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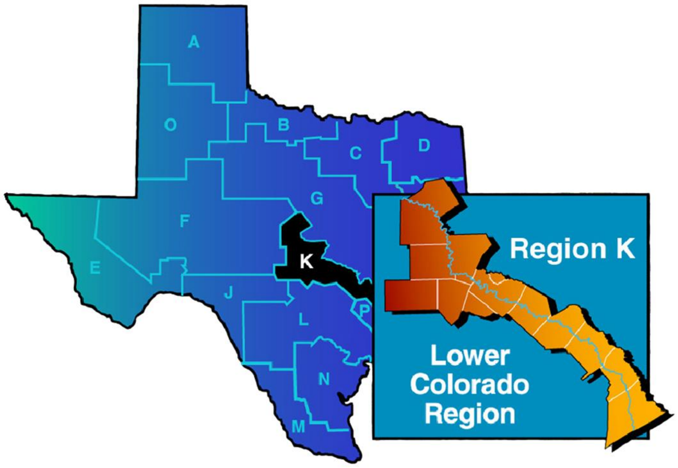

Adopted

2016 Region K Water Plan

for the Lower Colorado Regional Water Planning Group

Volume 2 of 2

prepared by
Lower Colorado Regional Water Planning Group

with funding assistance from
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prepared for
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CHAPTER 5.0: IDENTIFICATION, EVALUATION, AND SELECTION OF WATER MANAGEMENT STRATEGIES BASED ON NEED

Chapter 4 identified the WUGs in the region with water needs. *Appendix 4A* lists all WUGs within Region K with shortages. This chapter (Chapter 5) describes the analysis regarding the identification, evaluation, and selection of appropriate water management strategies for the Region K. Water management strategies have been defined for each of the identified future water shortages within Region K as required by the regional water planning process. Included within this chapter are:

- Description of the potentially feasible water management strategies
- Definition of the recommended and alternative water management strategies
- Allocation of selected strategies to specific WUGs

In addition to the above, this chapter has a sub-section specifically to address water conservation, including any recommended water conservation management strategies.

5.1 POTENTIAL WATER MANAGEMENT STRATEGIES

Region K presented their process for identifying potential water management strategies for public comment at the January 9, 2013, Region K meeting.

TWDB regional water planning guidelines provide a list of potentially feasible water management strategies that should include, but is not limited to:

- Expanded use of existing supplies.
- New supply development.
- Conservation and drought management measures.
- Reuse of wastewater.
- Interbasin transfers.
- Emergency transfers.

The Region K process that was used to identify potentially feasible water management strategies for the region includes the following:

1. Define groupings or common areas with supply deficiencies.
2. Develop a comprehensive list of potentially feasible strategies for each area.
    - Recommended and alternative strategies from 2011 Region K Water Plan
    - Strategies documented in local plans
    - Suggestions from the public

3. Meet with potential suppliers/WUGs for each area to determine current strategies under consideration.

4. Prepare qualitative rating based on cost, reliability, environmental impact, and political acceptability for the various strategies.

5. Select one or more additional strategies for each area, if appropriate.

6. Present proposed shortlist at Public Meeting during Region K Planning Group meeting for modification and/or approval.

The complete list of potentially feasible water management strategies considered in the 2016 RWP are included in *Appendix 5A*. *Appendix 5A* also includes a table that identifies whether each category of water management strategy required for consideration by TWDB is potentially feasible or is not potentially feasible for each Water User Group (WUG) with water needs.

5.2 RECOMMENDED WATER MANAGEMENT STRATEGIES

The primary emphasis of the regional water planning effort is the development of regional water management strategies sufficient to meet the projected needs of WUGs throughout the state. Water needs are determined by comparing user group water demands to the water supplies available to that user group. The following sections present information concerning the identification, evaluation, and selection of specific water management strategies to meet specific projected water supply shortages for the LCRWPA (Region K). If a project sponsor wishes to be considered for certain types of State funding, the project that the funding is requested for must be included in the Regional and State Water Plan. It should be noted that local plans that are not inconsistent with the regional water supply plan are also eligible to apply for certain types of TWDB financial assistance to implement those local plans even though they have not been specifically recommended in this plan.

