

Austin Water Resource Planning Task Force – Water Supply Augmentation

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Background

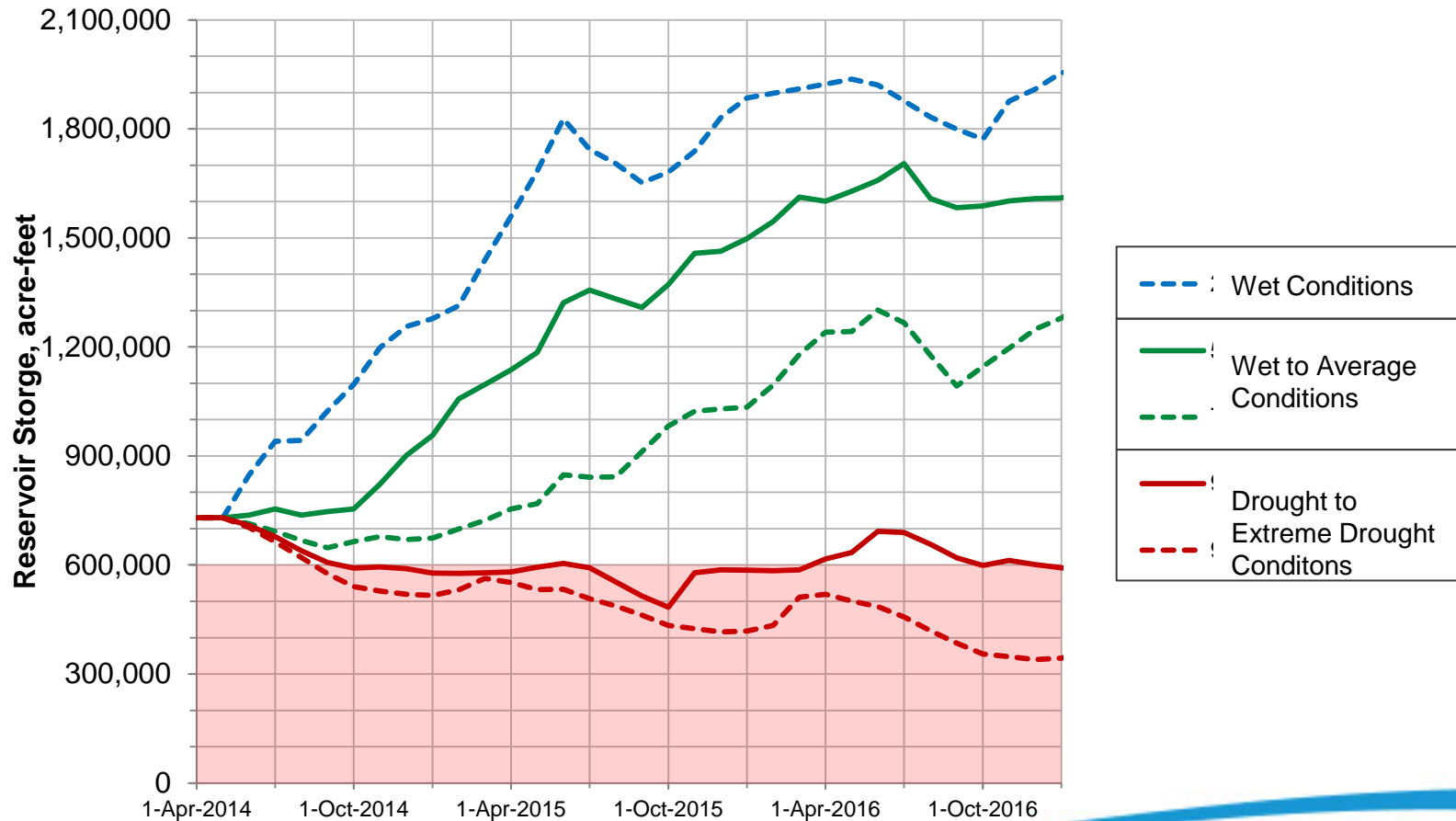
- Initiated review in August 2013
- Started with previously identified long-term strategies as a base
- Strategies that can be implemented in the near-term for drought response emphasized
- Protect/extend Highland Lakes storage

Background

- Attempt to minimize “Stranded Capital”
- Developed list of “possible” projects
 - “No stone unturned”
 - Projects may be mutually exclusive
 - Being on the list is not a recommendation

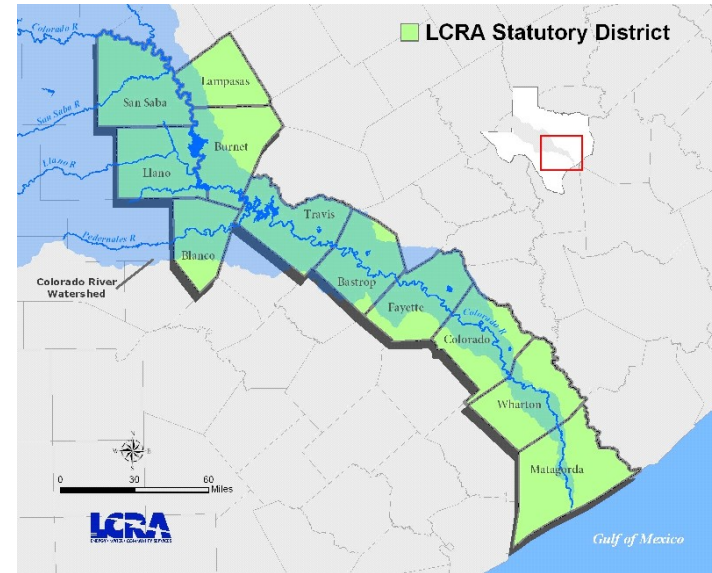
CRM Simulation with WAM

Period of Record Conditions



Colorado River Water Supplies

- Water Supplies
 - Run-of-River
 - Highland Lakes
 - Groundwater
- LCRA Water Management Plan
 - Environmental flows
 - Firm water
 - Interruptible water



