Water & Wastewater Master Plan

Fulshear City Council

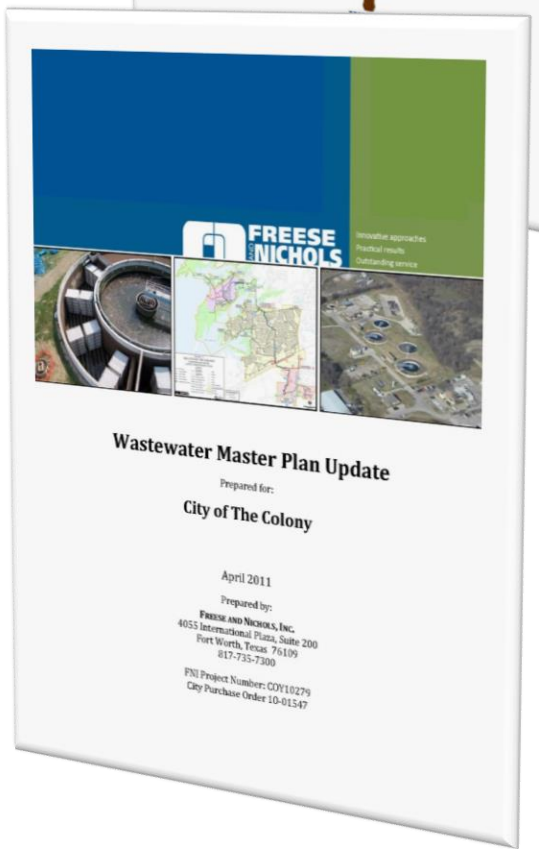
March 27, 2017

Agenda

- Introductions/Overview
- Population Projections
- Water System Overview
  - Water Demands
  - Water System Design Criteria
- Wastewater Overview
  - Wastewater Flows
  - WWTP Siting
  - Wastewater System Design Criteria
- Water and Wastewater Capital Improvement Plans
- Next Steps

Overview of City of Fulshear's Water & Wastewater Master Plan

- Water demand / Wastewater flow projections
- Identification of existing and future system deficiencies
- Prioritized, phased CIP with cost estimates and business case for recommended projects
- Very clear, easy to read CIP maps that show location and phasing of projects
- Comprehensive Master Plan Report
- Model tool for dealing with future development



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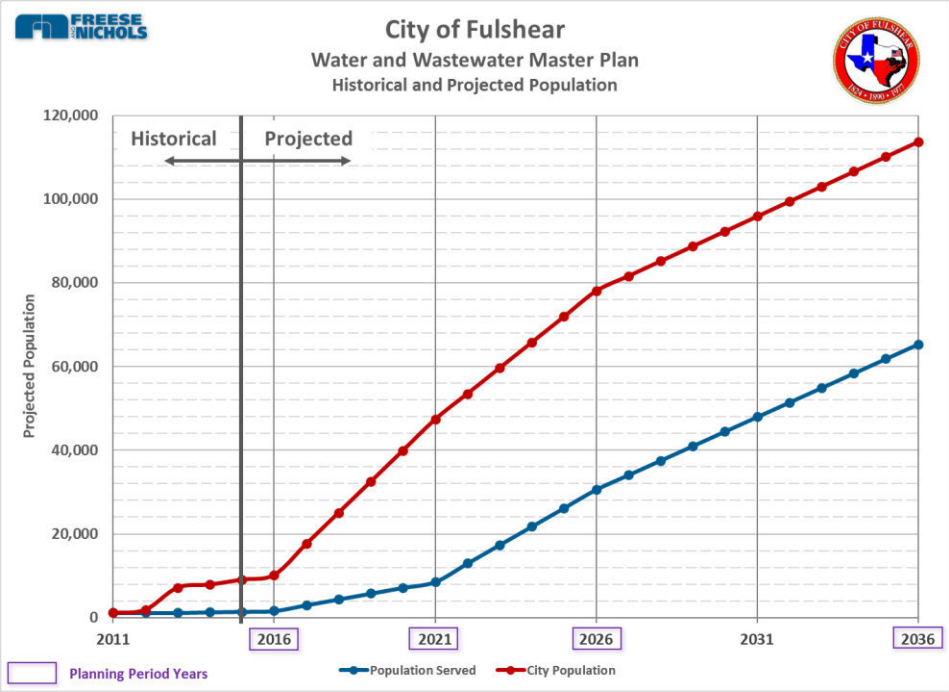
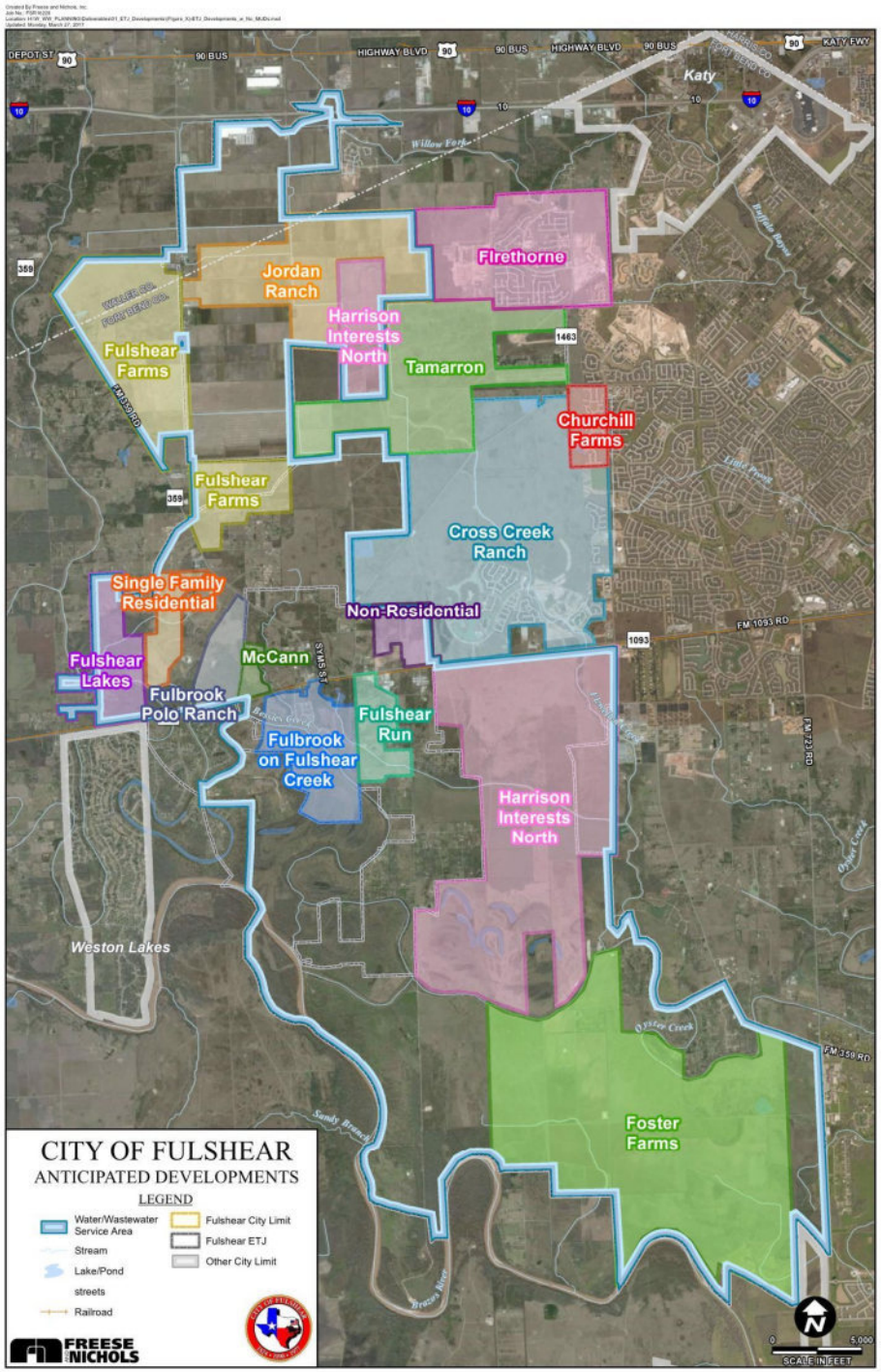
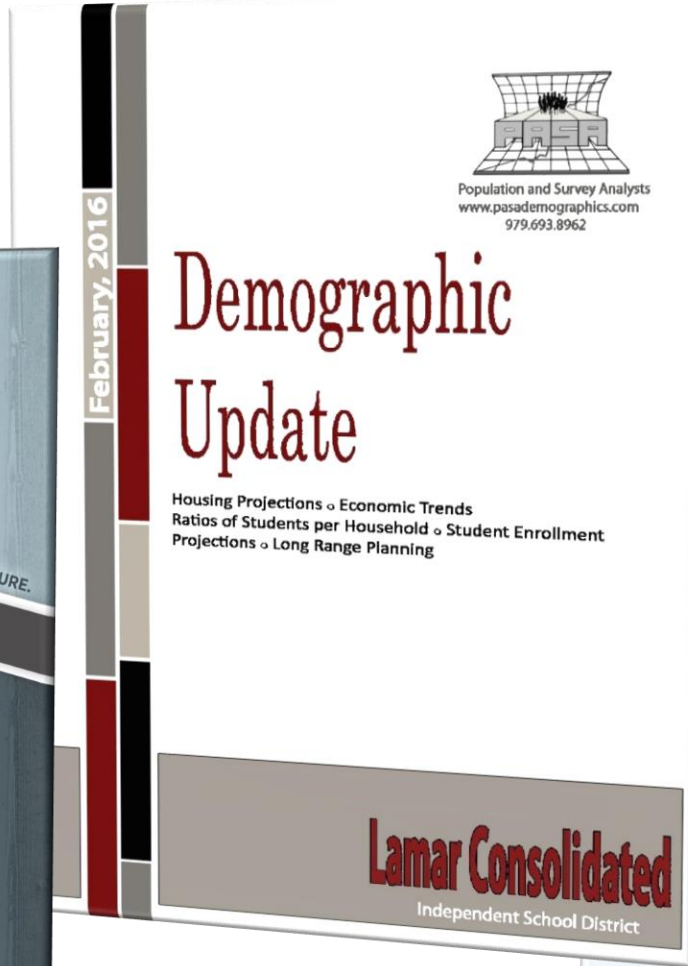
Population Projections

