

Region K Public Meeting

November 13, 2019

Lower Colorado Regional Water Planning Group
(Region K)



November 13, 2019

Agenda

1. Call to Order
2. Welcome and Introductions
3. Receive Public Comments
4. Attendance Report
5. Approval of Minutes from October 9, 2019 meeting
6. TWDB Update
7. Committee Reports – WMC, WMS, Legislative, and possible others

Agenda Item 7

COMMITTEE REPORTS

7a. Water Modeling Committee Report

▼ Committee meeting on October 23rd

- Committee reviewed committee comments received on Chapter 3 from LCRA and David Lindsay
- Discussion of changes to surface water availability for STPNOC (steam-electric, Matagorda County) based on comments from LCRA.
 - Drought of record for STP is still 1950s rather than new drought.
 - Using run-of-river and LCRA backup too high.
 - Calculated firm yield of STP reservoir instead.
 - Revised availability lower = water shortage

7b. Water Management Strategies Committee Report

▼ Committee meeting on October 31st

- Review of changes to draft strategies based on committee comments
- Presentation and discussion of draft water management strategy evaluations ready for Committee review
 - Non-Municipal Conservation
 - Irrigation Drought Management
 - Hays County Groundwater Importation
 - Brush Management
 - Wharton Water Supply
 - Reservoir Capacity Expansion
 - Water Supply Infrastructure Development
 - Goldthwaite
 - LCRA strategies
 - Austin strategies

7c. Legislative and Policy Committee Report

▼ Committee meeting on November 1st

- Committee met to discuss proposed edits:
 - Groundwater (8.1.4)
 - Potential Impacts to Agricultural and Rural Water Supplies (8.1.5)
 - Agricultural Water Conservation (8.1.6)
 - Brush Control (8.1.9)
 - Inflows to Highland Lakes (8.1.10)
 - Coordination of Planning Cycles for Determination of Desired Future Conditions (DFCs) by GCDs and Generation of the Regional Water Plan by RWPGs (8.1.11)
 - Recommended Improvements to the Regional Planning Process (8.1.12)

Agenda Item 8

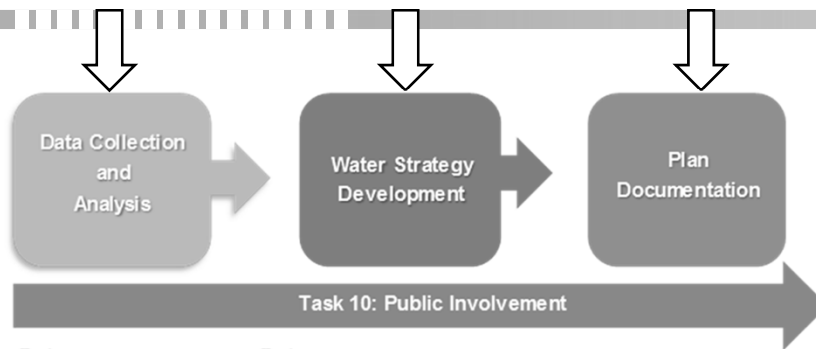
CONSULTANT STATUS REPORT

Region K

Page 7



8. Consultant Status Report



Task:

- 2A – Non-population demand
- 2B – Population demand
- 3 – Water supply analysis
- 4A – Water needs

Task:

- 4B – Potentially feasible strategies
- 4C – Technical memorandum
- 5A – Evaluation of strategies
- 5B – Conservation recommendations

Task:

- 1 – Regional description
- 6 – Impacts of strategies
- 7 – Drought response
- 8 – Unique sites and policy recommendations
- 9 – Financing
- 11 – Implementation and comparison
- 12 – Prioritization of projects



8. Consultant Status Report



8. Consultant Status Report Effort since last meeting (October 9, 2019)

- ▼ Chapter 3 of 2021 Plan – Water Availability and Supplies
 - Received comments/suggested edits from LCRA and Dave Lindsay
 - Water Modeling Committee met to discuss some of the comments
 - Working to address all comments before sending to RWPG
 - Will send out in next two weeks

8. Consultant Status Report Effort since last meeting (October 9, 2019)

▼ Water Management Strategies

- All but three of the scoped strategy write-ups have been completely drafted. Most have received either committee or RWPG review with comments addressed.
- One WMS committee meeting held.
- Presenting strategies today to RWPG in order to move forward with Chapter 5 and 6 text development.

8. Consultant Status Report Effort since last meeting (October 9, 2019)

▼ Implementation and Comparison

- Preparing surveys for WUGs.
- Hoping to send out in next couple weeks.
- Will let RWPG know when we do.

8. Consultant Status Report Upcoming Efforts

- ▼ Incorporate Chapter 3 (Water Availability and Supplies) comments from Water Modeling Committee meeting and send draft chapter out to RWPG for review.
- ▼ Finish Draft Chapter 4 (Water Needs) and send out for review.
- ▼ Compile Strategy Memos to create Chapter 5 (Water Management Strategies) and send out to RWPG for review.
- ▼ Begin drafting Chapter 6 (Impacts of Regional Water Plan); include cumulative impacts modeling.
- ▼ Finish Draft Chapter 7 (Drought Response) and send out for review.
- ▼ Send Implementation Survey out to WUGs/WWPs.
- ▼ Begin / work on other remaining chapters.

Agenda Item 9

DISCUSSION OF DRAFT 2021 PLAN CHAPTERS OUT FOR REVIEW AND COMMENTS RECEIVED

9. Draft 2021 Plan Chapters out for Review and Comments Received

- ▼ Chapter 1 – Regional Water Planning Area Description
 - Out for RWPG Review (electronic documents emailed)
 - Anticipating comments from LCRA.
 - Dave Lindsay has completed a draft update to Appendix 1B. Will send out for review in next couple of weeks with Chapters 3 and 4.
- ▼ Chapter 2 – Population and Water Demands
 - Discussed comments received from LCRA and Dave Lindsay at July meeting.
 - No additional comments have been received yet.
 - Working on addressing comments.
- ▼ Chapter 3 – Water Availability and Supplies
 - Working on addressing comments from committee.
 - Will send out to RWPG in next couple of weeks.