Project Categories

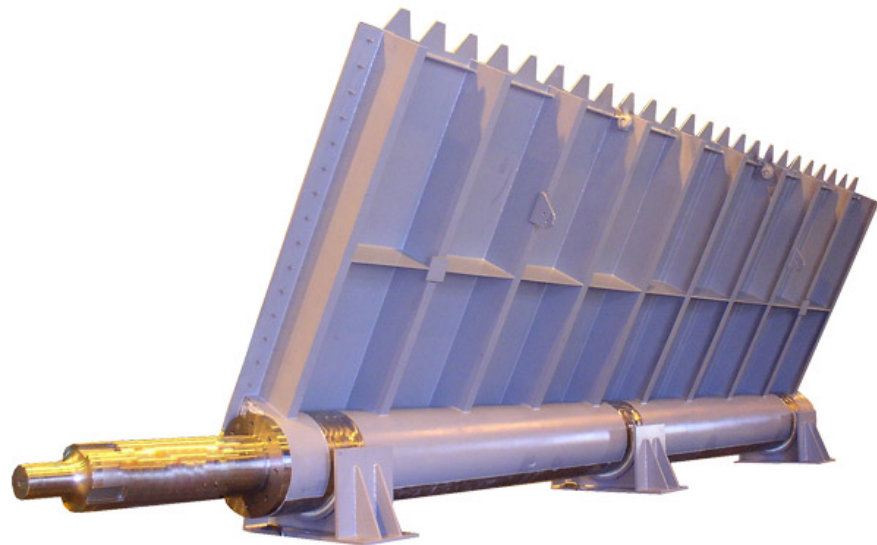
- Conservation (AWU staff)
- Direct Reuse (AWU staff)
- System operational improvements
 - More efficient use of existing supplies
 - Minimal capital required
- Enhanced operations
 - More efficient use of existing supplies
 - Capital investment required
- Alternative groundwater supplies
- Other mid- and long-term supplies

Operational Improvements (Minimal Capital Required)

- Operate Longhorn Dam Lift Gates
- Reduced Lake Evaporation
- Walter Long Lake Off-Channel Storage
- Move SAR Discharge Above Austin Gauge
- Lake Austin Operations

Longhorn Dam

- Primary releases are from bascule gates
 - Pulse flows result in excess releases



LCRA Installed Knife Gates

- Improved performance
 - Still can't control flow to match needs



Utilize Lift Gates

- Provides more flexibility
 - Requires close coordination between LCRA and AE
 - Historically operated this way



Longhorn Dam Operations

- Could be implemented < 6 months
- No capital cost
- No permits
- Yields 2,000 – 4,000 Ac-Ft/Yr
- Cost - \$8 / Ac-Ft, \$0.03 / 1,000 gal.

Reduced Lake Evaporation

- NSF approved product applied to lakes to form a monolayer that reduces evaporation
 - Long Lake
 - Lady Bird Lake



Reduced Lake Evaporation

- Insoluble fatty acids from coconuts and palms
- Comes in powder form
- Biodegrades within 72 hours
- Reduces evaporation 20% – 30%

Reduced Lake Evaporation

- Coordinate with TCEQ and TPWD
- Could be implemented < 6 months
- No capital cost
- Yields 800 – 1,200 Ac-Ft/Yr
- Cost - \$275 / Ac-Ft, \$0.84 / 1,000 gal.

Walter Long Lake Storage

- Lake used for cooling water at power plant
- Makeup water diverted from the Colorado River



Walter Long Lake Storage

- Power plant can operate with 3 ft variation in lake level ~ 3,750 Ac-Ft
- Timely releases from dam could satisfy downstream requirements



Walter Long Lake Storage

- Water rights need to be addressed
- Could be implemented < 6 months
- No capital
- Yields 1,000 – 4,000 Ac-Ft/Yr
- Cost - \$64 / Ac-Ft, \$0.20 / 1,000 gal.

Relocate SAR Discharge

- Discharge used to meet environmental flow requirement below Austin
 - WMP requires continuous flow of 46 cfs
 - Only beneficial when this gauge is controlling
- Krieg Field reclaimed water line could be used to discharge below Longhorn Dam

Relocate SAR Discharge

- Requires wastewater discharge permit
- Implementation would take 1 year
- Capital cost ~ \$300,000
- Yields 0 – 1,000 Ac-Ft/Yr
- Cost - \$114 / Ac-Ft, \$0.35 / 1,000 gal.

Lake Austin Operations

- Previously discussed
- Varying operating level would allow local flows to be captured rather than passed downstream
- Public acceptance
 - Levels could be varied seasonally



Lake Austin Operations

- Could be implemented < 6 months
- No capital cost
- No permits
- Yields 0 – 5,000 Ac-Ft/Yr
 - 30% of time savings would be 0
 - 50% of time savings would be at least 3,500 Ac-Ft/Yr
- Cost - \$10 / Ac-Ft, \$0.03 / 1,000 gal.

Enhanced Operations

(Capital Investment Required)

- Automate Longhorn Dam knife gates
- Increased use of Long Lake storage
- Capture local inflows to Lady Bird Lake
- Aquifer Storage and Recovery
- Indirect Potable Reuse through LBL

Automate Longhorn Gates

- Improved control of releases
- Add trash racks to prevent clogging
- Minimizes demands on operators