The identified water needs presented in Chapter 4 are based on conservative water availability estimates, which assume only water available during a repeat of the worst DOR, that all rights are being fully and simultaneously utilized, and exclude water available from LCRA on an interruptible basis and water available as a result of municipal return flows to the Colorado River. The water management strategies are intended to alleviate these projected water supply shortages (water needs). A table of the recommended water management strategies by WUG is contained in *Appendix 5B*. *Appendix 5C* contains the TWDB Costing Tool Cost Summary for each applicable strategy.

Regional water planning groups are required to take into account and report water loss estimates in the evaluation of water management strategies. A summary of water loss for Region K is provided at the end of Chapter 1. It shows an average real loss of 9.8% for the region. Reported real losses for individual municipal WUG from the 2010 audit submitted to TWDB range from 0% to 57%. These real losses are embedded in the water use survey data that the TWDB uses to project municipal water demands and determine water needs in the regional water planning process. Certain conservation strategies recommended in the 2016 Region K Water Plan are intended to decrease the water loss percentage for existing infrastructure, both for municipal and for irrigation water users. Drought management strategies recommended in this plan have no associated water losses. Strategies involving new or amended contracts or the purchase of water from a supplier are assumed to have no additional water losses with the use of existing infrastructure.

Recommended and alternative surface water strategies such as new reservoirs have water losses associated with evaporation that are included in the modeling analyses. Surface water strategies containing new infrastructure such as pump stations and transmission pipelines are assumed to have negligible water losses. Reuse projects are assumed to have negligible water losses as well.

Recommended and alternative groundwater strategies include aquifer storage and recovery (ASR), expansion of existing groundwater supplies, and development of new groundwater supplies, including importation from outside of the region. ASR reduces the water losses associated with evaporation from a reservoir, but there can be water losses due to recovery efficiency from the aquifer. Migration rates vary depending on the aquifer used for storage, and impacts will depend on how long the stored water remains in the aquifer. Recovery efficiency will have some impacts on water volume, but should have negligible impacts on the firm yield volumes. Groundwater expansion strategies that assume additional yield from existing infrastructure have no additional water losses associated with them. Groundwater expansion, development, and importation strategies that require new infrastructure are assumed to have negligible water losses.

Alternative desalination strategies in this plan have yields that are assumed to account for approximately 10 percent water loss, due to concentrate disposal.

5.2.1 **Utilization of Return Flows**

Approximately 60 percent of all municipal diversions by the City of Austin (COA) and others are currently returned to the Colorado River as effluent discharges. Unless otherwise authorized by permit, once discharged to the river, this water is subject to diversion under existing water rights' permits. State law currently allows a water right holder to consumptively use all of the water authorized by permit, unless discharge is required by permit. Direct reuse is one possible manner in which a water right holder may increase consumptive use of the water authorized for diversion and use under the water right. The Region K Cutoff WAM for the Colorado River that was used for determining water supply in this round of planning excludes all sources of return flows from the model. The inclusion of return flows in the model is proposed as a water management strategy for the benefit of water rights and environmental flows and indirect reuse by the City of Austin in future regional water plans, consistent with a settlement agreement between Austin and the Lower Colorado River Authority.

The exclusion of all return flows in the determination of water supply leads to conservatively low estimates of available surface water supply for planning purposes. Water shortages for entities that currently use and rely upon the return flows may not be realistic as long as upstream return flow discharges continue into the future. For purposes of this plan, the water management strategies include use of projected state surface water that result from discharge of return flows by the COA and the City of Pflugerville. Strategies related to COA's reuse of treated effluent are described in *Section 5.2.3.2*. This plan assumed projected levels of effluent to be discharged by the City of Pflugerville of 60 percent of the total projected demand after water savings for drought management, conservation, and reuse have been accounted for in each planning decade. Effluent not being directly reused by Austin as a strategy and these other projected levels of effluent were made available to help meet environmental flow needs of the river and Matagorda Bay and water rights, according to the prior appropriation doctrine. Therefore, return flow assumptions for purposes of developing LCRA's water strategies incorporate and reflect the COA's proposed strategies of reuse of effluent to meet portions of municipal and manufacturing demand and COA's steam electric demand in Travis County, including use of reclaimed water at the Sand Hill Energy Center, and the return flow sharing strategy described in *Section 5.2.1.1*.

