Water Planning Overview – Building the Foundation

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CITY OF DENTON

Overview

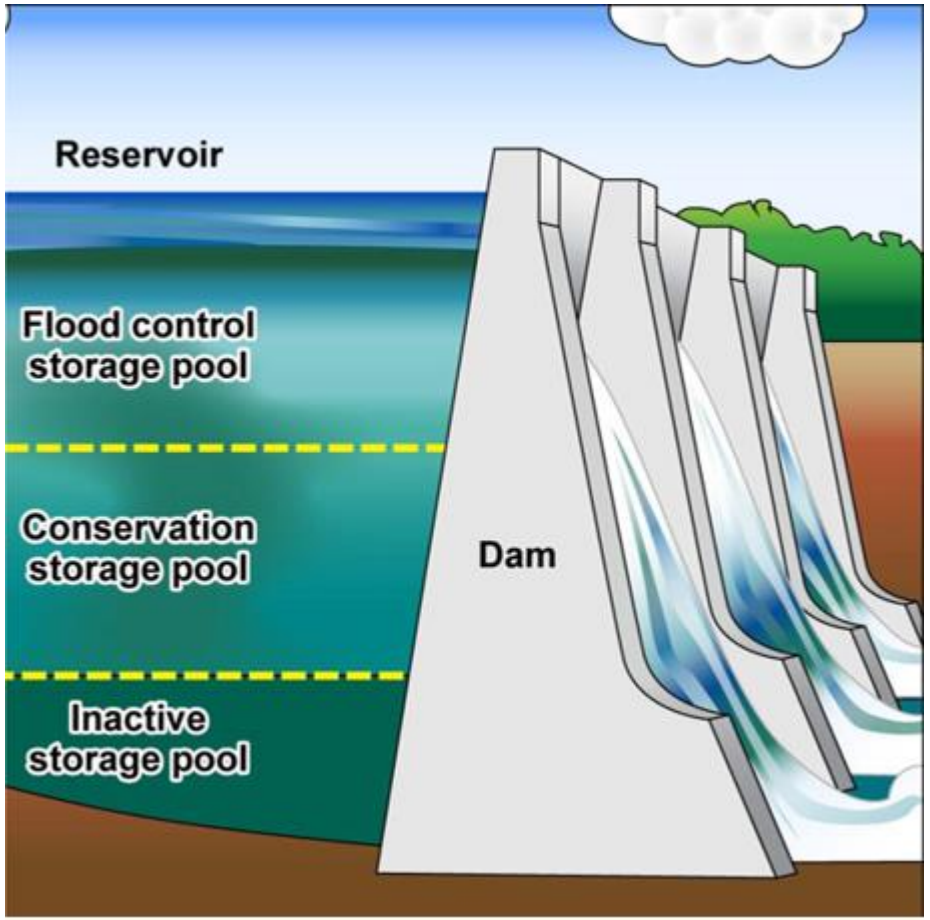
- Explanation of Water Rights
  - Key Terms & Definitions
  - Supply as a Function of Lake Levels and Firm Yield
  - What are Denton's Water Rights?
- Wastewater Considerations
  - Water Reclamation Basics
  - Bed & Banks Permits and Reclaimed Water
  - Total Water Supply
- Growth Projections
  - Population Growth
  - Per Capita Usage
  - Treatment Capacity and Capital Improvement Plans
- OneWater Planning
  - Regional Water Landscape
  - OneWater Approach

Explanation of Water Rights

Denton's Water History

- Early Denton relied on 17 groundwater wells
- 1957 – Lake Lewisville is completed, Denton incorporates as a supply
- 1970s – Denton creates the first portion of the reuse water system
- 1985 – Established Firm Yield limits with Dallas
- 1987 – Lake Ray Roberts is completed, Denton incorporates as a supply
- 1990s – Denton ceases use of groundwater after construction of Ray Roberts treatment plant
- 2019 – Texas Commission on Environmental Quality (TCEQ) Grants reuse permit allowing Denton to credit to water right the lesser of 12.05 MGD / 50% of released effluent

Supply as a Function of Lake Levels



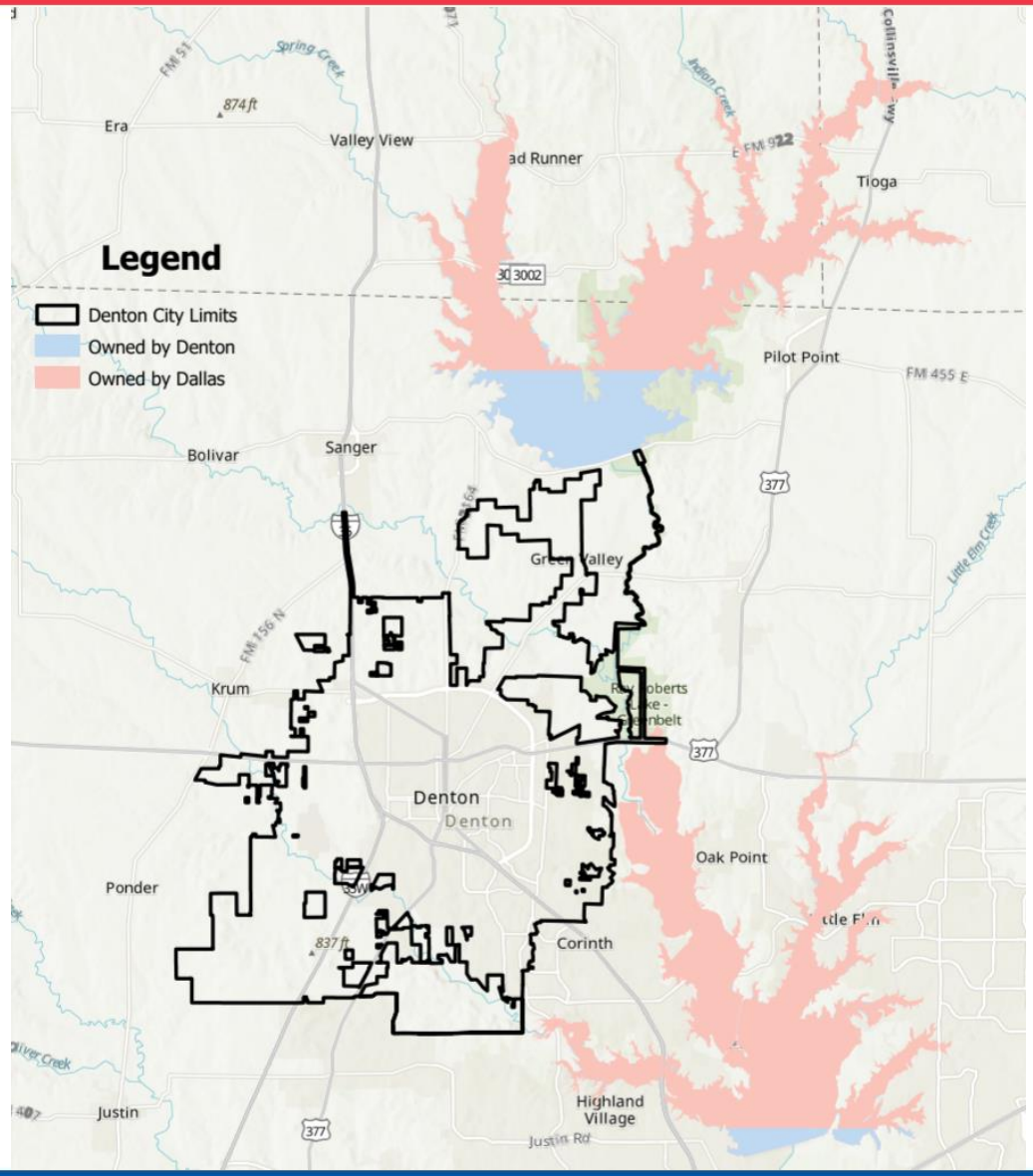
- Flood Pool – full water rights, the rest will be released downstream
- Conservation Pool – Full rights remain until the Conservation Pool reaches 50%, and then Firm Yield is enacted. Limited downstream release to maintain pool level.
- Inactive/Dead Pool – No water available

