Water Supply Engineering Feasibility Study

Water Advisory Board Update

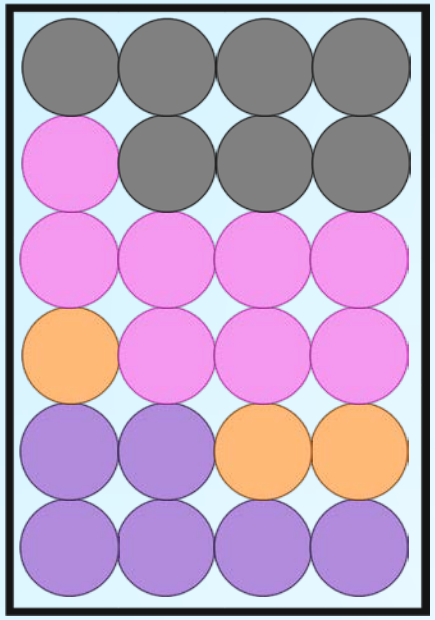
September 24, 2018

Agenda

- Review of Alternative Evaluation Process
- Detailed Evaluation of Water Supply Options
- Recommended Water Supply Strategy
- Next Steps

Alternative Evaluation Process

Initially Identified Options



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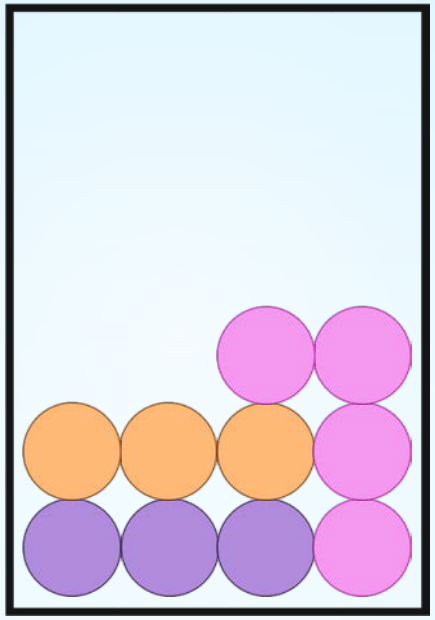
After Fatal Flaw Analysis



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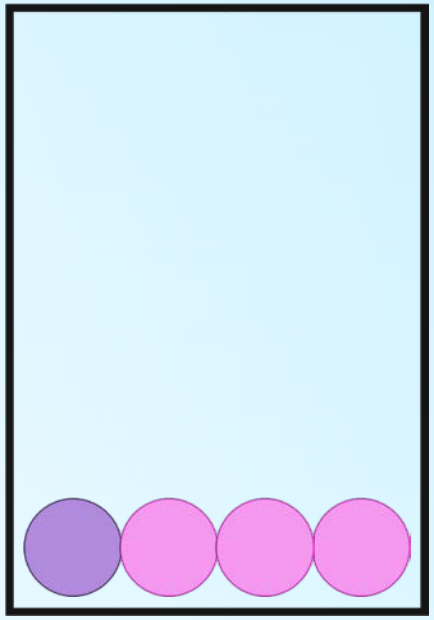
After Screening Workshop