5.2.1.1 COA Return Flows Strategy

In 2007, the City of Austin and LCRA signed a settlement agreement that resolved several permitting disputes and outlined a proposed arrangement for shared rights to the beneficial use of return flows discharged by the City of Austin. According to the settlement agreement, the two parties will seek regulatory approval to effectuate the strategy of joint return flow benefit. The settlement contemplates that the return flows will be managed between the two parties to first help satisfy environmental flow needs before Austin conducts indirect reuse. If Austin has an indirect reuse project in operation that is consistent with the terms and conditions of the Settlement Agreement, LCRA will not call on return flow passage for diversion under LCRA's water rights unless, first, environmental needs and, second, Austin's indirect reuse needs are met.

At this time, the City of Austin has not developed plans for implementing an indirect reuse project under the COA-LCRA Joint Application for Reuse pending at TCEQ, as outlined by the City of Austin and LCRA 2007 Settlement Agreement. Future Region K plans are expected to include assumptions related to indirect reuse under this pending joint COA-LCRA permit. Consistent with the 2007 settlement agreement language regarding the shared rights to the beneficial use of return flows and because Austin has not proposed a specific indirect reuse project under the pending joint COA-LCRA permit, return flows were modeled for downstream water right availability only as an illustration of concept. First, return flows were allocated towards meeting environmental flow requirements (instream flow and bay and estuary freshwater inflow requirements) of LCRA's Water Management Plan, as contained in the Region K Cutoff model, as well as the Environmental Flow Standards for base flow at the Bastrop gage, as needed. Thereafter, the return flows were made available for use by downstream water rights according to the doctrine of prior appropriation.

In this plan, after meeting the environmental flow requirements, as needed, in the Region K Cutoff model, the projected remaining return flows were made available to meet all downstream demands, including environmental, municipal, irrigation, and industrial (including steam electric) water needs, in accordance with the prior appropriation doctrine. The partitioning of Austin's municipal return flows between environmental flow requirements and water rights is indicated by *Table 5-1*. It should be noted that the partitioning of return flows shown in *Table 5-1* is dependent on the modeling assumptions used in the Region K Cutoff model and is presented here only as an illustration of concept. Environmental flow requirements will likely change in the future based on the latest scientific studies and actual water right utilization levels throughout the basin. The settlement agreement contemplates a framework for joint management between the two parties so that environmental flow requirements, as based on the best available science at the time, will be satisfied with Austin's return flows prior to beneficial use by either party's water rights.

Table 5-1: Example of Austin Municipal Return Flow Partitioning

	2020	2030	2040	2050	2060	2070
Total Projected Austin Municipal Return Flow Discharged to the Stream After Reuse Projects, ac-ft/yr	77,013	73,057	80,023	85,707	89,806	101,578
Average Return Flow Used to Satisfy 2010 WMP Environmental Flows During 1950's Drought, ac-ft/yr	42,784	40,875	45,087	48,628	51,308	58,434
Average Return Flow Used to Satisfy SB3 Baseflows at Bastrop During 1950's Drought, ac-ft/yr	1,609	1,642	1,927	2,200	2,448	2,931
Average Return Flow Available to Water Rights After Satisfying Environmental Flows During 1950's Drought, ac-ft/yr	32,620	30,540	33,009	34,879	36,050	40,213
Total	*77,013*	*73,057*	*80,023*	*85,707*	*89,806*	*101,578*
Average Return Flow Used to Satisfy 2010 WMP Environmental Flows for 1940 to 2013 Period of Record, ac-ft/yr	26,775	26,395	30,001	33,299	36,114	42,230
Average Return Flow Used to Satisfy SB3 Baseflows at Bastrop for 1940 to 2013 Period of Record, ac-ft/yr	5,876	5,015	4,881	4,571	4,103	3,863
Average Return Flow Available to Water Rights After Satisfying Environmental Flows for 1940 to 2013 Period of Record, ac-ft/yr	44,362	41,648	45,142	47,837	49,590	55,485
Total	*77,013*	*73,057*	*80,023*	*85,707*	*89,806*	*101,578*

Modeling for Table 5-1 uses the Region K Cutoff assumption, the 2010 LCRA Water Management Plan environmental flow requirements for Lakes Travis and Buchanan, the Environmental Flow Standards for base flow at the Bastrop gage, and assumes all water rights are exercised according to their fully authorized amounts. City of Austin municipal return flows are added to the model according to the decadal projection of discharge to the river as given by Table 5-2.