Firm Yield

- Maximum amount of water that can be consistently withdrawn from a reservoir or water source during a drought
  - Conservation pool < 50% full
- Established in 1985 agreement with Dallas
  - Based on 1950's drought of record
- Allows for 3-years of water to be drawn by both entities before the lake is run dry
  - Allows lake levels to recover from rain
  - Gives utility time to implement restrictions
  - Allows utility to tap other sources

What Are Denton's Water Rights?

- Lake Lewisville
  - 4.8% of the conservation pool
  - Full Rights: 52.15 MGD
  - Firm Yield: 4.34 MGD
- Lake Ray Roberts
  - 26% of the conservation pool
  - Full Rights: 185.6 MGD
  - Firm Yield: 19.76 MGD
- Total
  - Full Rights: 237.75 MGD
  - Firm Yield: 24.1 MGD
  - Average Winter Draw: 18 MGD (Base Usage)
  - Average Summer Draw: 40 MGD (Base + Discretionary)

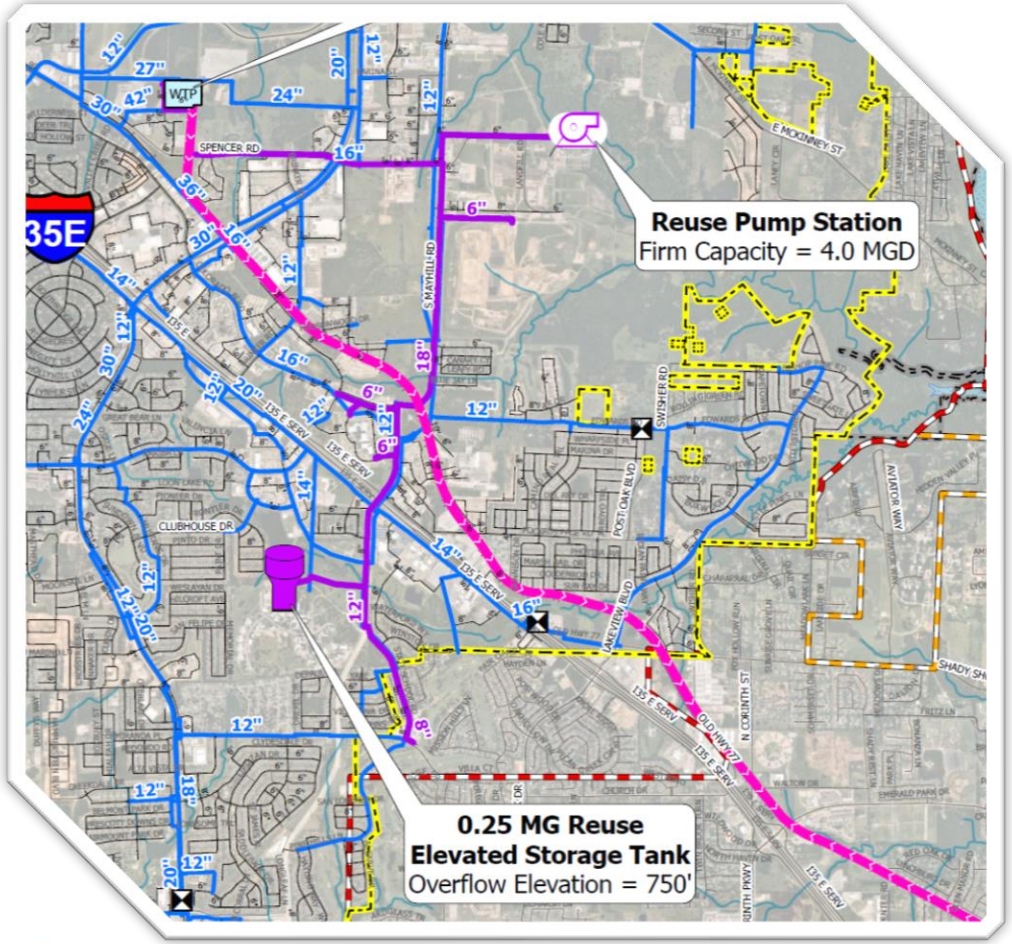


Water Rights Planning

- Water rights planning is a balance between system expansion and redundancy creation.
- Available methods to expand water portfolio:
  - Paper Water – increase available water through permits and authorizations
  - Wet Water – develop other water sources
  - Conservation – limit the amount of water used for “non-essential” uses such as lawn irrigation and vehicle washing
  - Reuse – creative use of reused treated wastewater
  - Negotiated Purchase – currently working with Dallas to purchase water