Agenda Item 10

PRESENTATION AND DISCUSSION OF DRAFT WATER MANAGEMENT STRATEGIES READY FOR RWPG REVIEW

10. Draft Water Management Strategies for RWPG Review

- Presented at July 10, 2019 Meeting (13)
 - Municipal Drought Management
 - Burnet County Regional Projects
 - Buena Vista; East Lake Buchanan; Marble Falls System
 - Austin
 - Aquifer Storage and Recovery; Off-Channel Reservoir with Evaporation Suppressant; Onsite Rainwater and Stormwater Harvesting; Capture Local Inflows to Lady Bird Lake; Indirect Potable Reuse through Lady Bird Lake; Lake Austin Operations; Austin Conservation
 - STPNOC (Matagorda Steam-Electric)
 - Alternate Canal Delivery; Brackish Surface Water Blending
- Presented at October 9, 2019 Meeting (10)
 - BS/EACD Edwards/Middle Trinity ASR
 - BS/EACD Saline Edwards ASR
 - Municipal Conservation
 - Rainwater Harvesting
 - Downstream Return Flows
 - Oceanwater Desalination
 - Expand Use of Local Groundwater
 - Development of New Groundwater Supplies
 - Direct Reuse
 - Direct Potable Reuse

10. Draft Water Management Strategies for RWPG Review

- Updated Strategies
 - a) BS/EACD Edwards Middle Trinity ASR
 - b) BS/EACD Saline Edwards Desalination and ASR
 - c) Rainwater Harvesting
 - d) Development of New Groundwater – Yegua-Jackson Aquifer
 - e) Expand Local Use of Groundwater – Ellenburger-San Saba Aquifer
 - f) Direct Potable Reuse
 - g) Direct Non-Potable Reuse

Non-MWP Strategies (10)

- a) Water Supply Infrastructure Development
- b) Mining Conservation
- c) Groundwater Importation – Hays County Pipeline
- d) Groundwater Importation – Alliance Regional Water Authority Pipeline
- e) New Water Purchase and Water Purchase Amendments
- f) Brush Management
- g) Wharton Water Supply
- h) Reservoir Capacity Expansion
- i) Goldthwaite Water Supply
- j) Irrigation Drought Management

Region K

10a. Water Supply Infrastructure Development

- ▼ Bertram plans to pump water from an inactive quarry. The quarry was identified by the TCEQ to be an off-channel reservoir that does not require a water right permit.
 - Yield = 750 – 2,000 ac-ft/yr (online 2030)
 - Costs
 - Total Project Costs: \$20,610,000
 - Annual Cost: \$2,450,000
 - Unit Cost: \$1,225/ac-ft
 - Notes
 - Additional pumping wells included in Expand Local Use of Groundwater
 - Infrastructure required for the surface water component of this project includes:
 - ~1.8 MGD raw water intake from quarry pit/reservoir, assumed to be located 50 feet deep;
 - ~1.8 MGD rated capacity water treatment plant
 - 7,470 linear feet of 16-inch transmission pipe

Region K

Page 20

AECOM

10b. Mining Conservation

- ▼ Mining conservation involves taking the existing pumped groundwater, once used, letting it settle, and then recycling it for additional use rather than pumping additional groundwater from the aquifer.
 - Mining WUGs (Bastrop, Burnet)
 - Yield
 - Bastrop Mining: 2 ac-ft/yr (2020); 243 ac-ft/yr (2030); 308 ac-ft/yr (2040); 233 ac-ft/yr (2050)
 - Burnet Mining: 1,300 ac-ft/yr (2020); 1,800 ac-ft/yr (2070)
 - Costs
 - Assumed no facilities cost; energy costs included
 - Annual Cost: Bastrop Mining (\$5,000), Burnet Mining (\$60,000)
 - Unit Cost: Bastrop Mining (\$16/ac-ft), Burnet Mining (\$33/ac-ft)
 - Notes
 - Negligible impact to environment/agriculture

10c. Groundwater Importation: Hays County Pipeline

- ▼ Withdrawal and transport of groundwater from the Carrizo-Wilcox aquifer in Kyle area to western Hays County; strategy shared with Region L.
 - Hays County-Other, West Travis County PUA (WTCPUA)
 - Yield
 - Hays County Other: 1,000 ac-ft/yr (online 2030)
 - WTCPUA: 3,000 ac-ft/yr (online 2030)
 - Costs
 - Total Project Costs: Hays County-Other \$7,485,500; WTCPUA \$22,456,500
 - Annual Cost: Hays County-Other \$773,500; WTCPUA \$2,320,500
 - Unit Cost: Hays County-Other \$774/ac-ft; WTCPUA \$774/ac-ft
 - Notes
 - Negligible impacts to agriculture
 - Socioeconomic impacts – Importing groundwater from rural areas may affect rural users.
 - Local groups have previously expressed concern about project

10d. Groundwater Importation: Alliance Regional Water Authority Pipeline

- ▼ Withdrawal and transport of groundwater from the Carrizo-Wilcox aquifer in Gonzales County to 1-35 Corridor area near San Marcos, Kyle, and Buda; primarily Region L strategy.
 - Buda
 - Yield = 762 - 2,113 ac-ft/yr (online 2030)
 - Costs
 - Total Project Costs: \$21,965,000
 - Annual Cost: \$2,337,000
 - Unit Cost: \$1,106/ac-ft
 - Notes
 - Cagle's map turtle (protected species) located within the project area
 - Socioeconomic impacts – Importing groundwater from rural areas may affect rural users.
 - Negligible impacts to agriculture

10e. New Water Purchase

- ▼ WUGs in the region purchase water from water providers other than LCRA.
 - Hays, Hays County Mining, Windermere, Llano
 - Yield
 - Hays (purchase from Buda): 70 ac-ft/yr (2060); 140 ac-ft/yr (2070)
 - Hays County Mining (purchase from Buda reuse): 500 ac-ft/yr (2040)
 - Windermere (purchase from Blue Water): 2,016 ac-ft/yr (2030)
 - Llano (purchase from Burnet): 365 ac-ft/yr (2020); 324 ac-ft/yr (2030); 264 ac-ft/yr (2040); 203 ac-ft/yr (2050); 207 ac-ft/yr (2060); 223 ac-ft/yr (2070)
 - Costs
 - Assumed water is sold at retail cost, except for Hays infrastructure
 - Total Project Costs - Hays: \$213,000
 - Annual Cost: Hays \$215,000; Hays County Mining \$798,335; Windermere \$2,351,758; Llano \$16,650,986
 - Unit Cost: Hays \$1,536/ac-ft; Hays County Mining \$1,597/ac-ft; Windermere \$1,167/ac-ft; Llano \$45,619/ac-ft
 - Notes
 - Negligible impact to environment/agriculture

