



BELL COUNTY WCID1

Water Master Plan

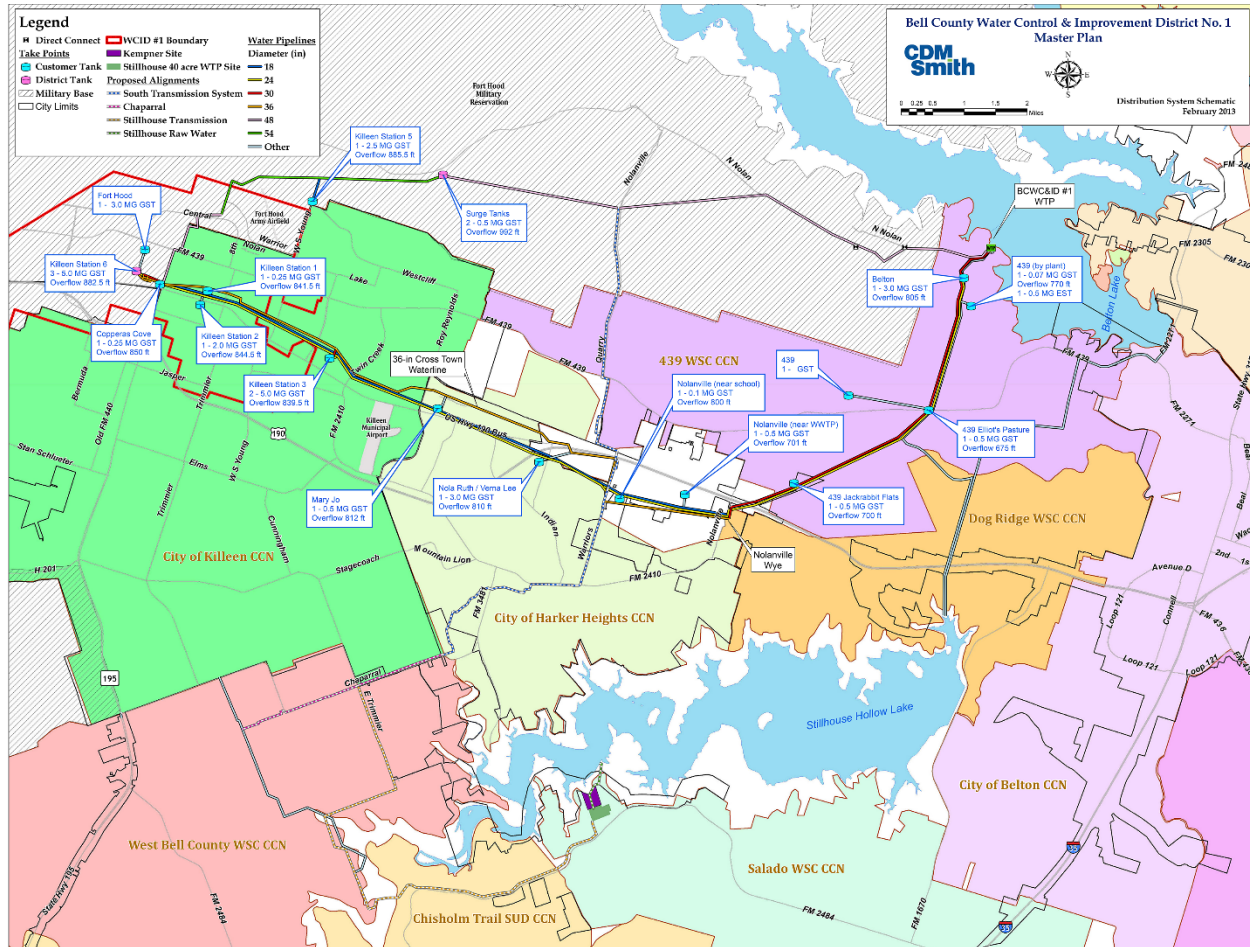
Board Presentation

March 3, 2021

Allen Woelke, PE, BCEE

**CDM
Smith**

Introduction



Water Master Plan Scope

1. Water Demand and WTP Capacity Forecasting
2. WTP Condition Assessment
3. Water Transmission/Distribution System Assessment



Water Demand and WTP Capacity Forecasts

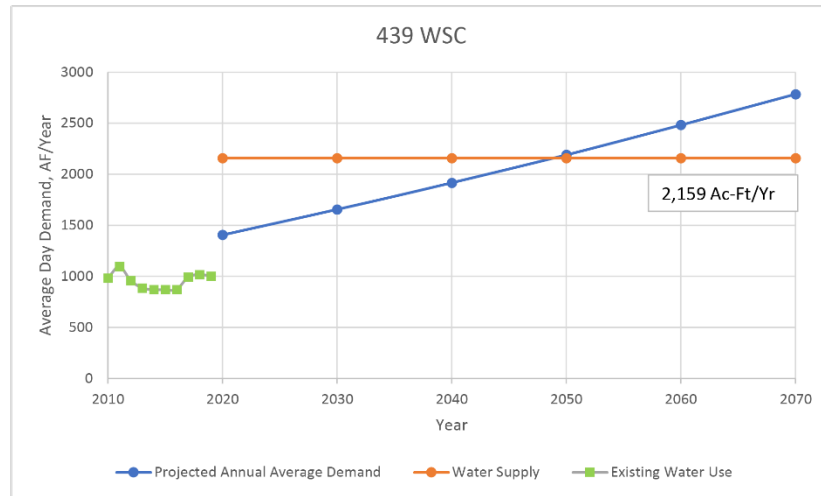
439 WSC

TWDB Region G Population Projections

Customer Name	2020	2030	2040	2050	2060	2070
439 WSC	10,220	12,327	14,490	16,700	18,961	21,285

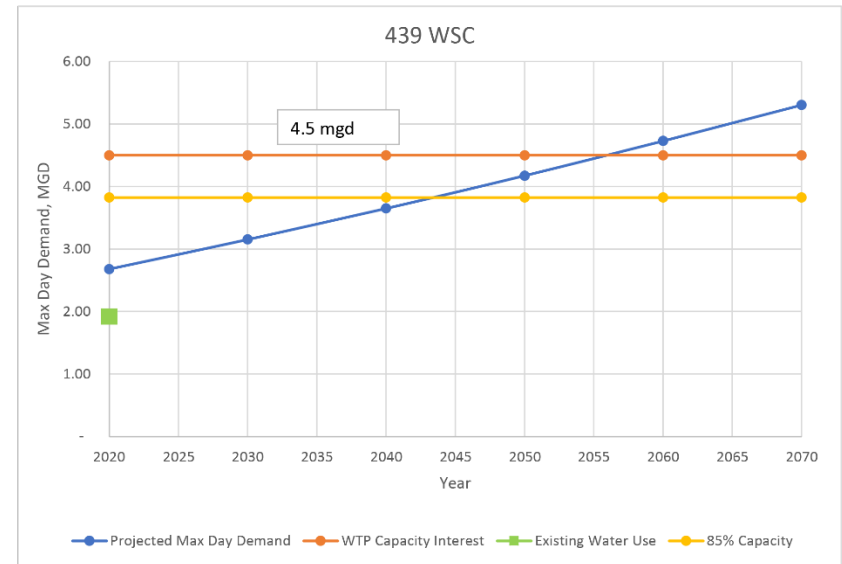
TWDB Region G Water Demand Projections (Ac-Ft/Year)

Customer Name	2020	2030	2040	2050	2060	2070
439 WSC	1,407	1,656	1,917	2,191	2,483	2,785



Max Day Water Demand Projections (MGD)

Customer Name	2020	2030	2040	2050	2060	2070
439 WSC	2.68	3.15	3.65	4.17	4.73	5.30



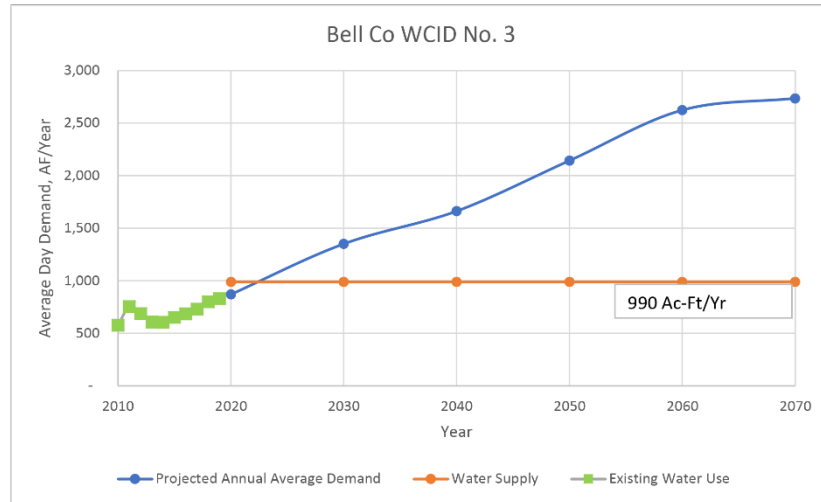
Bell County WCID3 (Nolanville)

TWDB Region G Population Projections

Customer Name	2020	2030	2040	2050	2060	2070
Bell County WCID 3	6,100	9,460	11,636	14,996	18,356	19,140