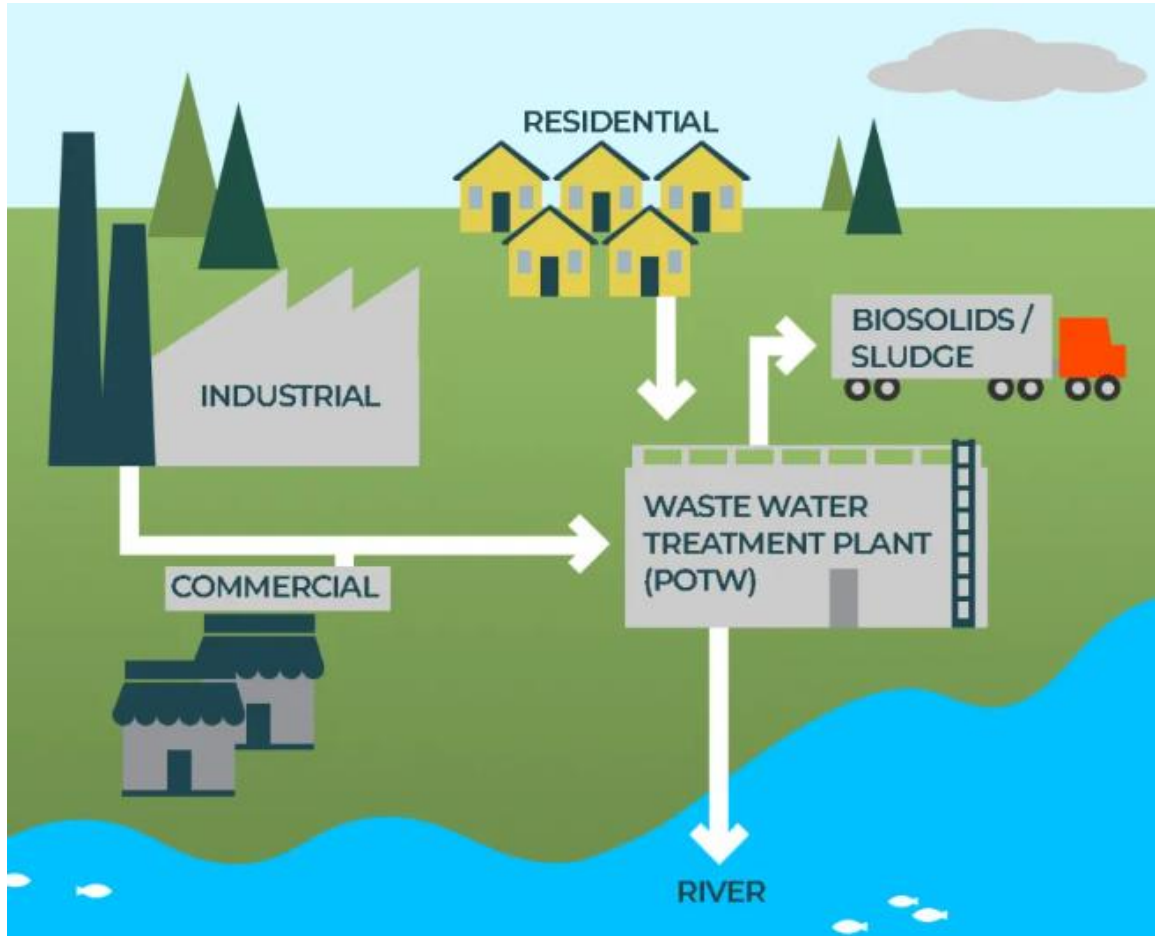
Wastewater Considerations

Denton's History of Reuse Water



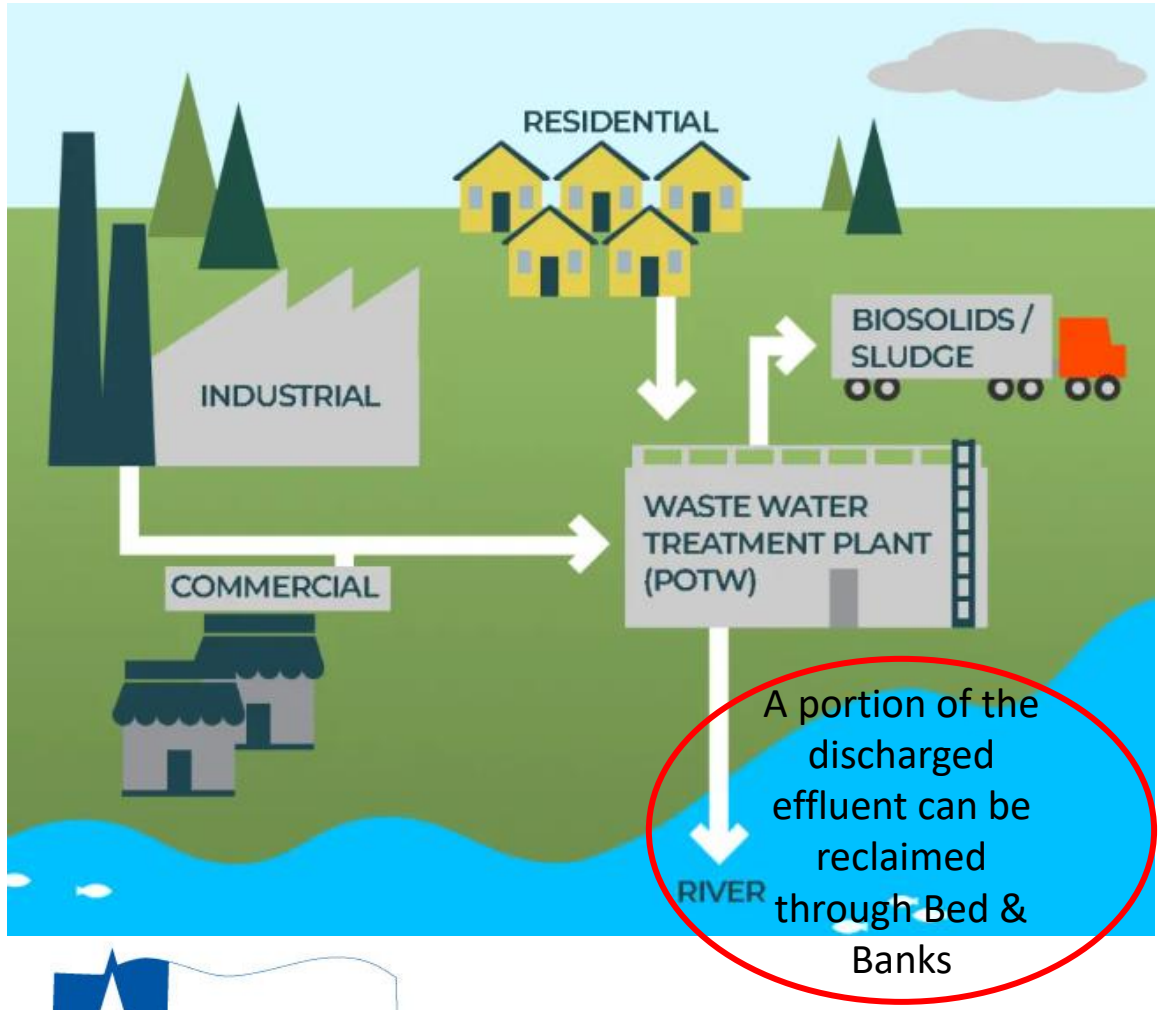
- 1971 – Pecan Creek effluent utilized for cooling towers of Spencer Street Generating Station
- 1999 – City looks to expand reuse system for either industrial use or irrigation
- 2002 – Reuse system expanded for irrigation purposes
- The reuse system bolsters Denton water rights through a "wet water" approach that lowers demand on the potable system and reduces how much water is accounted against our right to draw water from the lakes