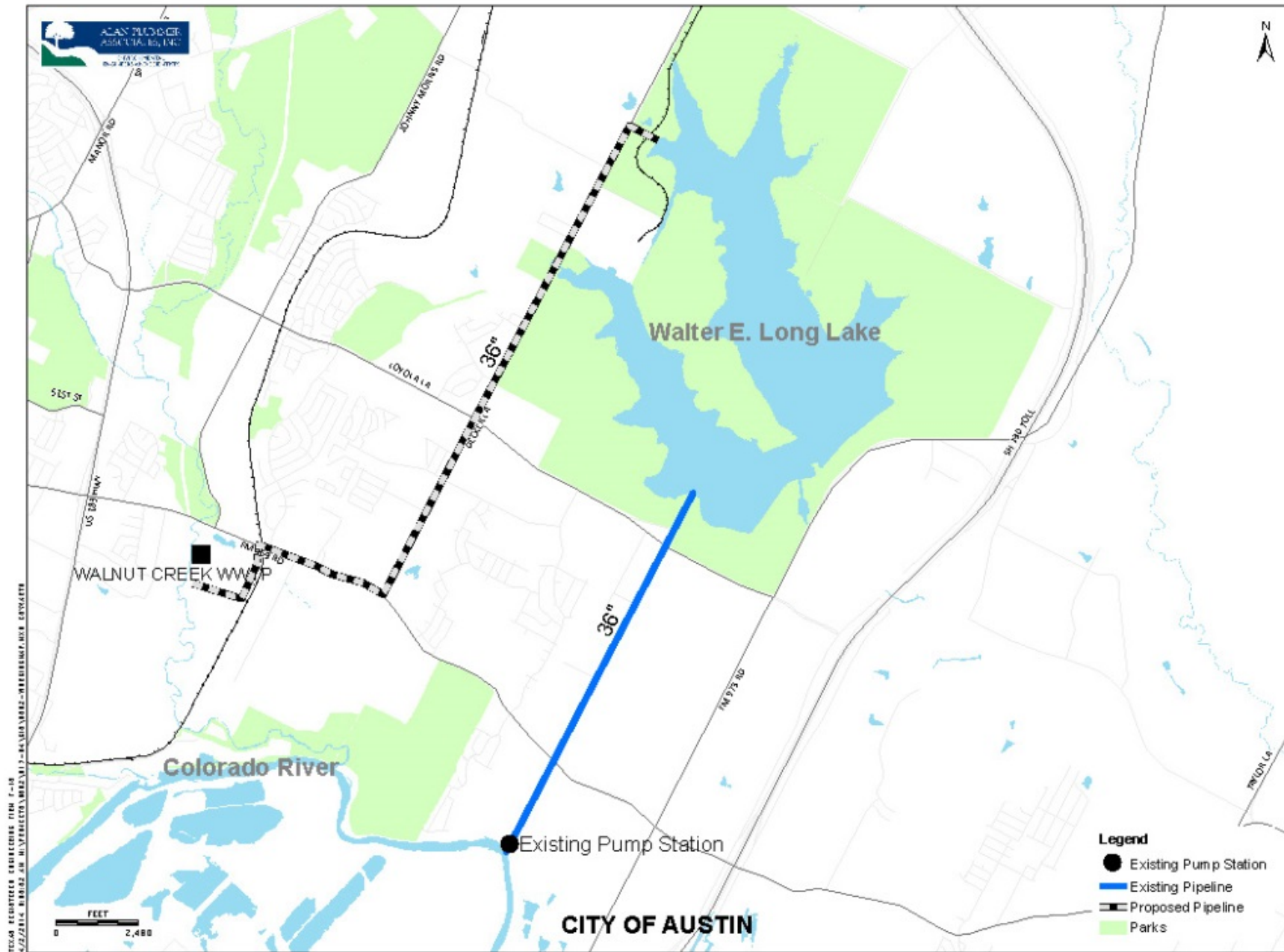


Automate Longhorn Gates

- No permits required
- Can be implemented in 1 – 2 years
- Capital cost of \$750,000
- Yields 4,000 – 7,000 Ac-Ft/Yr
- Cost - \$15 / Ac-Ft, \$0.04 / 1,000 gal.

Increased Use of Long Lake

- Increase ability to refill lake
 - Increase pump capacity at Colorado River
 - Build reclaimed water line from Walnut Creek WWTP
 - Reclaimed water line is included in Reclaimed Master Plan and would be used for other purposes



Increased Use of Long Lake

- Allow more fluctuation in lake level – 25 ft.
 - Necessitates taking Decker Power Plant off-line
 - Would require ERCOT approval
 - Exposes AE customers to the spot power market
 - Impacts to recreational uses



Increased Use of Long Lake

- Can be implemented in 1 – 2 years
- Requires wastewater discharge permit
- Water rights need to be addressed
- Capital cost ~ \$22 million
- Yields 8,000 - 20,000 Ac-Ft/Yr
- Cost - \$183 / Ac-Ft, \$0.56 / 1,000 gal.

Capture LBL Local Inflows

- Install floating pump intake below Tom Miller Dam
- Pump water from LBL to Ullrich intake line
- Capture spring flows and storm flows when not needed downstream



Capture LBL Local Inflows

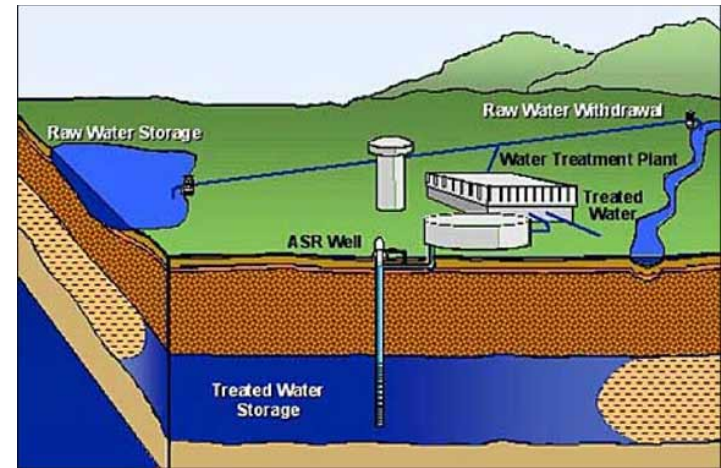
- Can be implemented in 1 – 2 years
- Water rights need to be addressed
- Requires coordination with LCRA
- Capital cost ~ \$1.8 million
- Yields 1,000 – 3,000 Ac-Ft/Yr
- Cost - \$334 / Ac-Ft, \$1.03 / 1,000 gal.