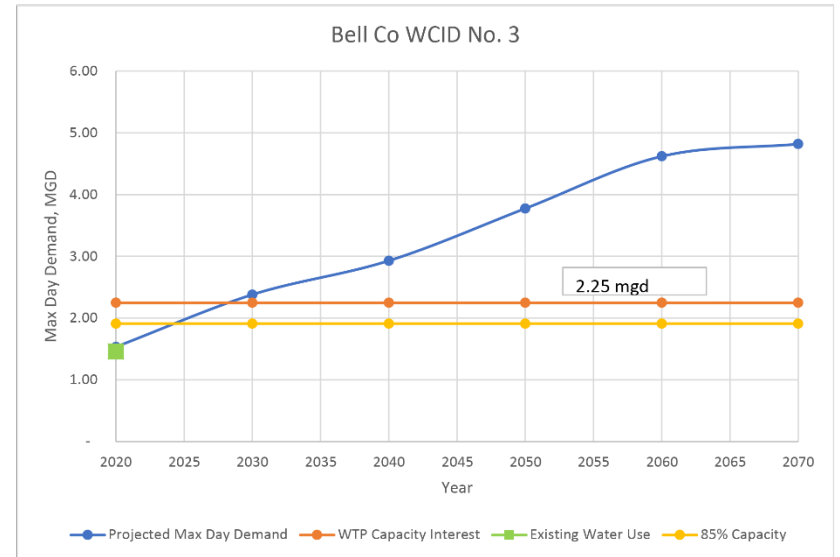
TWDB Region G Water Demand Projections (Ac-Ft/Year)

Customer Name	2020	2030	2040	2050	2060	2070
Bell County WCID 3	872	1,352	1,663	2,144	2,624	2,736



Max Day Water Demand Projections (MGD)

Customer Name	2020	2030	2040	2050	2060	2070
Bell County WCID 3	1.54	2.38	2.93	3.78	4.62	4.82



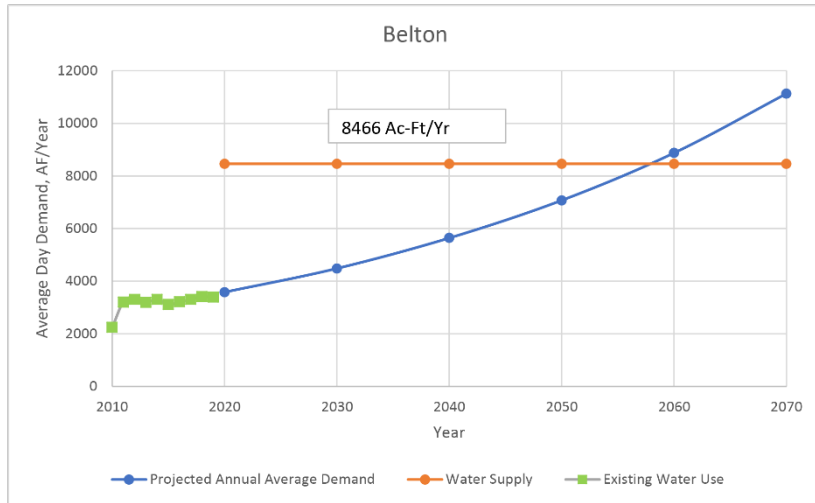
City of Belton

TWDB Region G Population Projections

Customer Name	2020	2030	2040	2050	2060	2070
City of Belton	22,850	28,600	36,000	45,100	56,600	71,000

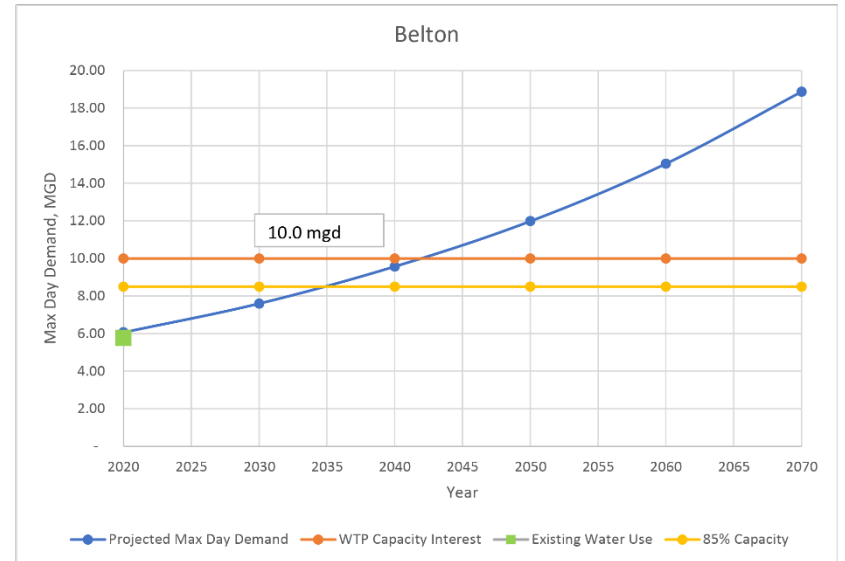
TWDB Region G Water Demand Projections (Ac-Ft/Year)

Customer Name	2020	2030	2040	2050	2060	2070
City of Belton	3,584	4,485	5,646	7,073	8,877	11,135



Max Day Water Demand Projections (MGD)

Customer Name	2020	2030	2040	2050	2060	2070
City of Belton	6.07	7.60	9.57	11.99	15.04	18.87



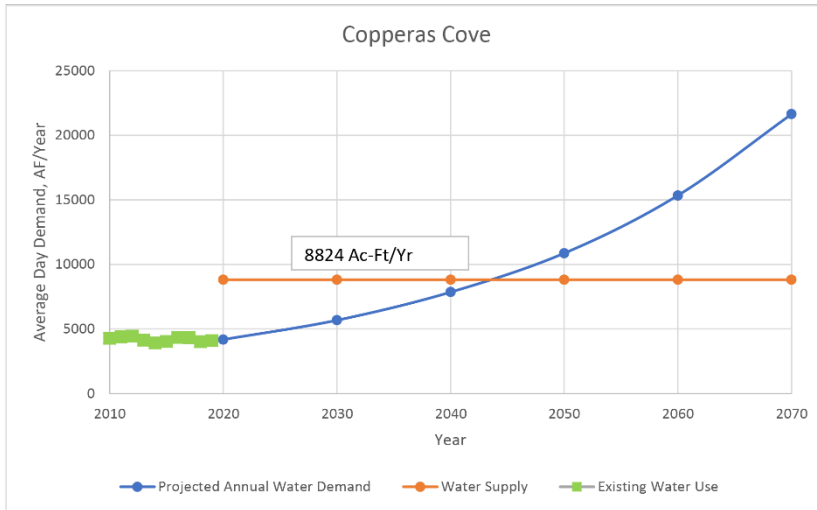
City of Copperas Cove

City of Copperas Cove Population Projections

Customer Name	2020	2030	2040	2050	2060	2070
City of Copperas Cove	35,307	49,804	70,253	99,099	139,790	197,187

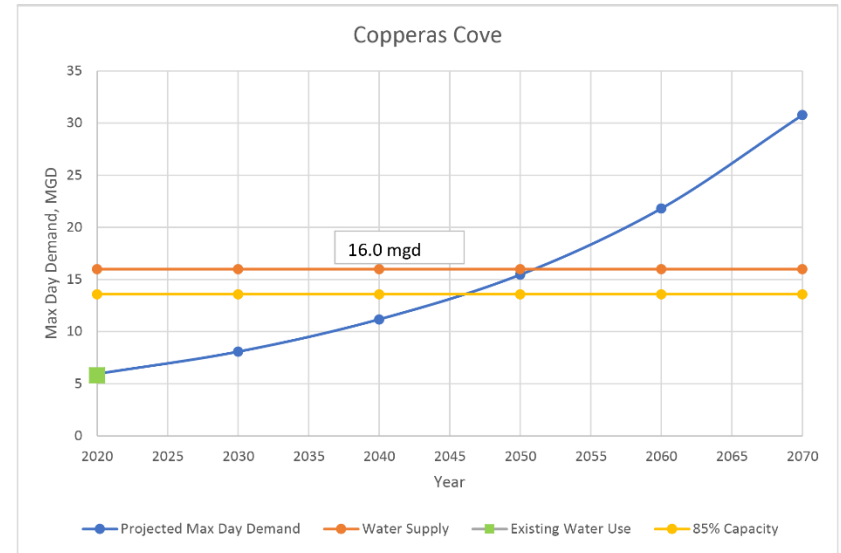
City of Copperas Cove Water Demand Projections (Ac-Ft/Year)

Customer Name	2020	2030	2040	2050	2060	2070
City of Copperas Cove	4,192	5,691	7,870	10,879	15,346	21,648



Max Day Water Demand Projections (MGD)

Customer Name	2020	2030	2040	2050	2060	2070
City of Copperas Cove	5.96	8.09	11.19	15.47	21.83	30.79



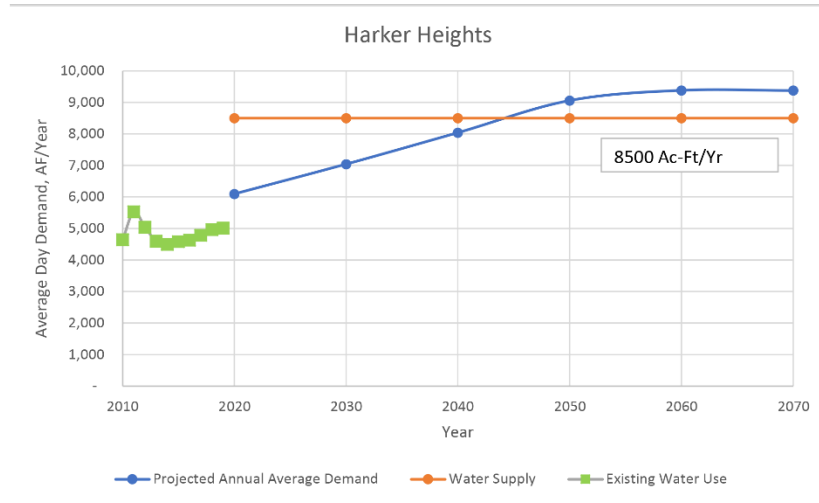
City of Harker Heights

TWDB Region G Population Projections

Customer Name	2020	2030	2040	2050	2060	2070
City of Harker Heights	31,372	36,879	42,566	48,218	50,000	50,000

