Water / Wastewater Asset Management

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FREESE AND NICHOLS

NOVEMBER 9, 2026

Project Background

Stakeholder/Community Expectations

ORGANIZATIONAL STRATEGIC GOALS

CORPORATE RISK MATRIX AND AM POLICY

ASSET MANAGEMENT PLANS

WATER SYSTEM | WASTEWATER SYSTEM | STORMWATER SYSTEM | ROADWAY NETWORK | CITY FACILITIES | PARKS/REC



2025/2026

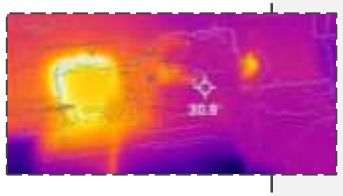
2024

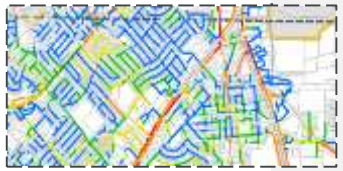
FUTURE

FINANCIAL PLAN

Project Methodology







Water (W)
Mains and Facilities

Wastewater (WW)
Mains and Facilities







Risk-based Assessment Frameworks for Linear and Vertical Assets

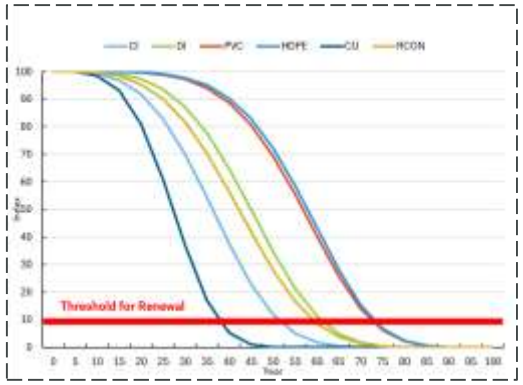
Condition

Criticality

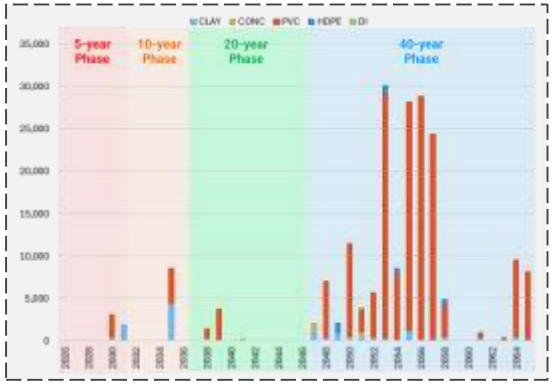
Core Risk

Risk Mitigation

Business Risk Exposure



W/WW Infrastructure Lifecycle Assessment

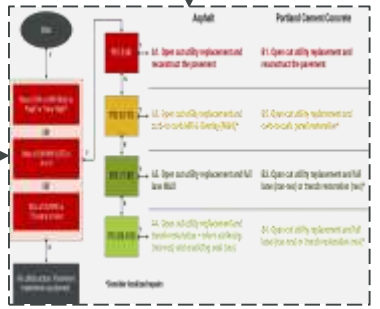


W/WW Infrastructure Renewal Needs

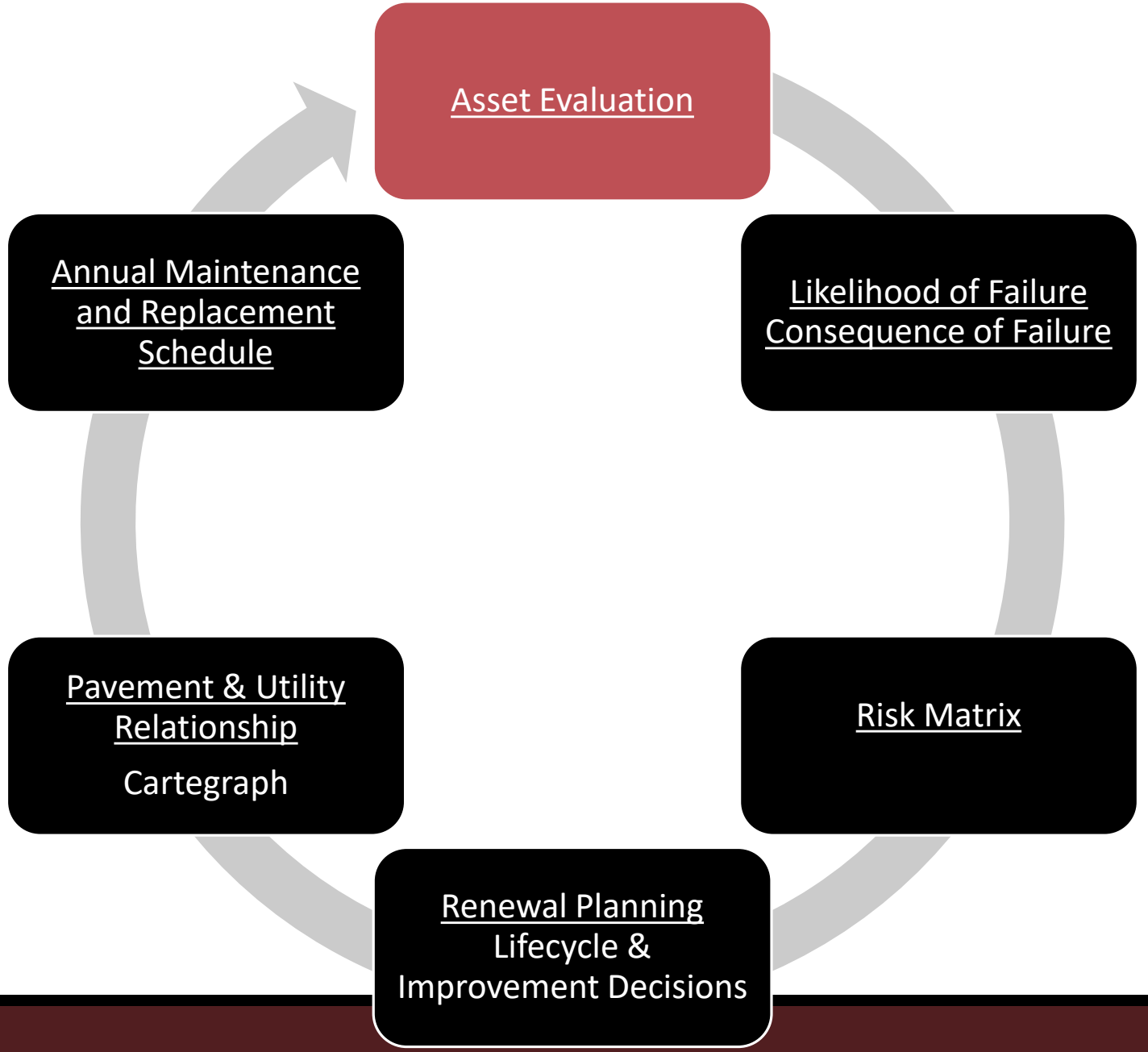


Pavement Renewal Needs

2024 Study



Coordinated Infrastructure Right-of-Way Renewal Planning


Asset Evaluation
Likelihood of Failure
Consequence of Failure
Risk Matrix
Renewal Planning
Lifecycle &
Improvement Decisions
Pavement & Utility
Relationship
Cartegraph
Annual Maintenance
and Replacement
Schedule

WATER MAINS

8908 SEGMENTS - 233 MILES

WASTEWATER GRAVITY MAINS

4480 SEGMENTS - 237 MILES

WASTEWATER FORCE MAINS

5 SEGMENTS - 0.56 MILES

6,099 Water Valves

1,831 Fire Hydrants

23 Water Pumps

6 Sewer Pumps

14,770 Residential

962 Commercial

4 Sewer Lift Stations

4 Water Pump Stations

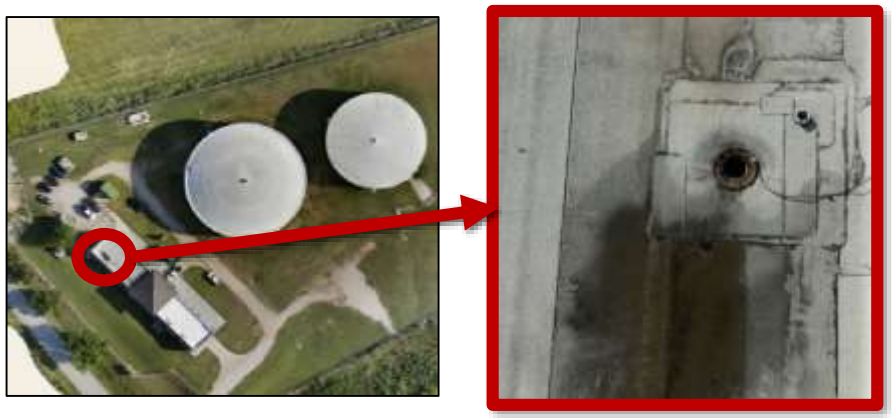
4 Elevated Storage Tanks

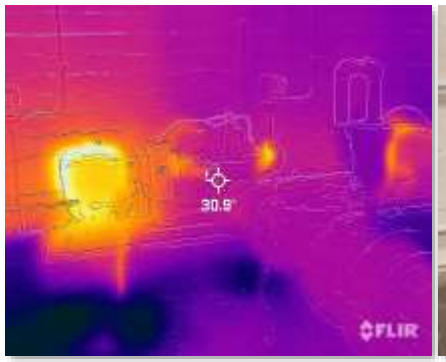
5 Ground Storage Tanks

ASSET ASSESSMENT

Facility Site Visits

- Drones captured high-resolution photos
- Mobile field map applications used to collect condition data during site visits
- FLIR camera captured thermal images of pumps