Water Reclamation Basics



- Collection
  - Wastewater collected in underground pipes that flow to the Water Reclamation Plant (WRP)
- Treatment
  - WRPs utilize several technologies to clean and treat the water
- Discharge
  - Biosolids/Sludge are removed to be composted (DynoDirt) or disposed of (landfill)
  - Effluent (cleaned water) is discharged into local streams and waterways and into the beneficial reuse system

Bed & Banks Permit Explained



- Bed & Banks is a permit issued by TCEQ that allows us to reclaim some of the treated effluent discharged back into the lake to be retreated into potable water.
  - A form of Indirect Potable Reuse
- This bolsters water rights through a “paper water” credit. There is no additional water, but since we have a right to use it initially, we maintain a right to reuse a portion of it.
- The Bed & Banks permit goes through continual amendments to increase the amount we can reclaim

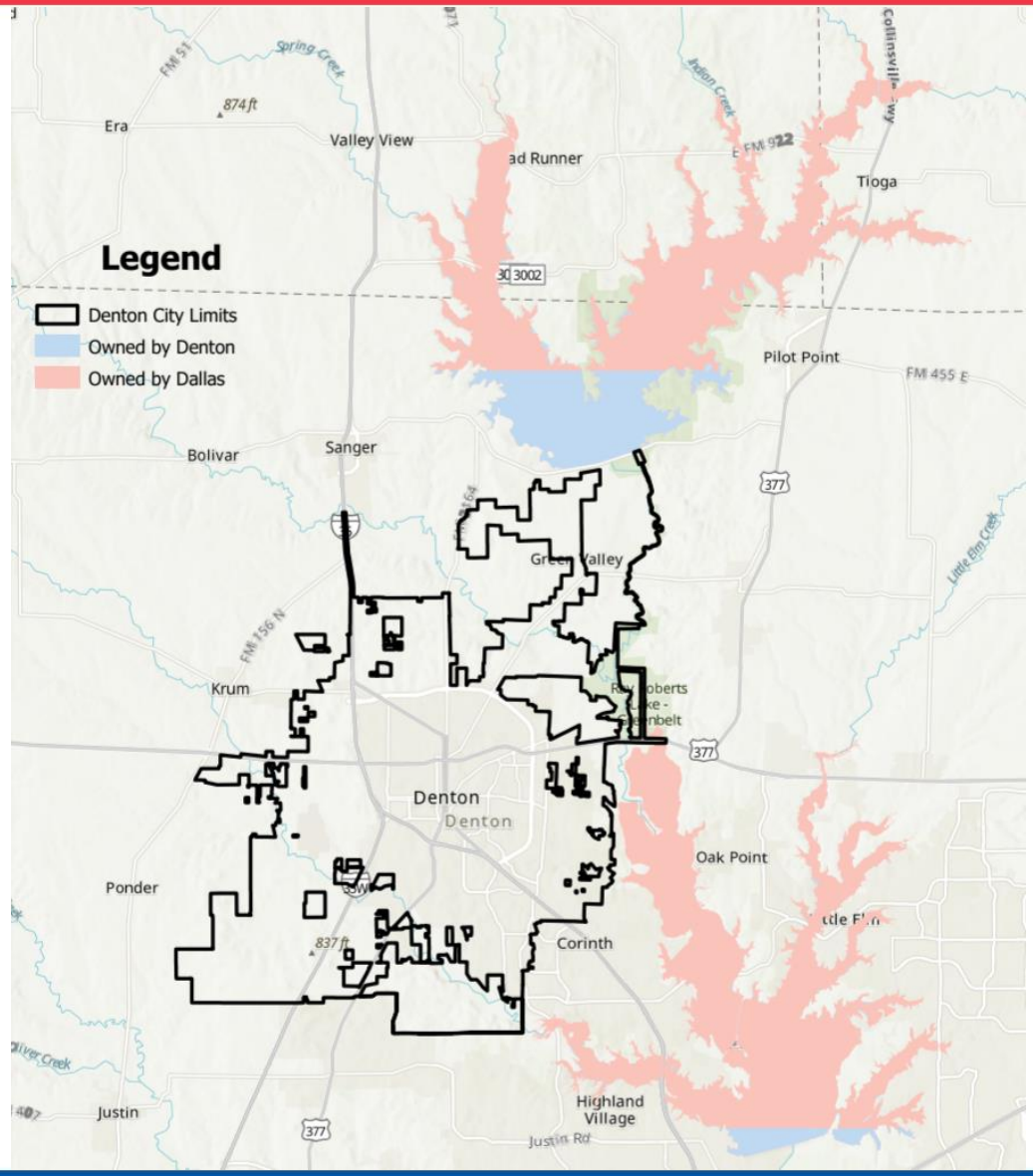
Water Conservation and Drought Contingency Plan

- During drought, usage can be curtailed by enacting the Water Conservation and Drought Contingency Plan
  - Enacted Stage 2 in August - October 2024 due to operational issues
  - Resulted in a 5 MGD drop in demand for a 12% reduction

	Stage 1 Mild	Stage 2 Moderate	Stage 3 Severe
Supply	Lake Levels 65%	Lake Levels 50%	Lake Levels 35%
Demand	85% (42.5 MGD - 4 days)	90% (45 MGD - 3 days)	95% (47.5 MGD - 2 days)
Operational	Situational – Including, but not limited, to mechanical failure/infrastructure failure, contamination		

Wastewater's Impact on Water Rights

- Standard Water Rights:
  - Firm Yield: 24.1 MGD
- Added through Wastewater
  - Bed & Banks: 12.05 MGD max
  - *Plus reduced demand on water rights through reuse system and conservation
- Total
  - 36.15 MGD



Growth Projections

Growth Projection Basis

3.2.5. GROWTH PROJECTIONS AND PHASING

Population growth rates were determined for the 5, 10, and 25-year planning periods. For the 5-year period, Kimley-Horn determined an 8.1% compound annual growth rate based on the unit counts provided by the known developments (Section 3.2.3). Kimley-Horn worked with the City to establish a 3.5% growth rate for the 10-year planning period and a 2.0% growth rate for the 25-year period that account for the known multi-phase developments and additional growth throughout the City (Figure 3.2).