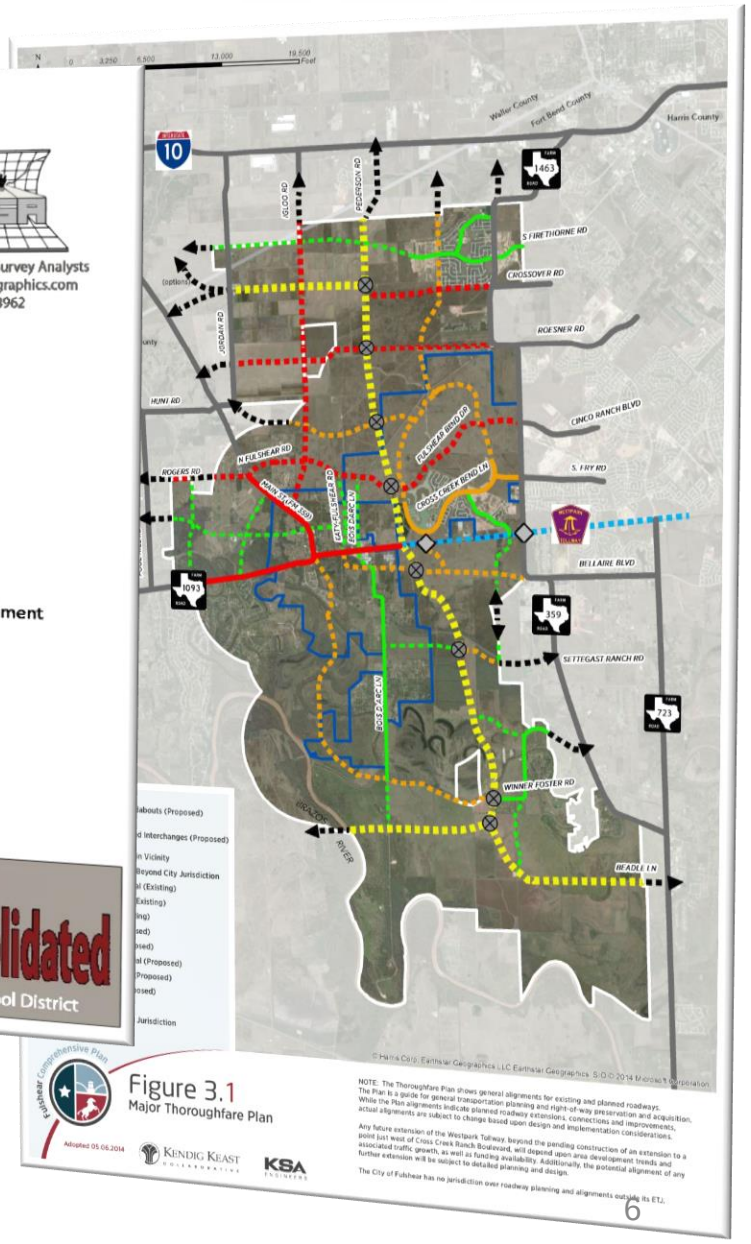
Year	City Population	Service Area Population	
		Water	Wastewater
2017	8,620	1,635	1,635
2021	47,408	6,817	8,568
2026	78,085	25,334	30,629
2036	113,739	50,361	65,368