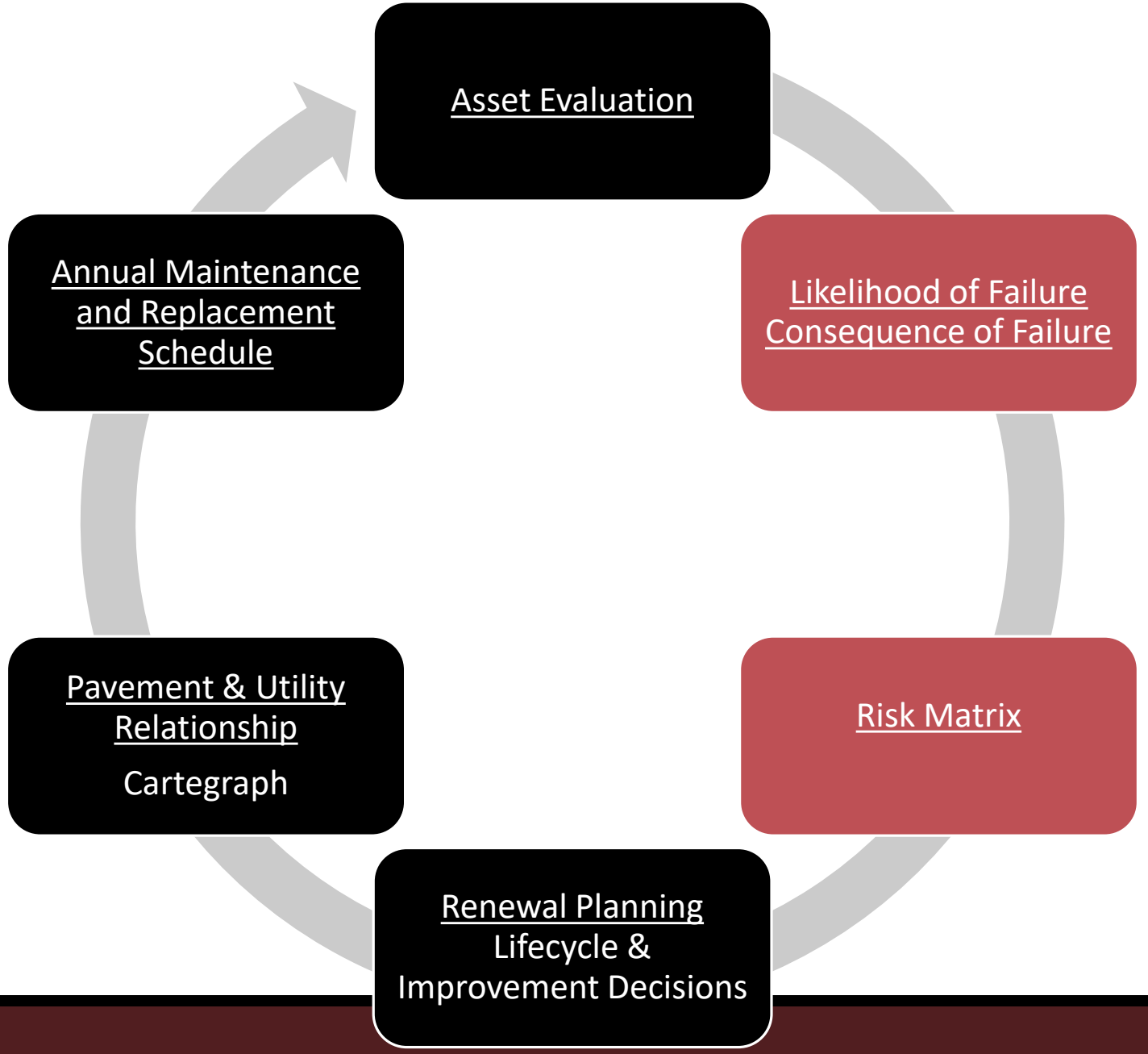






Condition Assessment

- Asset data
  - Material type, age, W/O history, satellite leak detection data, and PACP defects
- Apply condition assessment framework to determine condition scores for water and wastewater


Asset Evaluation
Likelihood of Failure
Consequence of Failure
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RISK EVALUATION

THE CITY OF BURLESON TEXAS

PROBABILITY OF FAILURE (Condition): Likelihood that an asset will fail at a given time and an important part of effective risk analyses.

CONSEQUENCE OF FAILURE (Criticality): Consequences in safety, economy, and environment that is evaluated as the outcomes of a failure based on the assumptions that such a failure will occur.

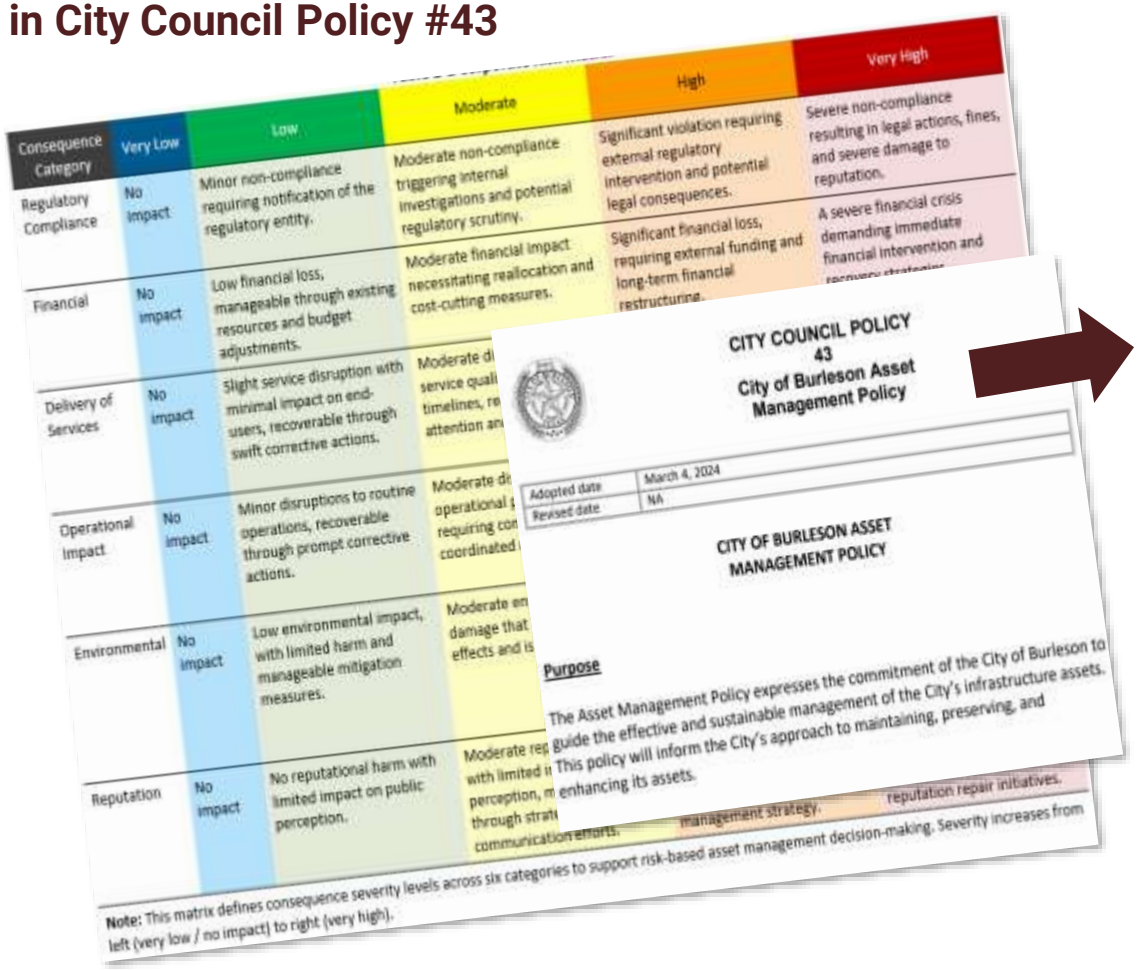
RISK MATRIX: The Consequence of Failure (CoF), calculated together with the Probability of Failure (PoF), helps establish the risk level for a particular piece of equipment and set inspection intervals based on the calculated risk.

Core Risk		Condition				
		Very Low	Low	Moderate	High	Very High
Criticality	Very Low	VERY LOW	VERY LOW	LOW	MODERATE	MODERATE
	Low	VERY LOW	LOW	MODERATE	MODERATE	HIGH
	Moderate	LOW	MODERATE	MODERATE	HIGH	HIGH
	High	MODERATE	MODERATE	HIGH	VERY HIGH	VERY HIGH
	Very High	MODERATE	HIGH	HIGH	VERY HIGH	VERY HIGH

Condition PoF  *Criticality CoF*  *Risk of Failure*

Criticality of Water & Wastewater System

The criticality framework aligns with the City's Corporate Risk Matrix, as outlined in City Council Policy #43



https://burlesontx.com/DocumentCenter/View/33501/AM-City-Policy-43

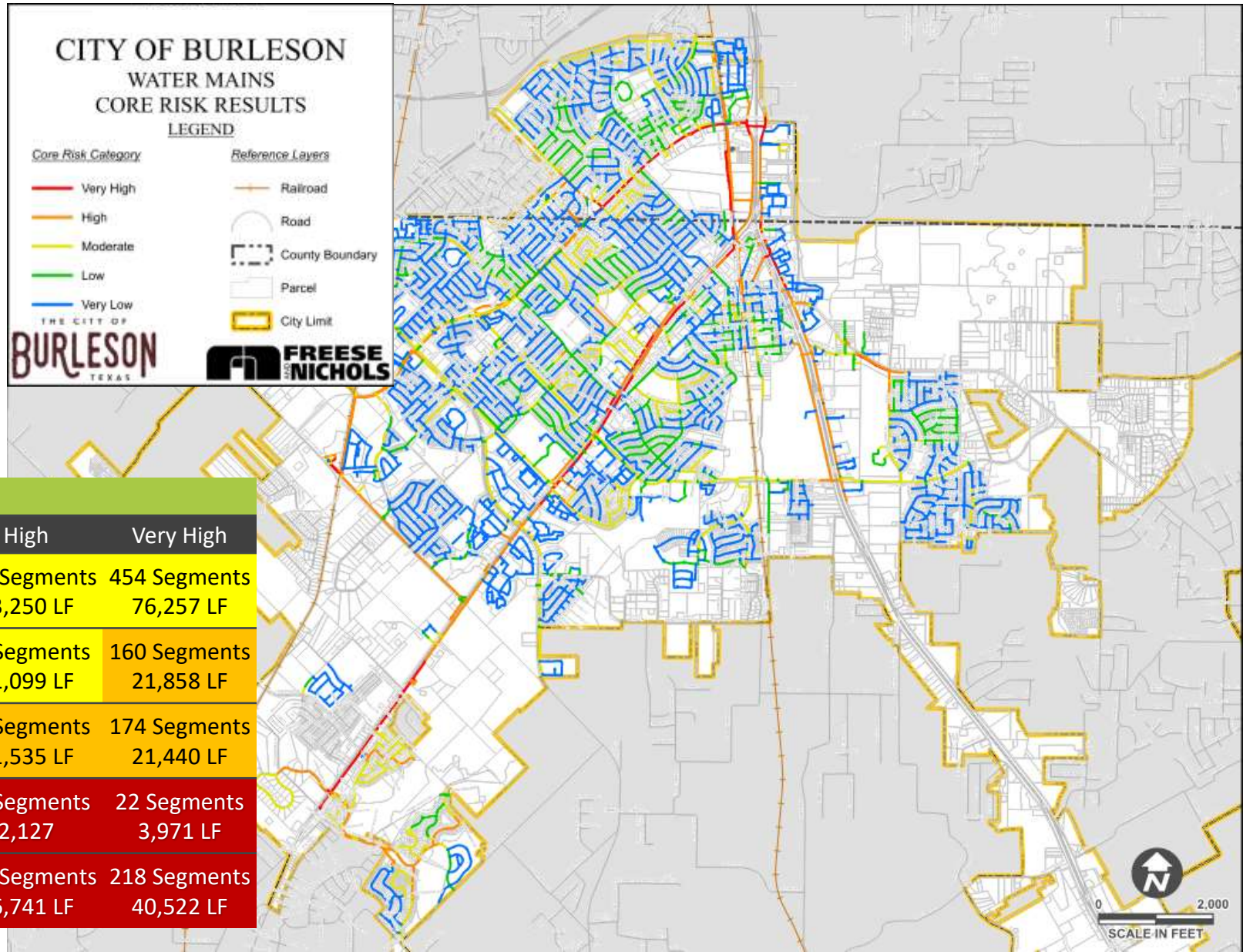
Corporate Risk	Criticality Parameter
Delivery of Service: The estimated impact to the City's ability to deliver its services.	Pipe Diameter
Health & Safety: The estimated impact to the safety of staff and the general public.	Proximity to Critical Customers
Operational Impact: The estimated impact on the City's operations	Proximity to Major Thoroughfare Infrastructure