10e. Water Purchase Amendments

- ▼ WUGs in the region purchase water from water providers other than LCRA.
 - Barton Creek WSC, Creedmoor-Maha WSC, Travis County MUD 14
 - Yield
 - Barton Creek WSC (purchase from Travis County MUD 4): 90 ac-ft/yr (2020)
 - Creedmoor-Maha WSC (purchase from Aqua WSC): 335 ac-ft/yr (2040)
 - Travis County MUD 14 (purchase from Aqua WSC): 35 ac-ft/yr (2050)
 - Costs
 - Assumed water is sold at retail cost
 - Annual Cost: Barton Creek WSC (\$146,633), Creedmoor-Maha WSC (\$409,350), Travis County MUD 14 (\$42,768)
 - Unit Cost: Barton Creek WSC (\$1,629/ac-ft), Creedmoor-Maha WSC (\$1,222/ac-ft), Travis County MUD 14 (\$1,222/ac-ft)
 - Notes
 - Negligible impact to environment/agriculture

10f. Brush Management

- ▼ Convert land that is covered with brush (juniper, mesquite, saltcedar) to grasslands, increasing water availability through reduced extraction of soil water for transpiration and increased recharge to shallow groundwater and emergent springs.
 - Blanco, Hays, Gillespie, and Travis County-Other
 - Yield in DOR conditions = 5,571 ac-ft/yr (online 2030).
 - Yield allocated proportionally by geographic area to four counties in Region K
 - Costs
 - Total Project Costs: \$29,707,000
 - Annual Cost: \$2,379,000
 - Unit Cost: \$427/ac-ft
 - Notes
 - 2000 Pedernales River/Lake Travis watershed assessment and feasibility study
 - Brush management for water supply enhancement must be viewed favorably by the RWPG as a recommended or alternative Water Management Strategy or as a Policy Recommendation. Otherwise, the application is considered not to qualify for funding (State Water Supply Enhancement Plan, TSSWCB, July 2014)

10g. Wharton Water Supply

▼ Requested from Wharton

- Wharton believes that its proximity to the Houston urban area and the new I-69 corridor will increase its water demands during the next fifty years beyond those otherwise anticipated in regional water planning.

▼ Regional Water Supply Study for the City of Wharton and East Bernard

- Published April 2017
- Detailed three alternative supply sources to provide additional water: surface water, additional groundwater, and aquifer storage and recovery
- The study recommended the use of additional groundwater; incorporated into Expand Use of Local Groundwater for Gulf Coast aquifer

▼ Strategy

- Project Yield (2030): 3,000 ac-ft/yr
- Total Project Costs: \$9,100,000; Annual Cost: \$817,000; Unit Cost: \$272/ac-ft

10h. Reservoir Capacity Expansion

- ▼ During times of drought, Llano Water User Group (WUG) would install a flashboard system downstream along the Llano River Lake, and potentially upstream along the dam of Llano Park Lake, in order to raise the reservoir level above the fixed spillway crest level.
- ▼ Strategy modeled using the strategy version of the Region K Cutoff Model and shown not to increase yields in drought-of-record conditions under regional water planning guidelines.
- ▼ Strategy classified as considered, but not as recommended or alternative.

10i. Goldthwaite Water Supply

- ▼ Water Right Permit Amendment and expansion of Goldthwaite's reservoir storage capacity cannot be recommended as a strategy, as the yield is 0 ac-ft/yr during drought of record.
- ▼ Though strategy does not provide water under drought-of-record conditions, it was requested for inclusion in the 2021 RWP to describe the WUG's water situation.
- ▼ Strategy classified as considered, but not as recommended or alternative.

10j. Irrigation Drought Management

- ▼ Irrigation drought management assumes farmers using groundwater restrict their usage by 25 percent. For Irrigation in Mills County (Brazos Basin), limited supplies of water are available, and growth of agriculture would be reduced based on water available.
 - Irrigation WUGs (Colorado, Matagorda, Mills, Wharton)
 - Yield = 34,153 ac-ft/yr (2020) – 29,800 ac-ft/yr (2070)
 - Costs
 - Based on TWDB Socioeconomic Impact Analysis of Unmet Needs from the 2016 Region K Water Plan (will be updated for 2021 plan when report is released)
 - Unit Cost: Colorado (\$132/ac-ft), Matagorda (\$193/ac-ft), Mills (\$183/ac-ft), Wharton (\$203/ac-ft)
 - Notes
 - Not supplying water to meet irrigation needs has negative economic impacts to the entire agriculture economy and rural local economies
 - Strategy would reduce irrigation return flows by up to 6,800 ac-ft/yr and reduce the acreage of potential feedstock for migratory birds by approximately 22,000

Austin Strategies (6)

- a) Austin Blackwater and Greywater Reuse
- b) Austin Onsite Rainwater and Storm Water Harvesting/Community-Scale Stormwater Harvesting
- c) Austin Decentralized Direct Non-Potable Reuse
- d) Austin Centralized Direct Non-Potable Reuse
- e) Austin Brackish Groundwater Desalination
- f) Austin Return Flows

Region K

10a. Austin Blackwater and Greywater Reuse

- ▼ Blackwater Reuse is the onsite capture and treatment of the wastewater stream generated from a building for onsite reuse via a dual (purple) pipe system to supply outdoor demands and non-potable indoor demand. Reuse of water from laundry, shower, and bath at the lot/unit scale can meet non-potable demands through greywater diversion and greywater treatment systems.
 - Yield = 1,450 – 9,290 ac-ft/yr (online 2030)
 - Costs
 - \$0 - Regional water planning guidelines do not allow inclusion of site development costs, as they are below the WUG level.
 - Austin Water Forward Plan estimates facilities costs at \$40,000,000.
 - Notes
 - Strategy reduces the energy spent transmitting wastewater from the collection system to existing centralized wastewater treatment plants, but may result in an increase in nutrient loading at the treatment plants.
 - No impact to agriculture.