n = 4

Groundwater Options

Purchased Water Options

Potable Reuse Options

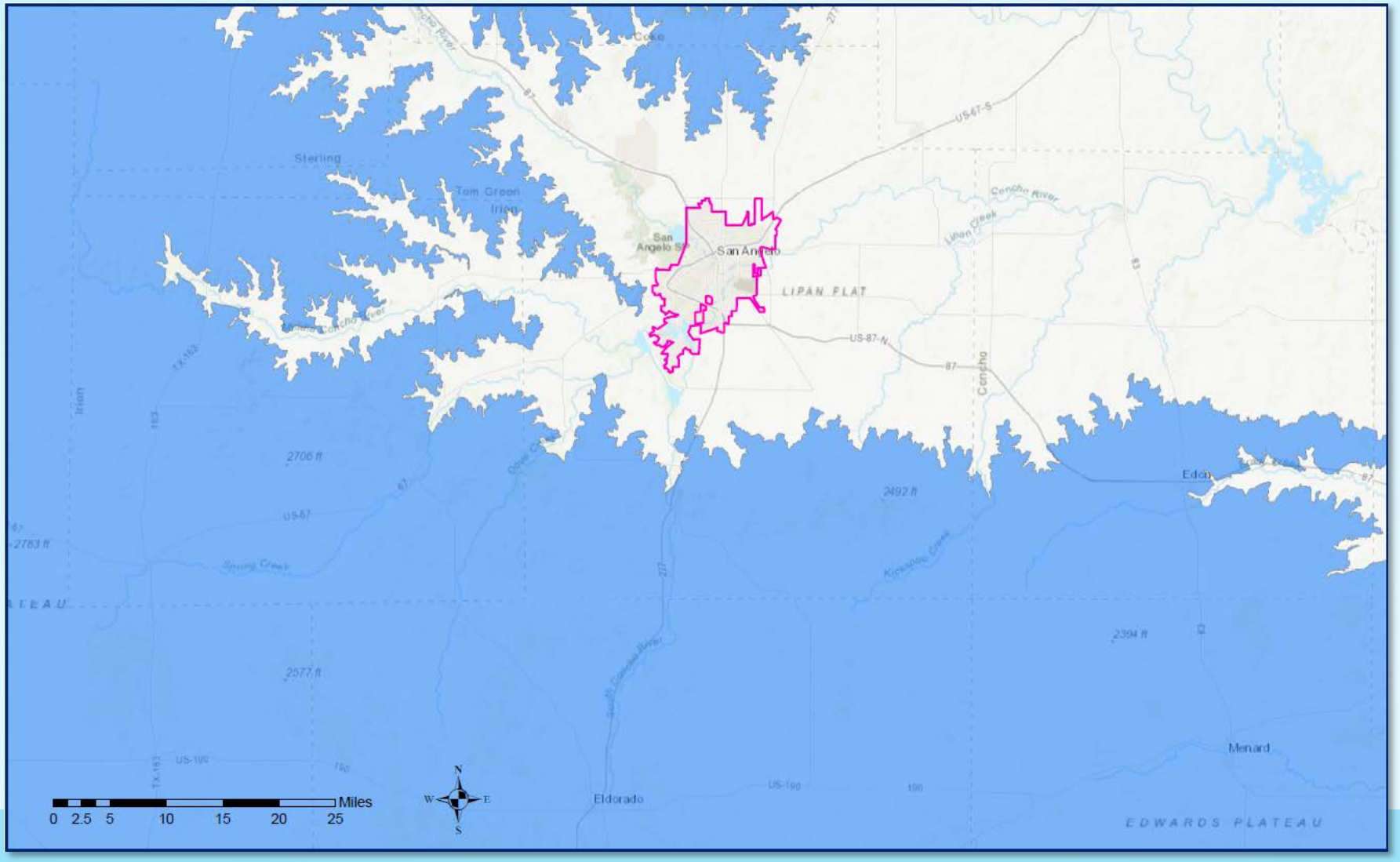
Other Options

Options Considered in Detailed Evaluation

- Edwards-Trinity Plateau Aquifer
- Augmentation of Lake Nasworthy
- Direct Potable Reuse
- Concho River Water Supply

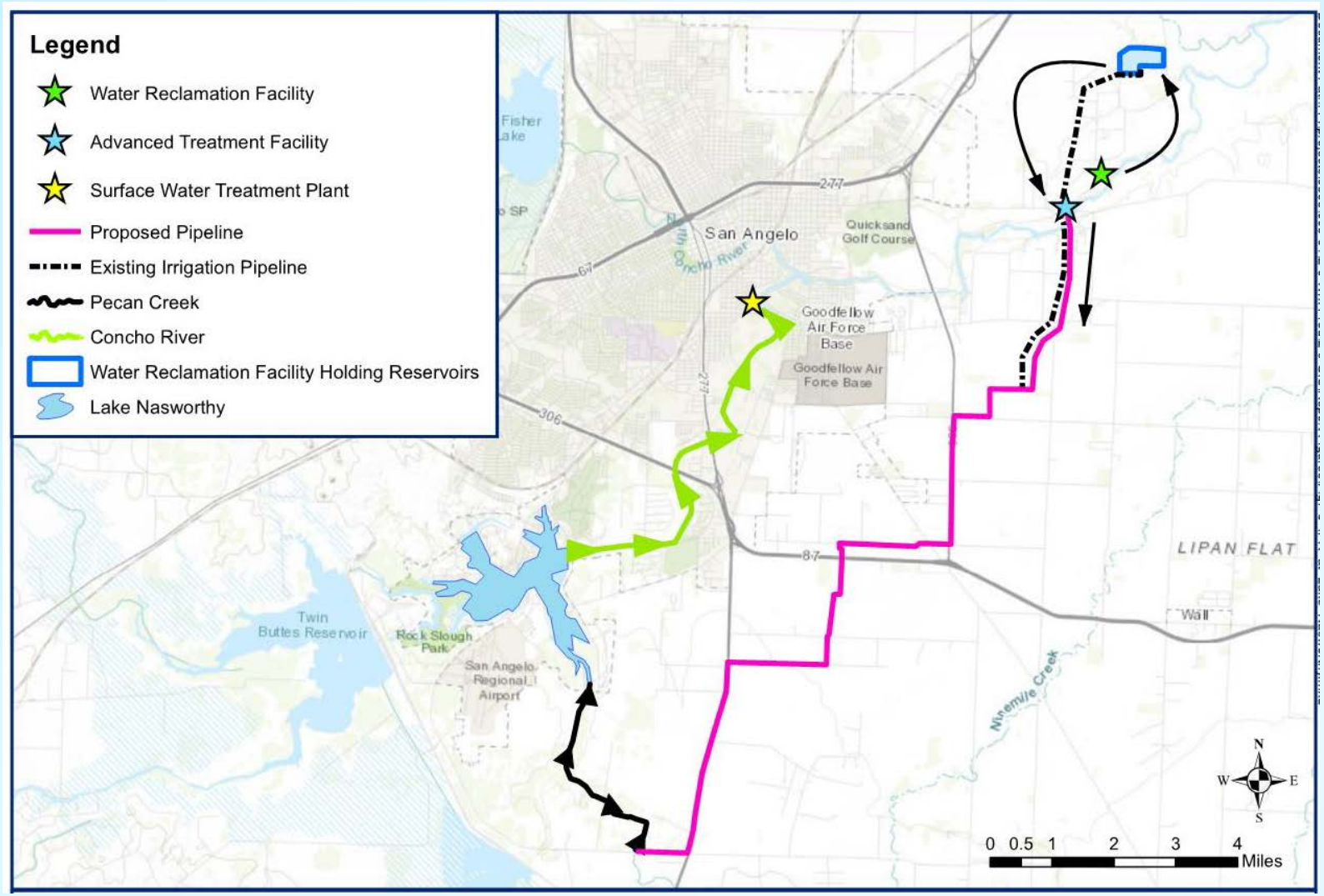
Detailed Evaluation of Water Supply Options