Corporate Risk	Criticality Parameter
Delivery of Service: The estimated impact to the City's ability to deliver its services.	Service Disruption
Health & Safety: The estimated impact to the safety of staff and the general public.	Potential for Injury
Operational Impact: The estimated impact on the City's operations	Tolerance to Operational Disruption
Environmental: The estimated impact on the environment.	Magnitude of Environmental Impact
Reputation: The estimated impact on the City's image and relationships.	Level of External Awareness

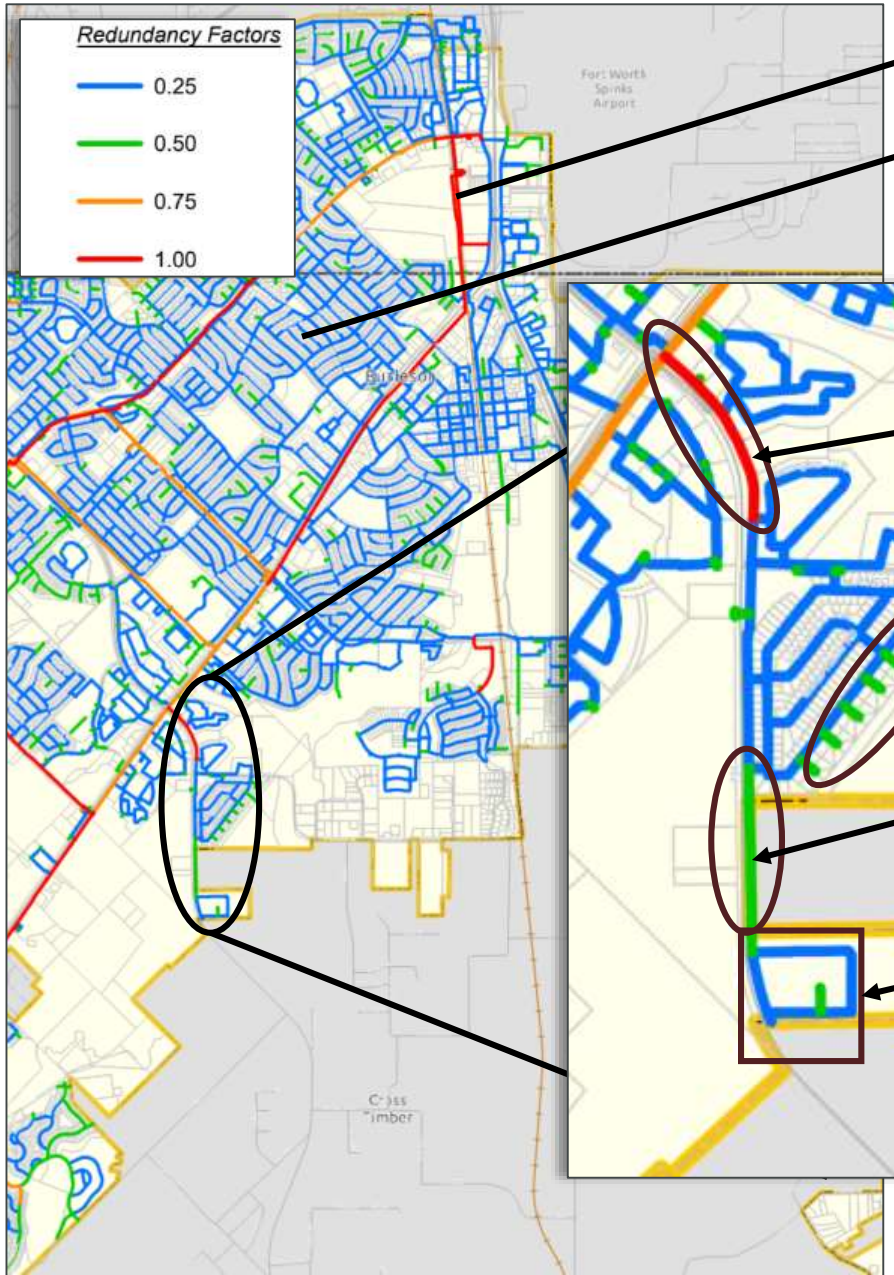
Core Risk of Water Mains

- **Core Risk = Condition x Criticality**
- Condition based on modeled pressures, install year, and material.
- Criticality based on impacts on health & safety, service delivery, and operations.
- **The core risk does not always reflect the actual risk exposure of the assets.**

Core Risk		Condition				
		Very Low	Low	Moderate	High	Very High
Criticality	Very Low	915 Segments 101,470 LF	1,980 Segments 273,859 LF	1,586 Segments 208,139 LF	420 Segments 73,250 LF	454 Segments 76,257 LF
	Low	151 Segments 15,471 LF	634 Segments 71,477 LF	281 Segments 36,045 LF	84 Segments 11,099 LF	160 Segments 21,858 LF
	Moderate	132 Segments 11,851 LF	351 Segments 47,079 LF	143 Segments 13,569 LF	75 Segments 11,535 LF	174 Segments 21,440 LF
	High	16 Segments 2,036 LF	86 Segments 15,193 LF	150 Segments 26,454 LF	13 Segments 2,127	22 Segments 3,971 LF
	Very High	47 Segments 9,486 LF	238 Segments 59,346 LF	233 Segments 25,597 LF	126 Segments 26,741 LF	218 Segments 40,522 LF



Risk Exposure of Water Mains



Non-Redundant,
RF: 1.0

25% of the Core Risk is retained,
RF: 0.25

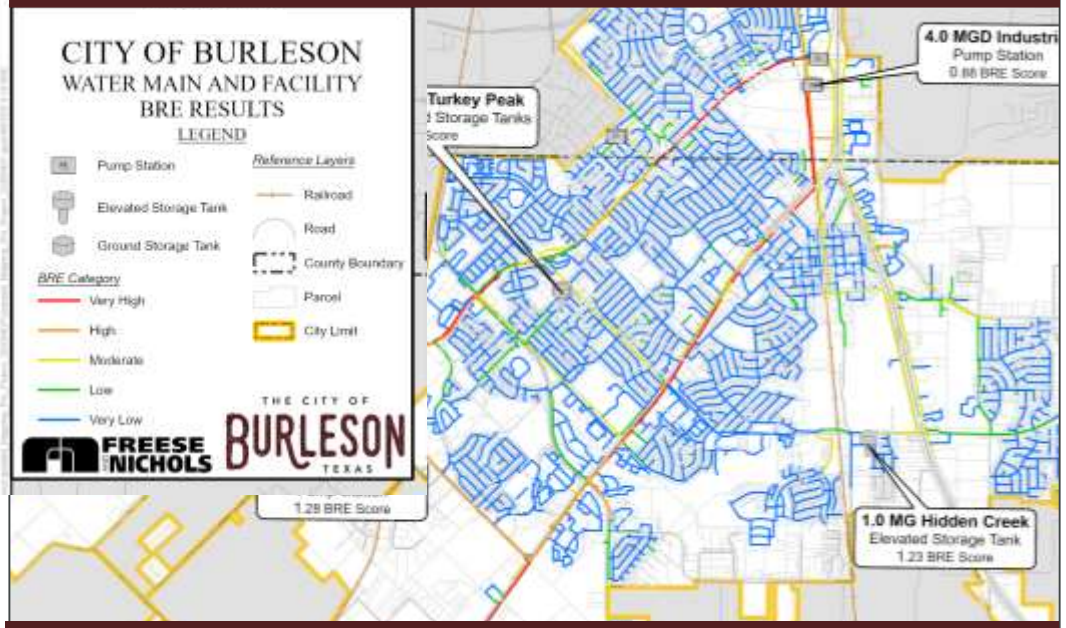
Non-Redundant,
RF: 1.00

Dead-end Pipes,
RF: 0.5

Non-Redundant,
RF: 0.5

Isolated Demand,
RF: 0.25

Core Risk x Redundancy Factor = Business Risk Exposure (BRE)



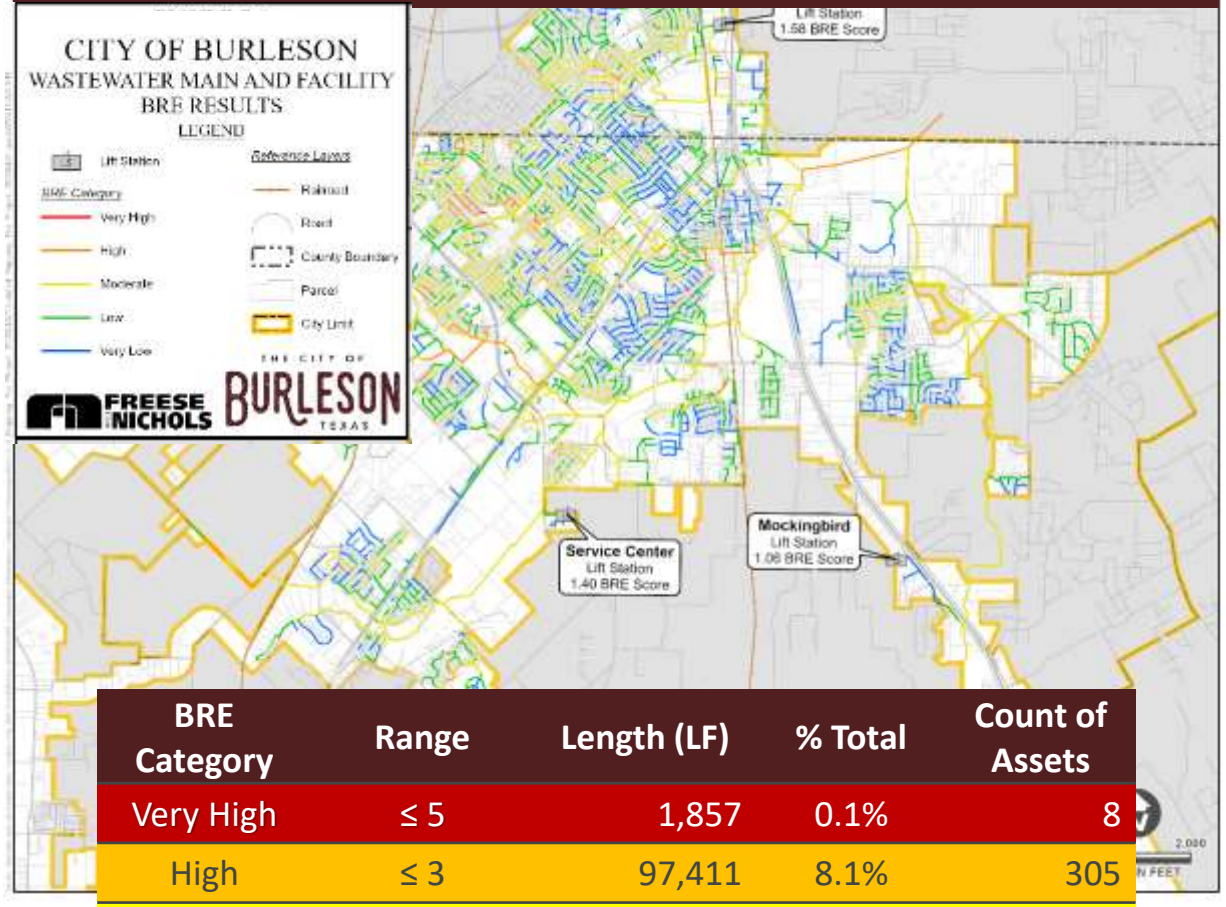
BRE Category	Range	Length (LF)	% Total	Count of Assets
Very High	≤ 5	44,125	3.7%	261
High	≤ 3	44,312	3.7%	220
Moderate	≤ 2	104,315	8.7%	580
Low	≤ 1.4	74,925	6.2%	526
Very Low	≤1.2	938,197	77.8%	7,102
Total		1,205,874	100%	8,689