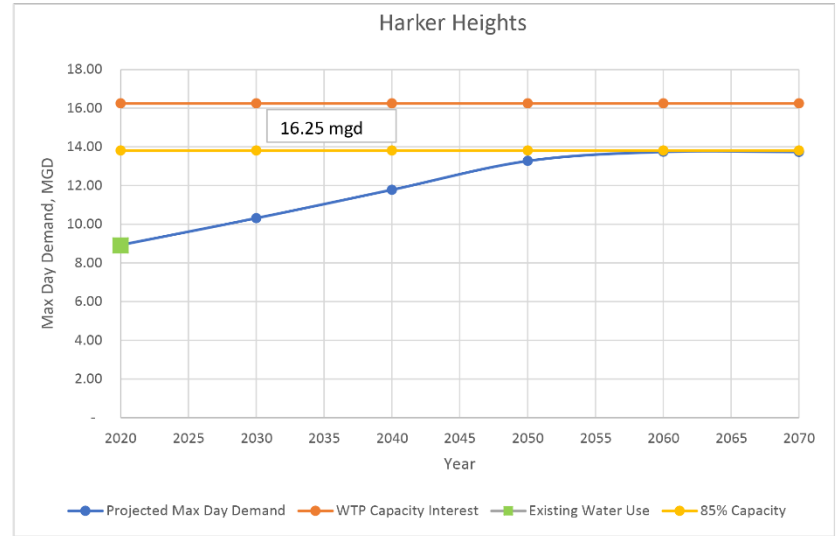
TWDB Region G Water Demand Projections (Ac-Ft/Year)

Customer Name	2020	2030	2040	2050	2060	2070
City of Harker Heights	6,099	7,043	8,042	9,060	9,381	9,377



Max Day Water Demand Projections (MGD)

Customer Name	2020	2030	2040	2050	2060	2070
City of Harker Heights	8.94	10.32	11.78	13.28	13.75	13.74



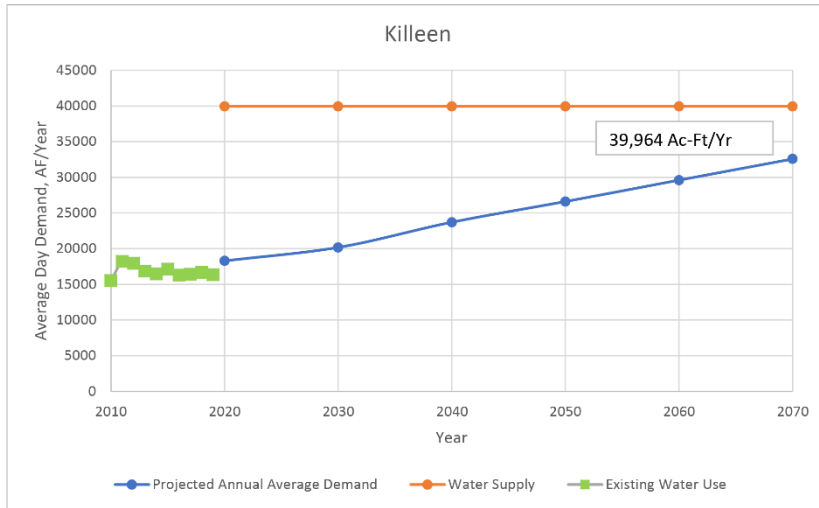
City of Killeen

TWDB Region G Population Projections

Customer Name	2020	2030	2040	2050	2060	2070
City of Killeen	144,243	169,560	195,711	221,697	247,195	272,291

TWDB Region G Water Demand Projections (Ac-Ft/Year)

Customer Name	2020	2030	2040	2050	2060	2070
City of Killeen	19,713	23,702	27,164	30,299	33,783	37,213



Max Day Water Demand Projections (MGD)

Customer Name	2020	2030	2040	2050	2060	2070
City of Killeen	29.04	34.92	40.02	44.64	49.77	54.82



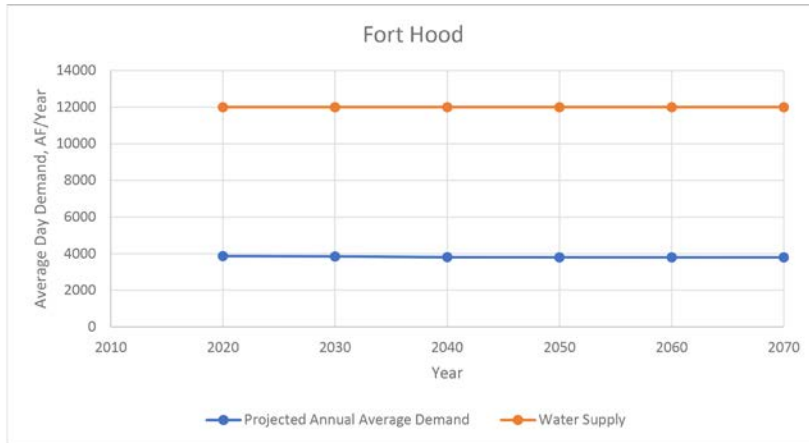
Fort Hood

TWDB Region G Population Projections

Customer Name	2020	2030	2040	2050	2060	2070
Fort Hood	16,936	17,196	17,282	17,282	17,282	17,282

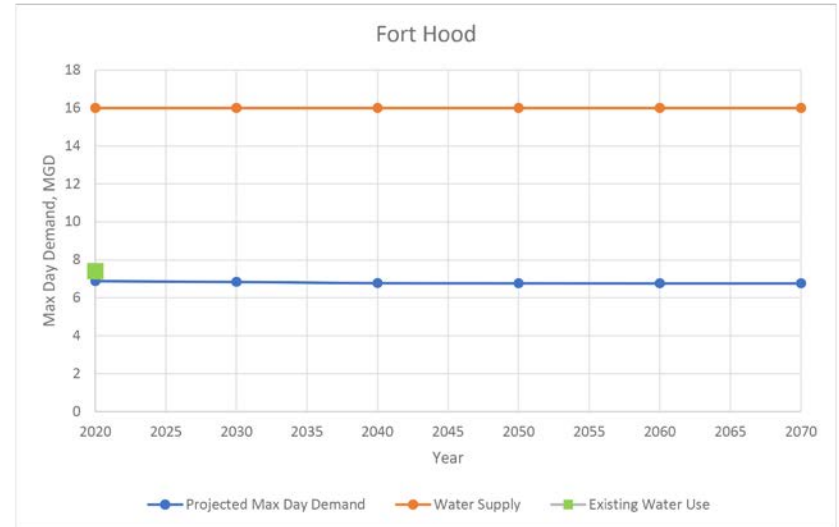
TWDB Region G Water Demand Projections (Ac-Ft/Year)

Customer Name	2020	2030	2040	2050	2060	2070
Fort Hood	3,874	3,850	3,815	3,809	3,804	3,804