Edwards-Trinity Plateau Aquifer



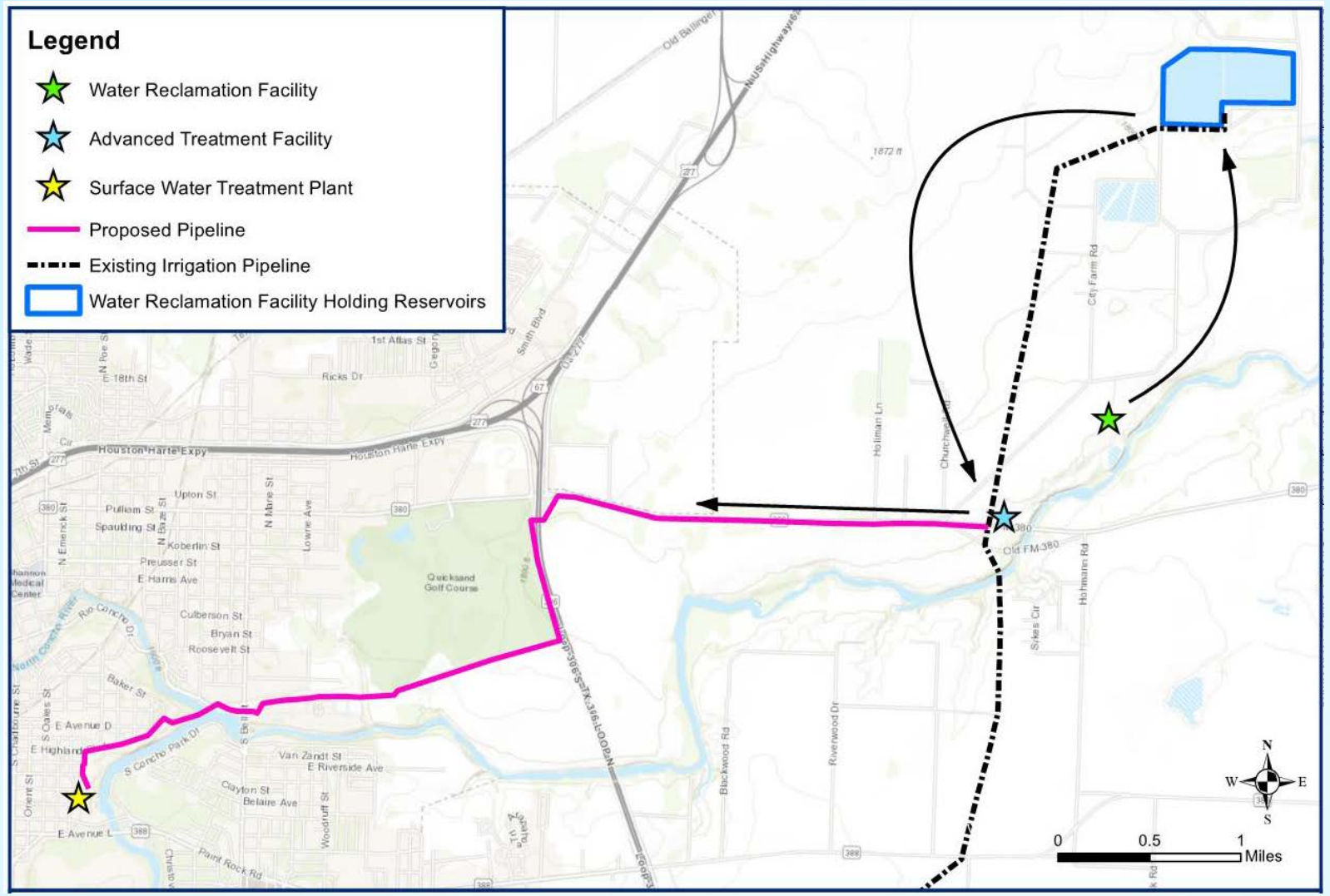
Detailed Evaluation of Water Supply Options

Augmentation of Lake Nasworthy



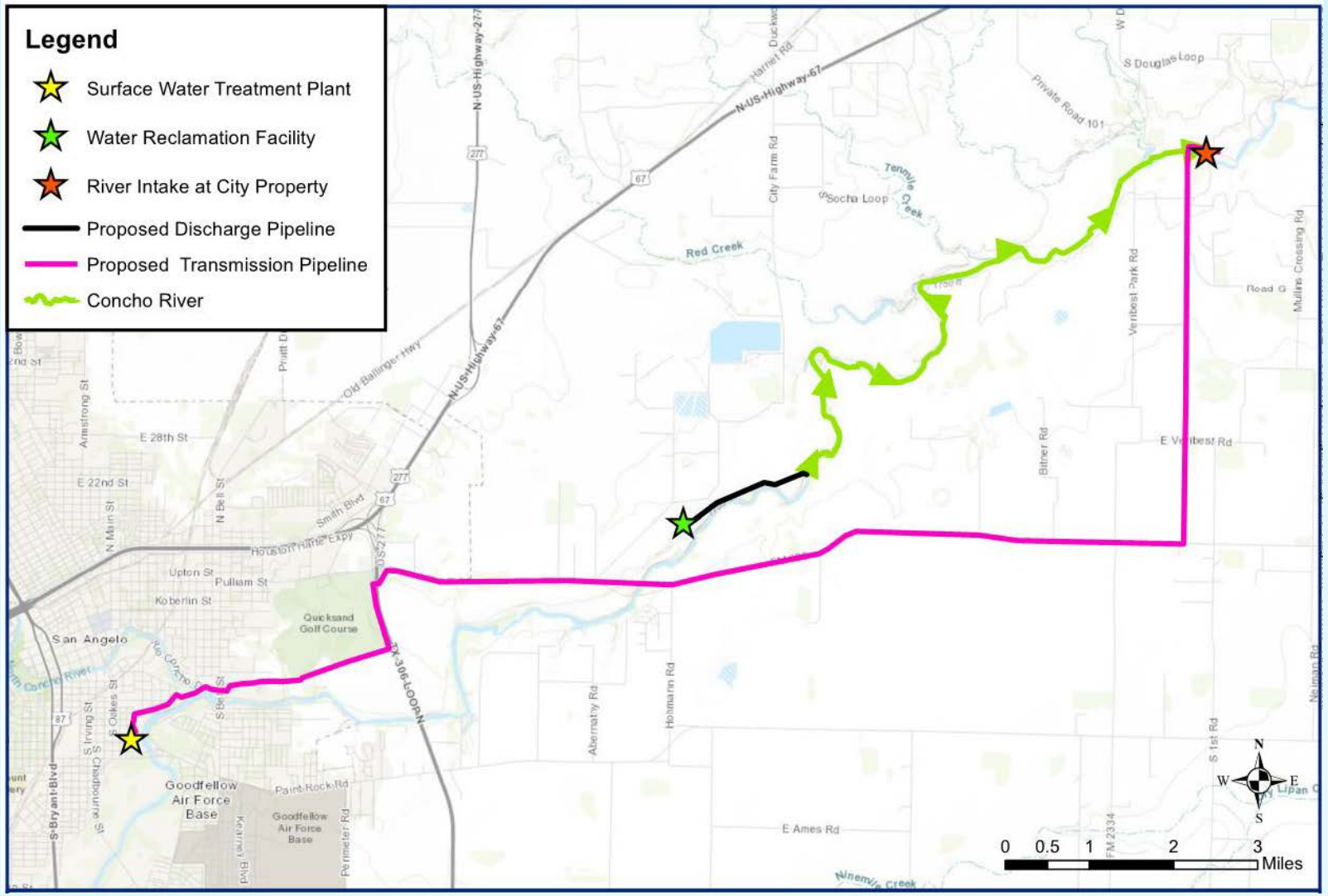
Detailed Evaluation of Water Supply Options