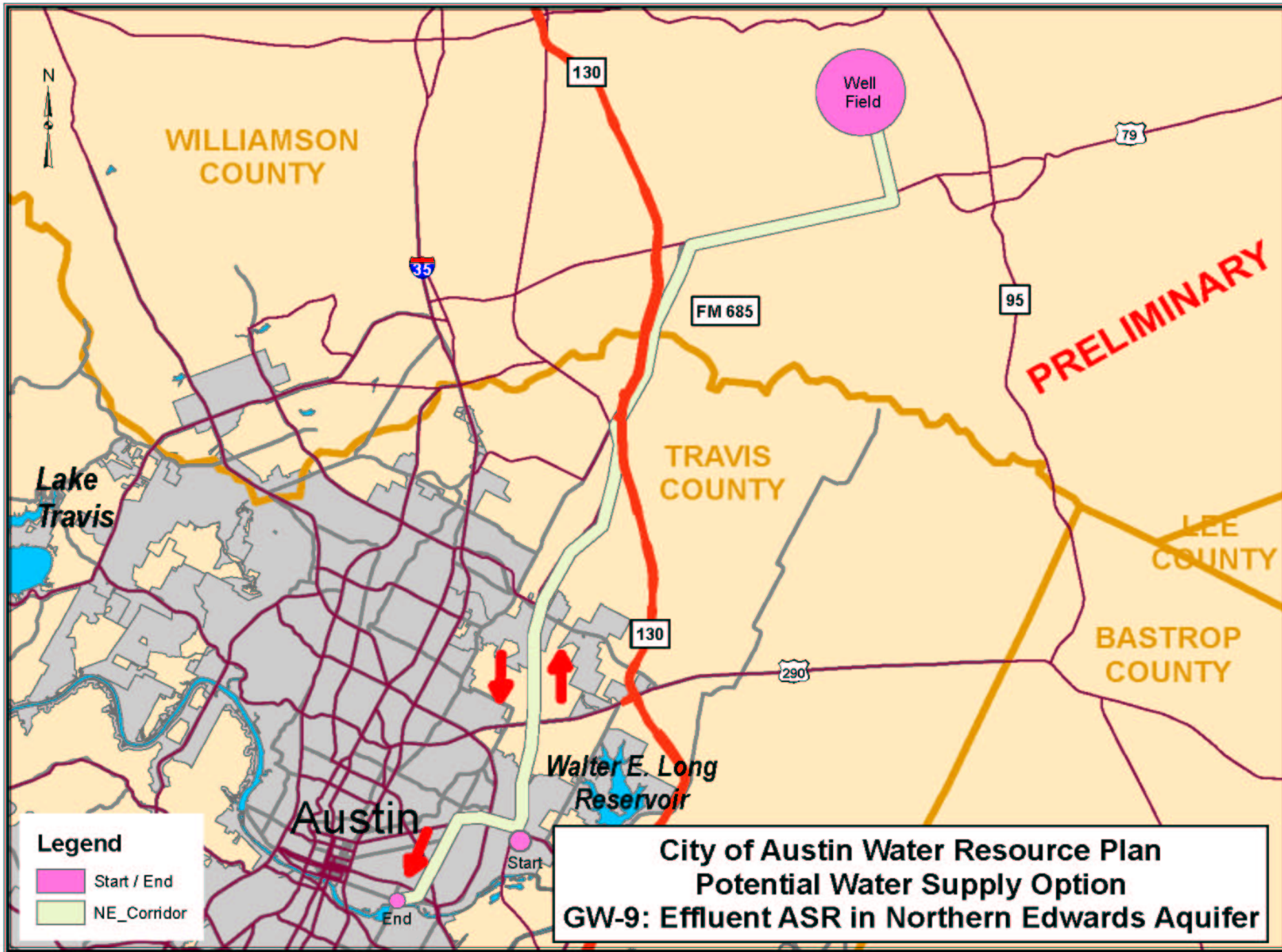
Aquifer Storage & Recovery

- Store water underground for later use
- Currently used by the following
 - San Antonio
 - Kerrville
 - El Paso
- Source of water is important
 - Colorado water doesn't address current drought
 - Reclaimed water can increase near-term supply

Aquifer Storage & Recovery

- Requires suitable aquifer
 - Significant storage capabilities
 - Not being used by others
 - Proximity to water source
 - Proximity to distribution system
- Considered Northern Edwards with Walnut Creek WWTP as a source





ASR Requirements

- Extensive aquifer study
- Purchase of land for wells
- Additional treatment at WWTP
- Conveyance pipeline
- ASR wells

Aquifer Storage & Recovery

- Implementation 3 – 5+ years
- Significant permitting
- Land purchases
- Capital cost ~ \$130,000,000
- Yields ~ 4,000 Ac-Ft/Yr
- Cost - \$1,000 / Ac-Ft, \$3.07 / 1,000 gal.

Indirect Potable Reuse

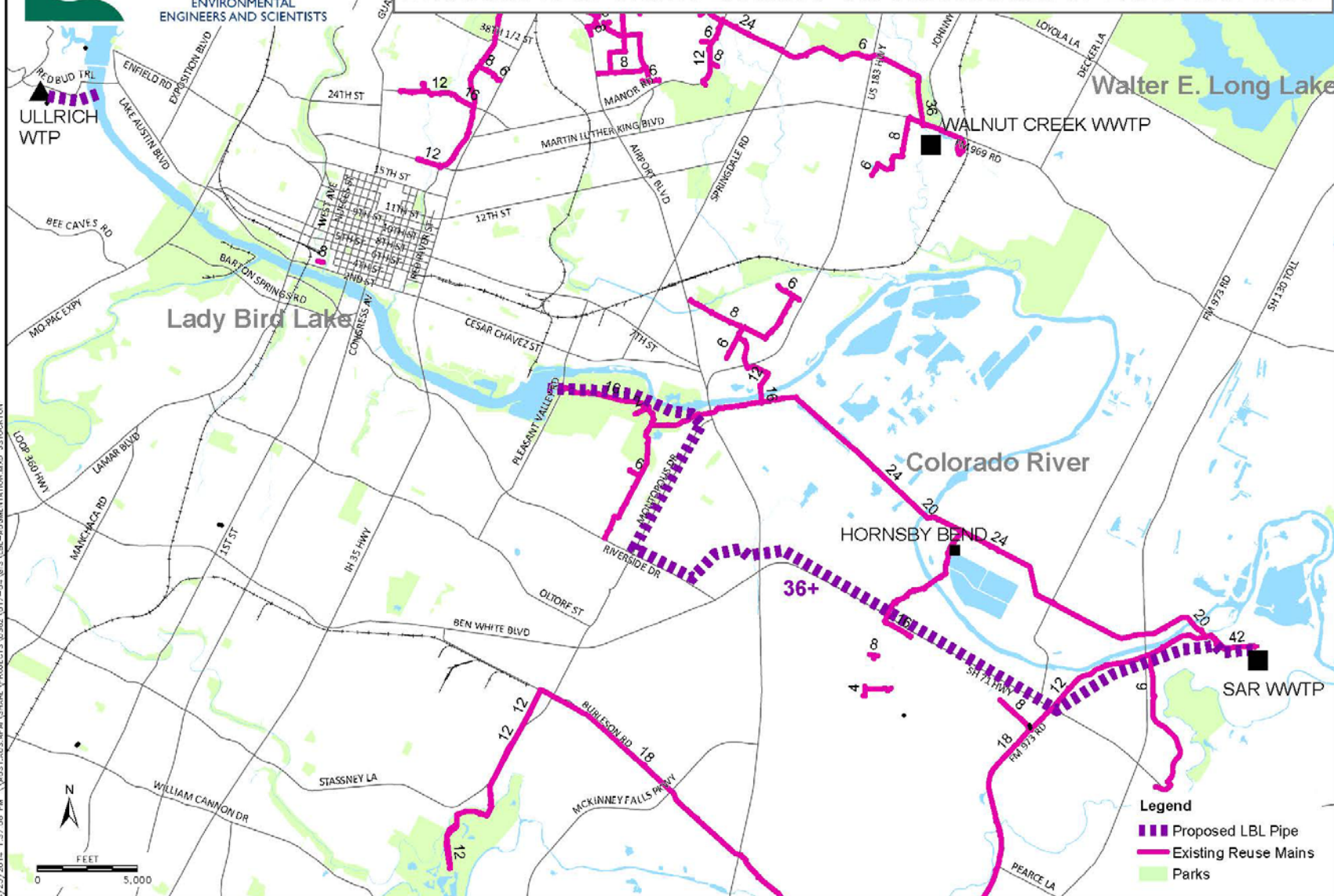
- Move part of SAR discharge to LBL
 - Requires acceleration of reclaimed water lines identified in Reclaimed Master Plan
- Withdraw water from new pump station below Tom Miller Dam
- System only operates when downstream demands are being met
- ~ 6 months retention in LBL