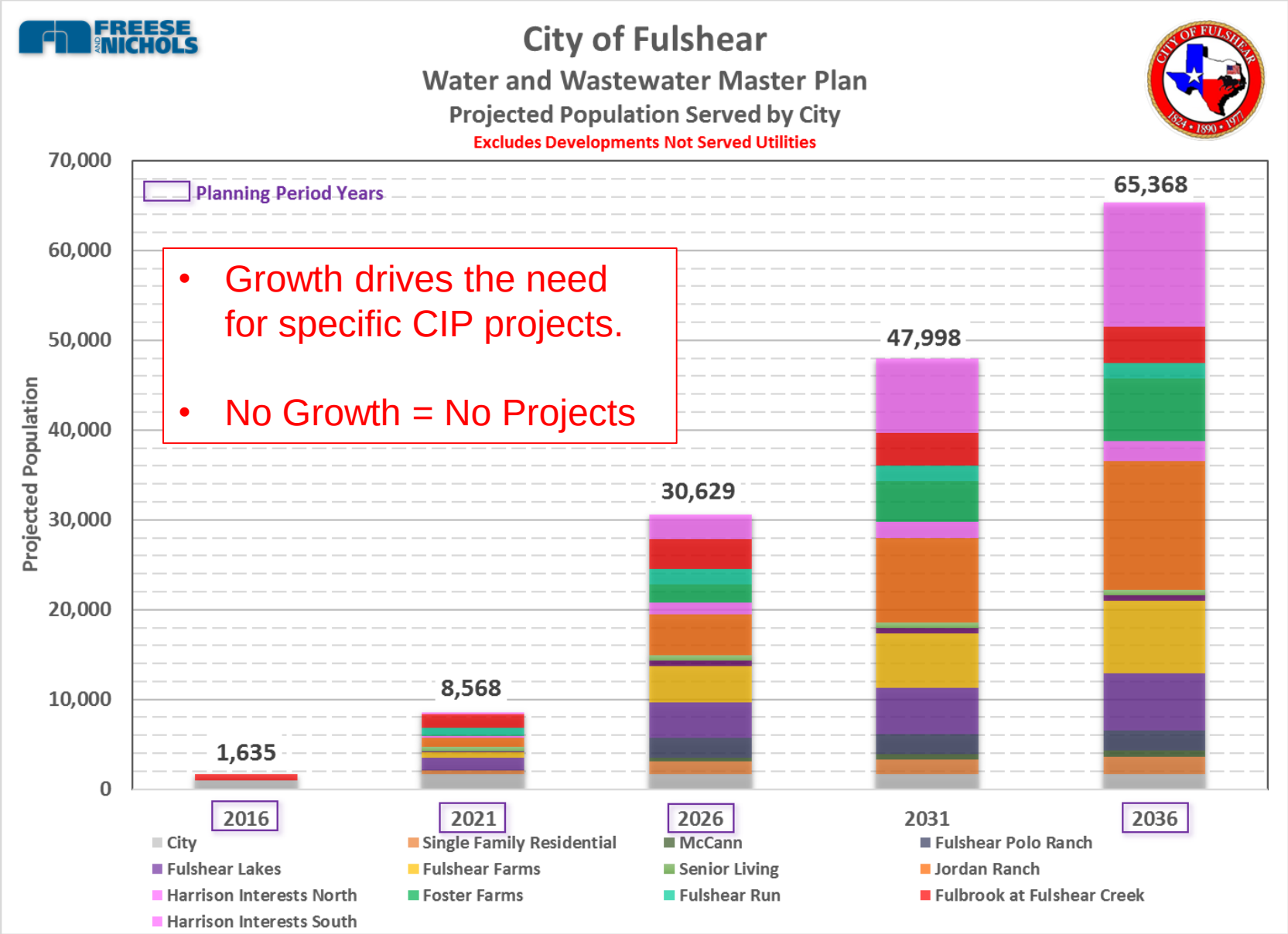


Population Data Sources





Service Area Population Projections



- Growth drives the need for specific CIP projects.
- No Growth = No Projects

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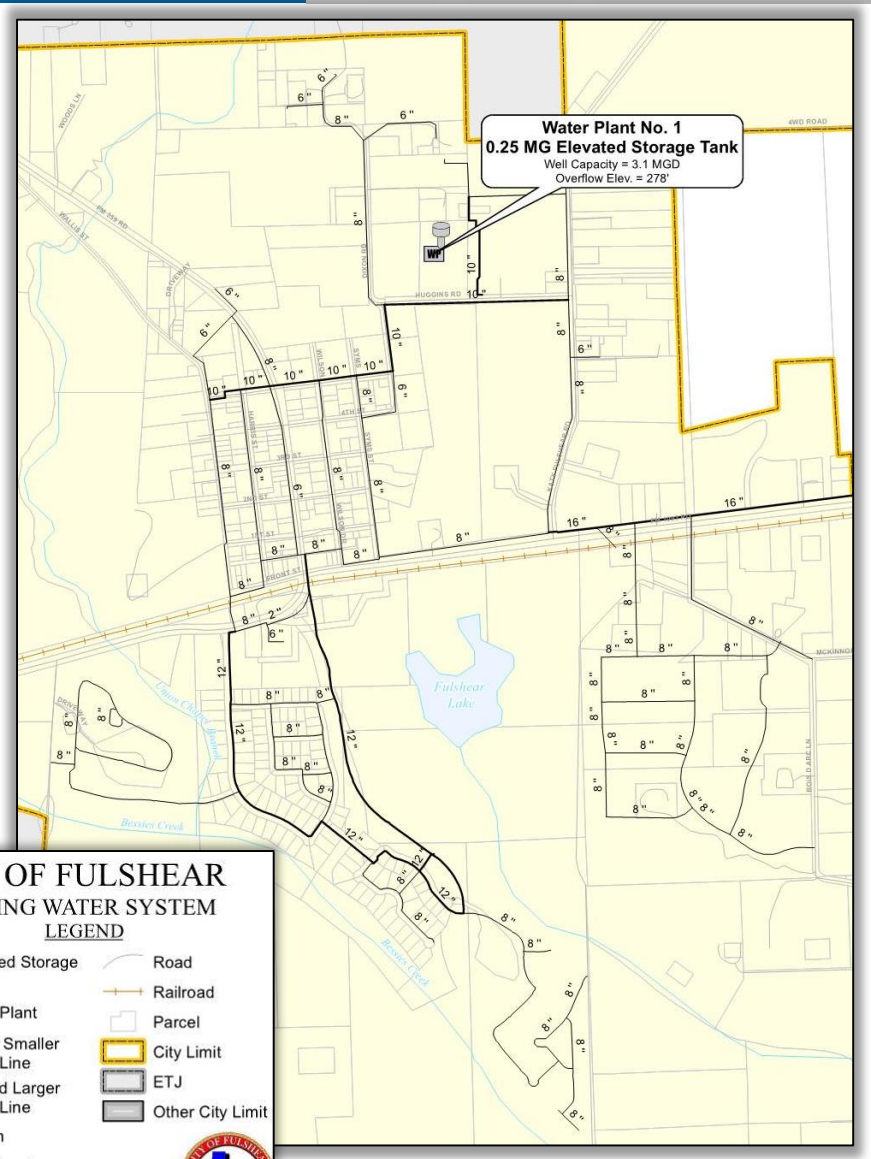
Existing Water System

City of Fulshear Water Plant #1

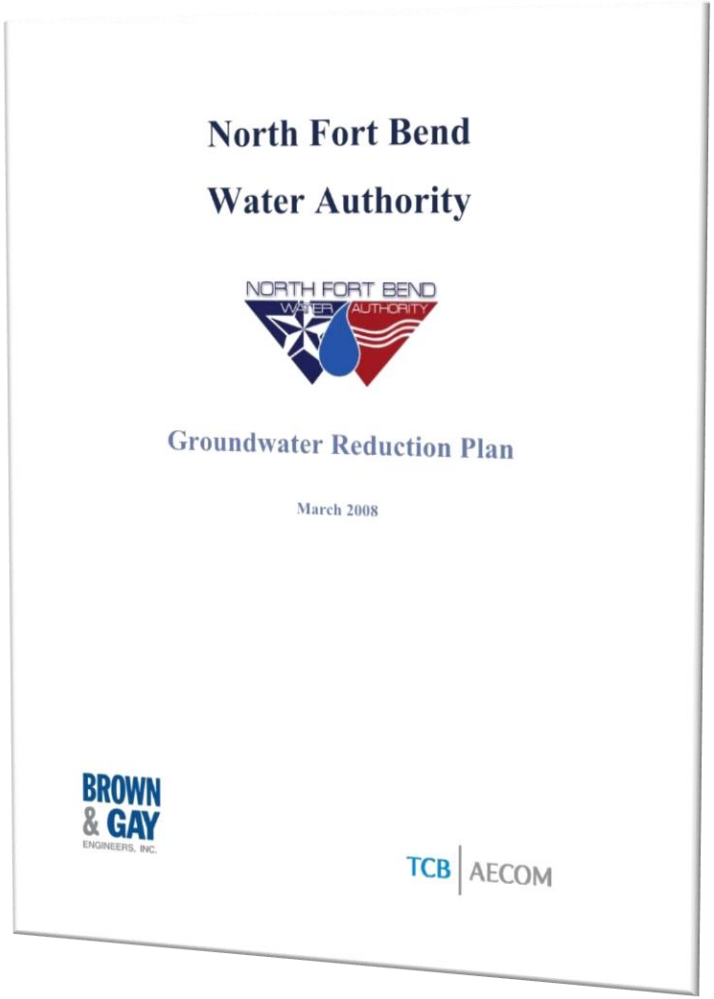
- 0.25 MG Elevated Storage Tank
- 0.085 MG Standpipe
- 0.15 MG Ground Storage Tank
- 2,150 gpm Well Capacity
- 680 gpm Booster Pumping Capacity



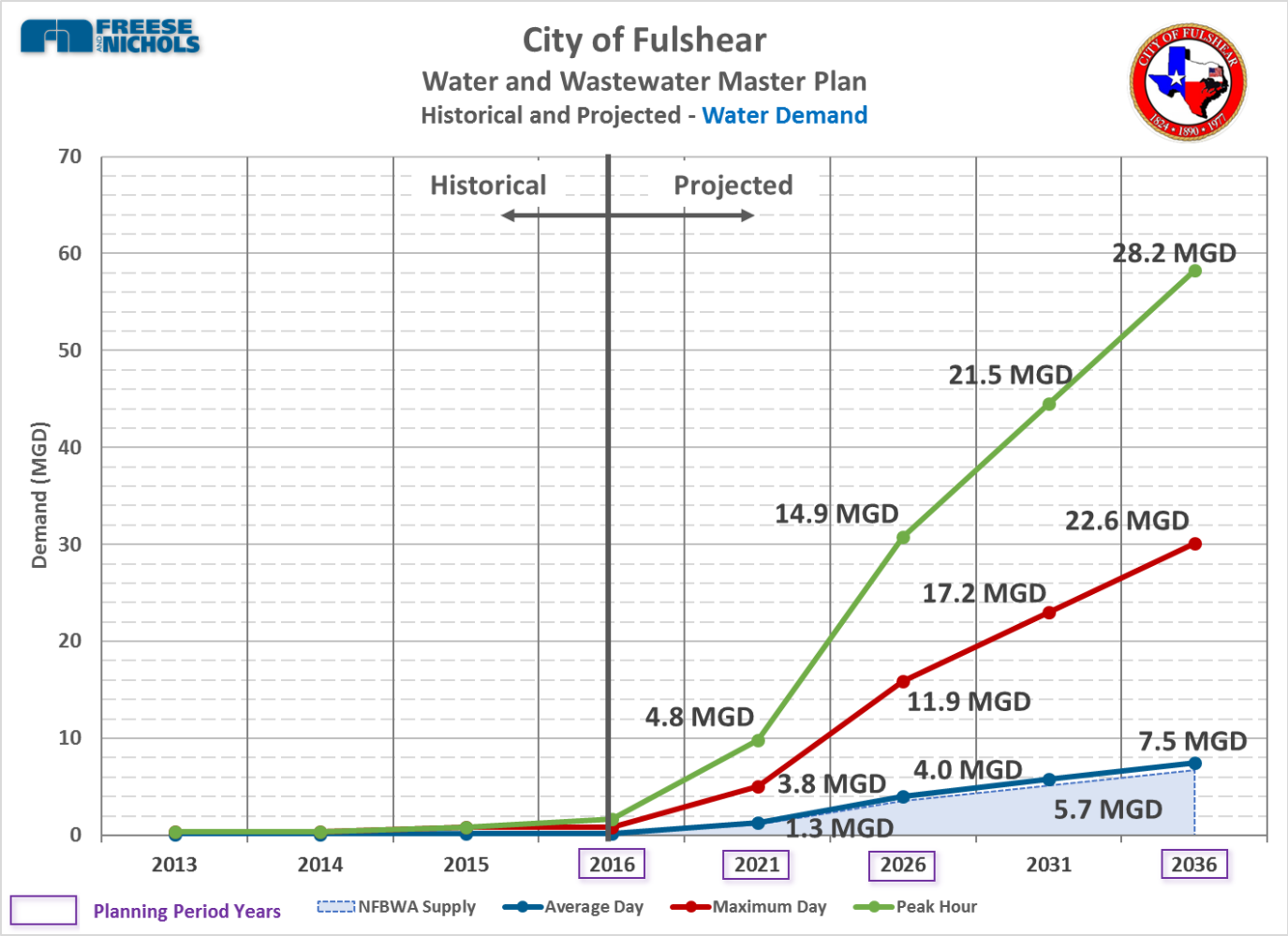
Future Water Supply Sources

Coordination with North Fort Bend Water Authority

- NFBWA plans to provide 90% of the average annual day water demand
- Plans to provide surface water to Fulshear in 2023/2024
- Requires minimum additional groundwater well production capacity of 0.25 gpm/connection
- Requires chloramine disinfection at all connected water plants
- Surface Water Rate = $3.40/1,000 gal
- Groundwater Rate = $3.05/1,000 gal



Projected Water Demands



Except where development agreements require more.

