	I
02.00.24.DI.003	5.65	4.90	2.77	11	2,046		I
02.00.24.GFR.012	5.15	5.35	2.76	12	2,980		I
01.05.21.RCP.058	6.56	4.18	2.74	13	4,198		I
01.05.24.DI.065	5.78	4.75	2.74	14	3,309		I
02.00.48.GFR.008	4.55	5.94	2.70	15	3,025	Bear Branch - TV	i
01.05.15.VCP.044	5.83	4.57	2.66	16	5,574		i
02.00.18.VCP.068	6.15	4.30	2.64	17	66		i
01.05.18.RCP.054	7.05	3.73	2.63	18	2,502	Line F - TV (VCP)	M
01.05.15.ABS.043	6.07	4.24	2.57	19	2,107		I
01.05.18.VCP.055	5.76	4.20	2.42	20	2,560		I
01.05.42.DI.079	4.58	5.24	2.40	21	12,505		M

Resulting in a CIP

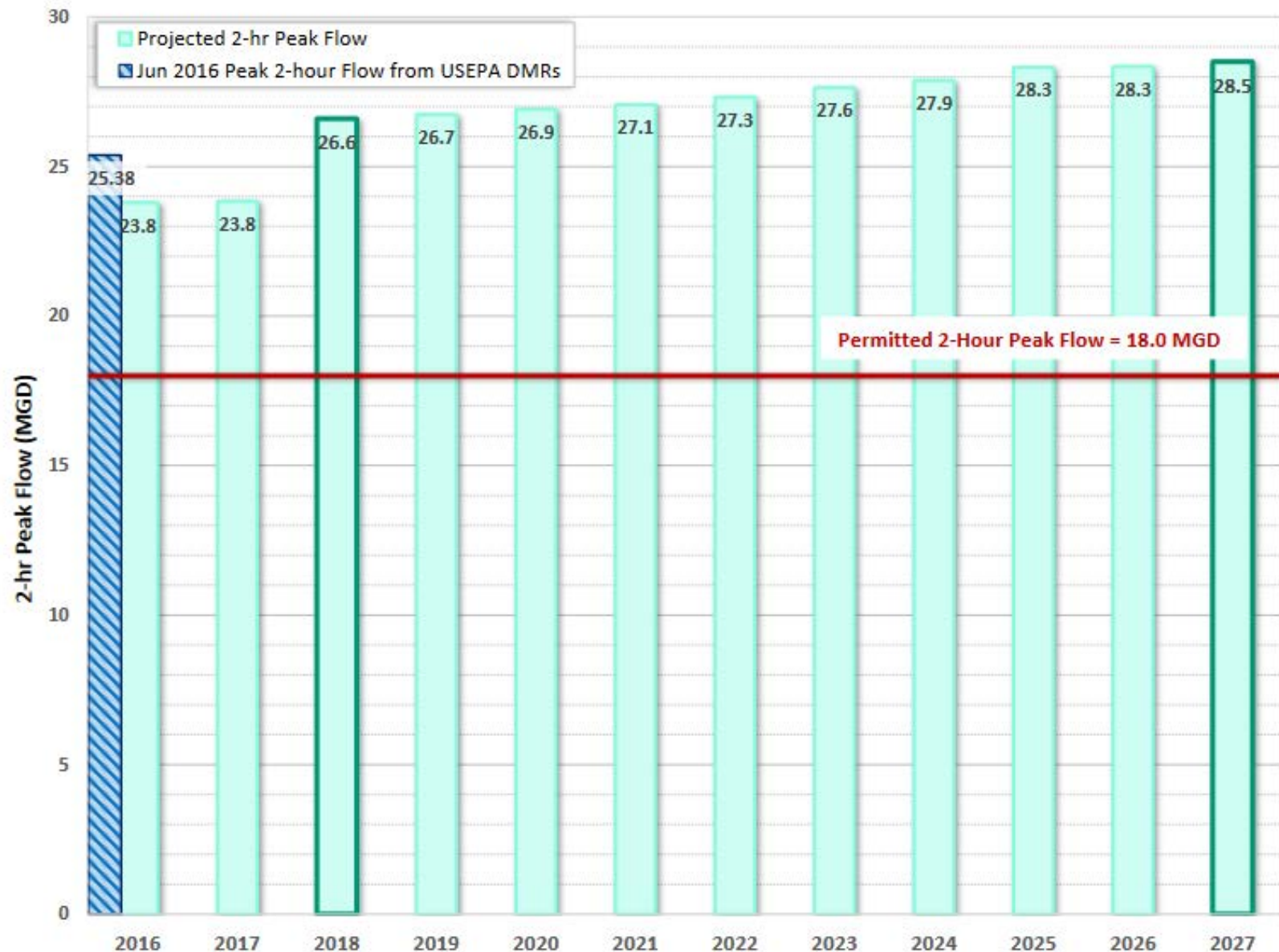
PROJECT NAME		PROJECT ID	FISCAL YEAR	DIVISION								
Water Plant No. 4 Ground Storage Tank No. 2		WA4GT2	2019	Woodlands								
PROJECT DESCRIPTION/JUSTIFICATION:			PROJECT MAP/PICTURE									
<p>An additional Ground Storage Tank (GST) will be required at Water Plant No. 4 to provide additional storage capability. Water plants with only one tank cannot be kept in operation if the tank is out of service. Building a second tank will allow for continuous use of the water plant when maintenance or repairs are being made to either tank. Water model analysis demonstrates a critical need for continuous operation of Water Plant No. 4. If the plant is not operational, large areas within the upper pressure plane would be without water.</p> <p>Proposed GST No. 2 shall have a storage capacity of 2.0 million gallons, equal to GST No. 1, providing additional storage capability. Two equally sized tanks will be sufficient to meet peak day demands, will simplify control settings, and will minimize call-to-run for surface water and ground water supplies, providing less wear on the supply facilities.</p>												
PROJECT SCHEDULE		DELIVERY	FUNDING									
Initiate Cons. Selection	2019	<input type="checkbox"/> DBB	<input type="checkbox"/> O&M									
PSA/WO Issued:	2019	<input type="checkbox"/> CMAR	<input type="checkbox"/> Bonds									
Final Proposal Docs:	2019	<input checked="" type="checkbox"/> CSP	<input type="checkbox"/> R&R									
Proposals/Bids Received:	2019	<input type="checkbox"/> Other	<input checked="" type="checkbox"/> Other									
Const. Contract to Board:	2020		Capacity									
Substantial Completion:	2021	<input type="checkbox"/> Capitalized	<input type="checkbox"/> Expensed									
BUDGET *	TOTAL	PREVIOUS	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
Planning/Permitting/PER	\$ 310,000			\$ 310,000								
Engineering/Design	\$ 310,000			\$ 310,000								
Construction	\$ 3,103,000				\$ 3,103,000							
CPS, CM&I, and CMT	\$ 310,000				\$ 310,000							
Land Acquisition	\$ -											
Equipment Purchase	\$ -											
Total	\$ 4,033,000	\$ -	\$ -	\$ 620,000	\$ 3,413,000	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
* Budget includes contingency												