Direct Potable Reuse

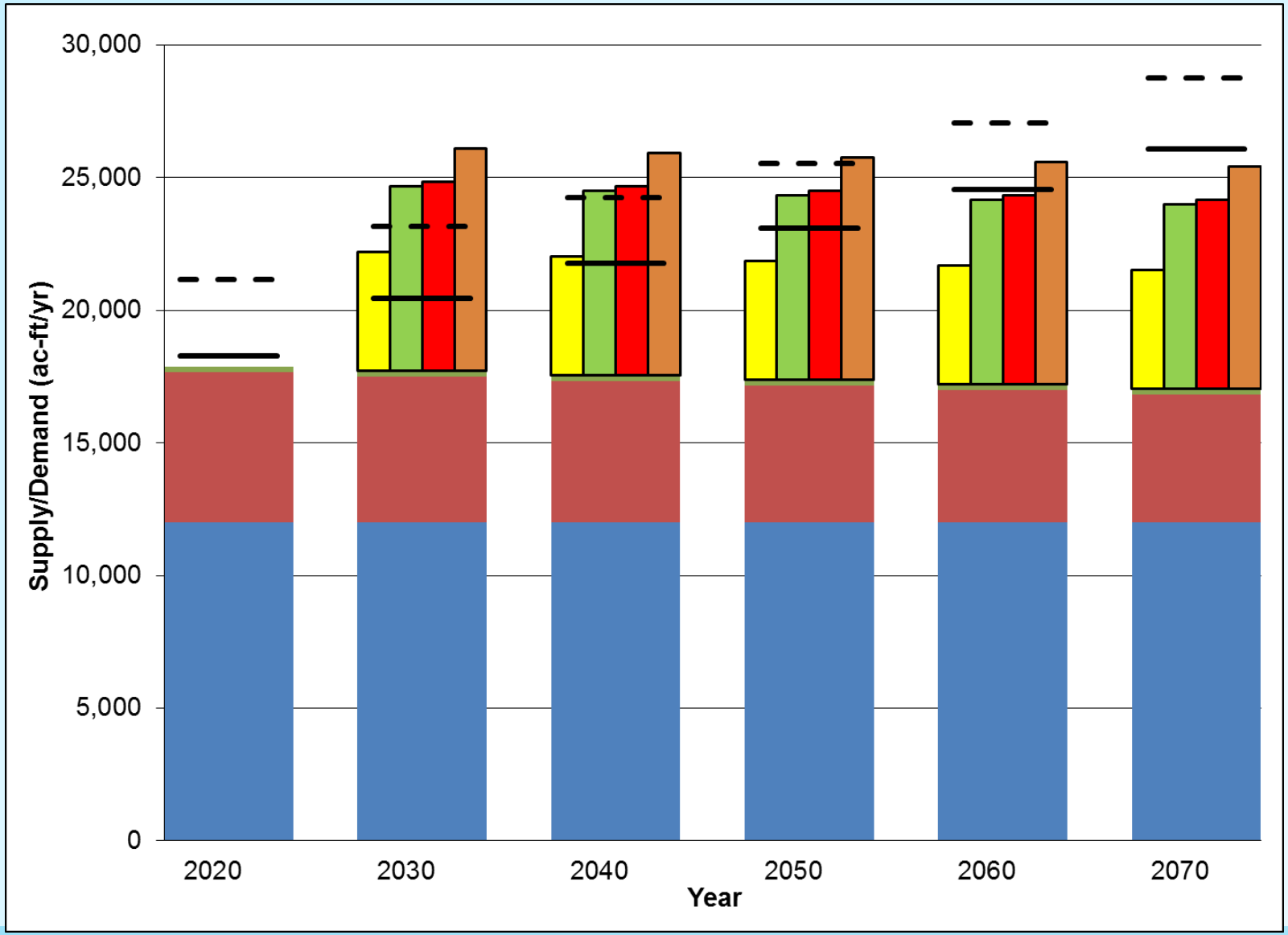


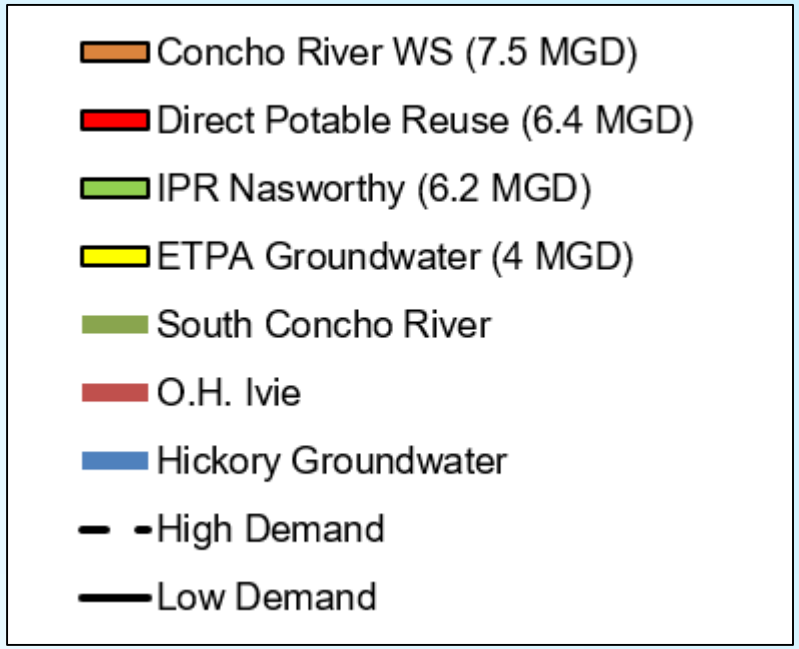
Detailed Evaluation of Water Supply Options

Concho River Water Supply



Comparison of Project Yields





Detailed Evaluation of Water Supply Options

Opinions of Probable Cost

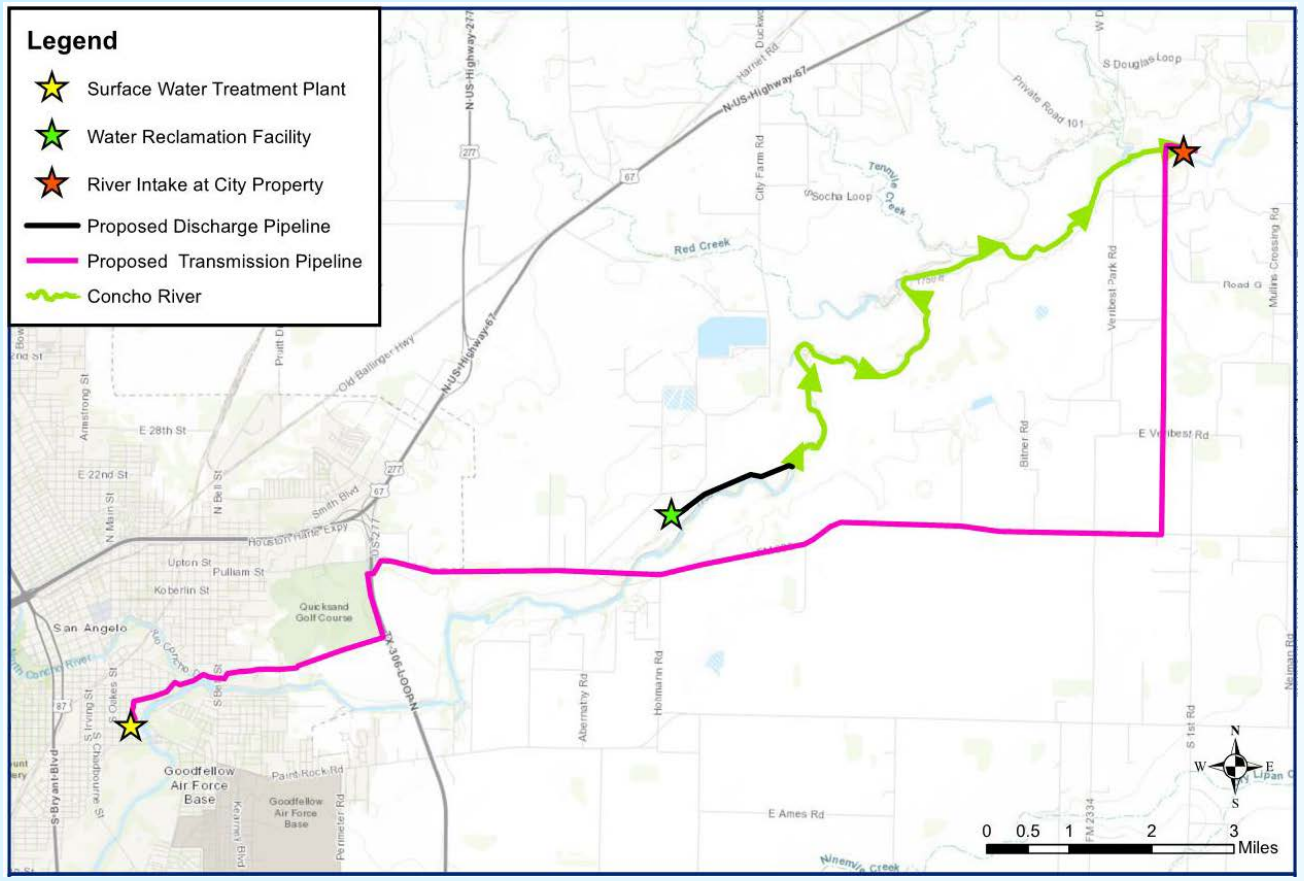
Option	Project Yield (MGD)	Project Cost* (million)	Annual O&M (million)	Unit Cost w/Debt ($/kgal)	Unit Cost w/o Debt ($/kgal)
Groundwater	4.0	$102	$0.9	$5.76	$0.64
Nasworthy Augmentation	6.2	$141	$4.1	$6.39	$1.82
DPR	6.4	$140	$5.3	$6.72	$2.29
Concho River Water Supply	7.5	$117	$2.3	$3.97	$0.83