Design Criteria

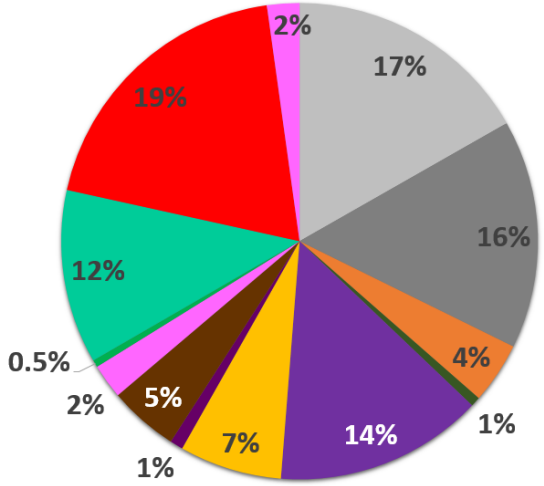
Average Day Demand = 130 gallons/Capita/Day

Maximum Day to Average Day Peaking Factor = 3.0

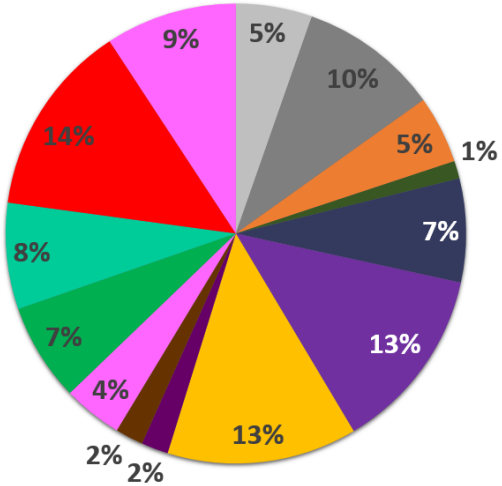
Peak Hour to Maximum Day Peaking Factor = 1.25

Projected Maximum Day Demands

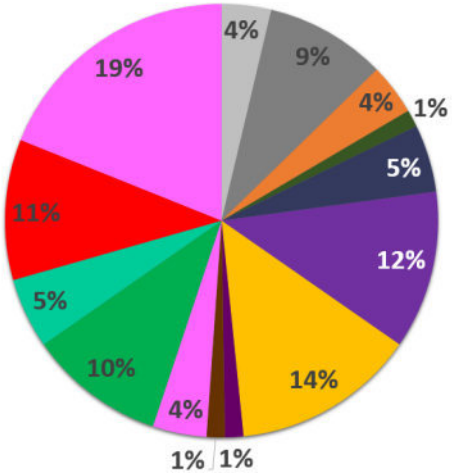
2021 Maximum Day Water Demand = 3.8 MGD



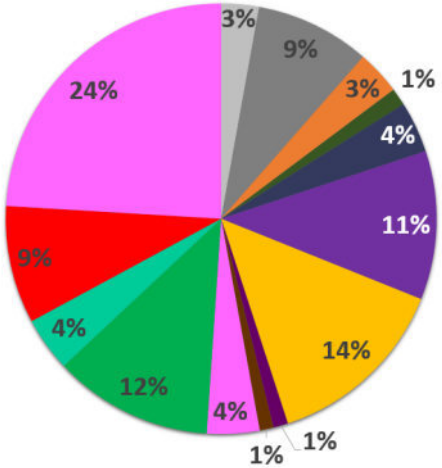
2026 Maximum Day Water Demand = 11.9 MGD



2031 Maximum Day Water Demand = 17.2 MGD

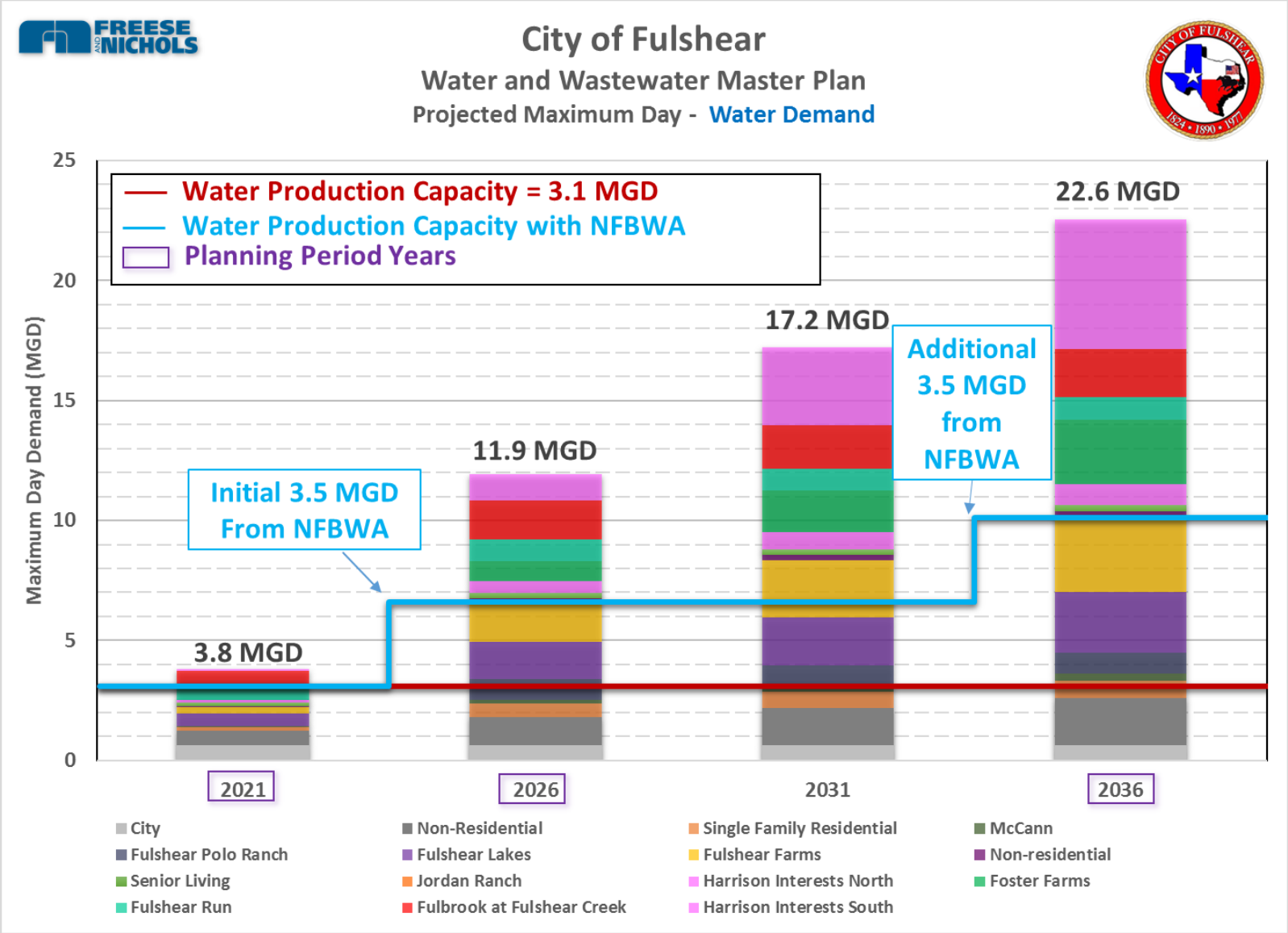


2036 Maximum Day Water Demand = 22.6 MGD



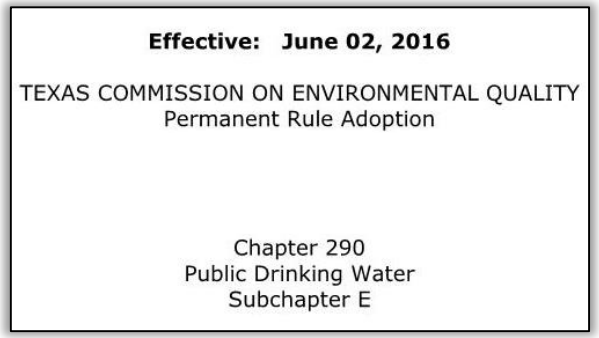
City | Non-Residential | Single Family Residential | McCann | Fulshear Polo Ranch
Fulshear Lakes | Fulshear Farms | Non-residential | Senior Living | Harrison Interests North
Foster Farms | Fulshear Run | Fulbrook at Fulshear Creek | Harrison Interests South