Risk Exposure of Wastewater Mains

Core Risk		Condition				
		Very Low	Low	Moderate	High	Very High
Criticality	Very Low	159 Segments 38,108 LF	300 Segments 85,195 LF	178 Segments 59,673 LF	118 Segments 35,744 LF	48 Segments 14,633 LF
	Low	620 Segments 149,697 LF	968 Segments 272,575 LF	122 Segments 36,831 LF	351 Segments 107,864 LF	42 Segments 13,857 LF
	Moderate	290 Segments 63,354 LF	457 Segments 117,786 LF	87 Segments 24,751 LF	64 Segments 20,163 LF	13 Segments 5,229 LF
	High	134 Segments 41,475 LF	155 Segments 39,813 LF	10 Segments 6,288 LF	4 Segments 1,565 LF	Segments 0 LF
	Very High	58 Segments 20,193 LF	163 Segments 48,293 LF	9 Segments 2,016 LF	6 Segments 1,601 LF	2 Segments 256 LF

- Condition based on install year and material.
- Criticality based on impacts on health & safety, service delivery, and operations.
- **No redundancy factors for WW mains.**
- **BRE values are influenced by the data distribution.**

Business Risk Exposure (BRE)



BRE Category	Range	Length (LF)	% Total	Count of Assets
Very High	≤ 5	1,857	0.1%	8
High	≤ 3	97,411	8.1%	305
Moderate	≤ 2	439,092	36.4%	1,530
Low	≤ 1.4	395,603	32.8%	1,436
Very Low	≤1.2	273,000	22.6%	1,079
Total		1,206,963	100%	4,358

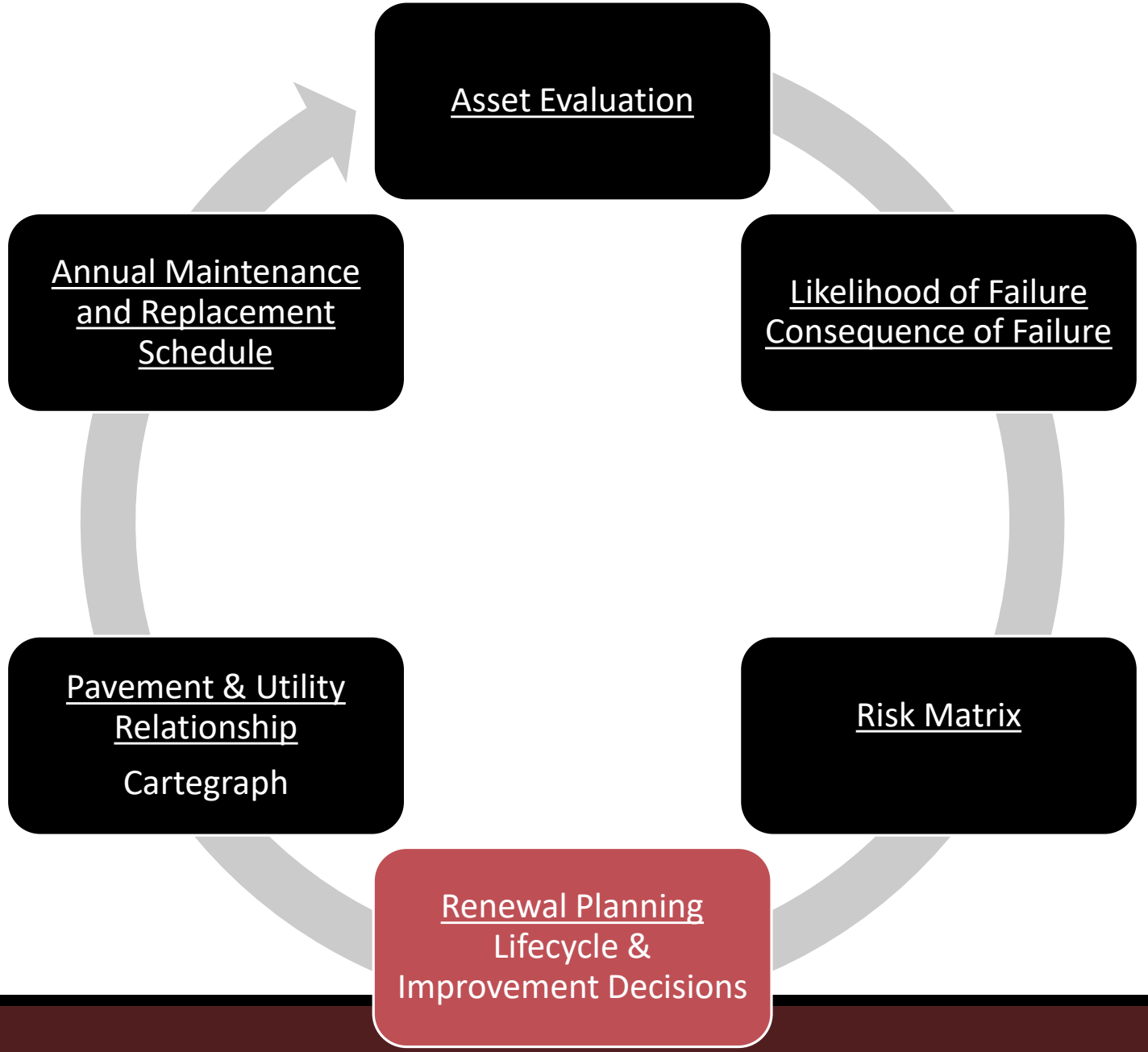
W & WW Facilities Risk Exposure

Core Risk	Condition				
	Very Low	Low	Moderate	High	Very High
Criticality: Very Low	-	-	-	-	-
Criticality: Low	-	-	-	-	-
Criticality: Moderate	Industrial Park PS Hulen PS GST#2 Industrial PS GST#1 Industrial PS GST#2 Industrial PS GST#3	Hulen PS - LPP Hulen PS - UPP Turkey Peak GST Hidden Creek EST	Turkey Peak PS Hulen PS GST#1		-
Criticality: High	-	Turkey Peak EST	-	-	-
Criticality: Very High	-	-	-	-	-

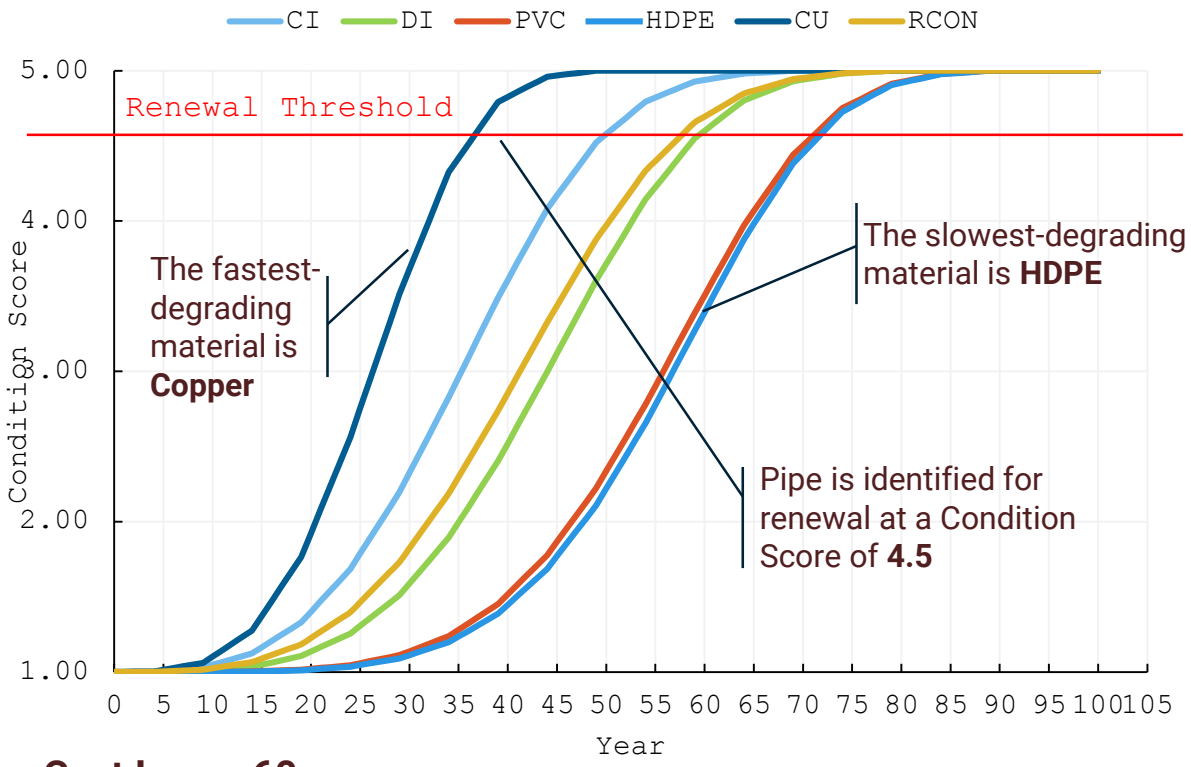
Core Risk	Condition				
	Very Low	Low	Moderate	High	Very High
Criticality: Very Low	Pecan Grove	-	-	-	-
Criticality: Low	-	-	-	-	-
Criticality: Moderate	-	-	-	Gateway LS Service Center LS	-
Criticality: High	-	-	Mockingbird LS	-	-
Criticality: Very High	-	-	-	-	-