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ENVIRONMENTAL
ENGINEERS AND SCIENTISTS

CITY OF AUSTIN DROUGHT RESPONSE PLANNING - AUGMENTATION OF LADY BIRD LAKE



IPR Requirements

- Nutrient removal at SAR
- Pipeline construction
- Pump/intake construction
- Wastewater discharge permit
- Water rights need to be addressed

Indirect Potable Reuse

- Can be implemented in 2 – 3 years
- Public perception issue
- Permitting issue
- Capital cost ~ \$30 million
- Yields up to 20,000 Ac-Ft/Yr
- Cost - \$190 / Ac-Ft, \$0.58 / 1,000 gal.

Alternative Groundwater Supplies

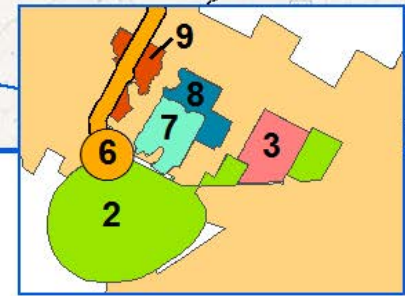
- Blue Water Systems
- Forestar
- Northern Edwards Wellfield
- Vista Ridge
- Hays-Caldwell Public Utility Authority

Blue Water Systems

- Existing project supplying Carrizo-Wilcox water east of Austin
- Holds permits for export of 75,000 Ac-Ft/Yr from Post Oak Savanna GCD
- Currently supplies ~ 1-2 MGD



ter



- **Well Field Location**

1. City of Lexington
2. City of Manor
3. Cottonwood Creek MUD 1
4. Hornsby Bend Utility
5. Manville WSC
6. Shadow Glen Delivery Point
7. Travis County MUD 2
8. Wilbarger Creek MUD 1
9. Wilbarger Creek MUD 2

Blue Water Systems

- Existing system can be expanded to supply Austin ~ 10 MGD
- Blue Water would be responsible for construction with cost recovered in rates
- Take-or-pay contract would be required
 - Contract could be for between 5 and 30 years

Blue Water Systems

- Austin would need to construct facilities to connect to Blue Water System
- Water would need to be treated for compatibility
 - Austin to construct and operate plant
- Water quality variations a concern for some industrial customers

Blue Water Systems

- Implementation in 1 – 2 years
- No permits but need water sale contract
- Water compatibility concerns
- Austin capital cost ~ \$26.5 million
- Yields 12,000 Ac-Ft/Yr
- Cost - \$1,526 / Ac-Ft, \$4.68 / 1,000 gal.

Forestar

- Groundwater leases in Bastrop & Lee Co.
- No existing infrastructure
- Signed contract with Hays Co. to reserve 45,000 Ac-Ft/Yr for \$1 million per year
- Applied for 45,000 Ac-Ft/Yr in permits from Lost Pines GCD but only received 12,000
- Sued GCD for permits

Forestar

- Infrastructure development dependent on long-term contract
- Water compatibility issues
- Austin would have to treat for compatibility
- Austin would construct connection
- Availability is unknown

Forestar

- Implementation could occur in 2 – 3 years
- Permits need to be resolved
- Water sale contract needed
- Austin capital cost unknown
- Yield is unknown
- Cost is unknown

Northern Edwards Wells

- Northern Edwards has been used by entities in the past (Lamplight Village)
- Well yields are typically low ~ 1 MGD
- Water quality is good – verify compatibility
- Would require land purchases

Northern Edwards Wells

- Implementation in 1 – 2 years
- No permits
- Capital cost to connect 4 wells ~ \$7.6 million
- Yields 1,000 – 1,500 Ac-Ft/Yr
- Cost - \$431 / Ac-Ft, \$1.32 / 1,000 gal.

Vista Ridge

- Consortium including Blue Water Systems
- Responded to SAWS RFP for water
- 50,000 Ac-Ft/Yr of permitted water
- Would include construction of pipeline from Burleson Co. to San Antonio

Vista Ridge

- Water compatibility concerns
- Austin would need to treat the water
- Austin would need to construct facilities to connect to the proposed pipeline
- Amount of water available and duration are not known