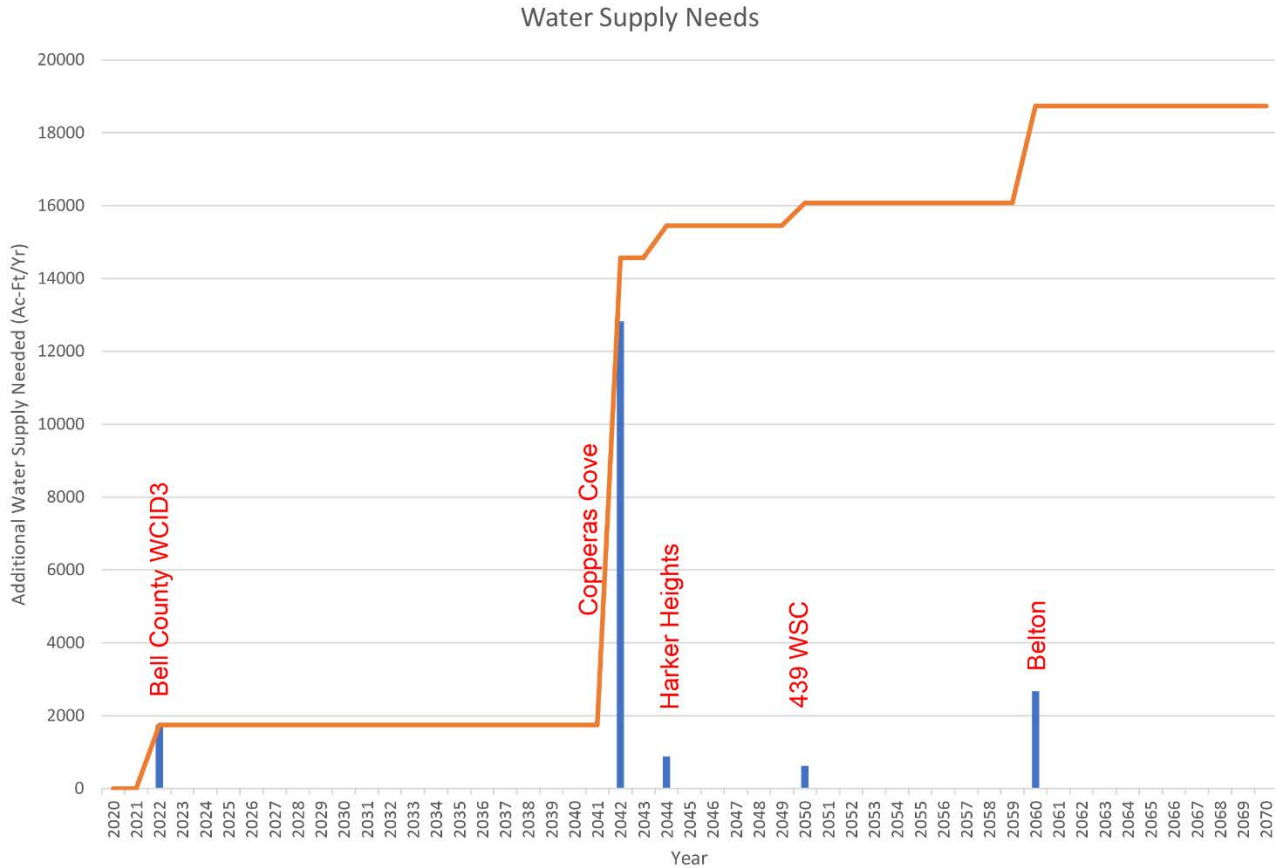


TWDB Region G Population Projections

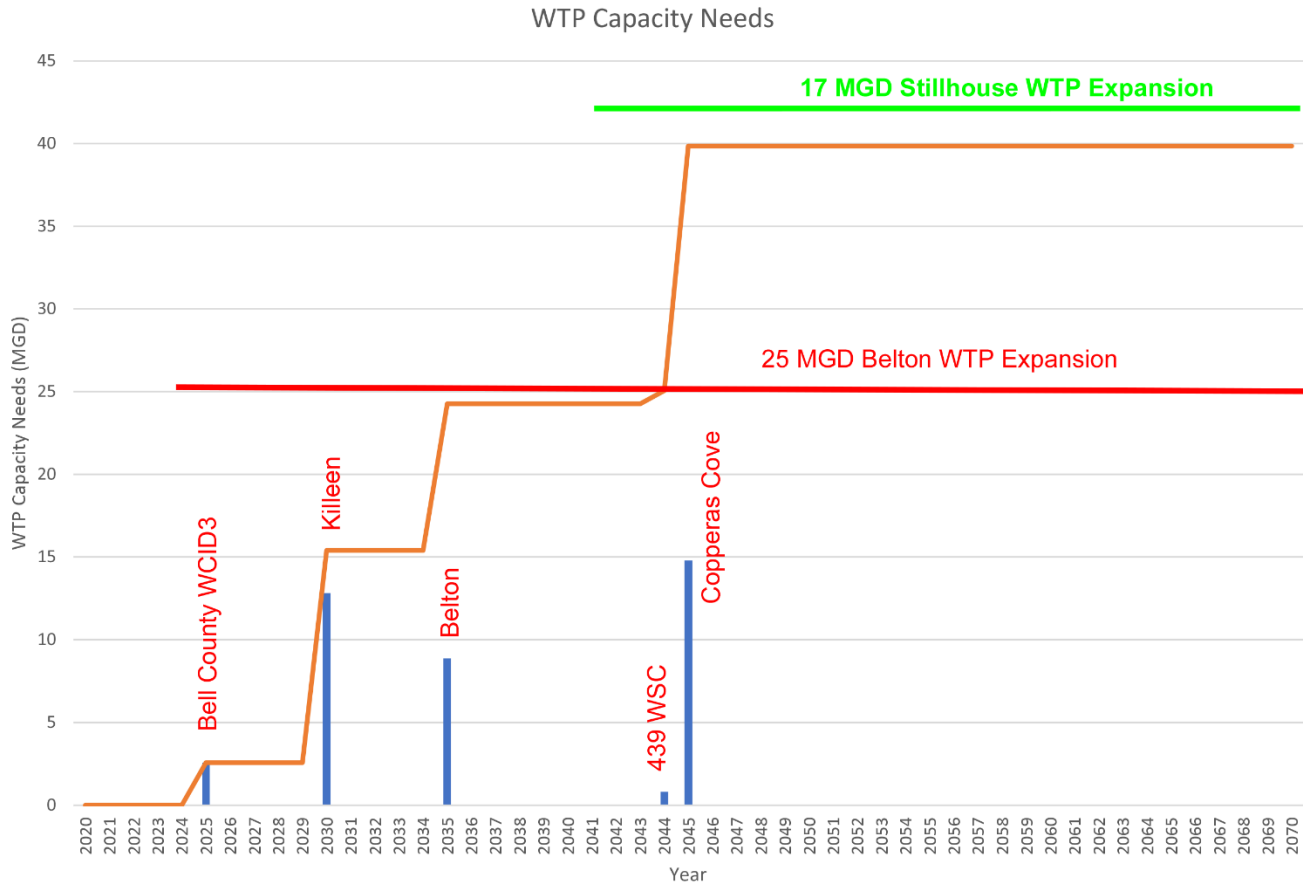
Customer Name	2020	2030	2040	2050	2060	2070
Fort Hood	6.88	6.84	6.77	6.76	6.75	6.75