Projected Maximum Day Demands



Water System Design Criteria

- Texas Commission on Environmental Quality
  - Chapter 290 of Texas Local Government Code
- Minimum System Pressure > 35 psi under normal conditions
- Water Supply
  - TCEQ minimum = 0.60 gpm/connection
  - City of Fulshear maximum day demand = 0.9 gpm/connection
- Elevated Storage > 100 gallons/connection
- Booster pump capacity must supply sufficient pressure during peak hour demand
- Fire Flows
  - Minimum residual pressure of 20 psi
  - Range of fire flow = 1,000 to 5,000 gallons per minute depending on land use type


Effective: June 02, 2016

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Permanent Rule Adoption

Chapter 290
Public Drinking Water
Subchapter E

Summary of Water System CIP Recommendations

5-year Projects

- Water Plant No. 2 (no NFBWA supply)
- One 1 MG elevated storage tank
- 10 miles of water lines

10-year Projects

- Water Plant No. 3 (with 1.75 MGD NFBWA)
- Add 1.75 MGD NFBWA to Water Plant No. 2
- One 1 MG elevated storage tank
- 14 miles of water lines

20-year Projects

- Water Plant No. 4 and 5 (with 1.75 MGD NFBWA at each plant)
- One 1.5 MG elevated storage tank
- 9 miles of water lines

Each water plant consists of a 4 MGD well, 3 MG ground storage tank and 5.75 MGD pump station.

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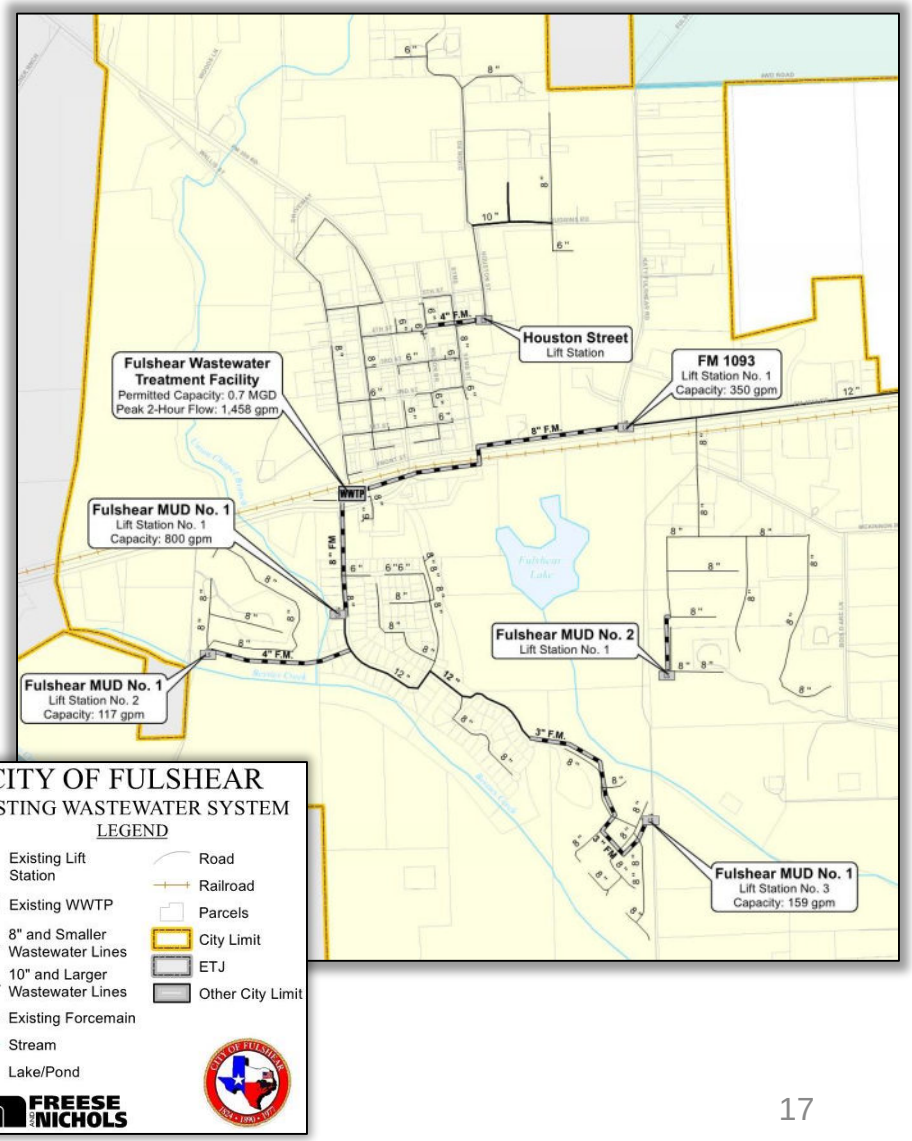
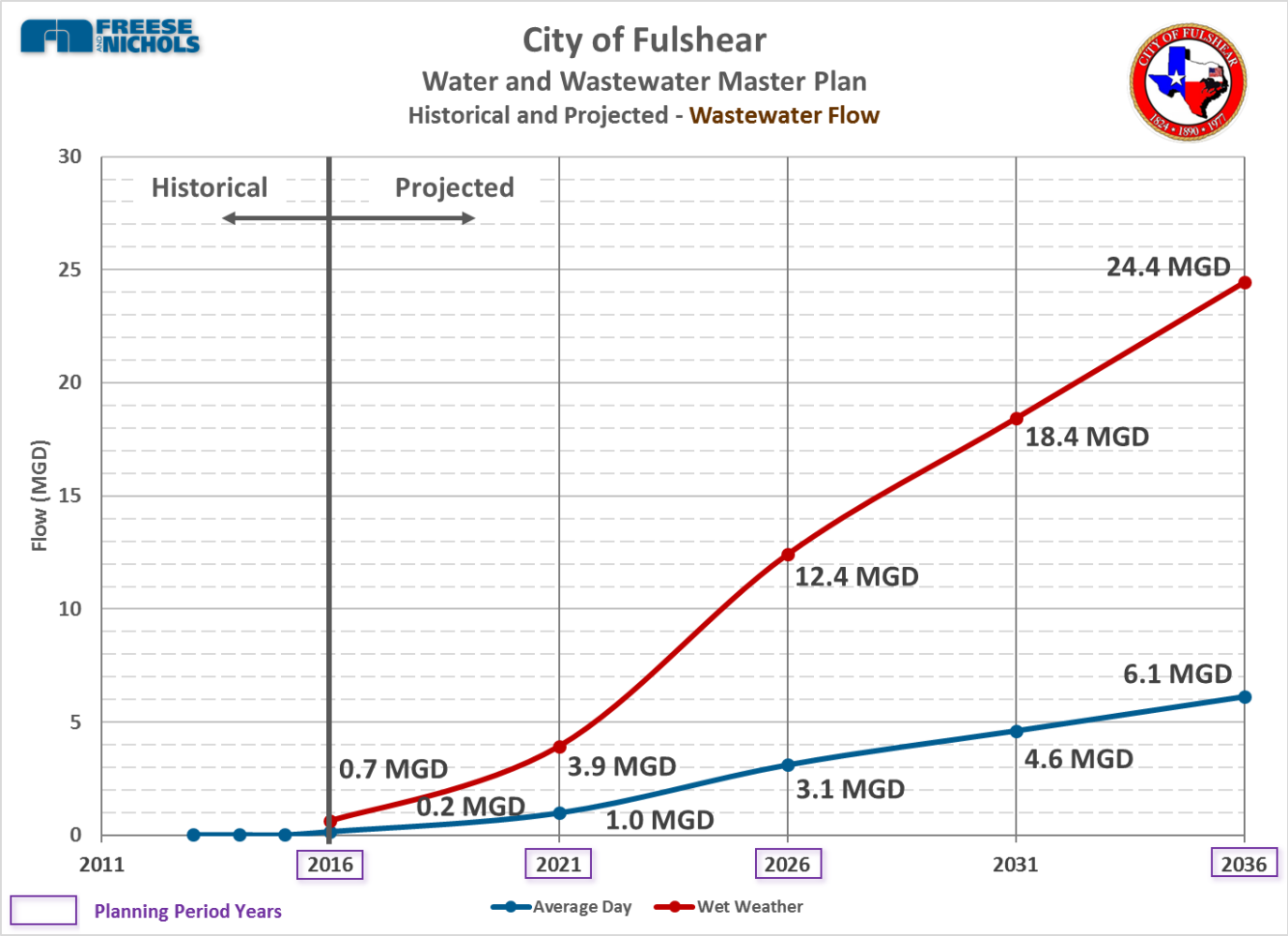
Existing Wastewater System

City of Fulshear WWTP

- **Permitted Capacity:**
  - Interim I: 0.10 MGD Average / 278 gpm Peak
  - Interim II: 0.50 MGD Average / 1,042 gpm Peak
  - Interim III: 0.70 MGD Average / 1,458 gpm Peak
- **New WWTP Site Needed**



Projected Wastewater Flows



Except where development agreements require more.