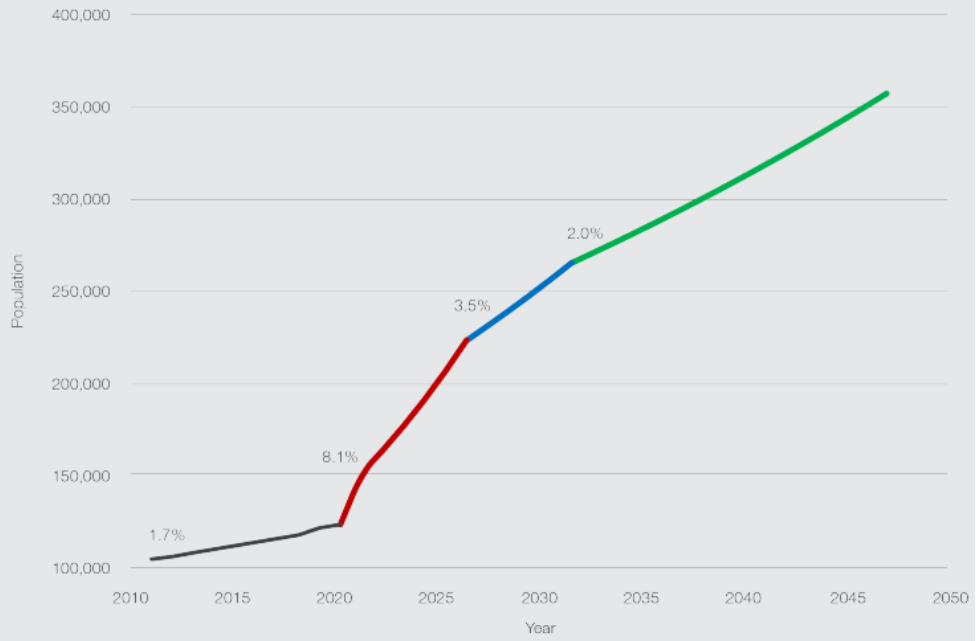
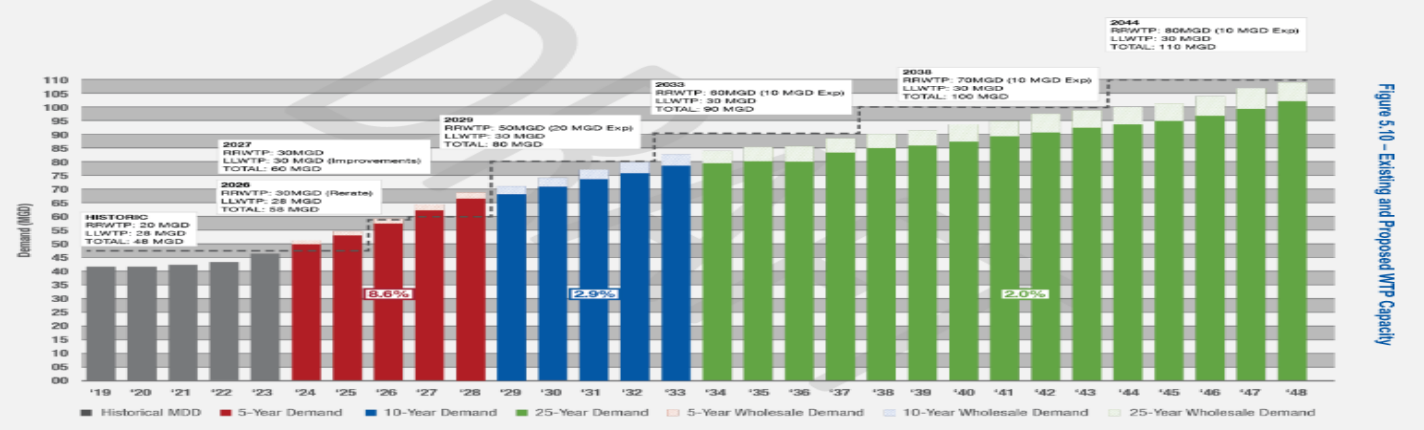
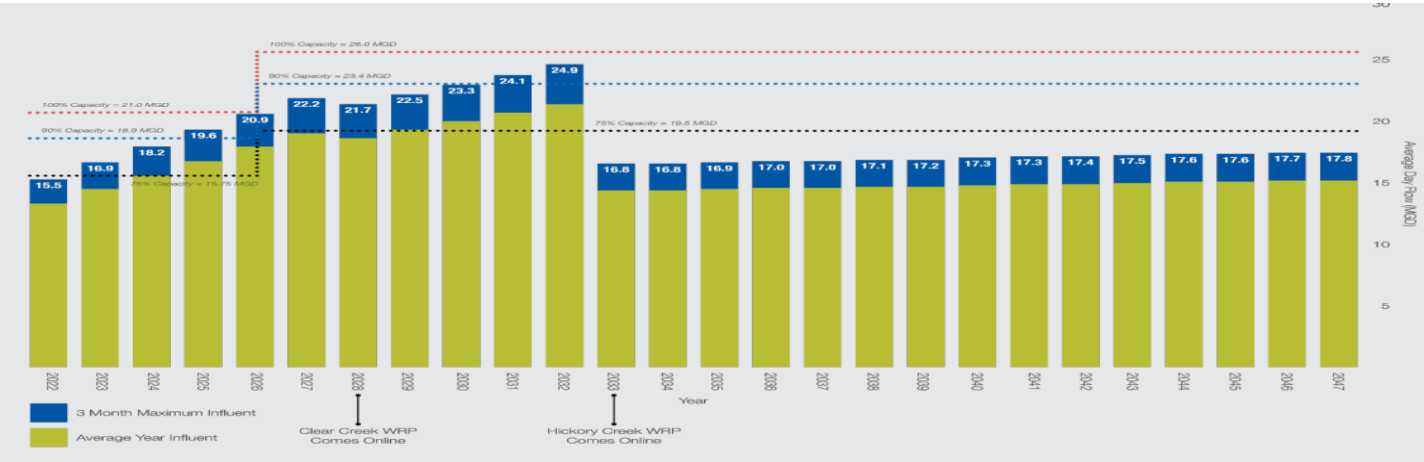


Figure 3.2 – Population Growth Rate

- Master Plans use community planning efforts and known developments to anticipate growth rate and demand increases
  - Denton 2040 Comprehensive Plan
- Estimated population growth is then multiplied by per capita usage expectations to create demand expectations
  - This is calculated as both the Average Daily Demand (ADD) and Maximum Daily Demand (MDD)