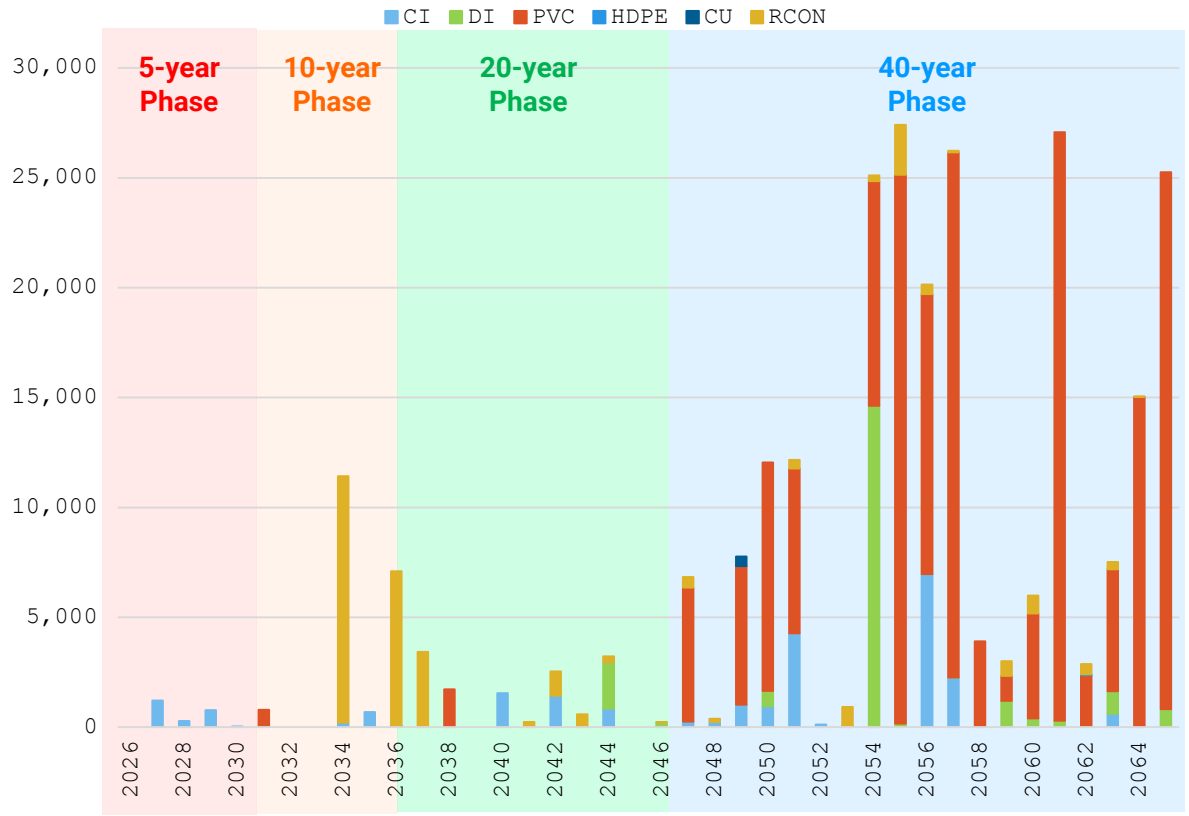
* Three more lift stations coming on in 2027

- **Assigned service life and estimated end of life for all equipment inside each facility**
- **The 2022 condition assessment program identified improvements needed to address the aging infrastructure issues**


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Water Mains Renewal Planning

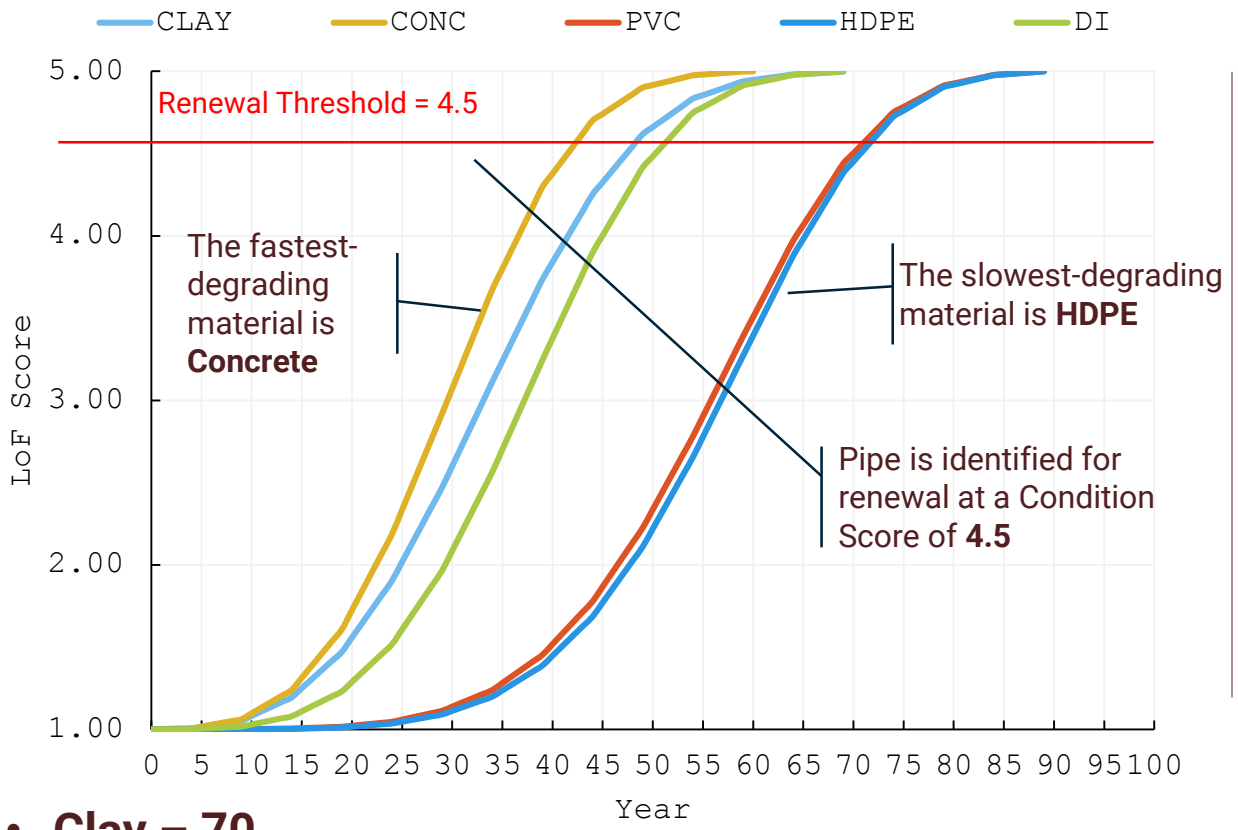


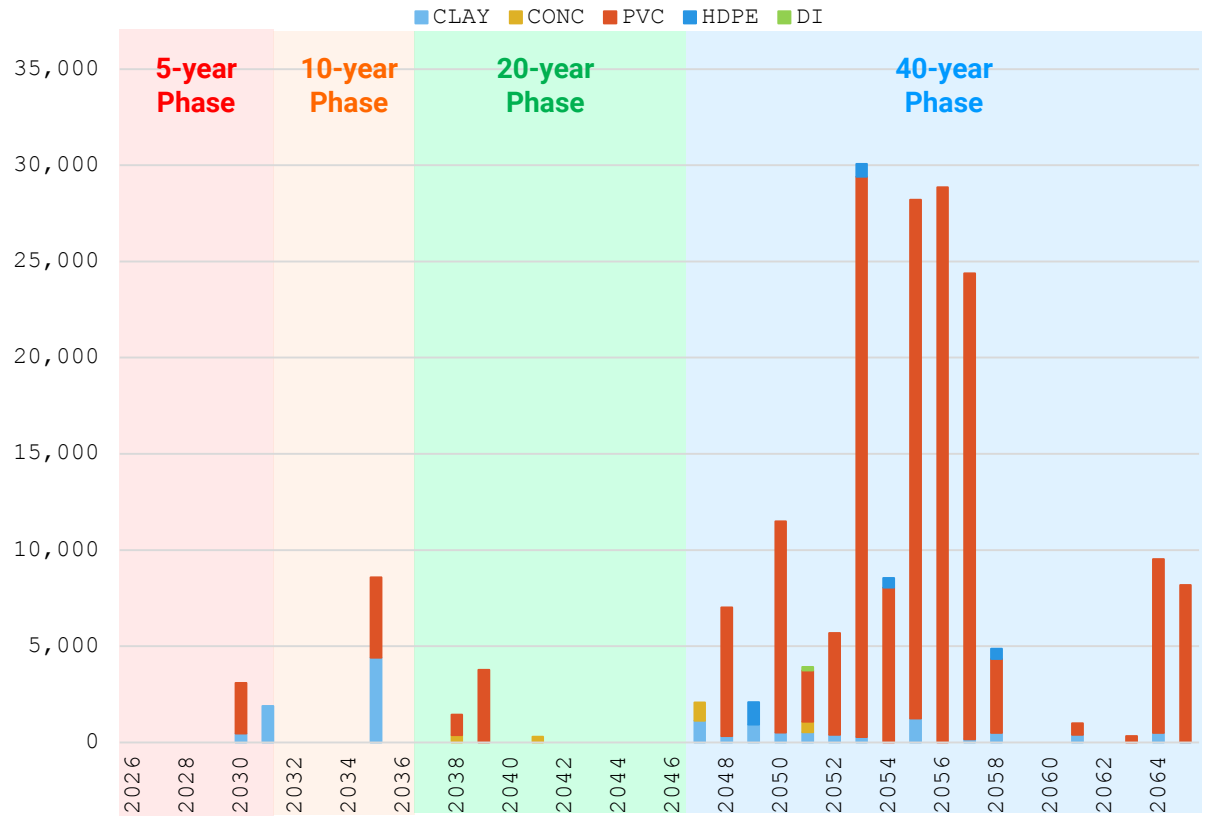


- **Cast Iron – 60**
- **Ductile Iron – 90**
- **Reinforced Concrete Pipe – 120**
- **PVC – 100**
- **High-Density Polyethylene – 120**
- **Copper - 40**

- **Reinforced Concrete pipes are estimated to reach the end of life in the next ten years**
- **Plan a condition assessment program in the next 5 years**
- **PVC pipes start to reach the end of life in the next 40 years**
- **Plan a system-wide water loss leak-detection program to address large future replacement needs**