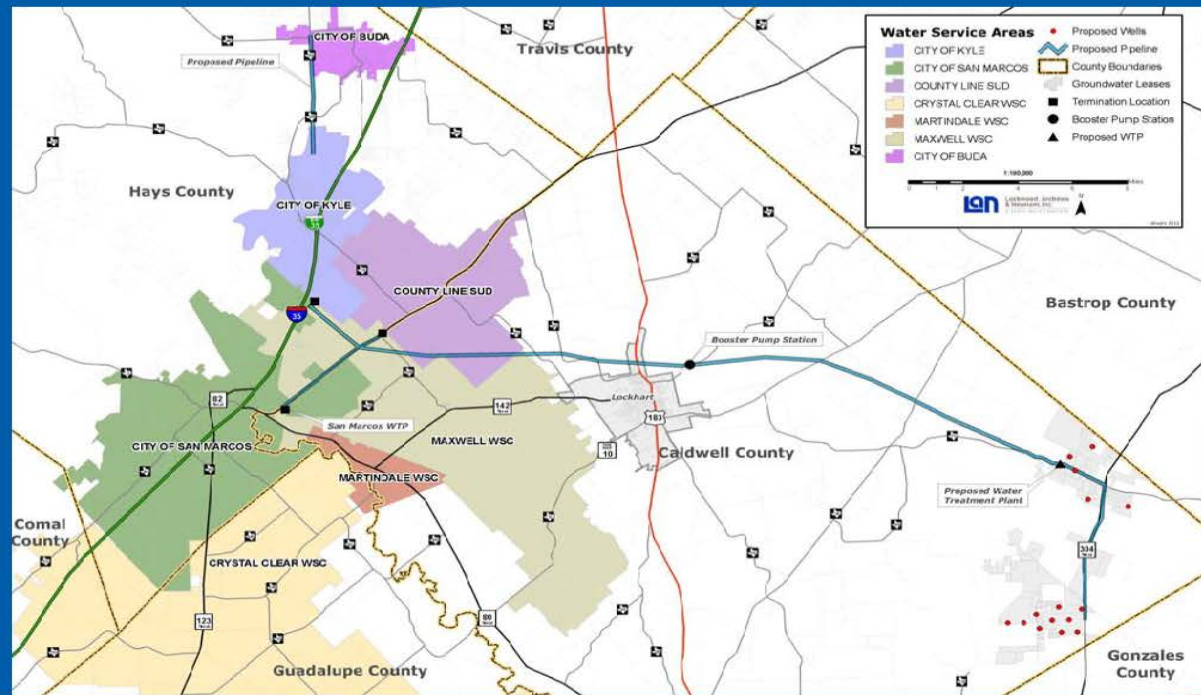
Vista Ridge

- Implementation could occur in 3 years
- Water sale contract needed
- Austin capital cost unknown
- Yield is unknown
- Cost is unknown

Hays Caldwell Public Utility

- Public Utility Authority made up of San Marcos, Kyle, Buda, Crystal Clear, and Canyon Regional
- No infrastructure
- Has permits for 10,400 Ac-Ft/Yr from the Gonzales County GCD
- Has partnership with Texas Water Alliance for additional 15,000 Ac-Ft/Yr

- \$109 Million for Phase I
(Today's Prices)**



Hays Caldwell Public Utility

- Water compatibility concerns
- Austin would need to treat the water
- Austin would need to construct facilities to connect to the proposed pipeline
- Duration is not known

Hays Caldwell Public Utility

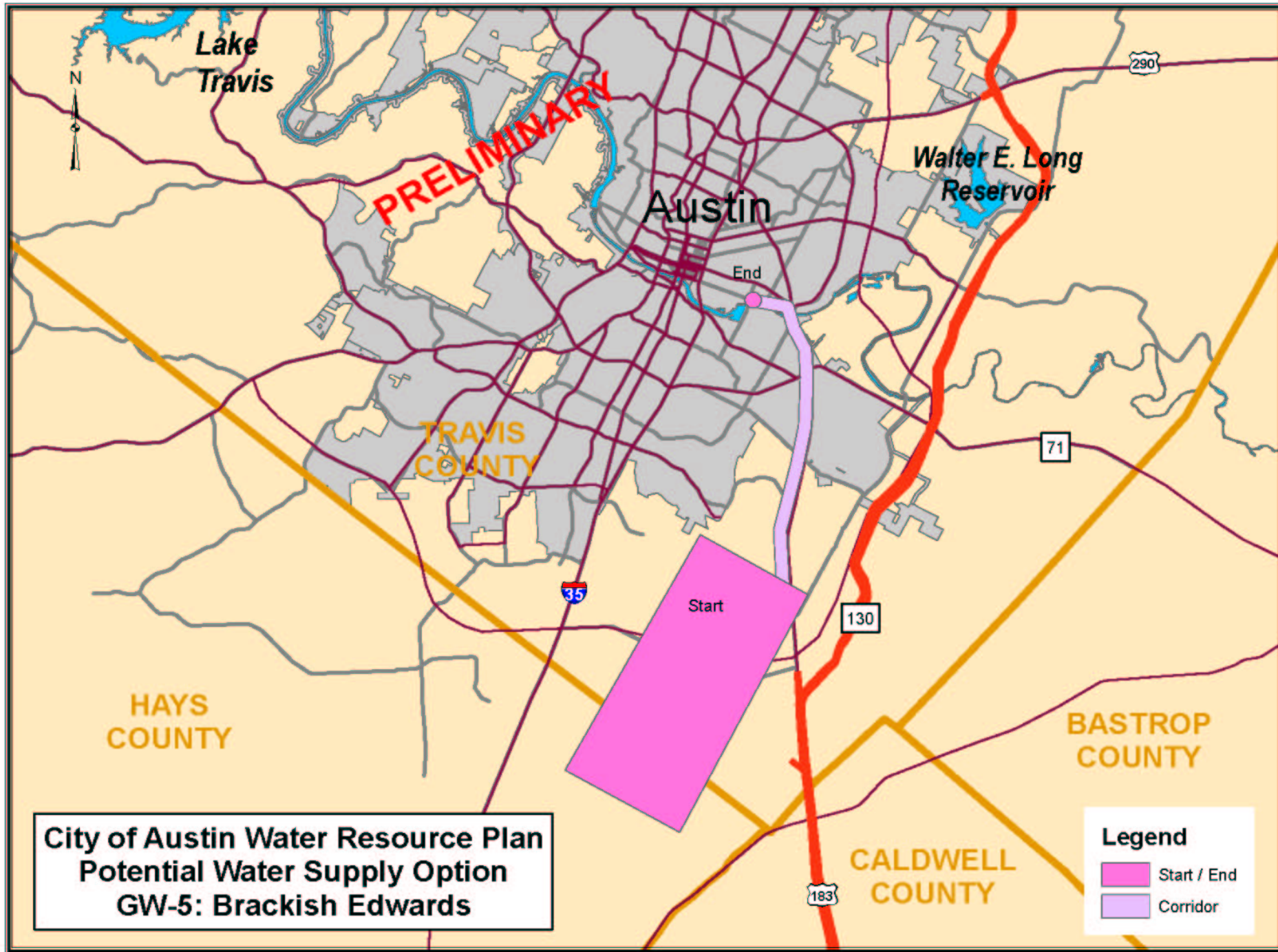
- Implementation in 2 - 3 years
- Water sale contract needed
- Yield is 25,000 Ac-Ft/Yr
- Cost – unknown but could be around \$2.00 / 1,000 gal., \$650 / Ac-Ft