Region K

Page 32

AECOM

10b. Austin Onsite Rainwater and Stormwater Harvesting + Community Scale Stormwater Harvesting

- ▼ Lot-Scale Rainwater Harvesting involves the capture and storage of roof water to supply a range of onsite demands at the lot/building scale.
- ▼ Community Scale Stormwater Harvesting involves the collection of stormwater runoff from urban areas for treatment and reuse at the community scale.
 - Yield
 - Onsite Rainwater and Stormwater Harvesting: 788 – 4,901 ac-ft/yr (online 2030)
 - Community Scale Stormwater Harvesting: 66 – 236 ac-ft/yr (online 2030)
 - Costs
 - \$0 - Regional water planning guidelines do not allow inclusion of homeowner or site development costs, as they are below the WUG level.
 - Austin Water Forward Plan estimates facilities costs:
 - Onsite Rainwater and Stormwater Harvesting: \$10,000,000.
 - Community Scale Stormwater Harvesting: \$200,000.
 - Notes
 - No impact to agriculture. Negligible impact to environment.

10c. Austin Decentralized Non-Potable Reuse

- ▼ Community-scale wastewater treatment plants treat and reuse wastewater in close proximity to the source of wastewater production; water is treated to non-potable quality, while discharging solids to the central wastewater collection and treatment system.
 - Yield = 1,400 – 16,680 ac-ft/yr (online 2030)
 - Costs (not including pipeline and pump station infrastructure)
 - Total Project Costs: \$5,811,000
 - Annual Cost: \$803,000
 - Unit Cost: \$48/ac-ft
 - Notes
 - Strategy reduces the energy spent transmitting wastewater from the collection system to existing centralized wastewater treatment plants, but may result in an increase in nutrient loading at the treatment plants.
 - No impact to agriculture.

10d. Austin Centralized Direct Non-Potable Reuse

- ▼ Reclaimed water systems established at Austin's major WWTPs treat and reuse wastewater to meet non-potable needs (golf course irrigation, cooling towers, etc.).
 - Yield = 5,100 – 29,600 ac-ft/yr (online 2020)
 - Existing: 4,600 ac-ft/yr (online 2020)
 - Municipal + Manufacturing: 500 – 23,250 ac-ft/yr (online 2020)
 - Steam-Electric: 1,750 ac-ft/yr (online 2030)
 - Costs
 - Total Project Costs: \$286,031,000
 - Annual Cost: \$24,865,000
 - Unit Cost: \$995/ac-ft
 - Notes
 - Program is known as Austin's Water Reclamation Initiative. Reclaimed water projects authorized under 30 TAC Chapter 210 are presumed to be protective of human health and the environment.
 - Strategy would reduce return flows, but instream and freshwater inflows would be expected to increase.

10e. Austin Brackish Groundwater Desalination

- ▼ Desalination of groundwater containing between 1,000 and 9,999 mg/L of total dissolved solids. Costs and yields sourced from both the Trinity and the Saline Edwards aquifers.
 - Yield = 5,000 ac-ft/yr (online 2070)
 - Costs
 - Total Project Costs: \$167,689,000
 - Annual Cost: \$14,976,000
 - Unit Cost: \$2,995/ac-ft
 - Notes
 - Environmental permits will need to be obtained for the disposal of concentrate brine.
 - Additional studies will be needed to determine the impacts of the proposed extraction location on the surrounding groundwater table.

10f. Austin Return Flows

- ▼ Treated effluent from Austin WWTPs is discharged and blended in the Colorado River. Austin and LCRA share rights to the beneficial use of return flows.

- Yield

	2020	2030	2040	2050	2060	2070
Projected Return Flows (ac-ft)	108,978	114,129	102,440	102,121	99,557	100,935

- Costs

- No capital costs, as diversions utilize existing infrastructure or infrastructure proposed through other strategies.
- Annual Cost: \$1,217,000
- Unit Cost: \$11/ac-ft

- Notes

- Return flows provide a positive impact as they reach the bay as freshwater inflows or they are diverted for use downstream. Positive agricultural impact.

10f. Austin Return Flows

Estimated Continued Benefits of Projected City of Austin Return Flows in the 2021 Region K Plan

COA Return Flows	2020	2030	2040	2050	2060	2070
Projected COA Effluent minus reuse	108,978	114,129	102,440	102,121	99,557	100,935
Estimated Benefits to Major ROR Water Rights ¹						
Highland Lakes ¹	29,317	30,519	25,983	25,419	22,674	22,477
COA ¹	30,038	28,540	24,888	29,339	26,571	30,075
STP ¹	1,202	1,142	996	978	886	859
Garwood ²	937	890	776	763	691	670
Gulf Coast ²	3,605	3,425	2,987	2,934	2,657	2,578
Lakeside ²	2,403	2,283	1,991	1,956	1,771	1,719
Pierce Ranch ²	5,084	4,830	4,212	4,138	3,747	3,636
Irrigation ³	20,621	22,516	22,183	24,294	24,270	25,746
Estimated Benefit to Matagorda Bay	15,772	19,985	18,425	12,301	16,291	13,175

Note: Estimates derived originally from 2006 Region K Plan RJ Brandes Company preliminary modeling using updated demands.

¹ The benefits for each major water right were computed by adjusting the estimated benefits from the modeling work completed in the 2006 Region K Plan for return flow amounts projected in the 2021 Region K Plan. The benefits represent the estimated increase in firm supply available to each water right due to the addition of the City of Austin return flows in the model.

² These values represent the gains due to return flows in the portions of the water rights used for non-irrigation purposes.

³ This value represents the gains due to return flows in the portion of the Irrigation ROR water rights that are used for irrigation purposes.

Irrigation Conservation

Strategies	Status
On-Farm Conservation	Updated Strategy from 2016 RWP
Irrigation Operations Conveyance Improvements	Updated Strategy from 2016 RWP
Drip Irrigation for Non-Rice Crops	New 2021 Strategy
Real-Time Use Metering and Monitoring	New 2021 Strategy
Sprinkler Irrigation	Updated Strategy from 2016 RWP
Tail Water Recovery	Strategy not recommended by committee.