Wastewater Mains Renewal Planning

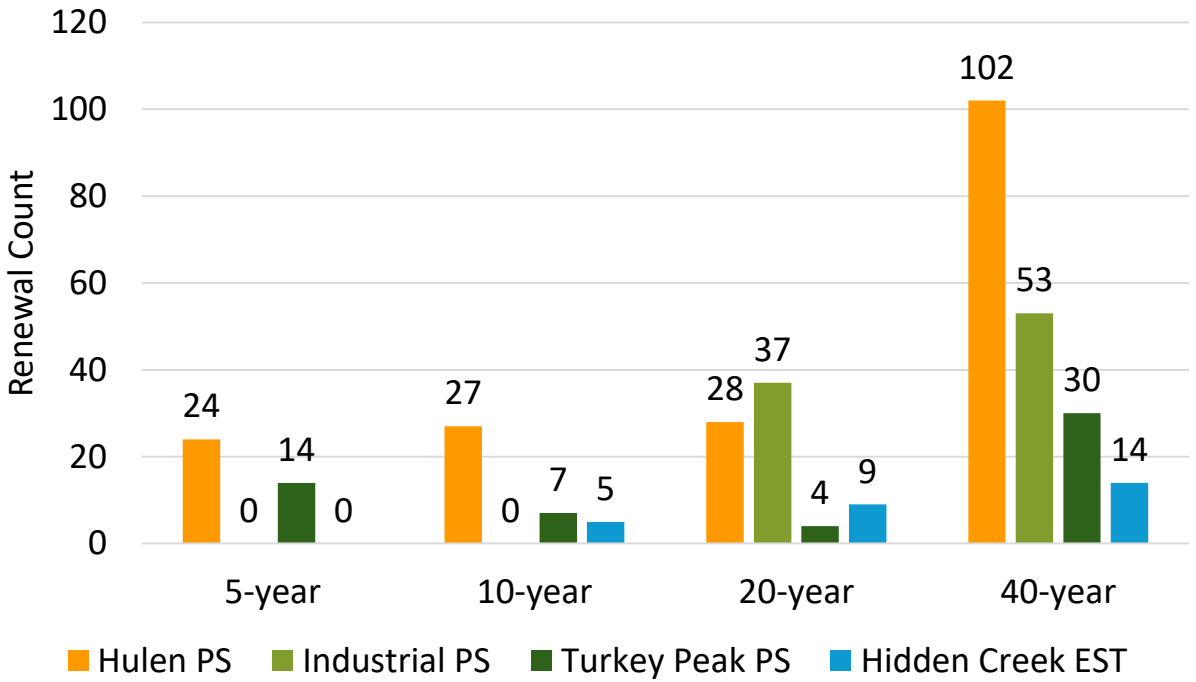


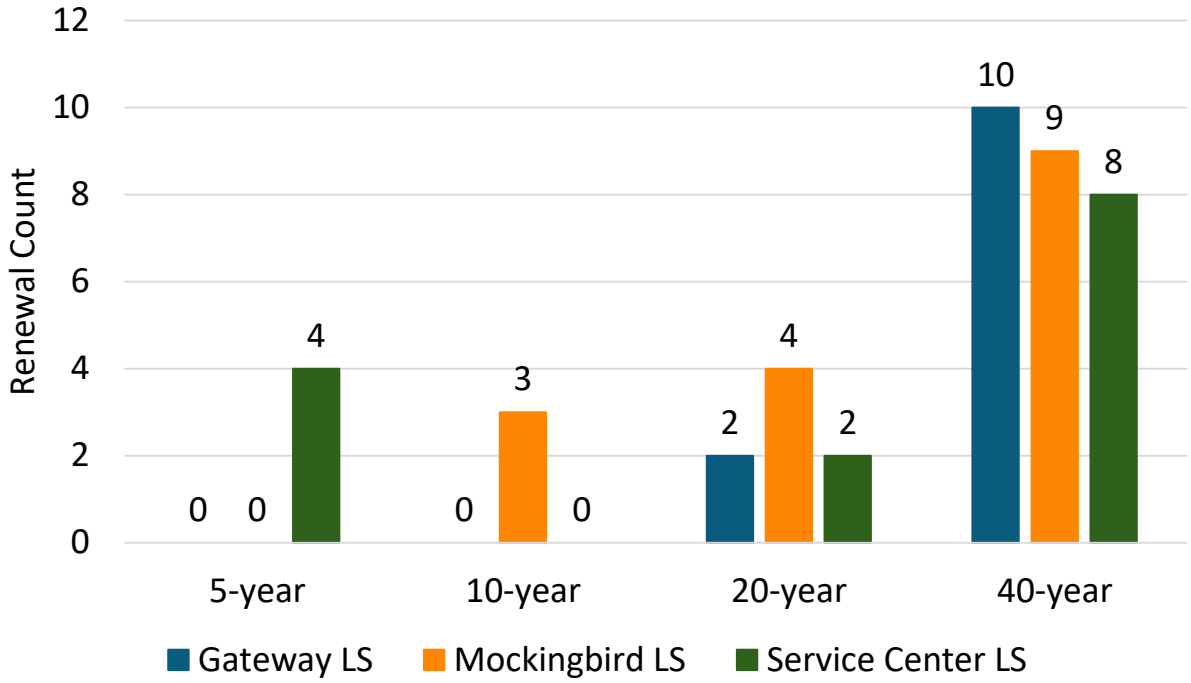


- **Clay – 70**
- **Ductile Iron – 70**
- **Concrete Pipe – 60**
- **PVC – 90**
- **High-Density Polyethylene – 90**

- **A wave of Clay and PVC pipes reaching end of life in the next 5-10 years**
- **Some of the Clay mains may have been misclassified as PVC**
- **Plan a SSES condition assessment program to address large future replacement needs**

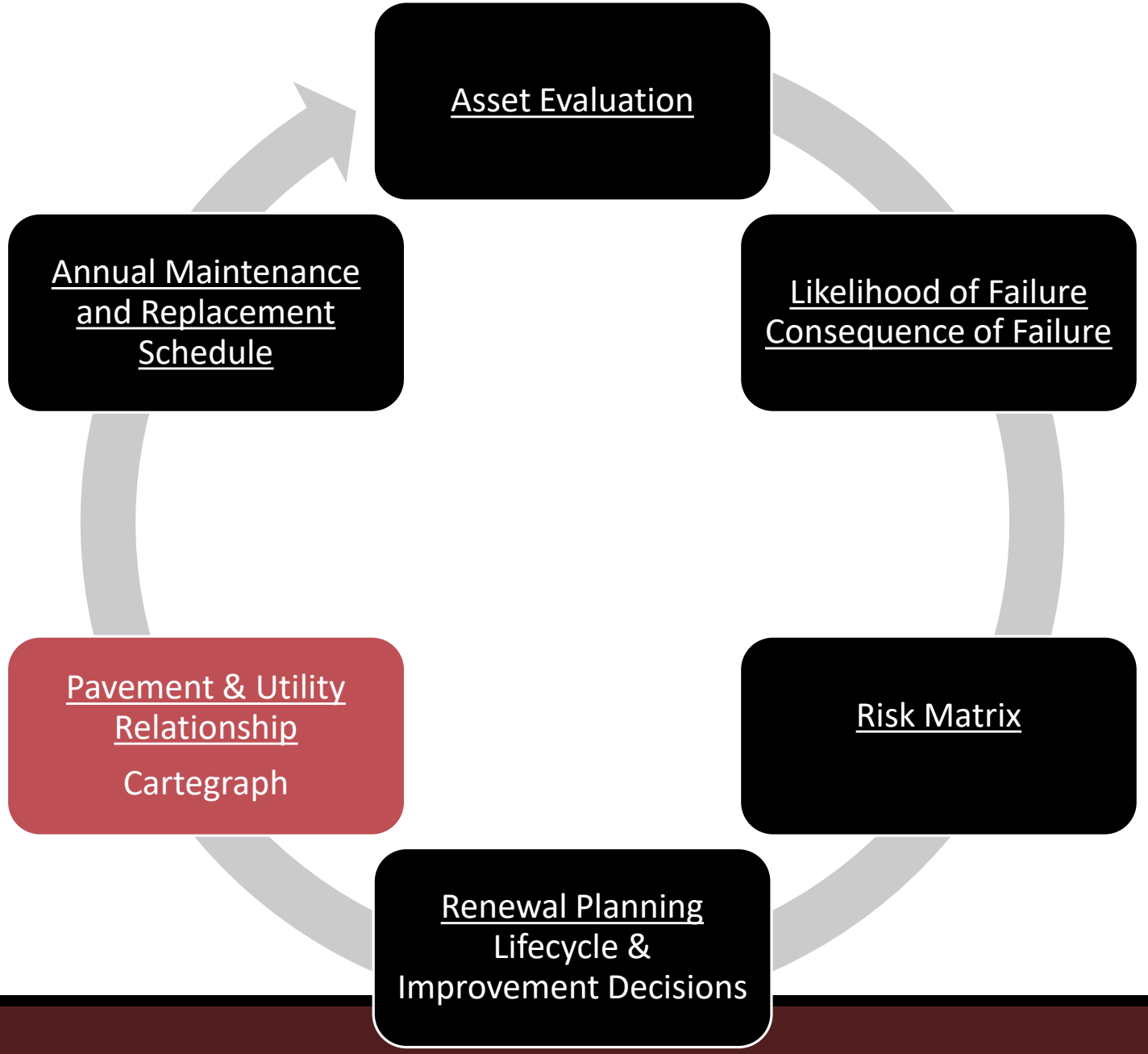
W Facilities BRE and Renewal Needs





- Hulen GST and Turkey Peak EST require paint recoating
- Pump station roof inspection and potential replacement
- MCC and Transfer Switch are at the end of useful life

- Assigned service life and estimated end of life for all equipment inside each facility
- The 2022 condition assessment program identified improvements needed to address the aging infrastructure issues


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BIG WORK BELOW. BIG IMPACT ABOVE.

BEFORE THE CUT



GOOD CONDITION

DAY OF CUT



DISRUPTION BEGINS

AFTER RESTORATION



VULNERABLE POINT

6 MONTHS LATER



CRACKING STARTS

18 MONTHS LATER



POOR CONDITION

THE CHALLENGE:

Renew aging W/WW infrastructure while minimizing community impact and preventing accelerated pavement degradation after cuts are made.

STAKEHOLDER CONCERNS:

- ❑ Traffic Delays
- ❑ Service Interruptions
- ❑ Business Access
- ❑ Economic Impact

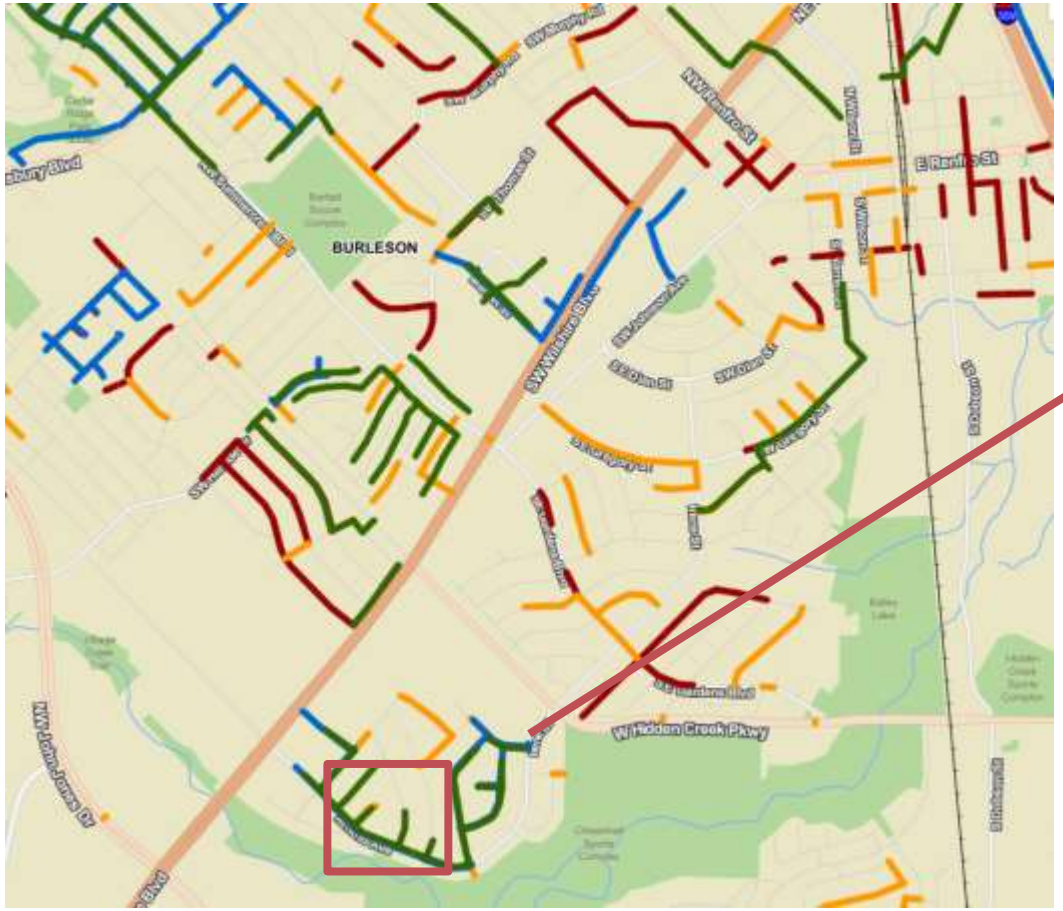
COMMUNITY IMPACTS:

- ❑ Higher Long-Term Maintenance Costs
- ❑ More Disruption for the Community
- ❑ Shorter Pavement Life
- ❑ Inefficient Investment

THE SOLUTION:

Coordinated efforts minimize disruptions and promote stronger, sustainable infrastructure.