*Includes engineering, permitting, mitigation, and land acquisition

Decision Matrix- Detailed Evaluation

Option	Edwards/Trinity Plateau Aquifer	Augment Lake Naswonthy with Reclaimed Water	Direct Potable Reuse	Concho River Water Supply		
Decision Factors (Criteria)	**6**	**11**	**16**	**17**	**Weight**	**Scale/Comments**
Permitting/regulatory challenges	2	3	4	3	6	The ease of resolving the legal, regulatory, permitting, and environmental challenges before implementation; 1= difficult to resolve regulatory issues; 5 = easy to resolve regulatory issues
Supply Quantity	1	3	3	5	20	The ultimate supply volume (in ac-ft/yr) 1: ≤ 5,000 3: ≤ 7,500 5: > 8,000
Supply Quality	4	3	5	3	8	Relative impact on drinking water quality 1: Greatest negative impact on drinking water quality 5: Greatest positive impact on drinking water quality
Operational Complexity	5	2	2	3	7	1: High complexity to operate 5: Low complexity to operate
Ownership	3	4	5	4	8	Based on objective rating of level of ownership/control SA has for the option; 5-full, 3-partial or 1-non-ownership
Reliability	3	2	5	3	9	Based on likelihood that supply volume is available 100% every year 1: Low reliability 5: High reliability
Sustainability	4	5	5	5	10	Based on likelihood that supply is available for long-term use (> 50 years) 1: Low sustainability 5: High sustainability
Public Acceptance	4	2.5	1	3.5	5	1: Low - greatest likely San Angelo citizens' concern about project 5: High - least likely San Angelo citizens' concern about project
Schedule	3	2	3	2	7	Relative length of strategy implementation schedule 1: >7 years 2: ≤ 6 years 3: ≤5 years 4: ≤ 4 years 5: ≤ 3 years
Unit Cost	2	1	1	4	20	1: > $6.00/kgal 2: ≤ $6.00/kgal 3: ≤ $5.00/kgal 4: ≤ $4.00/kgal 5: ≤ $3.00/kgal
TOTALS	**267.3**	**260.3**	**316.8**	**381**		Higher scores are more favorable Lower scores are less favorable
Relative Rank	3	4	2	1		

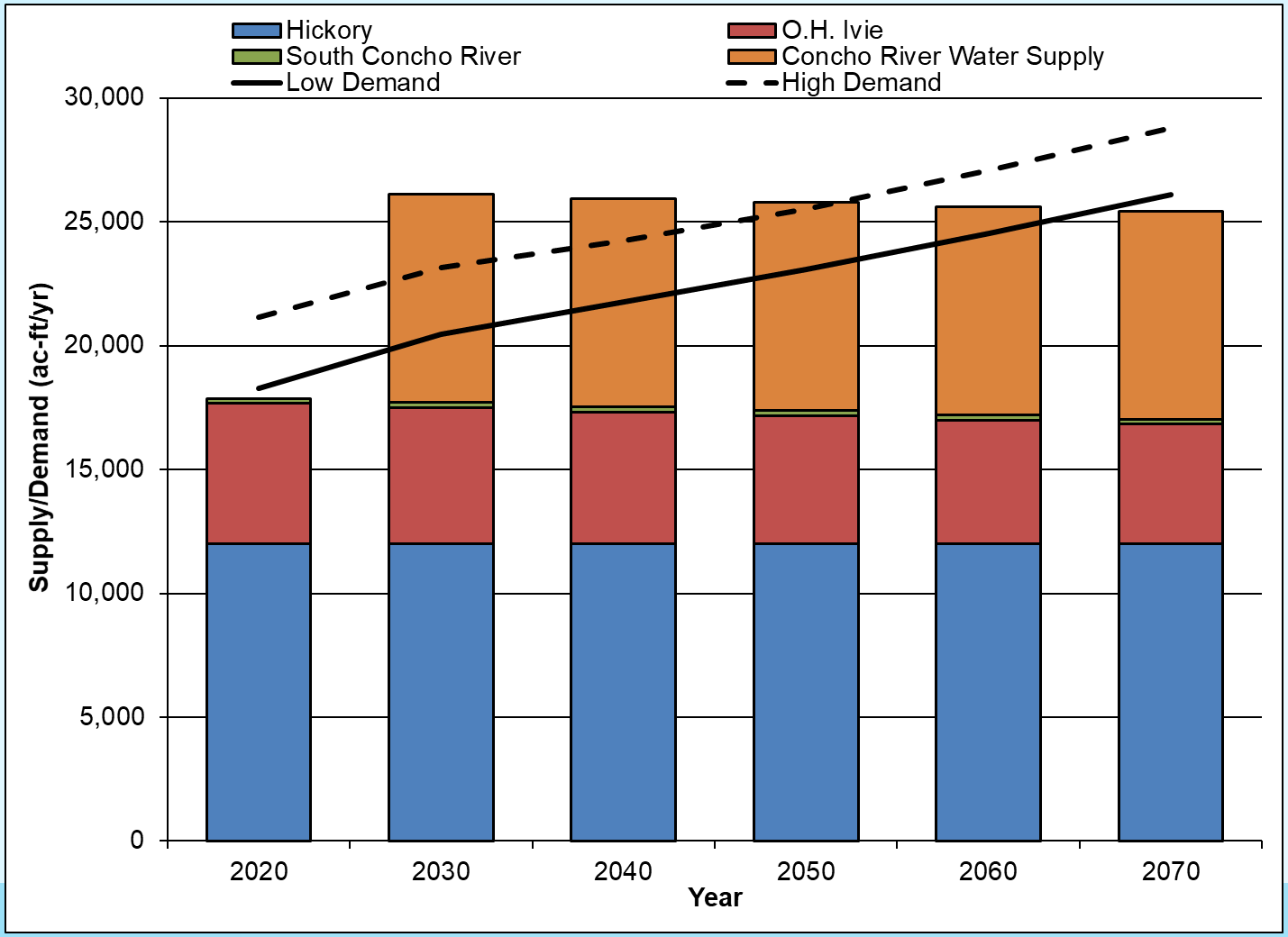
Recommended Water Supply Strategy: Concho River Water Supply



Benefits

- Lowest unit cost
- Highest yield
- Provides improved treatment infrastructure
  - Upgraded Water Treatment Plant
  - Upgraded Water Reclamation Facility

Supply vs. Demand with Recommended Water Supply Strategy



Recommended Water Supply Strategy

Next Steps

- Initiate permitting (authorized by City Council on 9/18)
  - Discharge from Water Reclamation Facility
  - Bed and Banks along Concho River
- Pilot and bench-scale testing of water treatment technologies
- Design
- Construction
- Start-up and Commissioning

Questions?