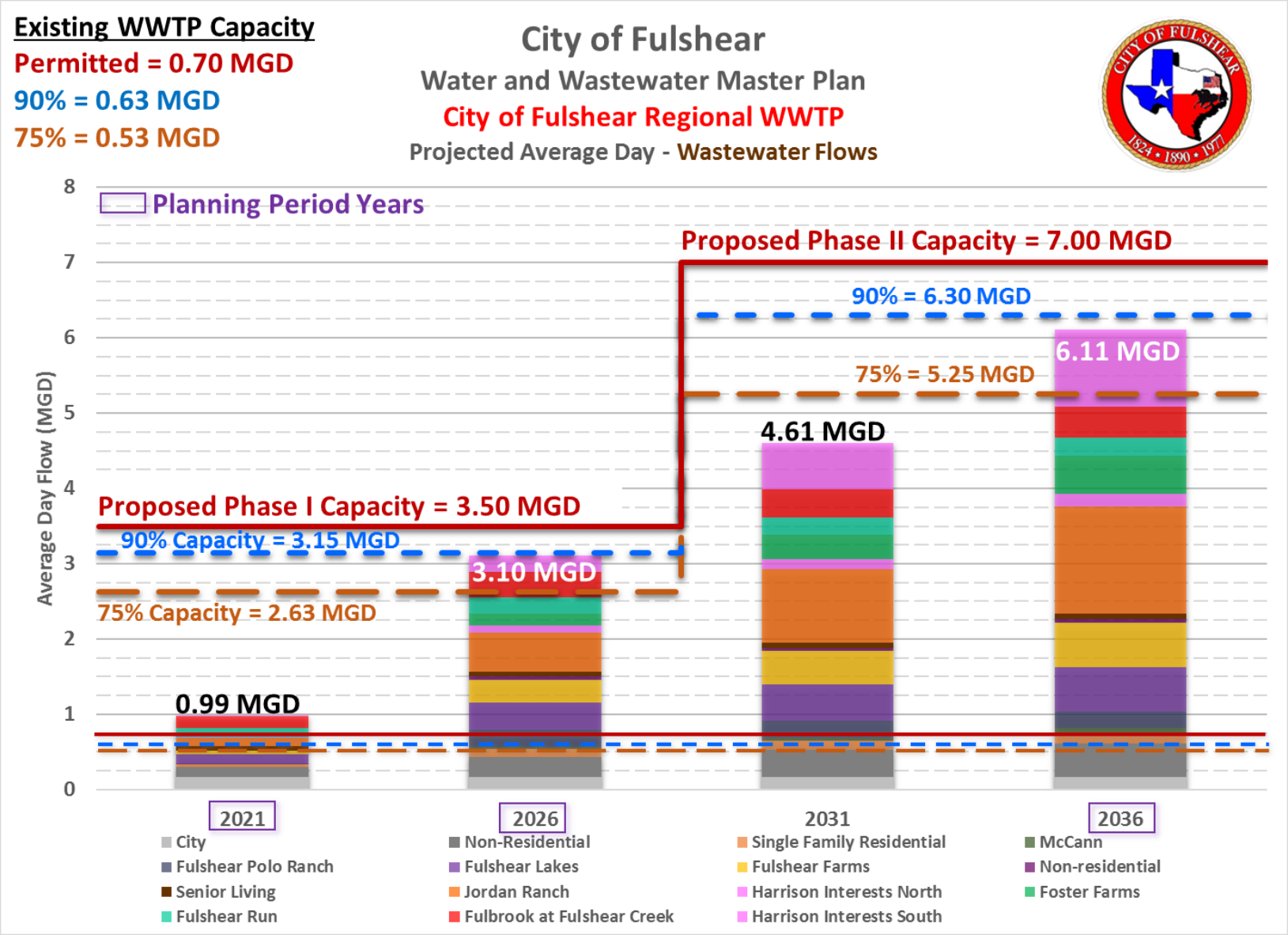
Design Criteria

Residential Average Flow = 100 gallons/Capita/Day

Commercial Average Flow = 420 gallons/Acre/Day

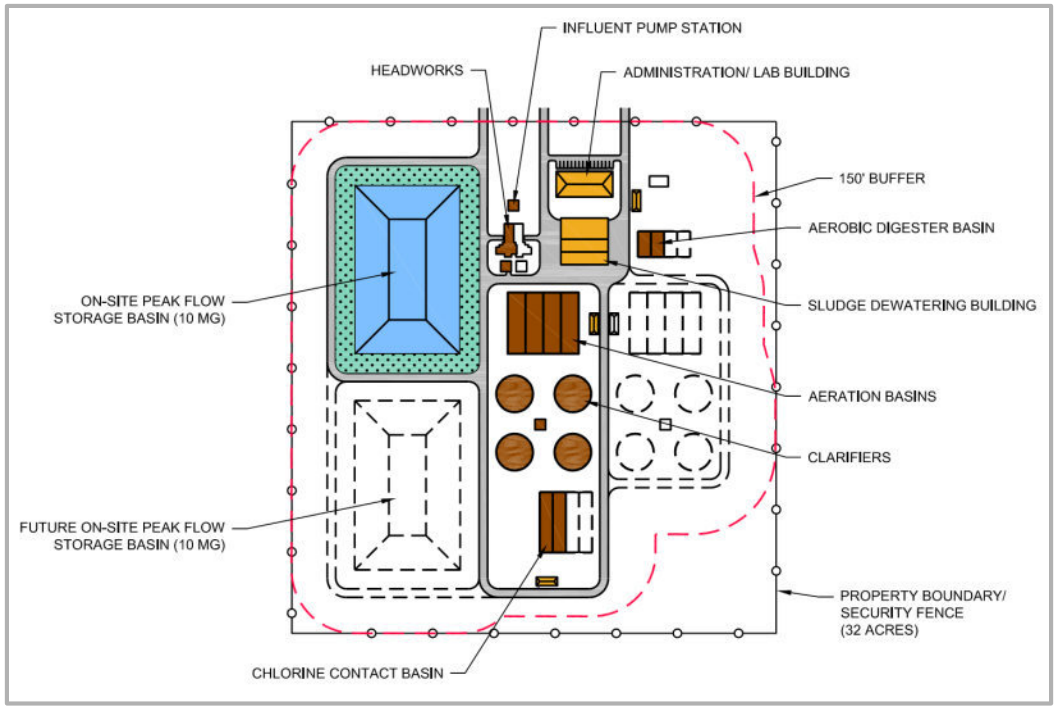
Wet Weather Peaking Factor = 4.0

Projected Wastewater Flows



WWTP Siting Evaluation

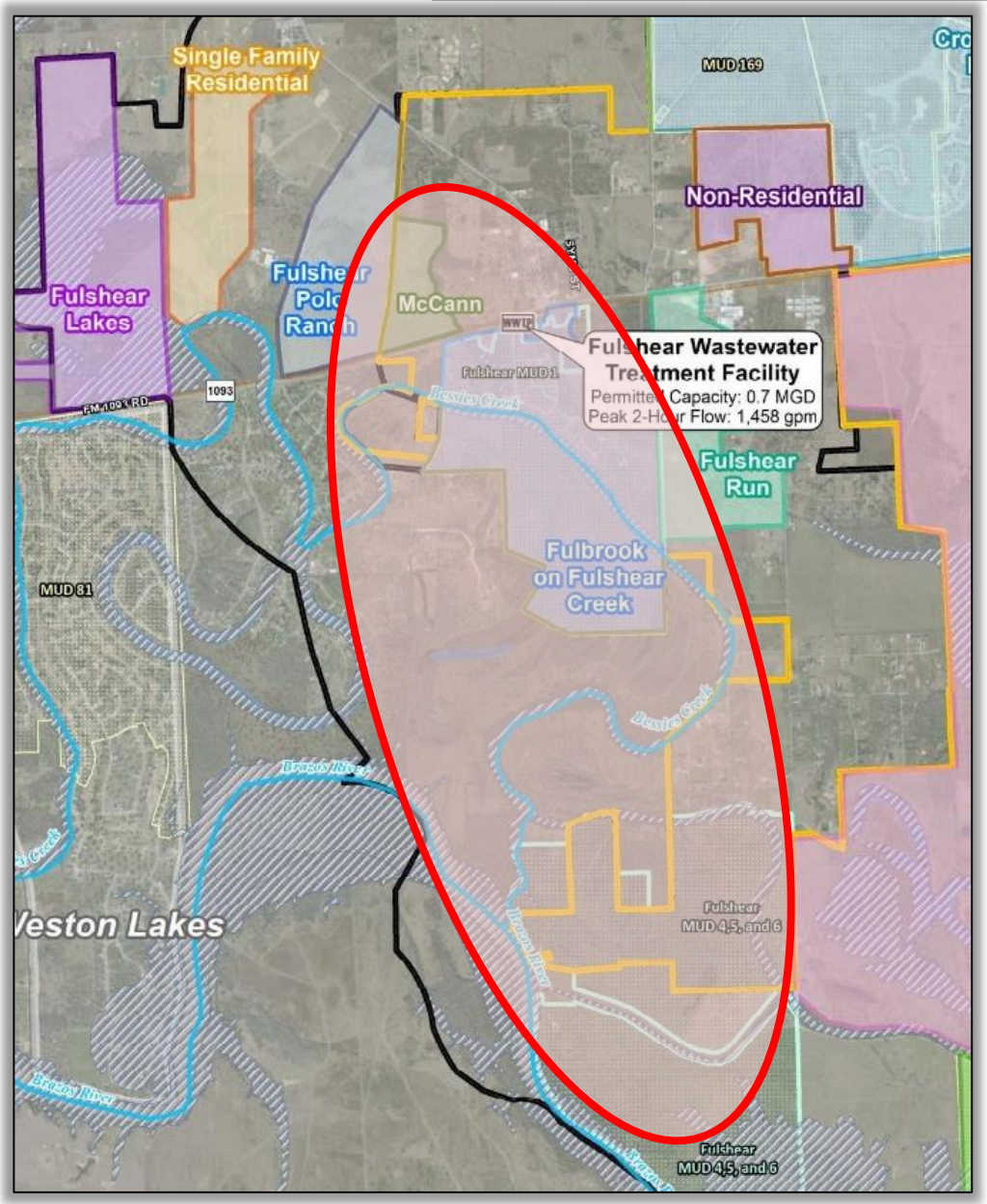
- FNI recommends the City purchase a WWTP footprint area for 7 MGD capacity
  - Phase 1: 3.5 MGD ; Phase 2: 7 MGD
  - Assumed conventional activated sludge treatment process
- Approximate 30 acre WWTP footprint area
  - Unit process sizing based on current TCEQ design criteria
  - Includes 150' buffer zone required for treatment plant
  - Includes two on-site peak flow storage basins