ASSET RELATIONSHIP





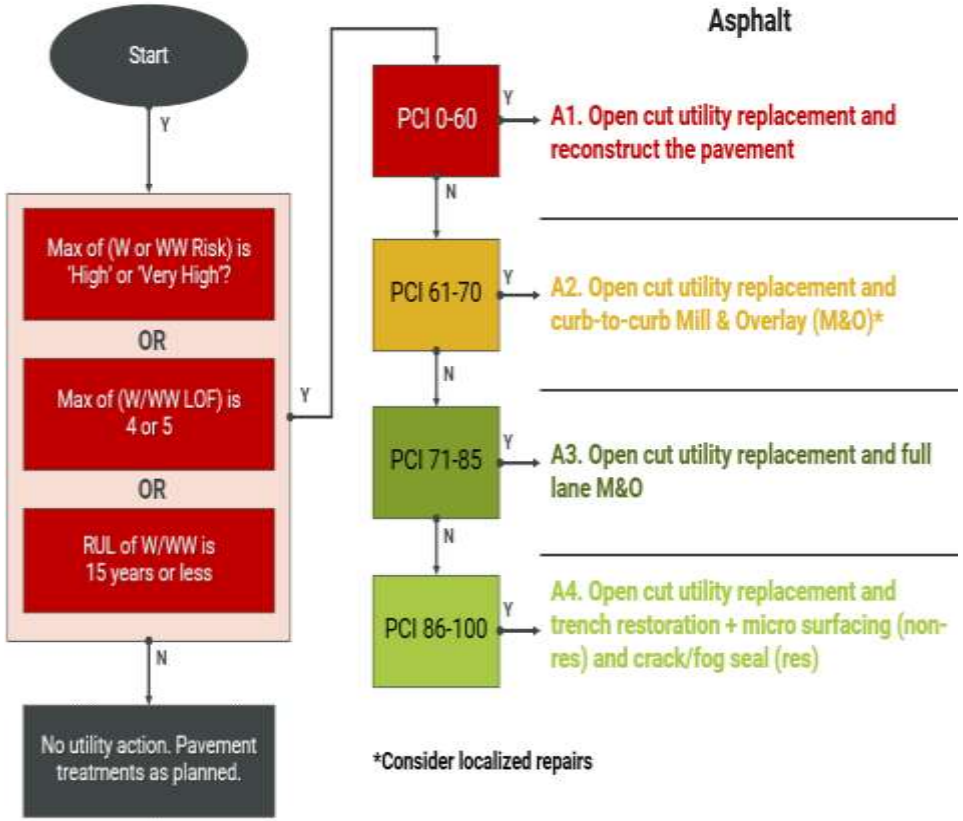
Streets Year 1

Streets Year 2

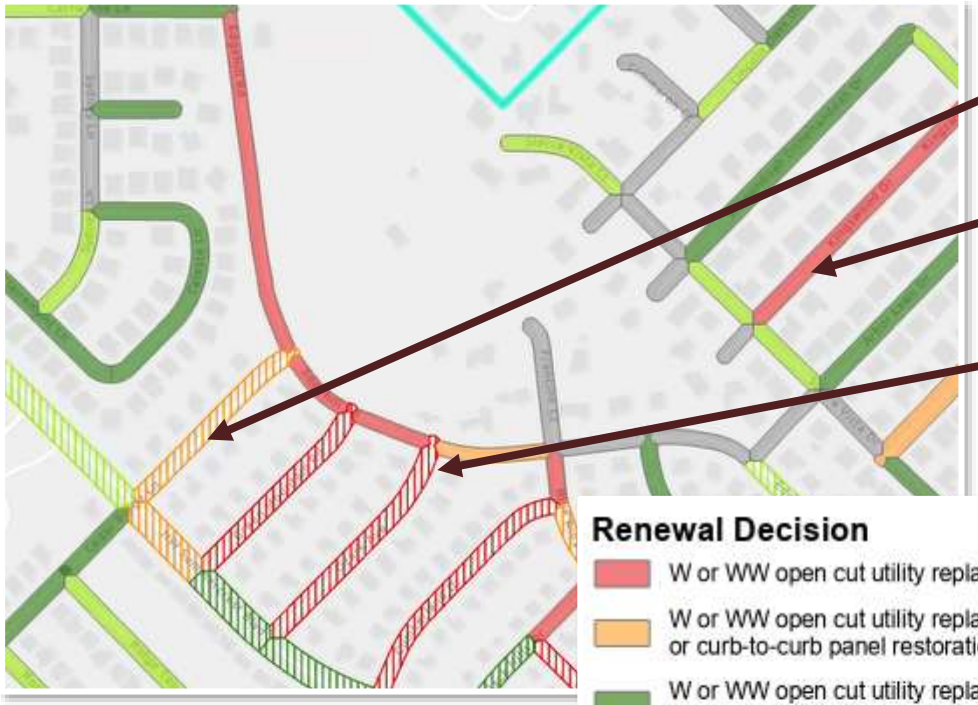
Water Year 1

Sewer Year 1

ASSET COORDINATION



Snapshot of the GIS-based Coordinated Right-of-Way Renewal Planning Tool



Examples:

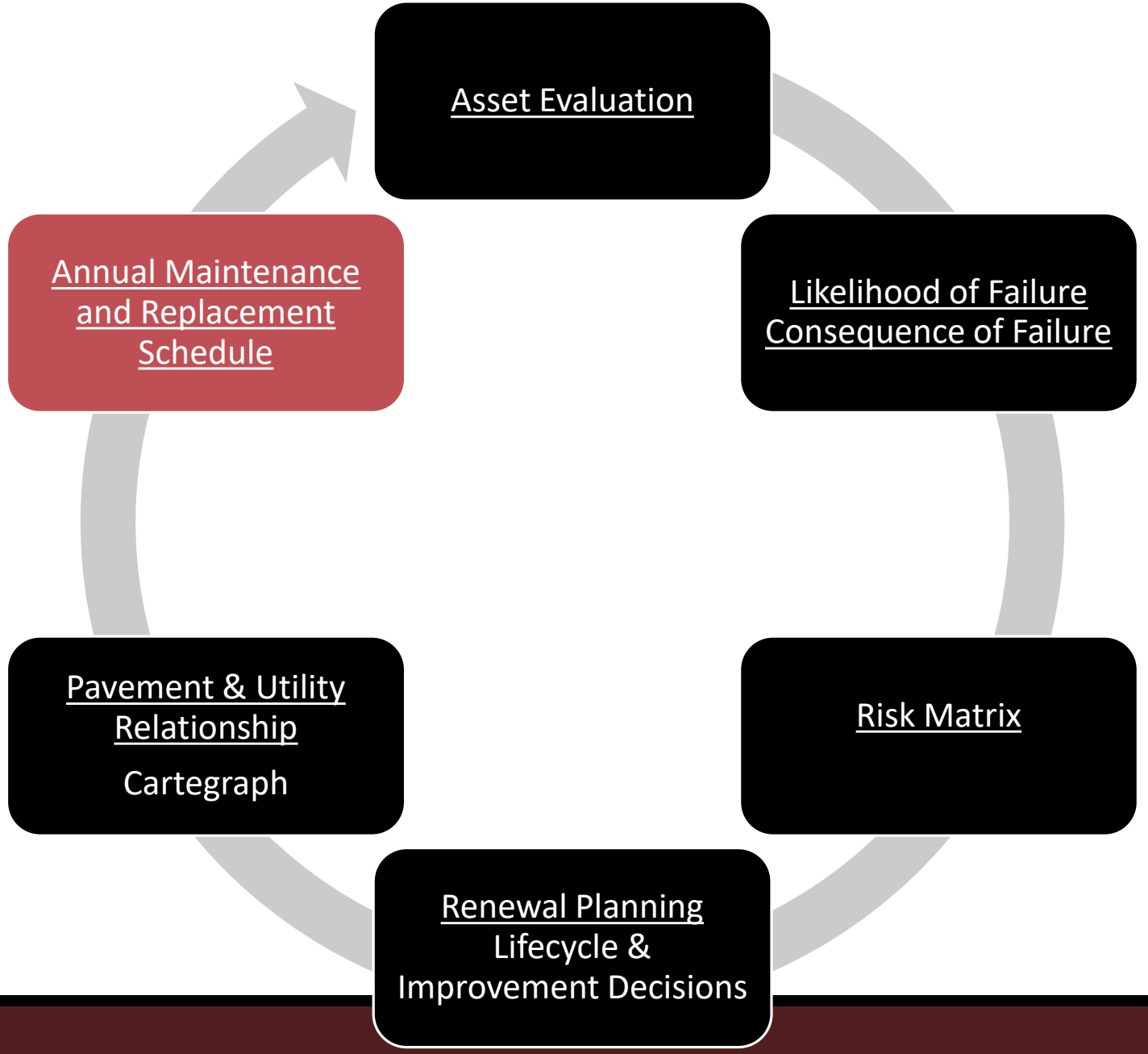
Both W/WW Open cut utility replacement and curb-to-curb Mill & Overlay