Water Supply Engineering Feasibility Study

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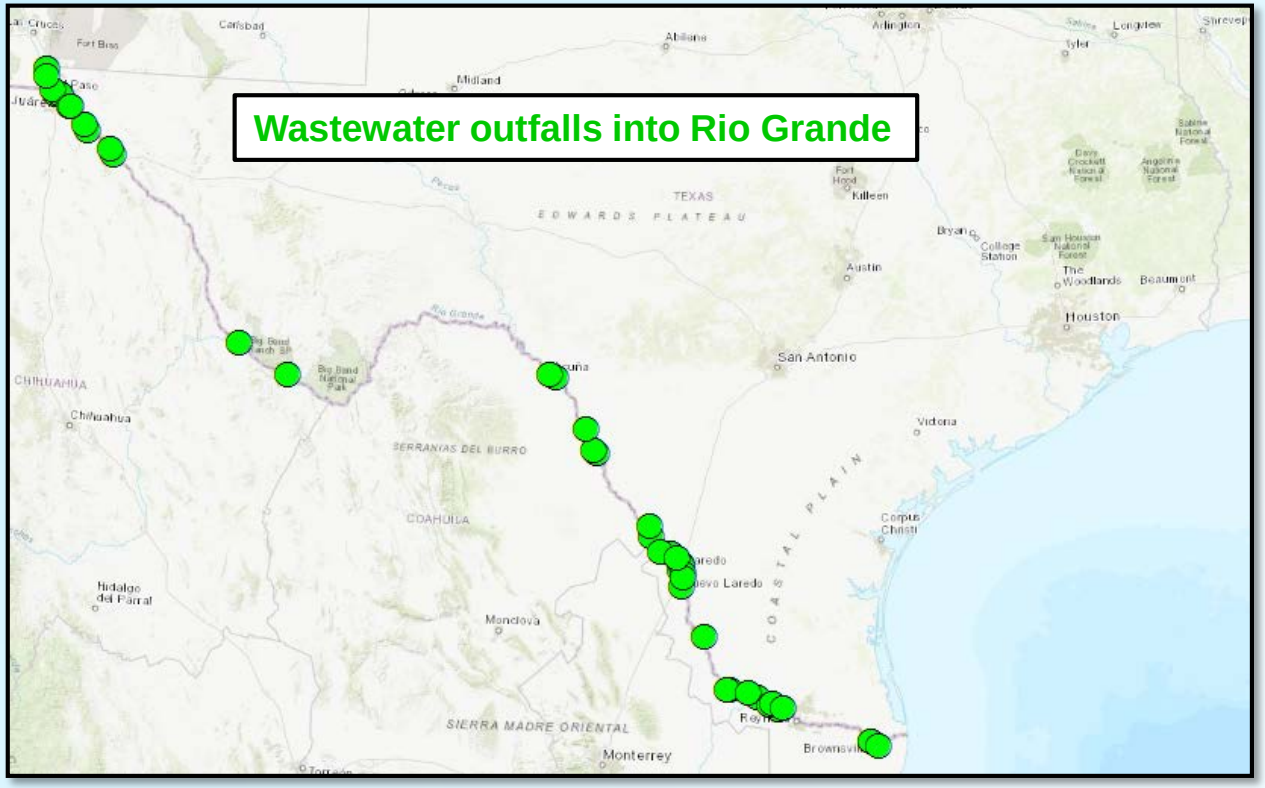
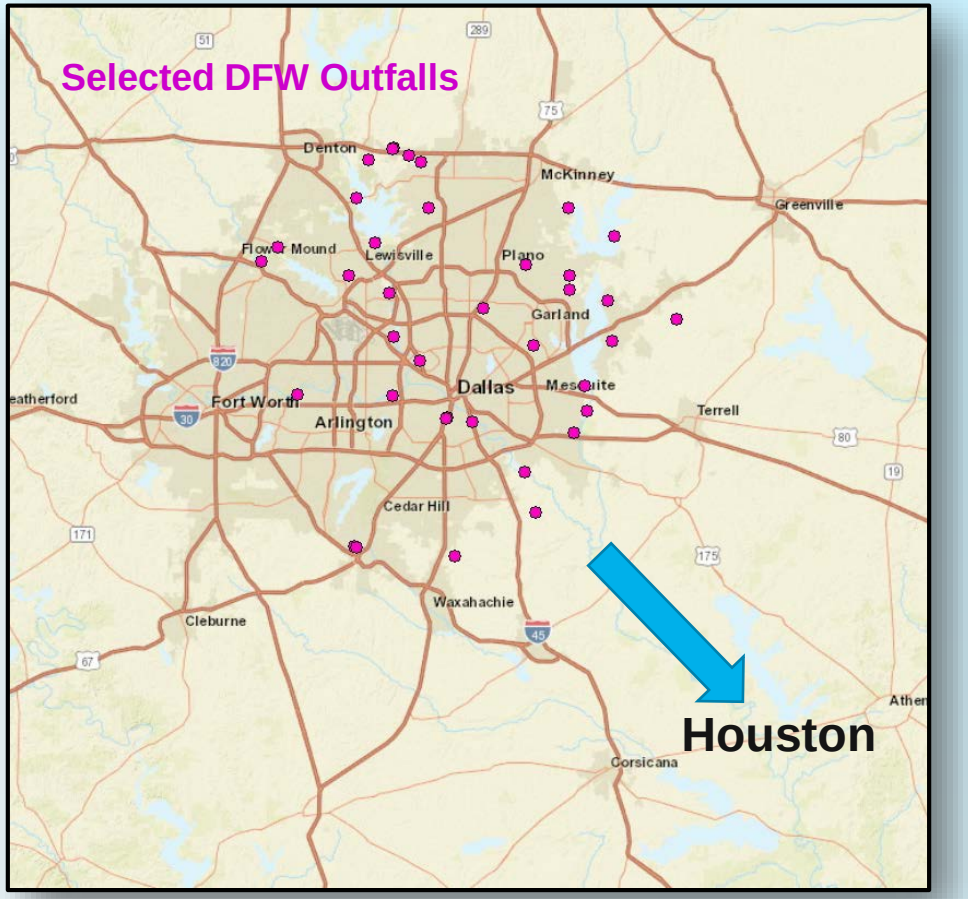
Wastewater Outfalls to Water Supply Rivers