10 Year CIP

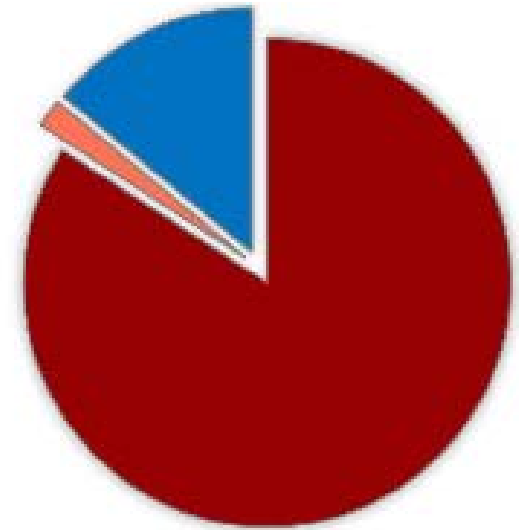
Wet Weather Flow Management

Projected 2-Hour Peak Flows to WWTF No. 1



Wet Weather Management

Owner/Operator	% Length	System
WJPA	84%	} Retail System
MUD 386	2%	
SJRA	14%	Wholesale System



Strategy	Notes / Recommendations
Collection System Storage and Operational Management	High Risk; potential future enforcement action by the TCEQ
Implementation of I/I Reduction Plans (retail and wholesale systems)	Recommended first step to mitigate collection system inflow and WWTF 2-Hour peak flows
Providing 2-Hour Peak Flow Treatment Capacity	This may eventually be necessary if I/I reduction efforts have limited effect and/or if a change occurs in TCEQ's philosophy and interpretation of regulations

Proposed Path Forward for I&I Reduction

Project	Start	Complete
Complete Bear Branch trunk line, aeration basins, and sludge handling	2018	2020
Conduct minimum 9-months of retail and wholesale flow monitoring and evaluation of data	2020	2022
Identify I&I reduction areas and re-evaluate CIP	2022	2023
Develop new CIP	2023	2023
Implement CIP I&I reduction efforts	2024	ongoing



Proposed FY 2018 – FY 2027 CIP



PLEASE REFER TO THE SUMMARY
SHEETS PROVIDED.



Comparison to FY 2017 – FY 2021 CIP

FY 2017 vs FY 2018

(Non-Capacity & Non-Bonds)

Water (FY17)

- 2018 - \$1,996,500
- 2019 - \$ 684,000
- 2020 - \$2,222,000
- 2021 - \$1,313,000

Water (FY18)

- 2018 - \$2,207,700
- 2019 - \$1,157,000
- 2020 - \$1,822,000
- 2021 - \$1,905,000

Wastewater (FY17)

- 2018 - \$12,931,000
- 2019 - \$ 2,678,000
- 2020 - \$18,150,000
- 2021 - \$ 3,060,000

Wastewater (FY18)

- 2018 - \$4,854,000
- 2019 - \$5,923,000
- 2020 - \$3,604,000
- 2021 - \$7,549,000



Questions?