W or WW Open cut utility replacement and reconstruct the pavement

Both W/WW Open cut utility replacement and reconstruct the pavement

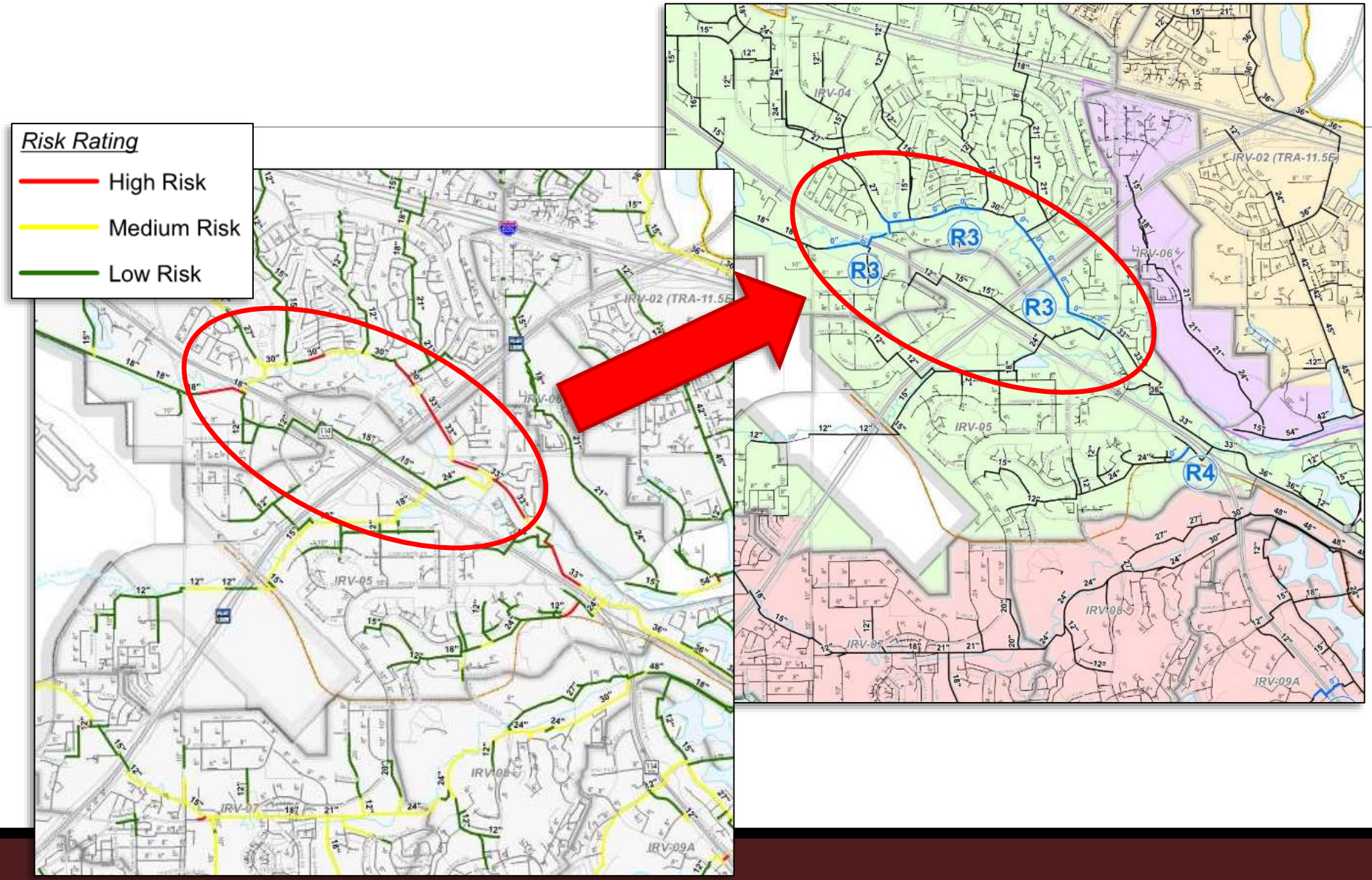
Renewal Decision

- W or WW open cut utility replacement and reconstruct the pavement
- W or WW open cut utility replacement and curb-to-curb Mill & Overlay (Asphalt) or curb-to-curb panel restoration (Concrete)
- W or WW open cut utility replacement and full lane Mill & Overlay (Asphalt) or and full lane (non-res) or trench restoration (res) (Concrete)
- W or WW open cut utility replacement and trench restoration + micro surfacing (non-res) and crack/fog seal (res) (Asphalt) or full lane (non-res) or trench restoration (res) (Concrete)
- Both W and WW open cut utility replacement and reconstruct the pavement or full lane (non-res) or trench restoration (res) (Concrete)
- Both W and WW open cut utility replacement and curb-to-curb Mill & Overlay
- Both W and WW open cut utility replacement and full lane Mill & Overlay (Asphalt) or and full lane (non-res) or trench restoration (res) (Concrete)
- Both W and WW open cut utility replacement and trench restoration + micro surfacing (non-res) and crack/fog seal (res) (Asphalt) or full lane (non-res) or trench restoration (res) (Concrete)
- No utility action. Pavement treatments as planned.


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LIFECYCLE EXAMPLE

THE CITY OF BURLESON TEXAS



PRIORITIZE CONDITION ASSESSMENT & RENEWAL IMPROVEMENTS BASED ON RISK

LIFECYCLE EXAMPLE

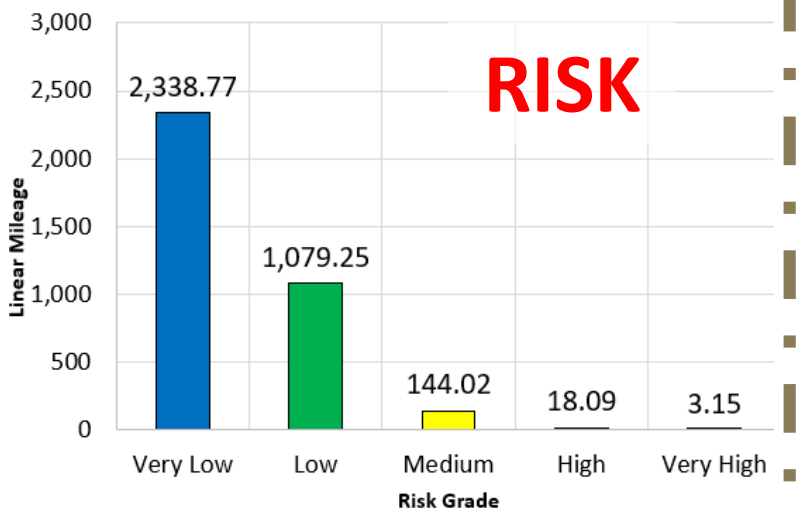
THE CITY OF BURLESON TEXAS

LOF

Weighting	Parameter	Criteria	Score
30%	Material	A.C.	10
		C.I. / Unknown	8
		D.I.	6
		H.D.P.E.	5
		Concrete	4
		Copper / Steel	3
		PVC	1
10%	Age	Older than 50 years	10
		41 – 50 years / Unknown	8
		31 – 40 years	6
		21 – 30 years	4
		0 – 20 years	2
50%	Pipe Work Order History (Last 5 years)	4 and Greater Repairs	10
		3 Repairs	8
		2 Repairs	5
		1 Repair	3
		No Repairs	1
10%	Modeled Pressure Difference	Greater than 20 PSI	10
		10 – 20 PSI	7
		5 – 10 PSI	4
		Less than 5 PSI	1

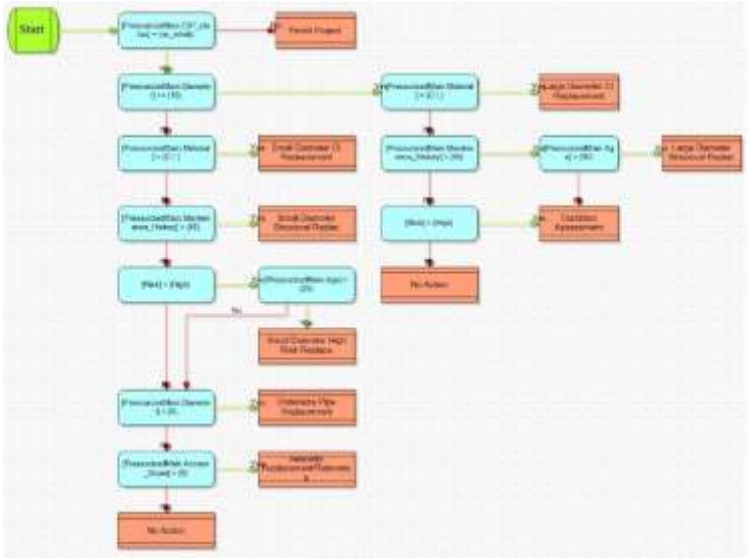
COF

Weighting	Parameter	Criteria	Points
15%	Access Issues	River / Stream / Railroad	10
		Alleyway	9
		Interstate / State Highway	7
		Major Collector / Arterial Road	4
		No Crossing	1
30%	Proximity to Critical Customers	More than 5 customers within ¼ mile	10
		More than 5 customers within ½ mile or 3 to 4 customers within ¼ miles	7
		More than 5 customers within 3/4 mile or 3 to 4 customers within 1/2 miles or 1 to 2 customers within ¼ miles	4
		Remaining Water Lines	1
30%	Customers Served	Greater than 24-inches	10
		20-inches – 24-inches	8
		14-inches – 18-inches	5
		8-inches – 12-inches	3
		Less than 8-inches	1
25%	Resiliency	Non-Redundant Pipe	7
		Redundant Pipe	3



Data Feed

IMPROVEMENT DECISION TREE



Maps

Tables



ENGINEERING & OPERATIONS JUDGEMENT

LESSONS LEARNED & MOVING FORWARD

- Asset Management can provide meaningful insights even with imperfect data.
- Lots of technology available but spend time to understand what decisions it does (and doesn't) drive.
- Fully utilize existing software systems to automate asset data management as much as possible.



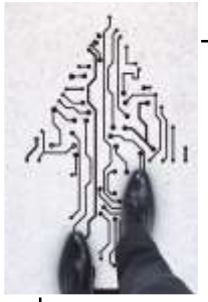
FY 2026

- Streets Timing
- W/WW Model Timing



FY 2027

- Streets Model (Fugro Update)
- W/WW Model with Capital



FY 2028

- Coordination Model
- Future Assets

THE CITY OF

BURLESON

TEXAS





A thriving southern gateway to the Dallas-Fort Worth metroplex – where small-town warmth meets big-city opportunity.

AT A GLANCE

A Community on the Rise

♪♪A Perpetual Harmony of Infrastructure Asset Management

Bottom-Up Approach to Achieving Citywide Asset Management and Coordinated Infrastructure Renewal Planning



Janalea Hembree



Steven Rhodes



Tanu Kulkarni

LIVE · WORK · PLAY IN BURLESON

Sharing the BURLESON Story

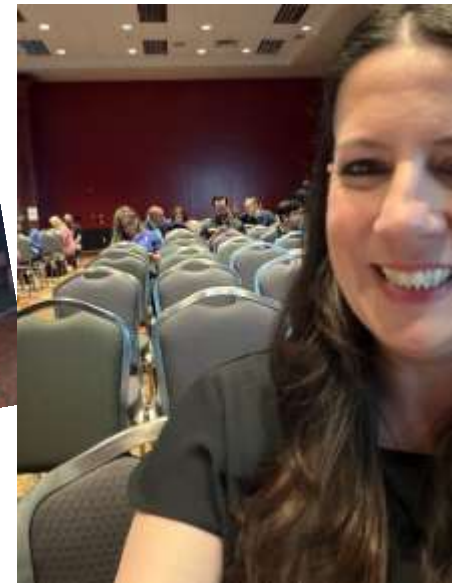
December 2025

ORCHESTRATING CITYWIDE ASSET MANAGEMENT: A PERPETUAL HARMONY OF COORDINATED INFRASTRUCTURE RENEWAL



April 2026





- **Largest regional water and wastewater conference in the United States with ~9,000 Attendees**
- **Presented a 30-minute Presentation in an Educational Session**

June 2025

SWAN
SMART WATER NETWORKS FORUM

- SWAN is the leading, global voice for the smart water.
- International Conference with over 400 attendees from 200 unique organizations from 22 countries
- Hosted a full-day interactive workshop roundtable on Bridging the Digital Divide.







August 2026

North Central Texas Council of Governments

Annual Public Works Roundup



- Attended by hundreds of Public Works and Engineering Professionals
- Keynote Speaker in Morning Welcome Session

September 2026

AWWA WATER INFRASTRUCTURE CONFERENCE & EXPOSITION



January 2027

UIC underground infrastructure conference

CONSTRUCTION. REHABILITATION. ASSET MANAGEMENT.

Underground Infrastructure Conference

Questions / Comments

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