Summary: Water Supply



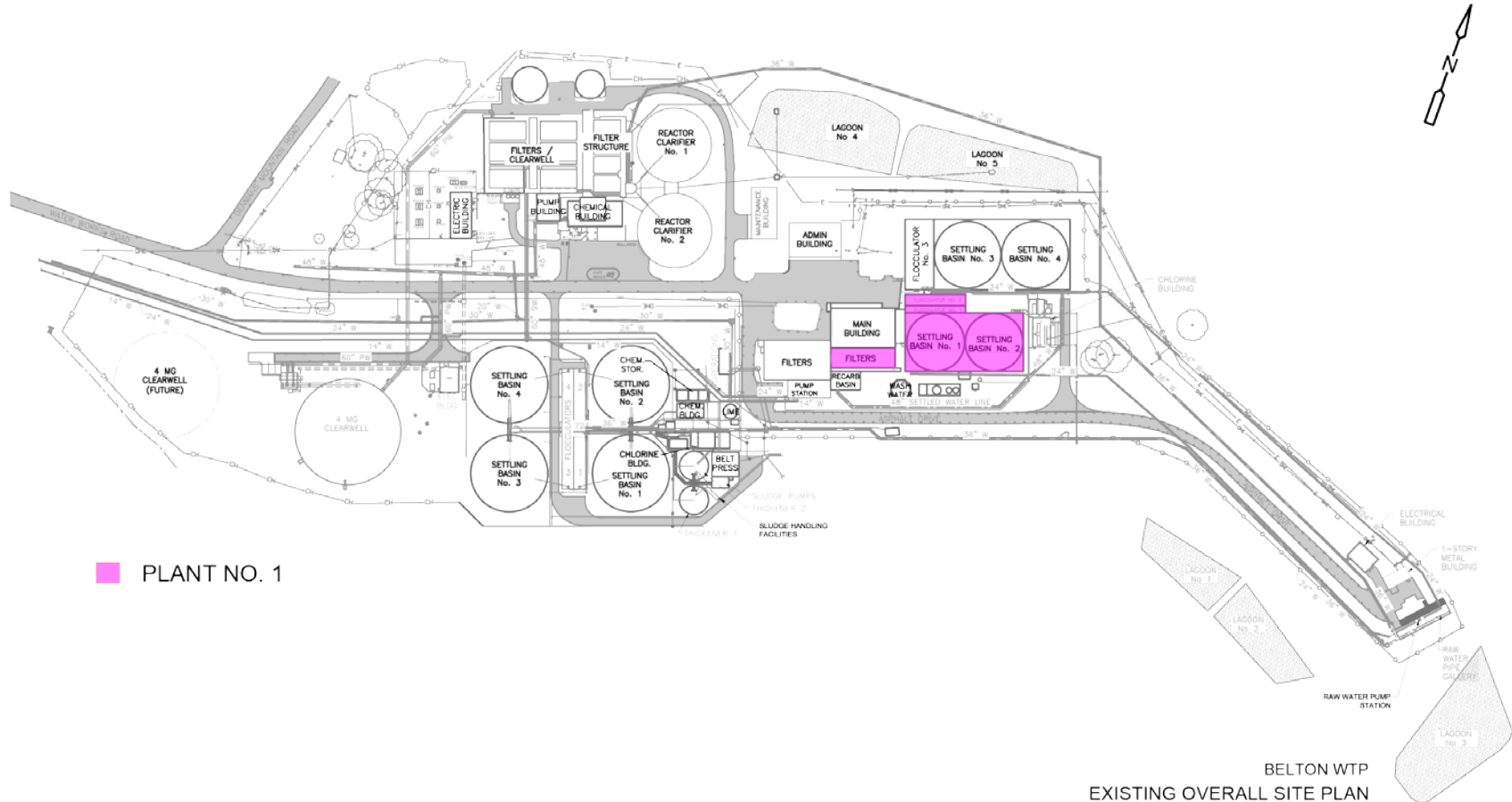
Summary: Water Treatment





WTP Assessment

Lake Belton WTP

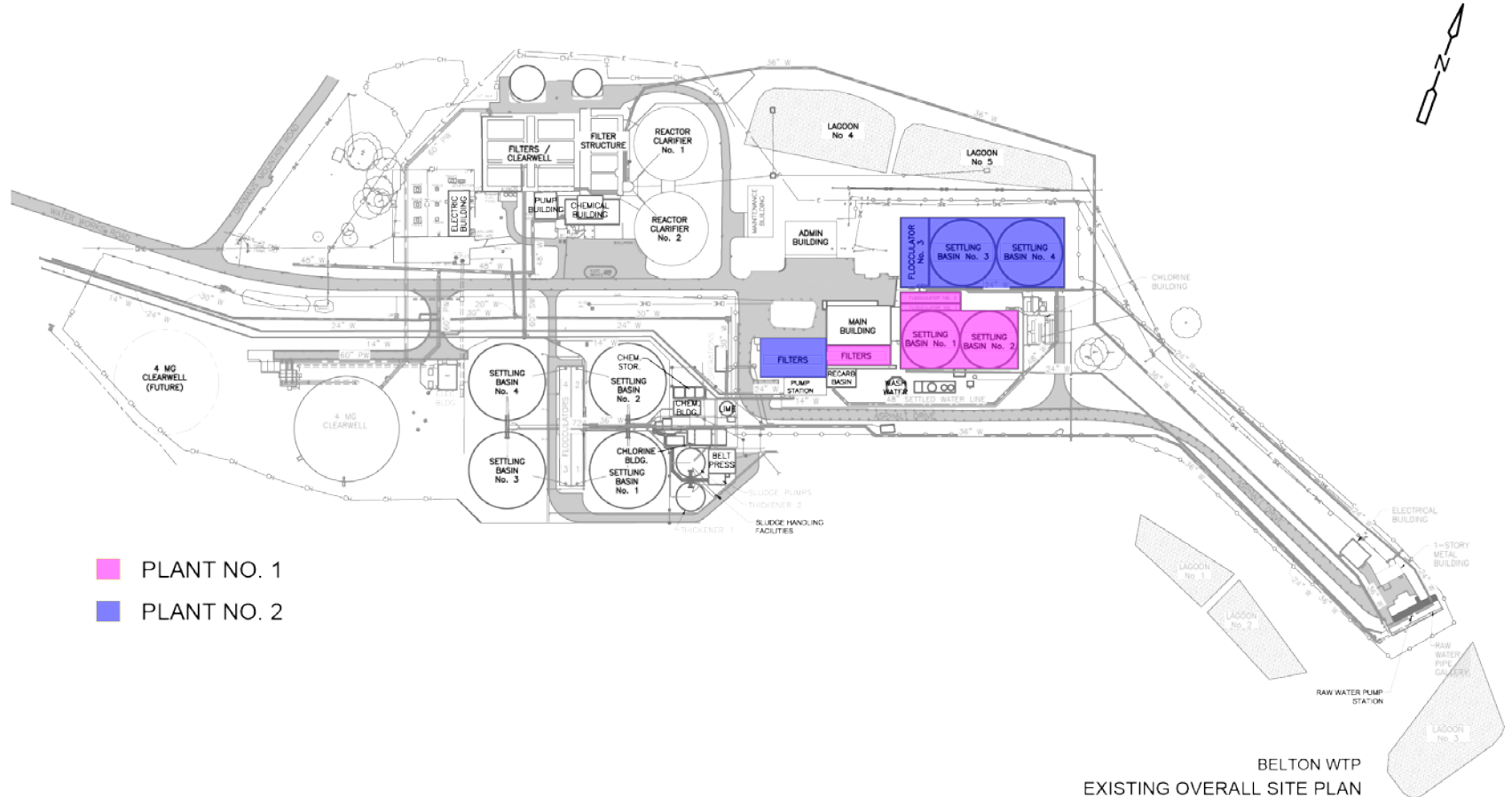


■ PLANT NO. 1

BELTON WTP
EXISTING OVERALL SITE PLAN

0 150 300
SCALE IN FEET

Lake Belton WTP

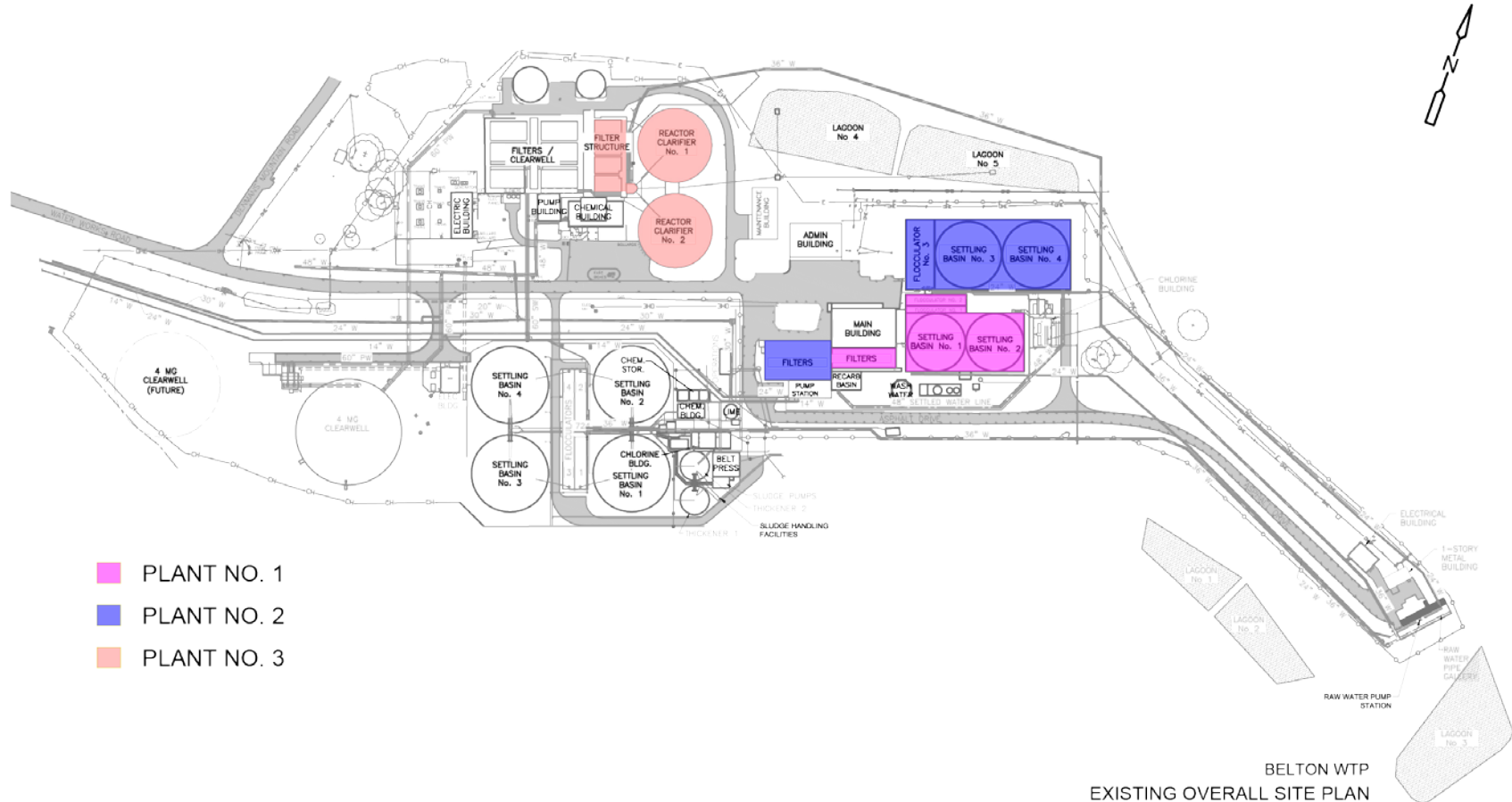


- PLANT NO. 1
- PLANT NO. 2

0 150 300
SCALE IN FEET

BELTON WTP
EXISTING OVERALL SITE PLAN

Lake Belton WTP

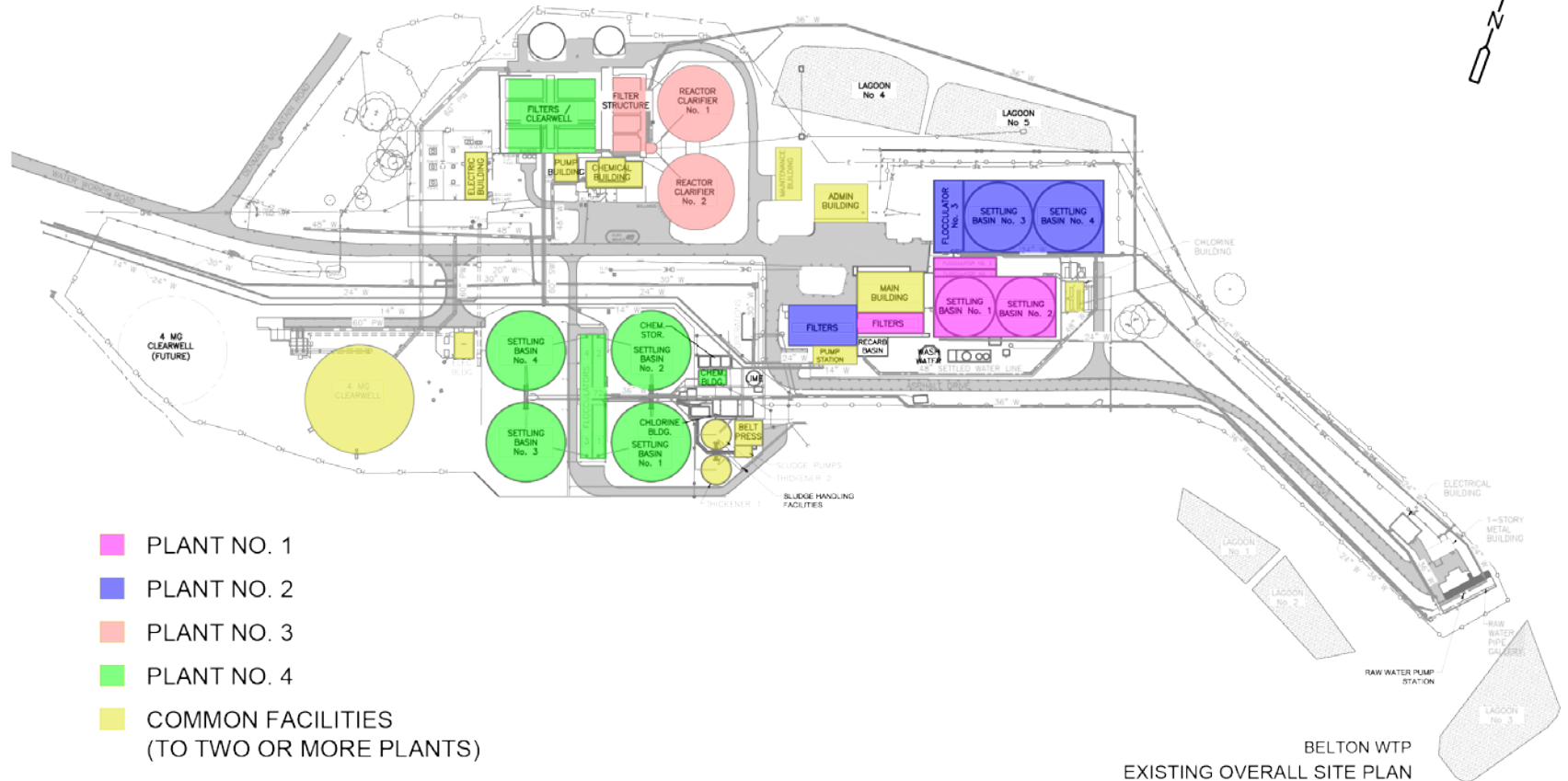


- PLANT NO. 1
- PLANT NO. 2
- PLANT NO. 3

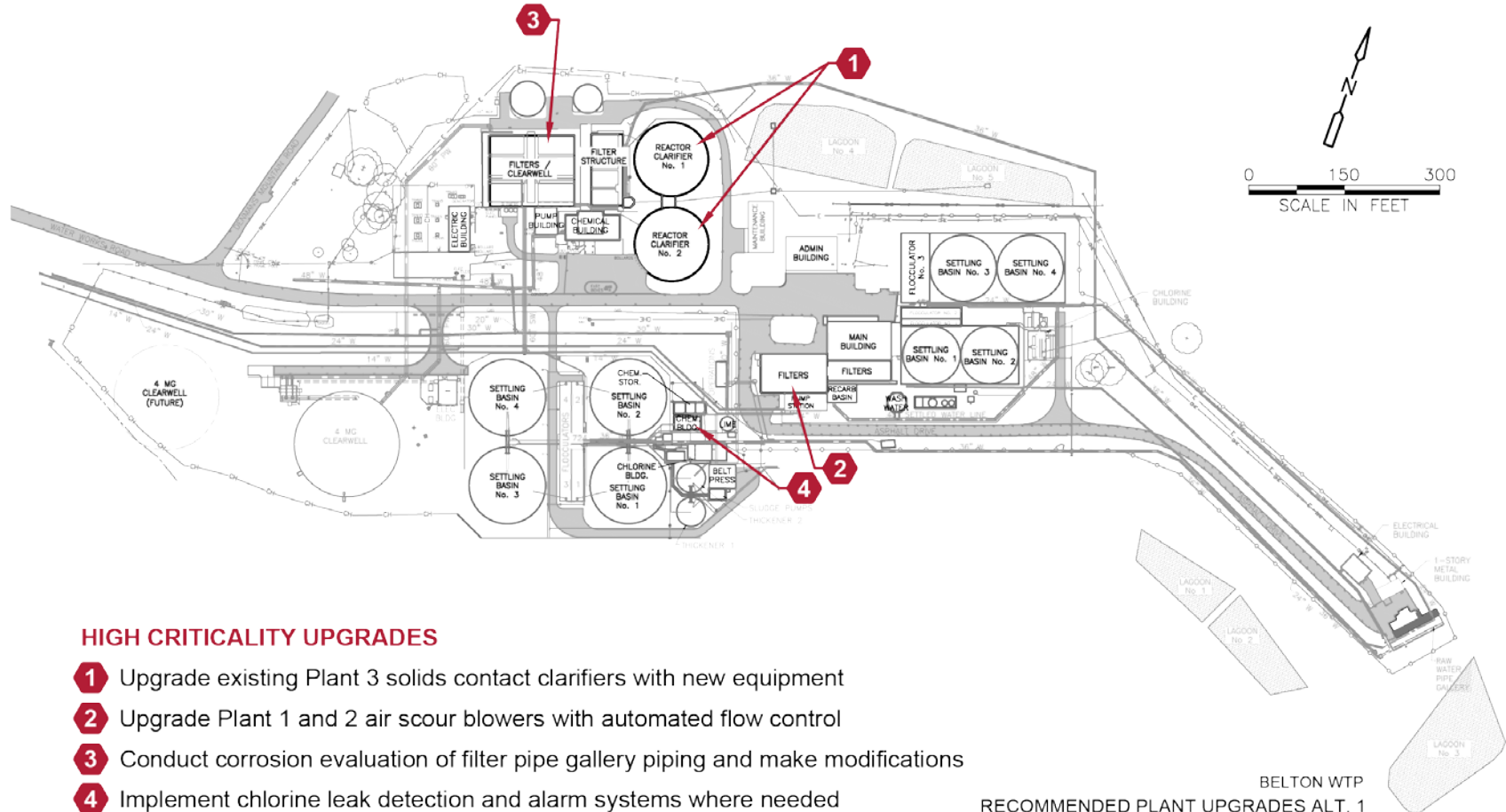
BELTON WTP
EXISTING OVERALL SITE PLAN

0 150 300
SCALE IN FEET