Region K

10. Irrigation Conservation – On-Farm Conservation

- ▼ Application of on-farm strategies including laser land leveling, use of multiple field inlets, and the replacement of on-farm canal ditches with irrigation pipeline.
 - Irrigation WUGs (Colorado, Matagorda, Wharton)
 - Yield = 22,053 – 44,106 ac-ft/yr (online 2020)
 - Costs
 - Total Project Cost: \$64,153,000
 - Precision Land Leveling: \$440/ac
 - Multiple Inlets: \$160/ac
 - Irrigation Pipeline: \$241/ac
 - Annual Cost: \$4,976,000
 - Unit Cost: \$113/ac-ft
 - Notes
 - On-farm conservation increases the likelihood of meeting irrigation demands consistently.
 - Overall negligible impacts to streamflow and the bay.

Region K

Page 40



10. Irrigation Conservation – Irrigation Operations Conveyance Improvements

- ▼ LCRA improvements to the efficiency of the canal systems that deliver water to the individual irrigator.
 - Irrigation WUGs (Colorado, Matagorda, Wharton)
 - Yield = 6,000 – 44,350 ac-ft/yr (online 2020)
 - Costs
 - Total Project Cost: \$100,980,000
 - Annual Cost: \$8,561,000
 - Unit Cost: \$193/ac-ft
 - Notes
 - The unit cost represents an average of more expensive strategies, such as balancing reservoirs, and less expensive options, such as automated canal gates.
 - Updated yields and costs from 2016 cycle are based on improvements LCRA has already implemented.
 - Reduced overall demand due to fewer losses would reduce the diversions and increase streamflows.

10. Irrigation Conservation – Drip Irrigation for Non-Rice Crops

- ▼ Application of micro irrigation to the root zone of non-rice crops through low pressure, low volume devices.
 - Mills County Irrigation
 - Yield = 459 ac-ft/yr (online 2020)
 - Costs
 - Total Project Cost: \$857,000
 - Annual Cost: \$245,000
 - Unit Cost: \$891/ac-ft
 - Notes
 - Drip irrigation requires a high level of maintenance, but also provides a water savings based on a high level of efficiency.
 - Considering for pecan irrigators in San Saba County.

10. Irrigation Conservation – Real-Time Use Metering and Monitoring

- ▼ Installation of meters that automatically record and transfer flow data at 15-minute intervals.
 - Irrigation WUGs (Colorado, Matagorda, Wharton)
 - Yield = 20,509 ac-ft/yr (online 2020)
 - Costs
 - Assume 3,000 meters would be required to serve the area + meters average \$6,000 each
 - Unit Cost: \$103/ac-ft
 - Notes
 - Yield
 - In 2015, the Gulf Coast Water Authority (GCWA) received a \$200,000 grant from the TWDB to implement project. From 2016 to 2018, this project estimated an annual 34 percent water savings rate.
 - Customers in LCRA irrigation divisions currently participate in volumetric billing, saving 0.3 ac-ft/ac.
 - Impacts to return flows would be negligible as this strategy's savings are based on demand reduction.
 - Generating a more accurate estimate of water use would reduce the water per acre required. During times of non-drought, this would allow farmers to increase production acres and grow more.

10. Irrigation Conservation – Sprinkler Irrigation

- ▼ Application of low elevation precision application (LEPA) sprinkler irrigation to rice as an alternative to flooding fields.
 - Irrigation WUGs (Colorado, Matagorda, Wharton)
 - Yield = 911 – 11,393 ac-ft/yr (online 2020)
 - Costs
 - Total Project Cost: \$11,829,000
 - Annual Cost: \$2,111,000
 - Unit Cost: \$185/ac-ft
 - Notes
 - It was assumed that operations and maintenance would be greater due to an increased production cost, as irrigators using sprinkler irrigation must control for grass and weeds.
 - Strategy would reduce return flows during non-drought years.
 - Driving factor of strategy is cost of implementation vs. cost of labor + yield.

LCRA Strategies (19+3)

- a) Expand Use of Groundwater in Bastrop County
- b) Alternative - Expand Use of Groundwater in Bastrop County
- c) Groundwater Supply for Fayette Power Plant – off-site
- d) Groundwater Supply for Fayette Power Plant – on-site
- e) Alternative Groundwater Supply for Fayette Power Plant – on-site
- f) Baylor Creek Reservoir
- g) LCRA Contract Amendments
- h) LCRA Contract Amendments with Infrastructure
- i) LCRA New Contracts
- j) LCRA New Contracts with Infrastructure
- k) LCRA Import Return Flows from Williamson County
- l) LCRA Amendments to Water Management Plan
- m) LCRA Enhanced Municipal and Industrial Conservation
- n) LCRA Amendments to Existing Water Rights
- o) Alternative LCRA Brackish Groundwater Desalination
- p) Alternative LCRA Groundwater Importation from Carrizo-Wilcox
- q) Alternative LCRA Supplement Environmental Flows with Brackish Groundwater
- r) LCRA Excess Flows Off-Channel Reservoir
- s) LCRA Mid-Basin Off-Channel Reservoir

Region K

10a. LCRA Expand Groundwater in Bastrop County

- ▼ Obtain and develop additional groundwater from the Carrizo-Wilcox aquifer within the Lost Pines Groundwater Conservation District to meet future demands.
 - Yield = 30 ac-ft/yr (online 2030)
 - Costs
 - Total Project Costs: \$331,000
 - Annual Cost: \$25,000
 - Unit Cost: \$833/ac-ft
 - Notes
 - Strategy would require one (1) 18 gpm water supply well and transmission piping.
 - No impact to environment/agriculture due to small yield.
 - The project is subject to requirements of the LCRA's Incidental Take Permit and Habitat Conservation Plan and associated requirements of the U.S. Fish and Wildlife Service.