WWTP Siting Evaluation

Factors Considered

- 30 Contiguous Acres
- Proximity to GCWA Raw Water Intake – Potential for Higher Discharge Limits
- Floodplain, Potential Wetlands
- Access – Power and Vehicle
- Proximity to Bessie's Creek or Brazos River
- Approximate Land Value
- Surrounding Existing Land Use
- Soil Conditions
- Approximate Site Clearing
- Existing City Limit



Wastewater System Design Criteria

- Texas Commission on Environmental Quality
  - Chapter 217 of Texas Local Government Code
- Chapter 217 says:
  - §217.53 (j) (3) that "An owner must ensure that the collection system has capacity to prevent a surcharge."
  - §217.61 (c) that "the firm pumping capacity of a lift station must handle the peak flow."
- The peak flow includes the domestic wastewater contribution plus the wet weather infiltration and inflow (I/I)
- Surcharging occurs when a gravity pipe is full of wastewater and could cause an overflow
- An Overflow is an unauthorized discharge of untreated wastewater from the wastewater system

Effective: December 4, 2015

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
Permanent Rule Change

Rule Project No. 2012-040-217-OW
Amendment to Chapter 217: Design Criteria

Chapter 217
Design Criteria for Domestic Wastewater Systems
Subchapters A, B, C, D, E, F, G, H, J, K, L, M

TCEQ

Summary of Wastewater System CIP Recommendations

5-year Projects

- Construct 3.5 MGD Regional WWTP
- Construct new Fulshear Lakes lift station
- 10 miles of regional wastewater lines

10-year Projects

- 4 miles of regional wastewater lines

20-year Projects

- Expand Regional WWTP to 7 MGD
- 3 miles of regional wastewater lines

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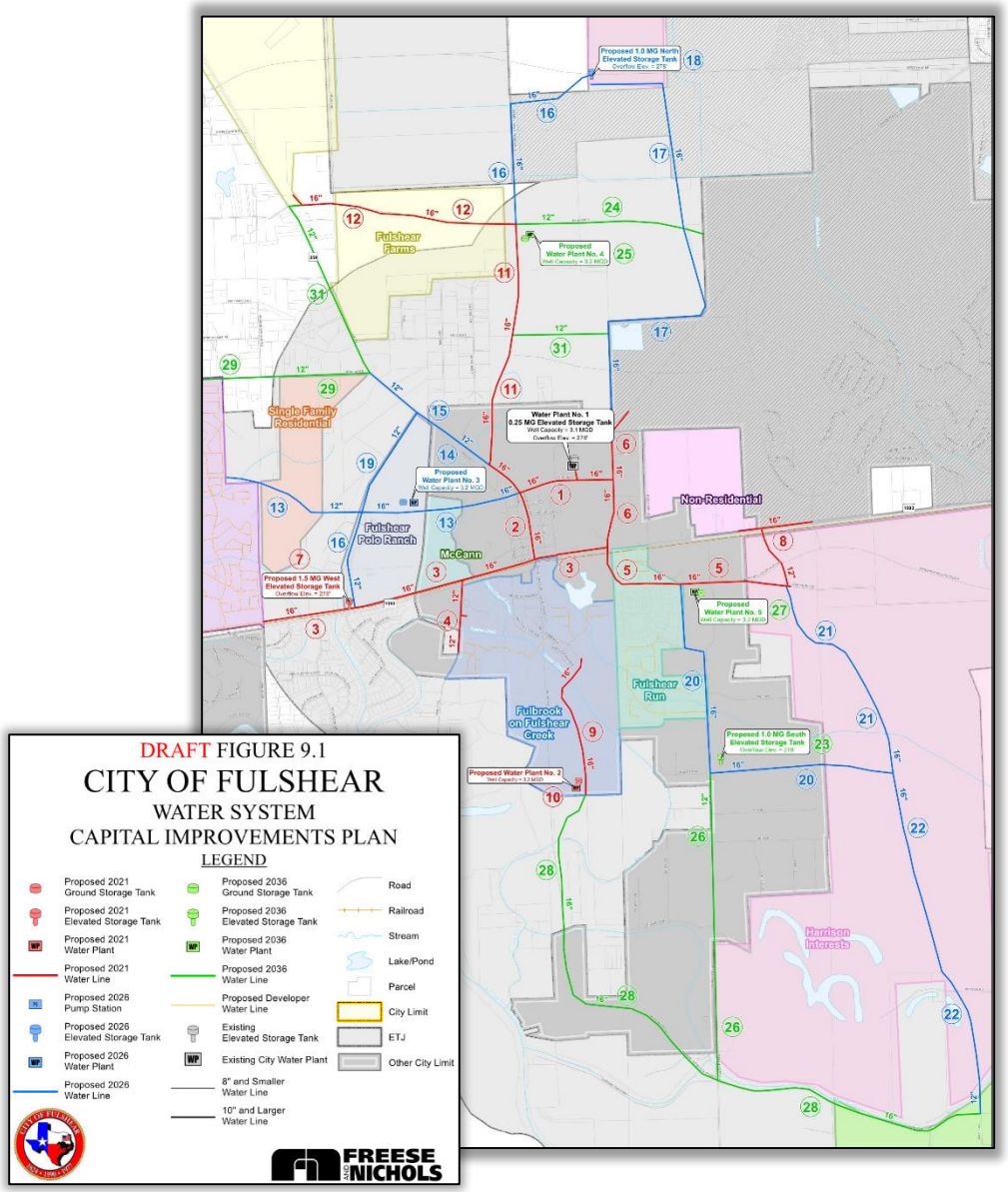
Project Timelines & Triggers

- All identified projects anticipate specific needs
  - If development is delayed, projects supporting development are delayed
- Development of Project "Triggers"
  - The final version of the Water & Wastewater Master Plan will include specific development benchmarks that must be met in order to start the design process
    - Collection & Distribution Lines – Serves specific development in areas currently not served or underserved
    - Water Production & Wastewater Treatment – Based on the number of connections and regulatory requirements for capacity
- Ongoing Program Management
  - Water/Wastewater Master Plan should be updated regularly
  - Project needs and implementation approach will require constant review
  - Alignment of development needs, goals, and funding options is crucial

Water System
Capital Improvements Plan

Phase	CIP	Cost
0-5 Year	Supply	$15,174,300
	Distribution	$25,565,900
	Sub-total	$40,740,200
5-10 Year	Supply	$15,174,300
	Distribution	$29,373,300
	Sub-total	$44,547,600
10-20 Year	Supply	$30,348,600
	Distribution	$21,788,500
	Sub-total	$52,137,100
	Total	$137,424,900

All costs are in 2017 dollars.