Other Mid- and Long-Term Supplies

- Down Dip Brackish Edwards
- Reclaimed Water Bank Infiltration to Colorado Alluvium
- Colorado Bed and Banks

Down Dip Brackish Edwards

- Develop wells in down dip brackish zone
- Would require desalination plant
- Concentrate disposal would be a concern
- Potential impact on overall Edwards level
- Water quality could deteriorate over time

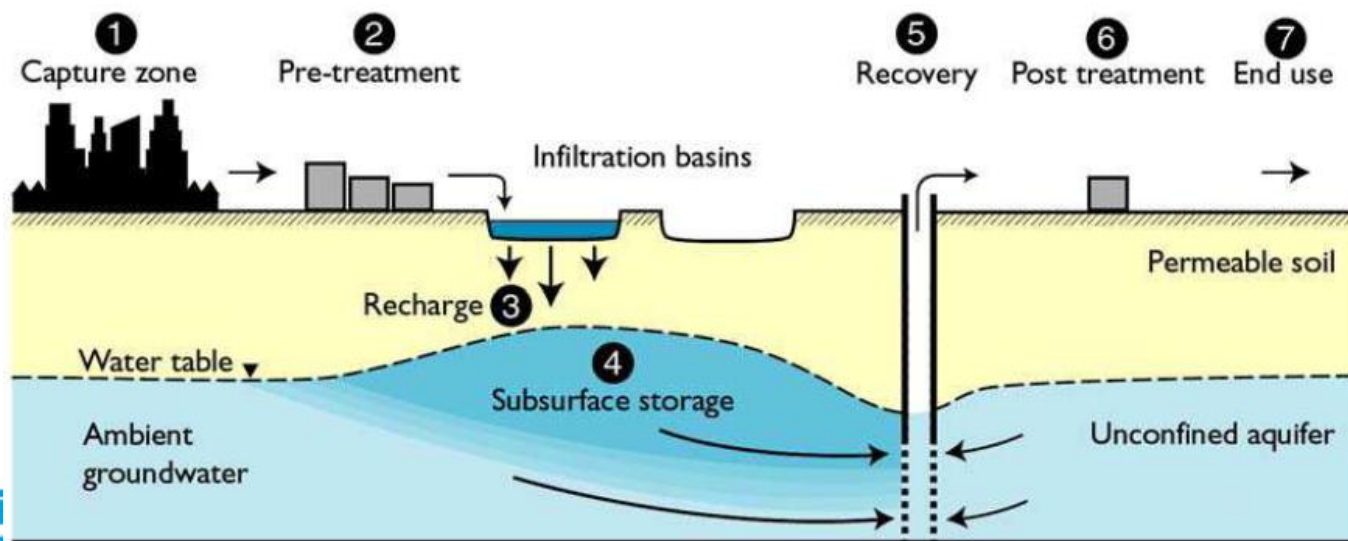


Down Dip Brackish Edwards

- Implementation in 5 – 10 years
- Brine disposal permit required
- BSEACD permit consideration
- Requires substantial land purchases
- Capital cost is \$90 million
- Yield is 5,000 – 10,000 Ac-Ft/Yr
 - Requires 20 production wells, 8 disposal wells
- Cost – \$1,733 / Ac-Ft, \$5.32 / 1,000 gal.

Reclaimed Water Bank Infiltration

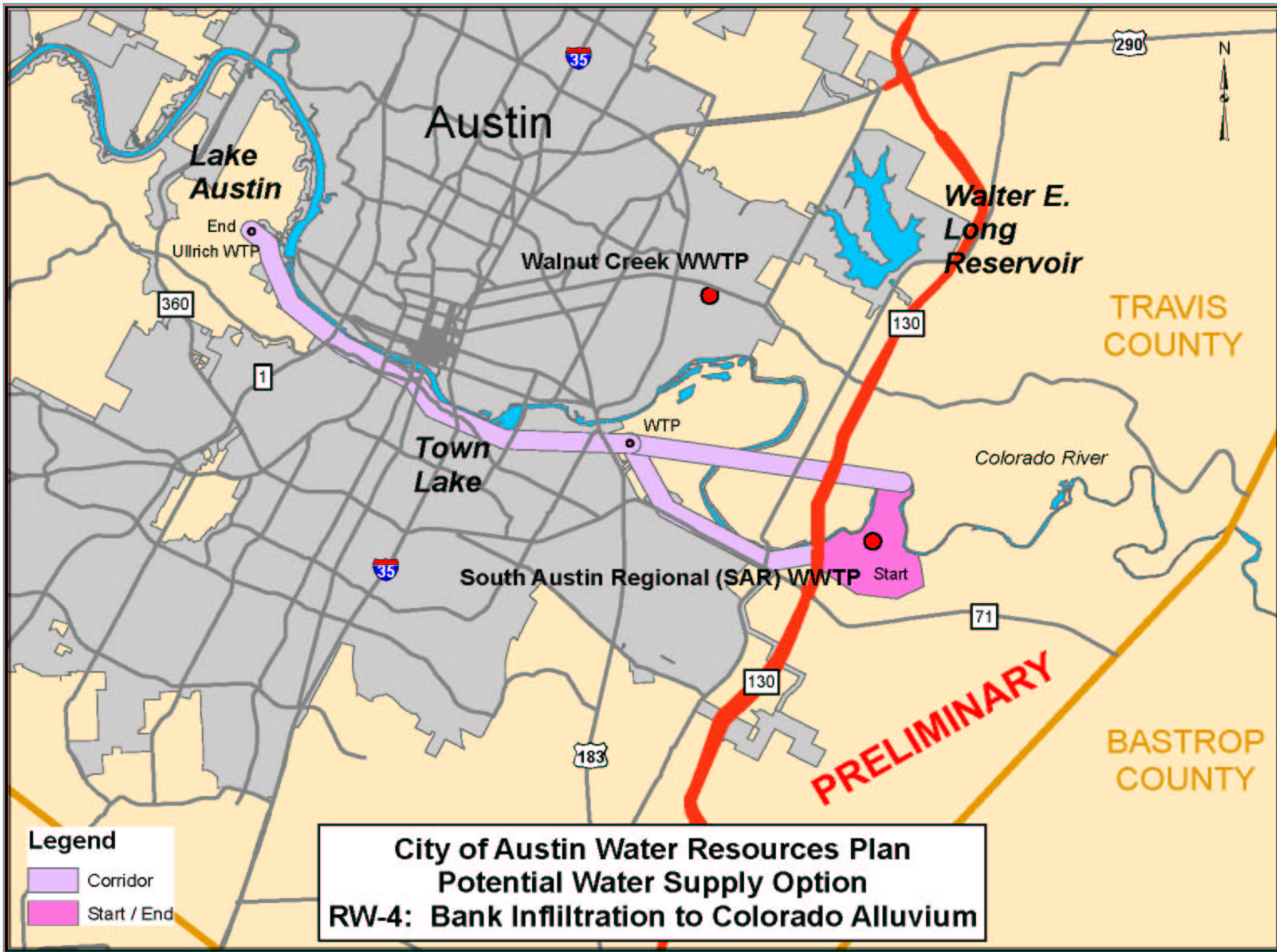
- Spread SAR effluent in an infiltration basin
- Recharge local Colorado Alluvium
- Recapture in alluvial wells along the river