Region K

Page 46

AECOM

10b. Alternative - LCRA Expand Groundwater in Bastrop County

- ▼ Obtain and develop additional groundwater from the Carrizo-Wilcox aquifer within the Lost Pines Groundwater Conservation District to meet future demands. Alternative version of strategy exceeds the MAG.
 - Yield = 25,000 ac-ft/yr (online 2030)
 - Costs
 - Total Project Costs: \$46,629,000
 - Annual Cost: \$5,436,000
 - Unit Cost: \$217/ac-ft
 - Notes
 - Strategy would require eighteen (18) 1,042 gpm water supply wells and associated transmission piping, 4.5 miles of transmission main, and a primary pump station.
 - Strategy exceeds MAG and could contribute to drawdown in aquifer beyond DFC (240 feet by 2070).
 - The project is subject to requirements of the LCRA's Incidental Take Permit and Habitat Conservation Plan and associated requirements of the U.S. Fish and Wildlife Service.

10c. LCRA Groundwater Supply for Fayette Power Plant – off-site

- ▼ Augment water provided to Fayette Power Project's cooling water reservoir by adding yield from the Carrizo-Wilcox Aquifer in northwestern Fayette County.
 - Yield = 2,500 ac-ft/yr (online 2030)
 - Costs
 - Total Project Costs: \$33,618,000
 - Annual Cost: \$3,142,000
 - Unit Cost: \$1,257/ac-ft
 - Notes
 - This strategy could contribute to drawdown in the aquifer of up to 110 feet by 2070, relative to January 2000.
 - No impacts to agriculture anticipated

10d. LCRA Groundwater Supply for Fayette Power Plant – on-site

- ▼ Augment water provided to Fayette Power Project's cooling water reservoir by adding yield from the Gulf Coast Aquifer.
 - Yield = 40 ac-ft/yr (online 2030)
 - Costs
 - Total Project Costs: \$342,000
 - Annual Cost: \$27,000
 - Unit Cost: \$675/ac-ft
 - Notes
 - This strategy could contribute to drawdown in the aquifer of up to 13 feet by 2070, relative to January 2000.
 - No impacts to agriculture anticipated

10e. Alternative - LCRA Groundwater Supply for Fayette Power Plant – on-site

- ▼ Augment water provided to Fayette Power Project's cooling water reservoir by adding yield from the Gulf Coast Aquifer. Alternative strategy assumes that the volume of groundwater used would exceed the MAG.
 - Yield = 700 ac-ft/yr (online 2040)
 - Costs
 - Total Project Costs: \$926,000
 - Annual Cost: \$82,000
 - Unit Cost: \$117/ac-ft
 - Notes
 - The water supply exceeds the MAG, so this strategy could contribute to drawdown in the aquifer exceeding 13 feet by 2070, relative to January 2000 conditions.
 - No impacts to agriculture anticipated

10f. LCRA Baylor Creek Reservoir

- ▼ Construct a new 48,390 ac-ft earthen dam reservoir in Fayette County adjacent to the Cedar Creek Reservoir (Lake Fayette) and the Fayette Power Project.
 - Yield = 18,000 ac-ft/yr (online 2040)
 - Costs
 - Total Project Costs: \$219,883,000
 - Annual Cost: \$16,333,000
 - Unit Cost: \$907/ac-ft
 - Notes
 - The construction of the Baylor Creek Reservoir will lessen the need to send Highland Lakes' water to industrial customers near the coast and could improve agricultural water reliability and efficiency.
 - This project could potentially provide up to 18,000 ac-ft/yr of water for agriculture purposes during a drought year, depending on firm customer needs.

10g. LCRA Contract Amendments

- ▼ Water contract amendments between WUGs and LCRA.
 - Full implementation could remove up to 13,320 ac-ft/yr from Highland Lakes by 2070
 - Unit Cost: \$145/ac-ft
 - West Travis County PUA LCRA Contract Amendment with Infrastructure includes infrastructure to accommodate Dripping Springs WSC, as WTCPUA currently treats and transports their water (*)

WUG	Online	Yield (ac-ft/yr)
Granite Shoals	2060	50 – 170
Horseshoe Bay	2040	400 – 800
Steam-Electric (COA)	2020	4,300
Dripping Springs WSC*	2050	1,000 – 2,000
Steam-Electric (STPNOC)	2020	8,300
Leander	2020	50 – 2,600
Pflugerville	2050	1,300 – 3,400
Travis County WCID Point Venture	2070	50

10h. LCRA Contract Amendments with Infrastructure

▼ Contract amendments between WUGs and LCRA with infrastructure development.

- Strategies online 2030
- Full implementation could remove up to 11,500 ac-ft/yr from Highland Lakes by 2070
- Implementation of new contracts/contract amendments could reduce available interruptible water for agricultural use and environmental flows.

WUG	Yield (ac-ft/yr)	Total Project Costs	Annual Cost	Unit Cost
Burnet	1,000 – 2,000	See Buena Vista Regional Project Strategy		
Marble Falls	4,000	See Marble Falls Regional Water System Strategy		
West Travis County PUA	2,400 – 5,500	\$35,402,000	\$4,300,000	\$782

10i. LCRA New Contracts

▼ New raw water contract between WUGs and LCRA.

- Strategies online 2040
- Full implementation could remove up to 6,320 ac-ft/yr from Highland Lakes by 2070
- Unit Cost: \$145/ac-ft
- Current wholesale customers currently receiving water from Austin need to contract with LCRA in the future. Austin will continue to treat and transport this water (*)

WUG	Yield (ac-ft/yr)
North Austin MUD 1*	770
Northtown MUD 1*	900 – 1,300
Rollingwood*	250
Sunset Valley	300
Travis County WCID 10*	2,300
Wells Branch MUD*	1,400

10j. LCRA New Contracts with Infrastructure

- ▼ New raw water contract between WUGs and LCRA with infrastructure development.

WUG	Year Online	Yield (ac-ft/yr)	Total Project Costs	Annual Cost	Unit Cost
Aqua WSC	2040	2,500 – 20,000	\$132,037,000	\$18,286,000	\$914
Bastrop	2050	1,000 – 4,000	\$26,407,000	\$3,657,000	\$914
Bastrop County WCID 2	2050	500 – 1,500	\$9,903,000	\$1,372,000	\$914
Smithville	2070	700	\$10,589,000	\$1,373,000	\$1,961
Burnet County-Other	2030	3,200 – 5,400	See Buena Vista Regional Project + East Lake Buchanan + Marble Falls Regional Water System Strategies		

- Bastrop Regional Project delivers water from a single intake + water treatment plant
- Full implementation could remove up to 31,600 ac-ft/yr from Highland Lakes by 2070

10k. LCRA Import Return Flows from Williamson County

- ▼ Import return flows (i.e. treated wastewater effluent) from entities in Williamson County that have contracts with LCRA for firm water from the Colorado River and for which exempt interbasin transfer permits have been issued allowing the water to be used in the Brazos River basin within Williamson County.