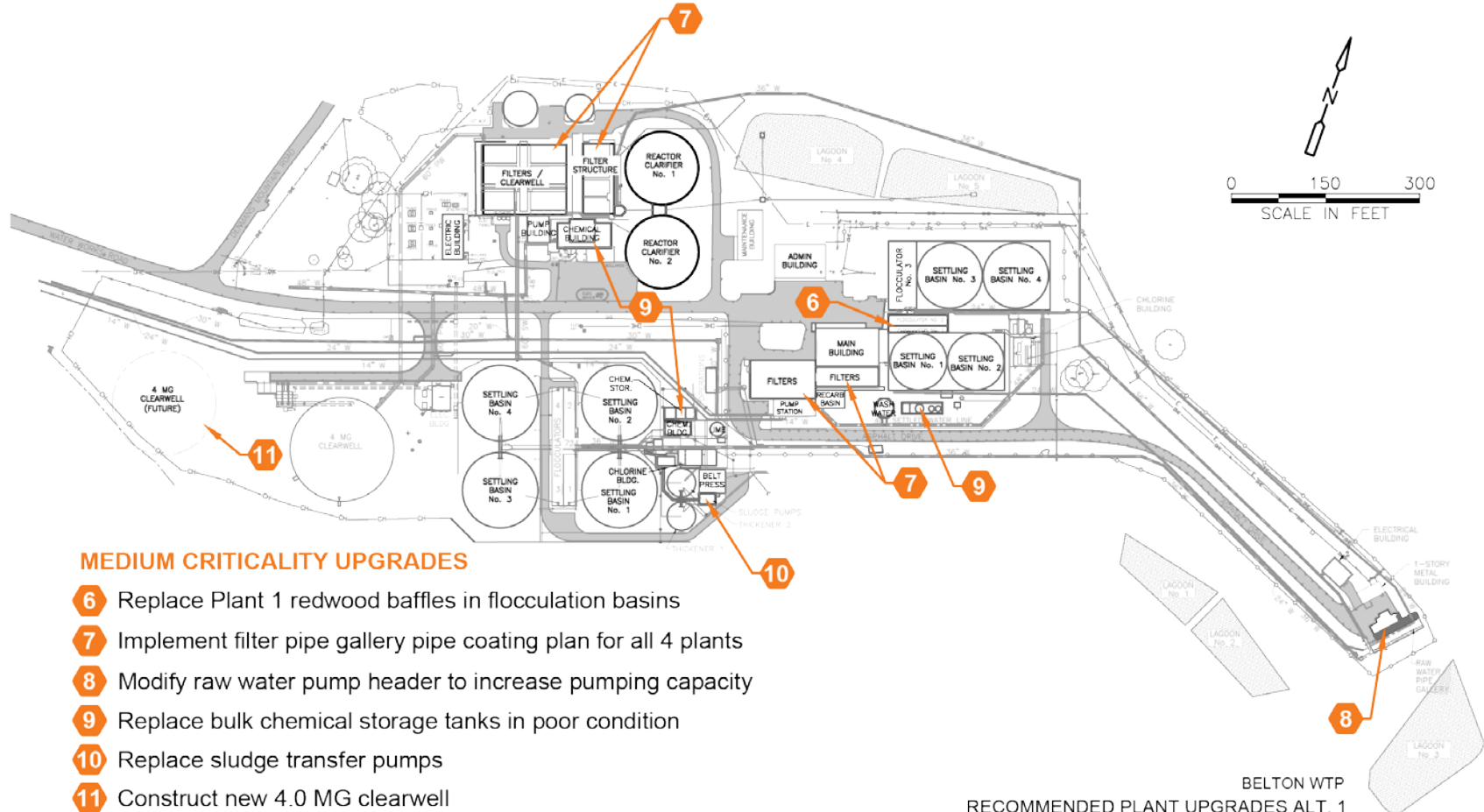
Lake Belton WTP



Results of Plant Assessment



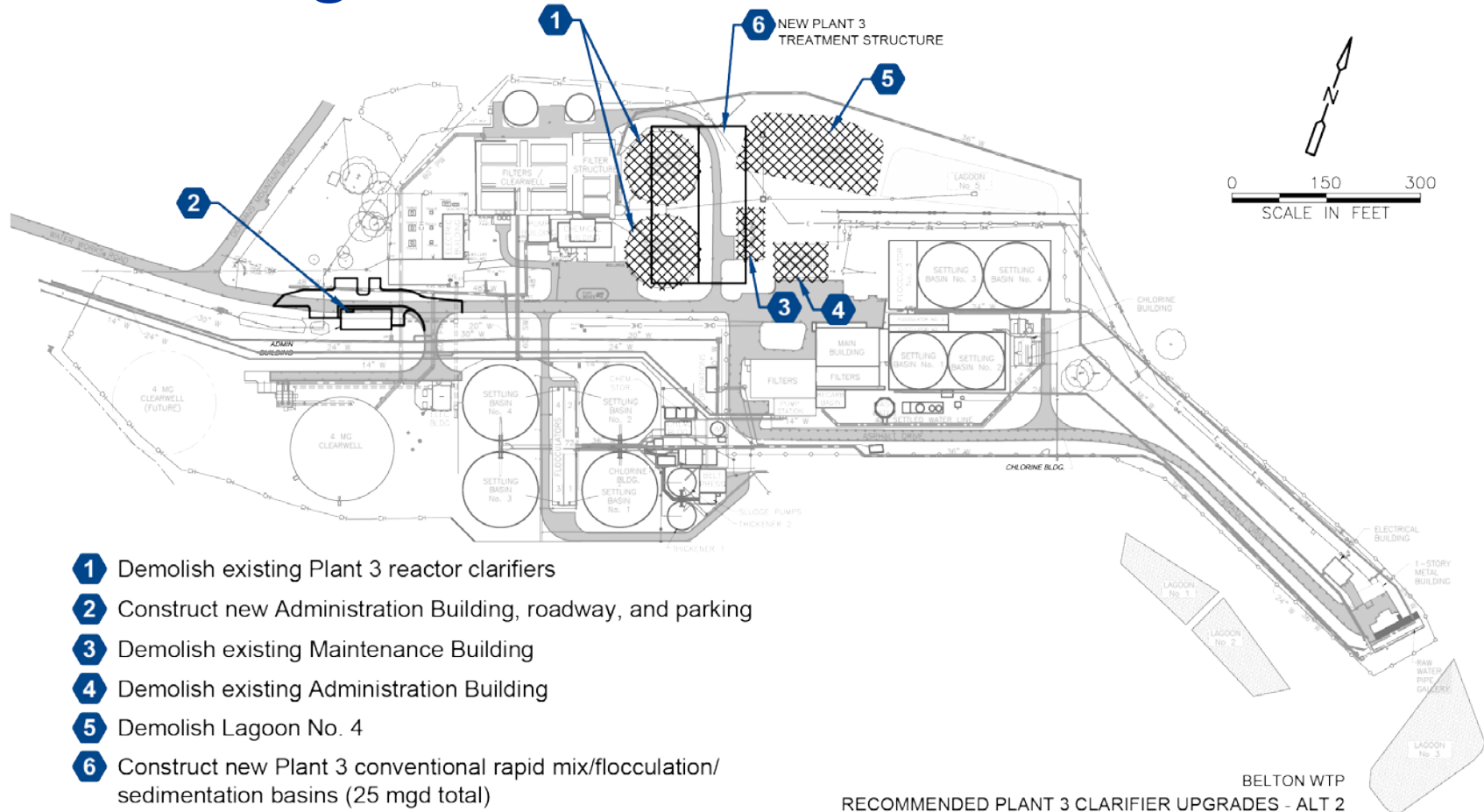
Results of Plant Assessment



MEDIUM CRITICALITY UPGRADES

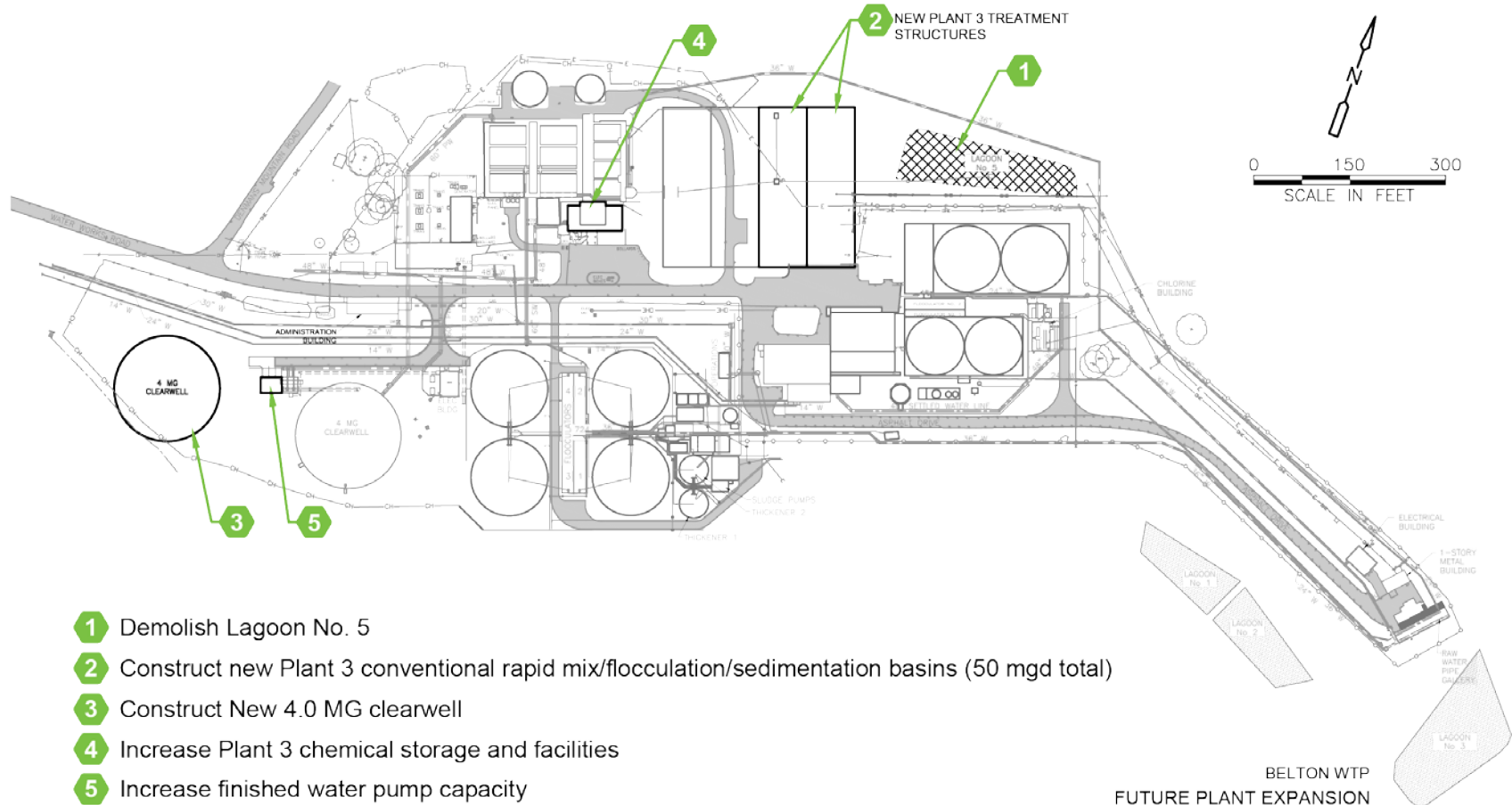
- 6 Replace Plant 1 redwood baffles in flocculation basins
- 7 Implement filter pipe gallery pipe coating plan for all 4 plants
- 8 Modify raw water pump header to increase pumping capacity
- 9 Replace bulk chemical storage tanks in poor condition
- 10 Replace sludge transfer pumps
- 11 Construct new 4.0 MG clearwell

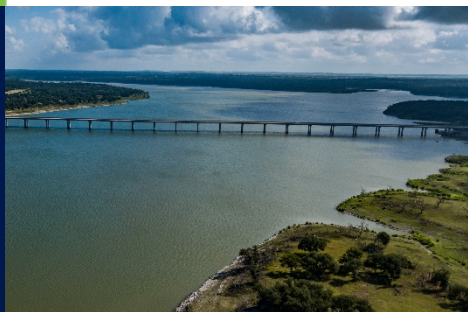
Addressing Plant 3