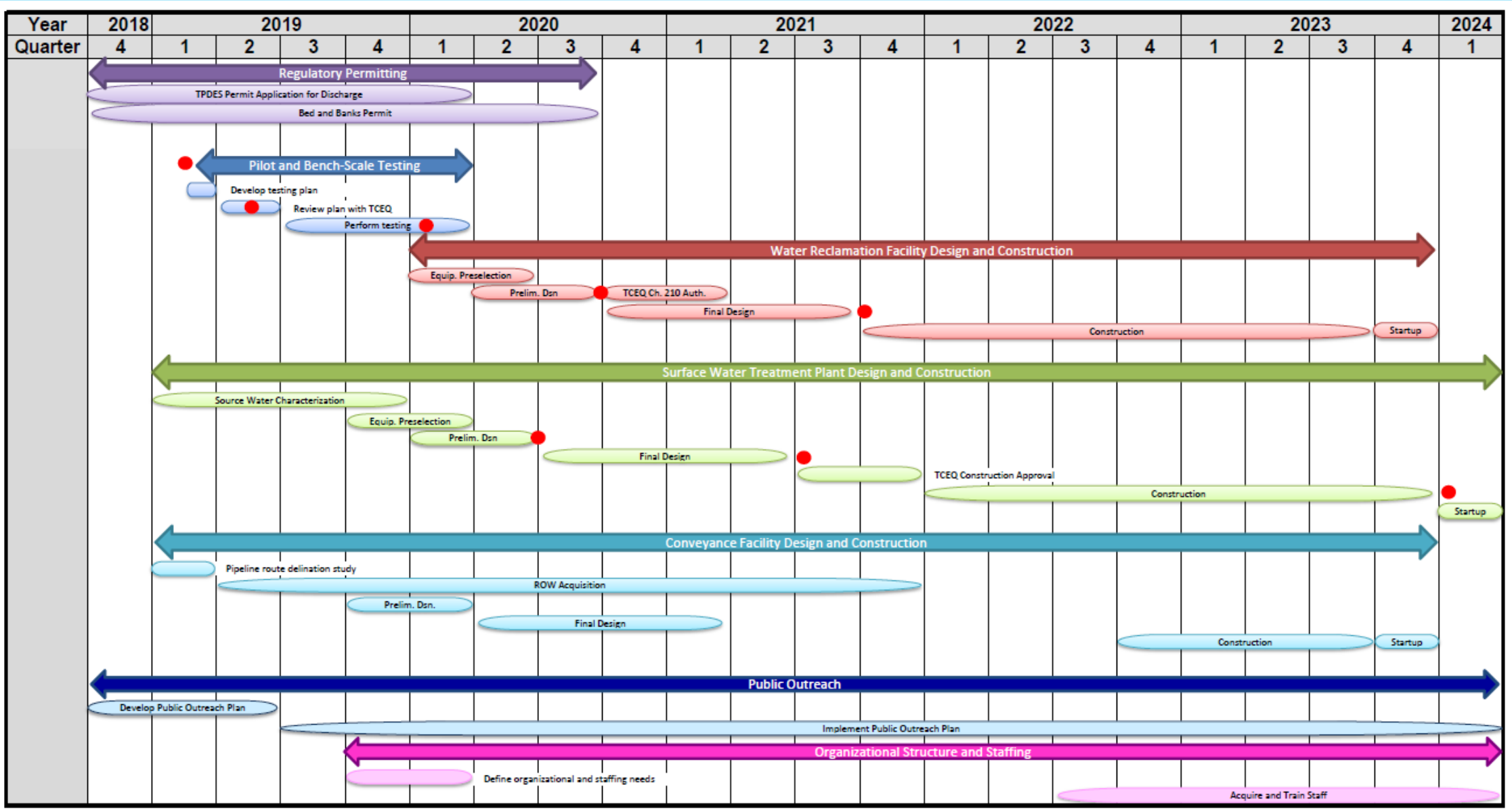


Typical Surface Water Membrane Facility

Water Supply Options Evaluated

#	Option	Fatal Flaw
1	Local Brackish Groundwater	Poor water quality and low well capacity
4	Capitan Reef Aquifer	Limits on aquifer recharge and poor water quality
5	Ellenburger Aquifer	Oil and gas production in aquifer.
10	Augmentation of O.H. Ivie Reservoir	OH Ivie not available during drought
12	Augmentation of Twin Buttes Reservoir	Twin Buttes not available during drought
13	Augmentation of O.C. Fisher Lake	O.C. Fisher not available during drought
15	Infiltration Basins	WRF subsurface conditions not ideal
18	Non-Potable Reuse	No additional supply during drought
19	Aquifer Storage and Recovery	Not a long term water supply
20	Red Arroyo	No additional supply during drought
21	Subordination	Unrealistic opportunity. Not long term solution
22	Brush Control	No additional supply during drought. Land access issues
23	Municipal Conservation	Not a significant supply during drought
24	Rehabilitate E.V. Spence Pipeline	Yield of E.V. Spence is zero.

Recommended Water Supply Strategy: Augmentation of Concho River



● Anticipated meetings with TCEQ

Note: Schedule is preliminary and is subject to change following meeting with TCEQ and during preliminary engineering