Note: CIP Cost Estimates include a 30% Contingency and 15% Engineering Services

5-year Water CIP Projects

Project	Project Description	Cost
1	16-inch Huggins Transmission Line	$1,080,500
2	16-inch FM 359 Transmission Line - Phase I	$1,286,000
3	16-inch FM 1093 West Transmission Line	$2,641,500
4	12-inch James Ln Transmission Line	$678,000
5	16-inch Katy-Fulshear/McKinnon Rd Transmission Line	$1,988,000
6	16-inch Katy-Fulshear Rd Transmission Line	$1,672,000
7	1.0 MG West Elevated Storage Tank	$2,000,000
8	12-inch Parkway South Transmission Line - Phase I	$1,308,000
9	16-inch Fulshear Trace Transmission Line - Phase I	$770,000
10	Water Plant No. 2	$10,150,000
11	16-inch Future Principal Arterial Transmission Line	$2,122,500
12	16-inch Future Principal Arterial Transmission Line	$1,554,000
	Subtotal	$27,250,500
	30% Construction Contingency	$8,175,300
	Subtotal	$35,425,800
	15% Engineering Services	$5,314,400
	Total	**$40,740,200**

All costs are in 2017 dollars.

10-year Water CIP Projects

Project	Project Description	Cost
13	16/12-inch Future Collector Transmission Lines	$2,272,800
14	Water Plant No. 3	$10,150,000
15	12-inch FM 359 Transmission Line - Phase I	$1,248,000
16	16-inch Igloo Rd Transmission Line	$1,652,000
17	16-inch Fulshear Parkway North Transmission Line	$3,690,500
18	1.0 MG North Elevated Storage Tank	$2,000,000
19	12-inch Future Collector Transmission Line	$1,608,000
20	16-inch Bois D'Arc Ln/Ellis Rd. ext. Transmission Line	$3,233,000
21	16-inch Parkway South Transmission Line - Phase II	$1,885,000
22	16-inch/12-inch Parkway South Transmission Line - Phase III	$2,058,000
	Subtotal	$29,797,300
	30% Construction Contingency	$8,939,300
	Subtotal	$38,736,600
	15% Engineering Services	$5,811,000
	Total	**$44,547,600**

All costs are in 2017 dollars.

20-year Water CIP Projects

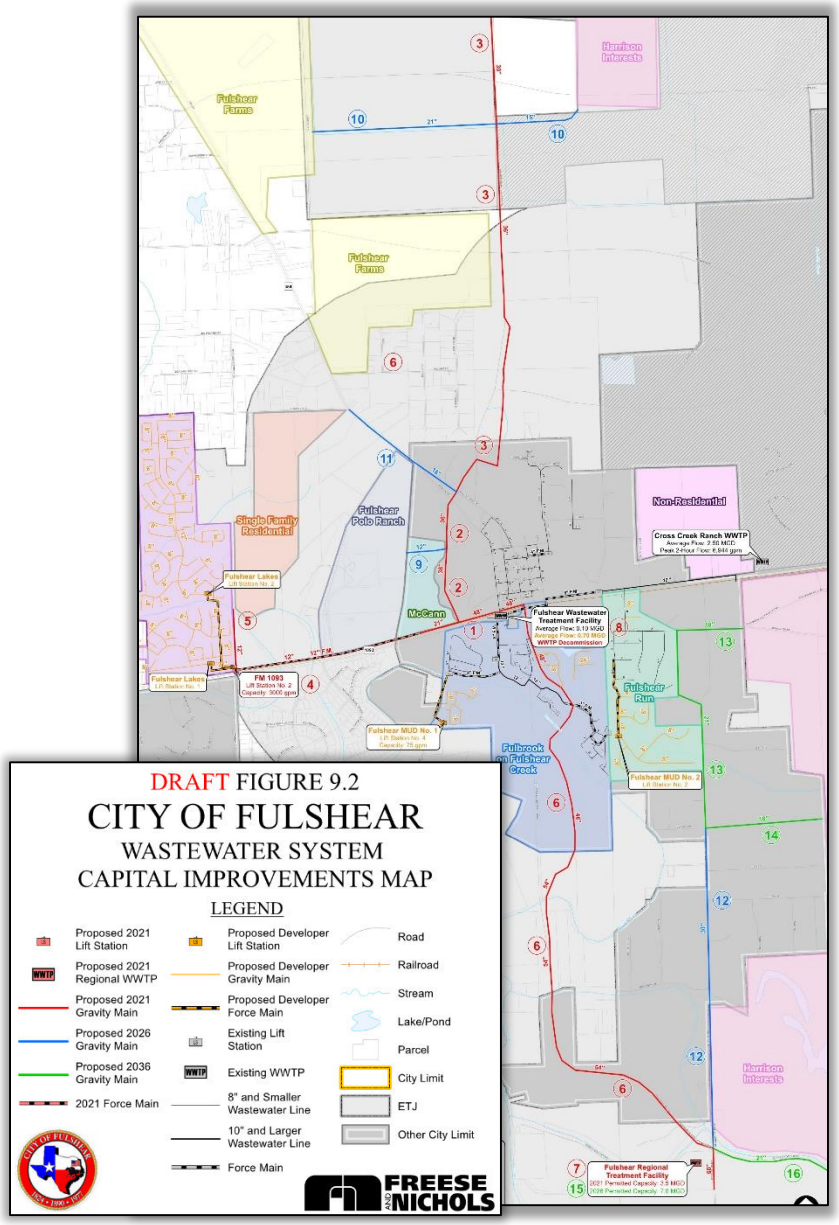
Project	Project Description	Cost
23	1.5 MG South Elevated Storage Tank	$3,000,000
24	12-inch Future Minor Arterial Transmission Line	$1,008,000
25	Water Plant No. 4	$10,150,000
26	12-inch Bois D'Arc Ln Transmission Line	$2,196,000
27	Water Plant No. 5	$10,150,000
28	16-inch Future Minor Arterial/Winner-Foster Transmission Line	$4,938,000
29	12-inch Rogers Rd Transmission Line	$1,254,000
30	12-inch FM 359 Transmission Line - Phase II	$1,422,000
31	12-inch Future Minor Arterial Transmission Line	$756,000
	Subtotal	$34,874,000
	30% Construction Contingency	$10,462,200
	Subtotal	$45,336,200
	15% Engineering Services	$6,800,900
	Total	**$52,137,100**

All costs are in 2017 dollars.

Wastewater System Capital Improvements Plan

Phase	CIP	Cost
0-5 Year	Collection	$47,895,500
	Treatment	$44,908,500
	Sub-total	$92,804,000
5-10 Year	Collection	$13,090,800
	Treatment	$0
	Sub-total	$13,090,800
10-20 Year	Collection	$6,605,500
	Treatment	$42,120,000
	Sub-total	$48,725,500
	Total	$154,620,300

All costs are in 2017 dollars.



Note: CIP Cost Estimates include 30% Contingency and 15% - 20% Engineering Services

5-year Wastewater CIP Projects

Project	Project Description	Cost
1	48-inch FM 1093 Interceptor	$2,130,700
2	36-inch Union Chapel Branch Interceptor	$2,965,700
3	30-inch/36-inch Future Principal Arterial Interceptor	$7,431,900
4	FM 1093 Lift Station and 12-inch FM 1093 Force Main/21-inch Interceptor	$3,930,600
5	12-inch Continental Interceptor	$363,300
6	48-inch/54-inch/60-inch Fulshear Trace Interceptor	$15,214,500
7	3.5 MGD Regional WWTP	$28,500,000
8	Existing WWTP Decommission	$300,000
	Subtotal	$60,836,700
	30% Construction Contingency	$18,251,300
	Subtotal	$79,088,000
	15% Engineering Services*	$13,716,000
	Total	**$92,804,000**

All costs are in 2017 dollars.
* Engineering Services include a 20% allowance for the WWTP projects

10-year Wastewater CIP Projects

Project	Project Description	Cost
9	12-inch Fulshear Polo Ranch Interceptor	$272,700
10	21-inch/15-inch Future Interceptor	$2,160,500
11	18-inch FM 359 Interceptor	$1,628,900
12	30-inch Bois D'Arc Interceptor - Phase I	$4,694,000
	Subtotal	$8,756,100
	30% Construction Contingency	$2,627,000
	Subtotal	$11,383,100
	15% Engineering Services	$1,707,700
	Total	**$13,090,800**

All costs are in 2017 dollars.

20-year Wastewater CIP Projects

Project	Project Description	Cost
13	18-inch/21-inch Bois D'Arc Interceptor - Phase II	$2,400,500
14	18-inch Ellis Rd ext. Interceptor	$849,200
15	3.5 MGD Regional WWTP Expansion to 7.0 MGD	$27,000,000
16	21-inch Winner-Foster Rd Interceptor	$1,168,500
	Subtotal	$31,418,200
	30% Construction Contingency	$9,425,600
	Subtotal	$40,843,800
	15% Engineering Services*	$7,881,700
	Total	**$48,725,500**

All costs are in 2017 dollars.
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Next Steps

- Possible workshop with City Council to discuss findings & implementation approach
  - Who does the projects?
  - Who pays for the projects?
  - How does this align with current conditions?
  - How do we engage necessary stakeholders?
- Receive Water and Wastewater Master Plan report
- Review water and wastewater rate study findings
  - Master Plan and other CIP
  - Future Maintenance and Operation considerations
- Consider adoption of Water and Wastewater Impact Fees
- Review initial implementation steps
  - Site options for new Regional WWTP and Water Plant No. 2

Questions?