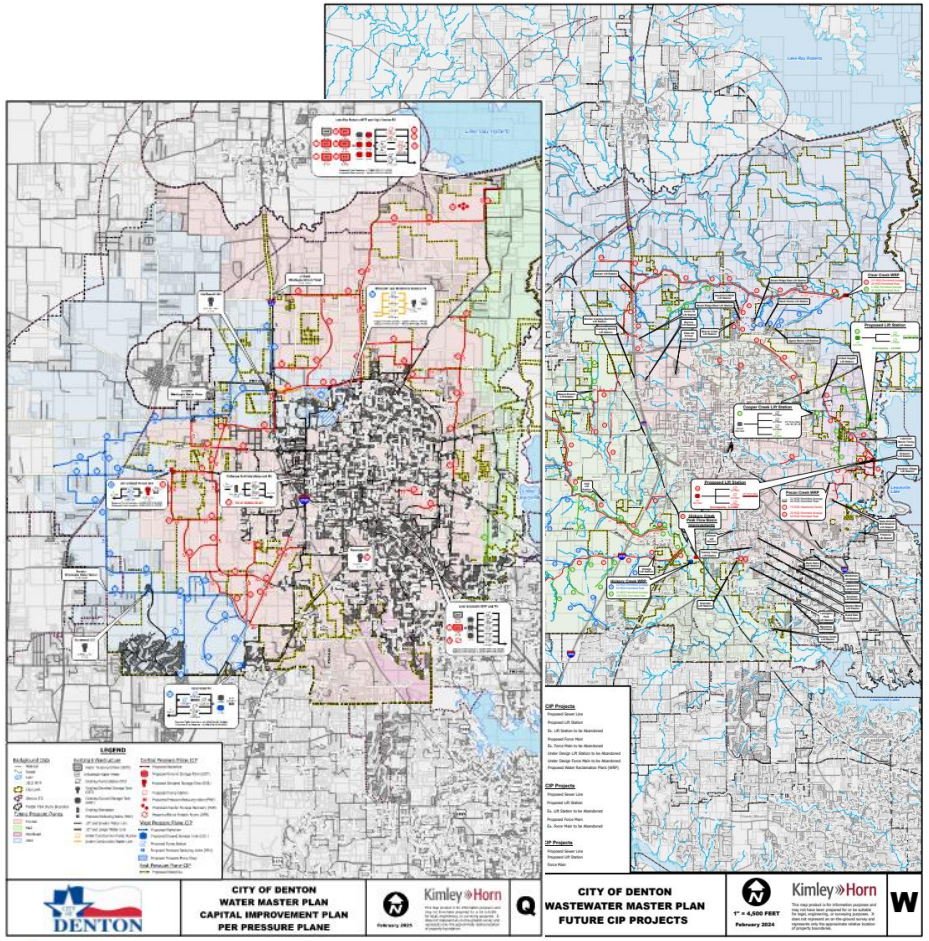
Population Growth vs Treatment Capacity





- The demand is then compared to existing treatment capacity to determine timing and size of additional capacity for both Water Treatment and Water Reclamation Facilities
- TCEQ requirements dictate timing of design and construction of Water Reclamation Facilities
  - 75% capacity – design started
  - 90% capacity – construction started

Capital Improvement Plan

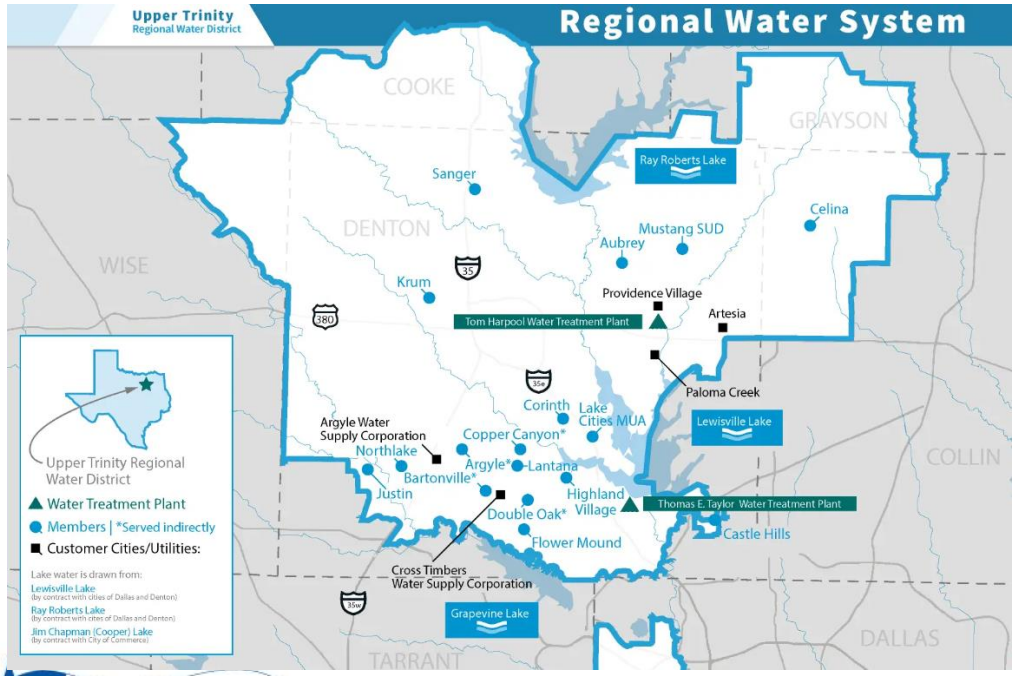


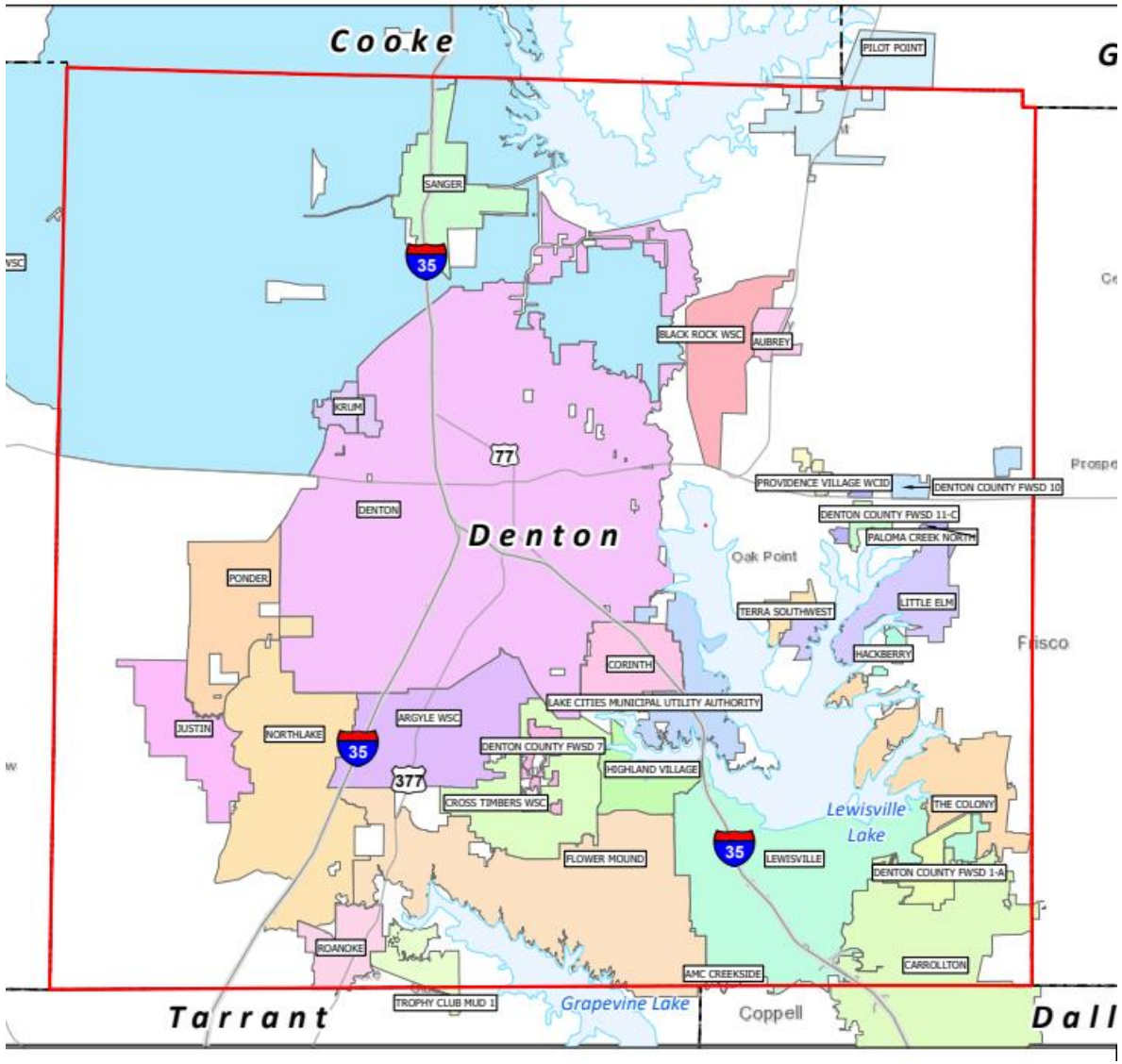
- The Capital Improvement Plan (CIP) is assembled based off the comparison of existing infrastructure, planned growth, and treatment requirements
  - The City's annual budget uses the 5-year CIP
  - Plans are created for up to 25 years in the future
- The CIP is used to
  - Calculate impact fees to help fund infrastructure required to support growth
  - Establish maintenance schedules for infrastructure replacement