- Yield = 5,460 – 25,000 ac-ft/yr (online 2030)

- Costs

- Total Project Costs: \$75,734,000
- Annual Cost: \$6,080,000
- Unit Cost: \$243/ac-ft

- Notes

- To bring return flows from the Brazos River Basin to the Colorado River Basin, an interbasin transfer permit (IBT) will be required under Texas Water Code § 11.085.

10l. Amendments to LCRA Water Management Plan

- ▼ LCRA will likely seek further amendments to its Water Management Plan to adjust the conditions under which it will provide water from lakes Buchanan and Travis to help meet demands for firm, interruptible agricultural, and environmental flows purposes.
 - Yield = 63,405 ac-ft/yr (online 2020) – 0 available by 2050
 - Costs
 - Capital expenditures for water supply purposes would not be required to implement this alternative since diversions would be made under existing water rights.
 - Unit Cost: \$37-60/ac-ft
 - Notes
 - Actual availability of this supply from year to year, or by season, can vary greatly, largely as a function of drought conditions, lake levels, inflows into the lakes, and demands for firm water.

10m. LCRA Enhanced Municipal and Industrial Conservation

- ▼ Implementation of 2019 Water Conservation Plan that addresses water conservation practices for its firm water customers (municipal, industrial, power generation, and recreational).
 - Yield = 5,100 – 20,000 ac-ft/yr (online 2020)
 - Costs
 - Total Project Costs: \$74,415,000
 - Annual Cost: \$5,236,000
 - Unit Cost: \$262/ac-ft
 - Notes
 - Conservation measures include regulations, financial incentives, and education for water efficiency.

10n. LCRA Amendments to Water Rights and Acquisition of Water Rights

- ▼ LCRA owns several downstream run-of-river (ROR) water rights, which authorize a total diversion of up to 503,750 ac-ft/yr on the lower Colorado River.
 - Amending these water rights to add additional diversion points and authorization to store the water in existing or new reservoirs, LCRA could use these water rights to meet firm demands
- ▼ In addition to amending existing water rights, from time to time, LCRA may purchase water rights that have the potential to enhance LCRA's overall water supply portfolio.
- ▼ Yield = 250 ac-ft/yr (online 2030)
 - Costs
 - Unit Cost: \$145/ac-ft (amendment)
\$500/ac-ft (acquisition)
- ▼ Strategy write-up also references Goldthwaite and STP plans for water right amendments

10o. LCRA Alternative Region K LCRA Brackish Groundwater Desalination

- ▼ This strategy includes the extraction of brackish groundwater from the Gulf Coast Aquifer in Matagorda County, treatment using reverse osmosis (RO), and delivery of treated water to the Bay City area for municipal and industrial use.
 - Yield = 22,400 ac-ft/yr (online 2040)
 - Costs
 - Total Project Costs: \$229,006,000
 - Annual Cost: \$31,199,000
 - Unit Cost: \$1,393
 - Notes
 - Infrastructure required includes 25 MGD RO plant, 15 miles of transmission piping, (14) extraction wells, six (6) RO permeate injection wells, 2 MG storage tank, and high service pump station.
 - Currently, Gulf Coast Aquifer MAG does not distinguish between fresh and brackish water. Exceeding the MAG could contribute to more than 13 feet of drawdown by 2070, relative to January 2000 conditions.
 - Potential environmental impacts include degradation of groundwater quality in vicinity of the proposed wells and the management of the RO waste and byproducts.

10p. LCRA Alternative LCRA Groundwater Importation from Carrizo-Wilcox Aquifer

- ▼ Strategy involves extracting and transporting untreated groundwater from outside the Lower Colorado Regional Water Planning Area (Simsboro Formation of the Carrizo-Wilcox aquifer in northern Burleson County) to eastern Travis County.
 - Yield = 35,000 ac-ft/yr (online 2040)
 - Costs
 - Total Project Costs: \$256,382,000
 - Annual Cost: \$29,031,000
 - Unit Cost: \$829/ac-ft
 - Notes
 - Infrastructure required includes 80 miles of 48-in transmission main, two booster pump stations, and eleven (11) 2,500 gpm wells with associated piping.
 - No groundwater modeling was conducted. Assumed that the production of this volume would conform to the water management plan and rules of the Post Oak Savannah Groundwater Conservation District.

10q. LCRA Alternative LCRA Supplement Environmental Flows with Brackish Groundwater

- ▼ Strategy supplies brackish groundwater to the Matagorda Bay Delta to offset required releases from the Highland Lakes.
 - Yield = 12,000 ac-ft/yr (online 2030)
 - Costs
 - Total Project Costs: \$47,269,000
 - Annual Cost: \$6,831,000
 - Unit Cost: \$532
 - Notes
 - Infrastructure includes twelve (12) brackish stainless steel groundwater wells and a simple outfall structure
 - Modeling and potential pilot testing would be necessary to determine environmental impacts and salinity levels. Instream flows would possibly be reduced by up to 12,000 ac-ft/yr as a result of not releasing stored water.

10r. LCRA Excess Flows Off-Channel Reservoir

- ▼ Strategy consists of construction of new off-channel reservoir (OCR), assumed to be located in Colorado County.
 - Yield = 39,247 ac-ft/yr (online 2030)
 - Costs
 - Total Project Costs: \$540,110,000
 - Annual Cost: \$48,713,000
 - Unit Cost: \$1,241
 - Notes
 - OCRs allow for capture of released water that is no longer needed once it reaches downstream users.
 - LCRA already has TCEQ permit to divert and store this water. Due to the environmental restrictions in the permit, negligible environmental impacts are anticipated.