Reclaimed Water Bank Infiltration

- Requires significant land purchase
- Water pumped to water treatment plant
- Meeting needs downstream may
Lake releases, off-setting yield
- Public perception



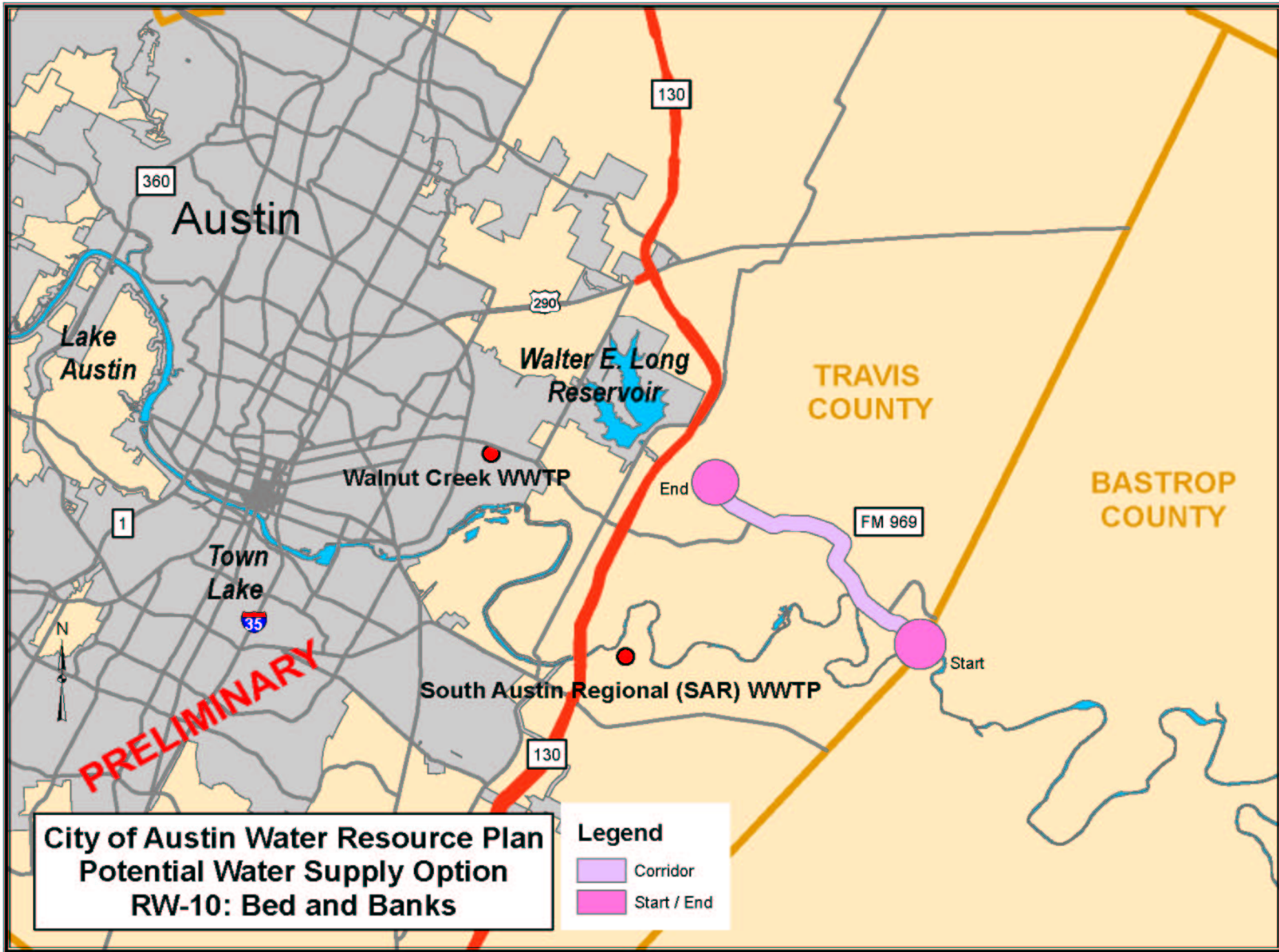


Reclaimed Water Bank Infiltration

- Implementation in 5 – 10 years
- Possible land application permit
- Requires substantial land purchases
- Capital cost is \$110 million
- Yield is 20,000 – 40,000 Ac-Ft/Yr
- Cost – \$667 / Ac-Ft, \$2.05 / 1,000 gal.

Colorado Bed and Banks

- COA/LCRA have applied for a permit
- Recapture discharged effluent downstream
- Pump water back to Austin for treatment
- Meeting downstream needs may offset some of the yield



Colorado Bed and Banks

- Implementation in 10 – 15 years
- Water rights permit
- Requires land purchases
- Capital cost is \$310 million
- Yield is 40,000 – 70,000 Ac-Ft/Yr
- Cost – \$691 / Ac-Ft, \$2.12 / 1,000 gal.

Drought Response

- Recommend a tiered response
- As drought continues/deepens, Austin adds larger scale projects with more investment
- Yields are not necessarily cumulative
- Establish triggers for projects based on Highland Lakes storage
 - Begin planning / permitting
 - Begin construction

Future Activities

- Continue to monitor WMP revision process
- Define policy goals for Response Plan
 - Identify project selection criteria
 - Minimum acceptable Highland Lake storage
 - Value of avoiding Stage IV restrictions
- Model effect of recommended projects
- Establish triggers for projects based on Highland Lakes storage