- 1** Demolish existing Plant 3 reactor clarifiers
- 2** Construct new Administration Building, roadway, and parking
- 3** Demolish existing Maintenance Building
- 4** Demolish existing Administration Building
- 5** Demolish Lagoon No. 4
- 6** Construct new Plant 3 conventional rapid mix/flocculation/sedimentation basins (25 mgd total)

Expansion from 90 mgd to 115 mgd

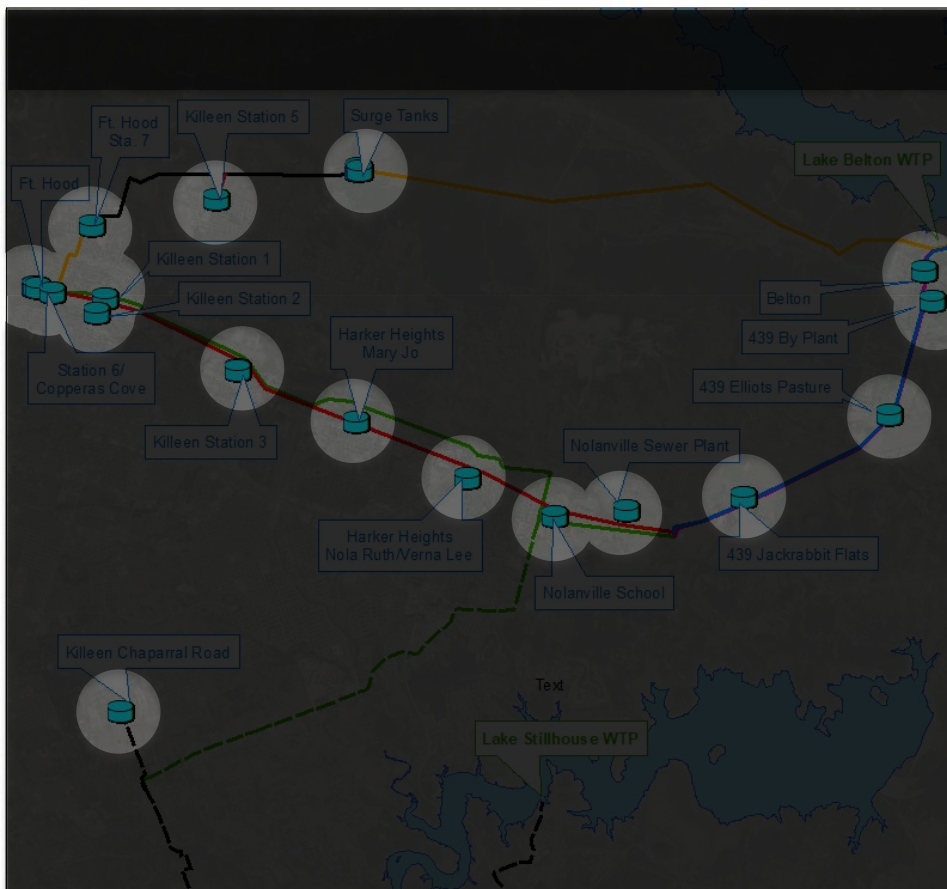




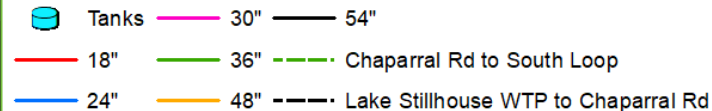
Transmission/Distribution System Assessment

System Overview

- North Transmission System
- South Transmission System
- Customer delivery points