10s. LCRA Mid-Basin Off-Channel Reservoir

- ▼ Strategy consists of construction of new mid-basin off-channel reservoir (OCR).
 - Yield = 20,000 ac-ft/yr (online 2030)
 - Costs
 - Total Project Costs: \$512,792,000
 - Annual Cost: \$46,993,000
 - Unit Cost: \$2,350
 - Notes
 - Infrastructure includes 40,000 ac-ft reservoir, (2) intake and pump stations to retrieve/return flows, 56-mile transmission main to end users
 - OCRs allow for capture of released water that is no longer needed once it reaches downstream users.
 - This strategy could potentially remove up to 20,000 ac-ft/yr from the Colorado River under existing water rights, but will create additional waterfowl habitat.

10t-v. LCRA Draft Strategies

▼ 10t. LCRA Prairie Reservoir

- This strategy consists of a new earthen ring dike off-channel reservoir with 2,000 acre-feet of storage located near Eagle Lake in Colorado County, approximately three miles from the Colorado River.
- The proposed off-channel regulating reservoir would provide operational flexibility for LCRA in providing water to the Lakeside Irrigation Division customers. The Prairie Site Reservoir would release flows to the Lakeside agricultural division canals.
- The balancing reservoir would conserve approximately 19,000 AFY.
- Online by 2030
- Costs
 - Total Project Costs: \$15,226,000
 - Annual Cost: \$86,000
 - Unit Cost: \$45

10t-v. LCRA Draft Strategies

▼ 10u. LCRA Enhanced Recharge and Conjunctive Use

- This strategy consists of diverting water from the Colorado River, when available, and pumping to one or more recharge basins located in the recharge zone of the Gulf Coast aquifer.
- During drought conditions, when backup surface water supplies are intermittent, the water stored underground by this project would be available to groundwater users in the area and also to wells that could augment canal flows.
- Still coordinating with LCRA/modeling to determine yield. (Last cycle = 10,000 AFY). Online ~2030.
- Costs
 - Total Project Costs: \$62,613,000
 - Annual Cost: \$4,540,000
 - Unit Cost: \$TBD (\$834 last cycle)

10t-v. LCRA Draft Strategies

▼ 10v. LCRA Aquifer Storage and Recovery (ASR) in Carrizo-Wilcox Aquifer

- This strategy utilizes surface water that is diverted from the Colorado River and treated at a surface water treatment facility. The treated water would either be delivered to meet existing demands, or diverted to aquifer storage for later recovery and use.
- It is assumed that the diversion point would be located in Bastrop County with the ASR wells located in an adjacent aquifer, but implementation of this strategy could occur at a more downstream diversion point as well.
- Still coordinating with LCRA/modeling to determine yield. (Last cycle = 5,048 AFY). Online ~2040.
- Costs
 - Total Project Costs: \$112,775,000
 - Annual Cost: \$12,403,000
 - Unit Cost: \$TBD (\$1,076 last cycle)

Agenda Item 11

INITIAL DETERMINATION OF DRAFT WATER MANAGEMENT STRATEGIES AS RECOMMENDED, ALTERNATIVE, OR CONSIDERED

11. Initial determination of draft water management strategies as recommended, alternative, or considered

- ▼ Looking to move forward with Chapter 5 and 6 drafting.
- ▼ Asking RWPG to make initial determination on whether each strategy is recommended, alternative, or just considered.
 - Determination can change before IPP is submitted, or up until final adoption.
- ▼ Some strategies need to be “alternative”, based on their sources and yields.
- ▼ Some WUGs may have multiple strategies to meet a need, and one strategy can be recommended, while another is “alternative”.
 - Plan would have to be amended to move an “alternative” strategy to “recommended” for a WUG to be able to obtain SWIFT funding.
- ▼ “Considered” strategies generally either don’t have enough detail, or don’t meet the regional water planning requirements.

11. Initial determination of draft water management strategies as recommended, alternative, or considered

- ▼ Suggested “Considered” strategies:
 - Goldthwaite strategies related to reservoir expansion, reuse, and water right permitting.
 - Limited detail available and no increase to water supply under DOR
 - Reservoir Capacity Expansion
 - Limited detail available and no increase to water supply under DOR
 - Oceanwater Desalination
 - No project sponsor
 - Irrigation Conservation – Tailwater Recovery
 - Not recommended by WMS Committee
 - Aquifer Storage and Recovery
 - General ASR strategy that was not applied to any WUG.

11. Initial determination of draft water management strategies as recommended, alternative, or considered

▼ Suggested “Alternative” strategies:

- Alternative Expand Use of Carrizo-Wilcox Aquifer (Bastrop County)
- Alternative LCRA Expand Use of Groundwater in Bastrop County
- Alternative LCRA Groundwater Supply for Fayette Power Plant – on-site
- Alternative LCRA Brackish Groundwater Desalination
- Alternative LCRA Groundwater Importation from Carrizo-Wilcox
- Alternative LCRA Supplement Environmental Flows with Brackish Groundwater

▼ Smithville

- 2070 strategies looking at either importing groundwater from Fayette County or a new LCRA contract with infrastructure.
 - May want one to be recommended and one alternative, or both recommended.

11. Initial determination of draft water management strategies as recommended, alternative, or considered

- ▼ Suggest all other strategies be recommended for their respective WUGs and MWP.
- ▼ Open to discussion by RWPG for initial determination.

Agenda Item 12

PRESENTATION AND DISCUSSION OF DRAFT LEGISLATIVE/POLICY RECOMMENDATIONS

12. Draft Legislative/Policy Recommendations

- ▼ Groundwater (8.1.4)
 - Jim Brasher provided minor language changes to policy, expanded discussion on Modeled Available Groundwater (MAG) Peak Factors, and provided discussion on the utilization and permitting of brackish water.
- ▼ Potential Impacts to Agricultural and Rural Water Supplies (8.1.5)
 - Policy reviewed by David Van Dresar and Jim Brasher. No changes recommended.
- ▼ Agricultural Water Conservation (8.1.6)
 - Policy reviewed by David Van Dresar and Jim Brasher. Reference to LCRA-SAWS project deleted.
- ▼ Brush Management (8.1.9)
 - David Lindsay coordinated with the Texas State Soil and Water Conservation Board (TSSWCB) in updating the Brush Management policy. The Water Supply Enhancement Program (WSEP), the TSSWCB program funding brush control measures, was de-funded for 2020-2021. The policy reflects TSSWCB's support in the value of brush management.

Agenda

13. Agenda items for next meeting
14. New / Other Business
15. Public Comments
16. Adjourn