OneWater Planning

Regional Water Landscape

- Denton is part of the Region C Water Planning Group (RCWPG) of the Texas Water Development Board (TWDB)
- We also work closely with the Upper Trinity Regional Water District (UTRWD)





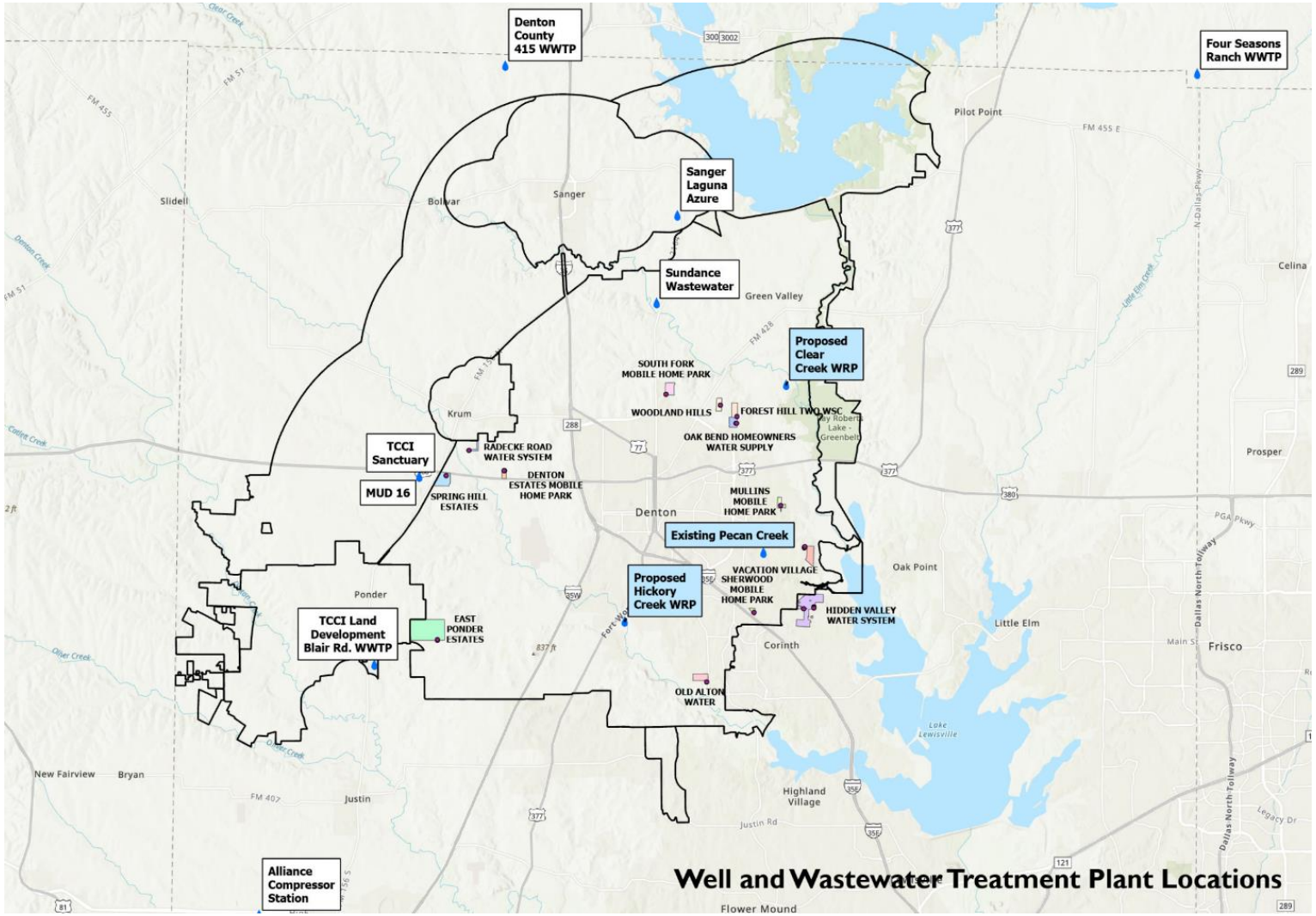
Upper Trinity Regional Water District

- UTRWD
  - Created in 1989
  - Focus is developing other water supplies to connect outlying portions of Denton and surrounding counties
- The City of Denton has historically partnered with UTRWD to provide wholesale water services to several member cities
  - Sanger, Krum, and Corinth
- Denton's focus has recently shifted to the local regionalization of our ETJ and neighbor cities