Legend



Transmission System Analysis

Parameters

- Evaluated transmission system under existing and future contract demands
- Included Stillhouse WTP and new Belton Pump Station
- Evaluated transmission system with one leg out of service

Findings

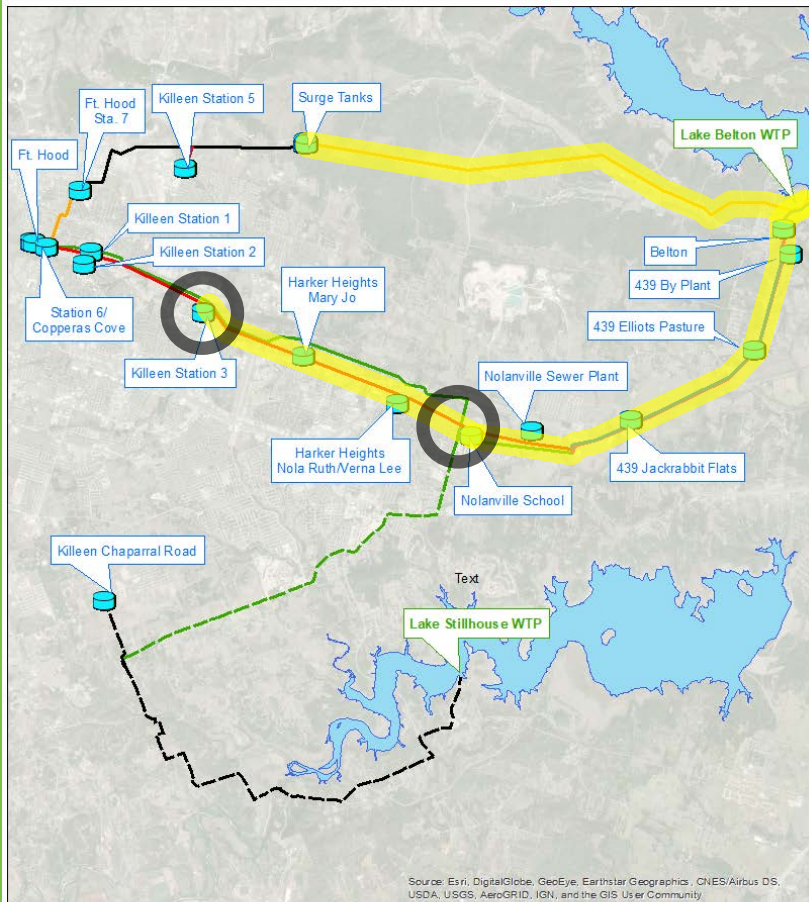
- Existing system provides acceptable service under current contract demands
- Transmission system improvements are required to accommodate 115-mgd future flow
- System cannot deliver contract demands with north leg out of service

Transmission System Analysis

Alternatives

Options to provide contract demands with north leg out of service:

1. Parallel north leg
2. Improve south leg
 - Replace 24-in from Belton WTP to Nolanville Wye
 - Replace 18-in from Nolanville Wye to Station 3
 - Add storage and pumping at Nolanville Wye and Station 3



Legend

- Tanks
- 30" — 54"
- 18" — 36" — Chaparral Rd to South Loop
- 24" — 48" — Lake Stillhouse WTP to Chaparral Rd

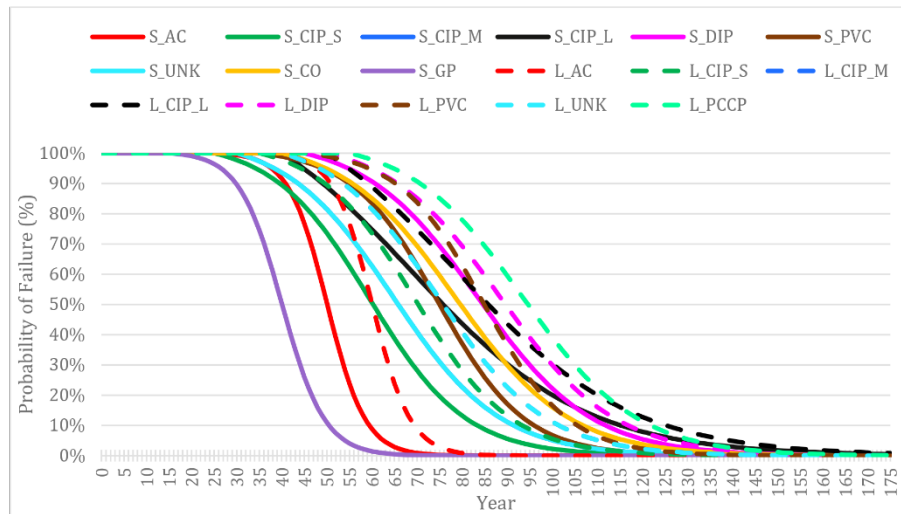
0 0.5 1 2 3 4 Miles



Either alternative creates resilience by replacing or paralleling aging pipes.

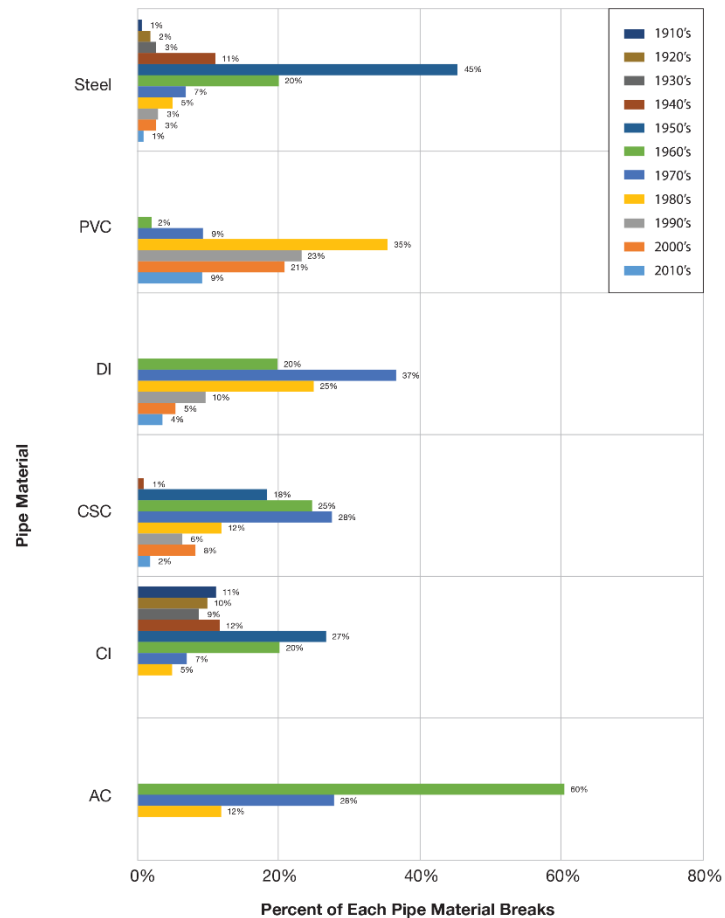
Resilience and Reliability

Figure 1. Service Life Curves -Water Mains – by Age



Source: City of Raleigh - Public Utilities Department 2018

FIGURE 26: PERCENT OF FAILURES PER DECADE OF INSTALLED PIPE MATERIAL



Source: 2018 Utah State Univ Water Main Pipe Break Study



Summary and Recommendations

Cost Summary:

Raw Water Supply & Treatment Projects

Project Number	Description	Completion Year	Project Cost Estimate
WTP-CIP1	Existing Plant Upgrades – High Criticality	2023	\$2.18M
WTP-CIP2	Existing Plant Upgrades – Medium Criticality	2025	\$1.2M
WTP-CIP4	Plant Expansion – Phase 1 (Replace Plant 3 Clarifiers with new Flocc/Sed Basins)	2026	\$28.5M
WTP-CIP5	Plant Expansion – Phase 2 (Expand Plant 3 by 25 MGD with new Flocc/Sed Basins)	2035	\$88.7M

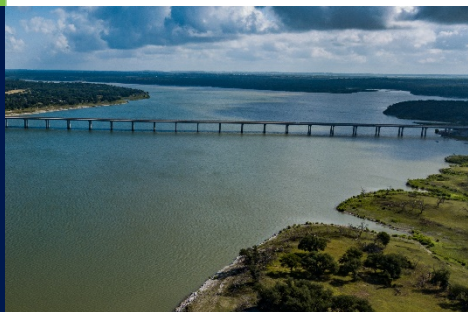
Cost Summary:

Pumping & Transmission Main Projects

Project Number	Description	Project Cost Estimate
DIST-CIP1	Upsize 24" from Belton WTP to Nolanville Wye to 36"	\$16.6M
DIST-CIP2	Upsize 18" from Nolanville Wye to Killeen Station 3 to 36"	\$17.4M
DIST-CIP3	Construct 5 MG GST at Nolanville Wye	\$5.2M
DIST-CIP4	Construct 3 MG GST at Killeen Station 3 <i>(Note: May be able to utilize existing GSTs at Killeen Station 3 as more demand is moved to Chaparral Road delivery point)</i>	\$3.8M
DIST-CIP5	Install new pump station at Belton WTP (pumping to south transmission main should total 57.1 MGD at 140' TDH)	\$6.75M
DIST-CIP6	Install new pump station at Nolanville Wye (53.5 MGD at 230' TDH)	\$10.6M
DIST-CIP7	Install new pump station at Killeen Station 3 (32.5 MGD at 126' TDH) <i>(Note: May be able to utilize abandoned pump station)</i>	\$5.75M

Emergency Power

- Systems serving **>250 connections** that do not meet elevated storage requirement:
 - Must deliver a **minimum of 0.35 gpm per connection** to the distribution system during loss of normal power supply
- Failure to provide min. 35 psi following a natural disaster:
 - Revised emergency preparedness plan or justification regarding pressure drop to be submitted for review/approval within 180 days of date normal power is restored
 - Executive director may require additional/alternative auxiliary emergency facilities



Questions?