Denton's Focus on the ETJ

Focus on our ETJ addresses Water and Wastewater risks to Denton's Watershed

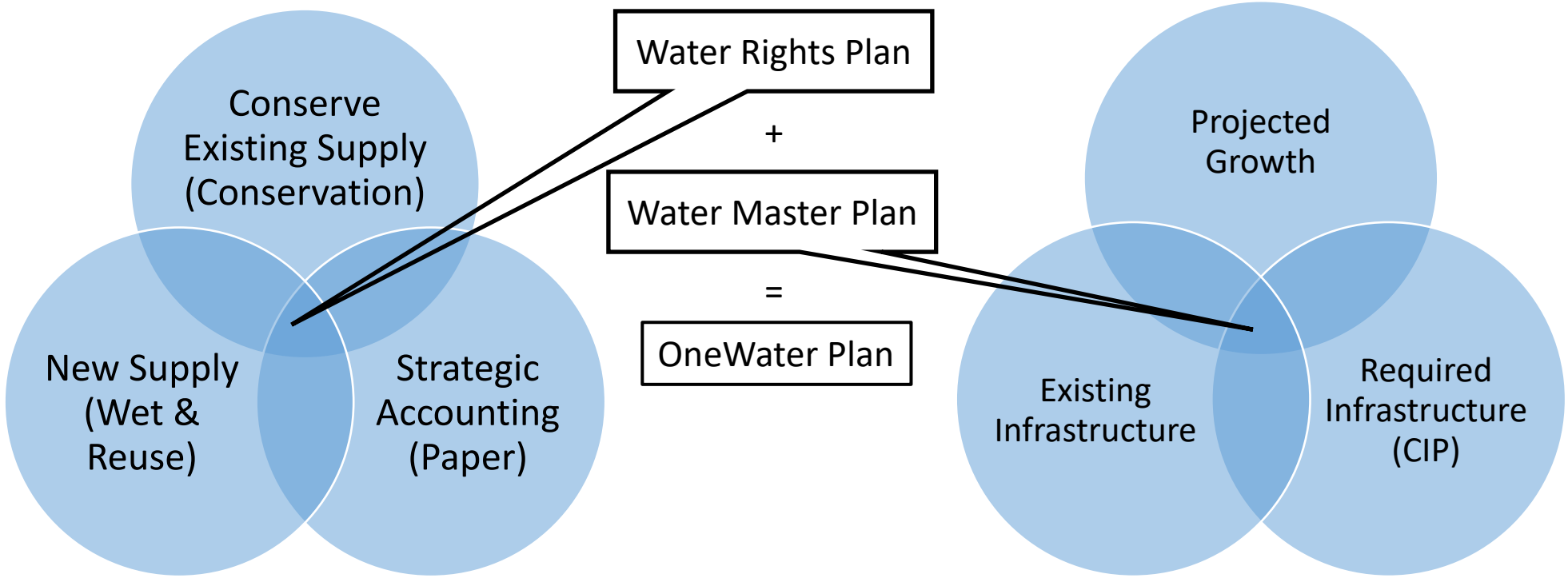
- Water Risks
  - Supply
  - Outlying dependence on wells
  - Water Quality
- Wastewater Risks
  - Independent "Package Plants"
  - Stream/River water quality
  - Access to reuse



Comprehensive OneWater Planning

Water Rights Planning ensures we legally maintain enough water to use.

Water Master Planning ensures we can efficiently treat and deliver that water.



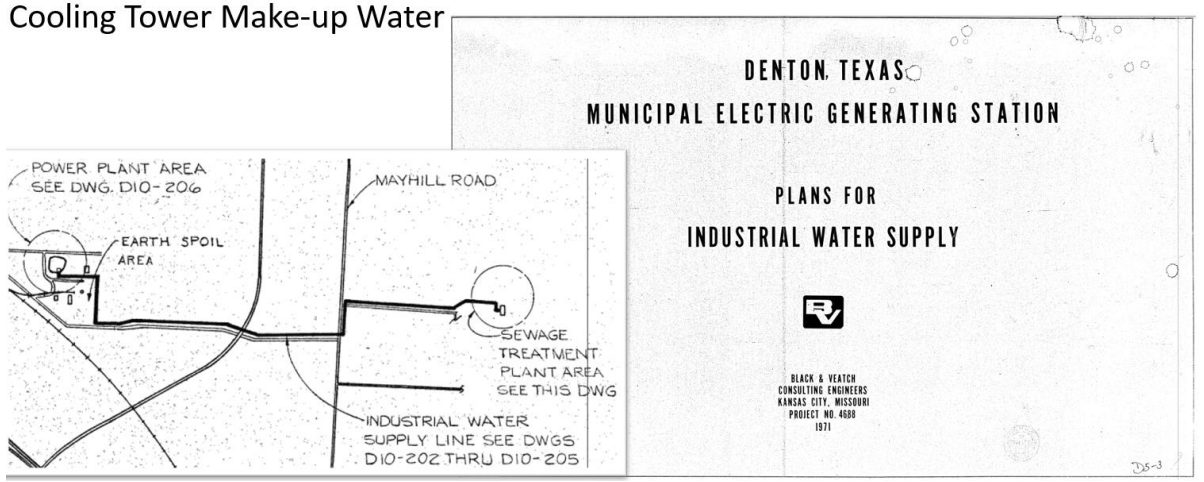
How Denton Differs

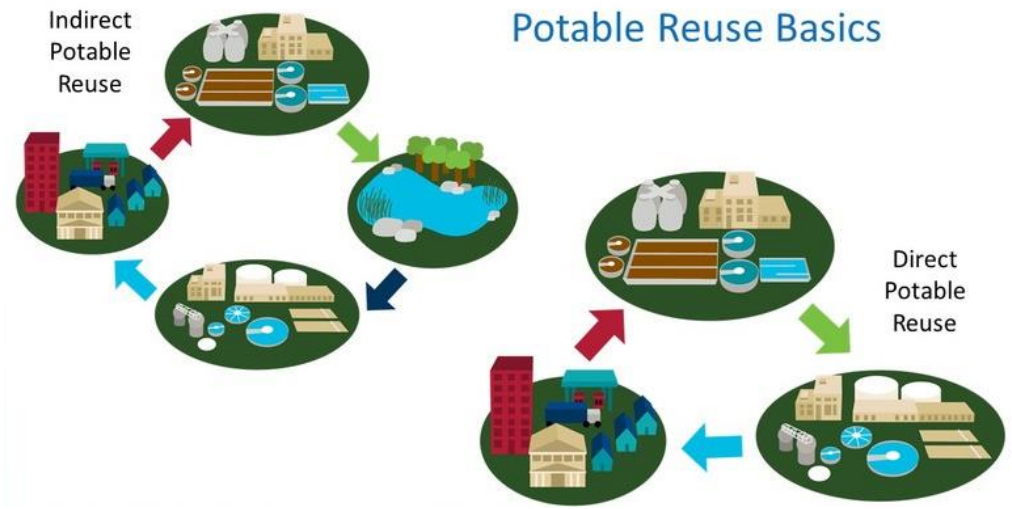
Denton was an early adopter of a “OneWater” approach since the reuse system was first created in the 1970’s and expanded in the 1990’s.

With heavy population growth on the horizon, Denton strives to maintain, grow, and respect our precious water supply.

Early Adoption of Reuse (1971):

Cooling Tower Make-up Water





Questions?