Until the City of Austin and LCRA have been granted regulatory approval for the strategy of joint return flow benefit and until Austin implements an indirect reuse project consistent with the terms and conditions of the Settlement Agreement, the beneficial use of these return flows as a water management strategy as indicated in *Table 5-2* helps meet the projected needs identified in Chapter 4 which were the result of the conservative modeling assumptions used in Chapter 3.

The quantity of return flows is projected to increase over the 50-year planning period due to increased water demands in the Austin area even though the quantity of water reused during this period will increase as well. However, beyond 2070, the COA projects that it will significantly increase its reuse of treated effluent to nearly 100 percent through direct and indirect reuse with the indirect reuse being implemented only in accordance with the 2007 settlement agreement. As return flows discharged by Austin diminish in the future due to enhanced reclamation of water, other sources may need to be dedicated or developed to meet needs that may currently be met by return flows discharged by Austin.

Table 5-2: Estimated Continued Benefits of Projected City of Austin Return Flows in the 2016 Region K Plan

COA Return Flows	2020	2030	2040	2050	2060	2070
Projected COA Effluent minus reuse	77,013	73,057	80,023	85,707	89,806	101,578
Estimated Benefits to Major ROR Water Rights [1]						
Highland Lakes [1]	20,594	18,530	19,919	19,519	19,999	22,526
COA [1]	19,258	17,749	22,990	22,874	26,759	30,312
STP [1]	770	710	766	763	764	859
Garwood [2]	601	554	598	595	596	671
Gulf Coast [2]	2,311	2,130	2,299	2,287	2,294	2,579
Lakeside [2]	1,540	1,420	1,533	1,525	1,529	1,720
Pierce Ranch [2]	3,259	3,004	3,242	3,226	3,235	3,637
Irrigation [3]	15,193	15,820	19,038	20,893	22,907	26,044
Estimated Benefit to Matagorda Bay	13,485	13,140	9,639	14,025	11,723	13,231

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 2016 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.

Opinion of Probable Costs

There are no capital costs associated with the diversion of this water because the diversions are done under existing water rights permits with existing infrastructure.

Environmental Considerations

Return flows provide a positive impact to the instream flows as they travel downstream to either reach the bay as freshwater inflows, or be diverted by downstream water users. Benefits to the bay are shown in *Table 5-2*.

Agricultural and Natural Resources Considerations

Return flows, when available for diversion by the downstream irrigators, provide a positive impact to agriculture. Benefits to irrigation are shown in *Table 5-2*.

Issues and Considerations

Issues related to ownership of treated wastewater effluent are discussed in Chapter 8 (*Section 8.1.8*).

5.2.1.2 Downstream Return Flows

In addition to the COA, return flows for the City of Pflugerville were also taken into consideration. This plan assumed projected levels of effluent to be discharged by the City of Pflugerville of 60 percent of the total projected demand after water savings for drought management, conservation, and reuse have been accounted for in each planning decade. *Table 5-3* shows the estimated benefits of these return flows by planning decade. These downstream return flows are assigned as a benefit to LCRA.

Table 5-3: Downstream Return Flows

Water Management Strategies (ac-ft/yr)					
2020	**2030**	**2040**	**2050**	**2060**	**2070**
5,086	5,834	6,784	8,636	8,997	10,453

Opinion of Probable Costs

There are no capital costs associated with the diversion of this water because the diversions are done with existing infrastructure or proposed infrastructure with costs identified in other strategies.

Environmental Considerations

Return flows provide a positive impact to the instream flows as they travel downstream to a diversion point. A potential diversion point for LCRA for these downstream return flows is the proposed Mid-Basin Reservoir project diversion point. Environmental impacts beyond the diversion point would be up to 10,453 acre-feet/year of diverted flow.

Agricultural and Natural Resources Considerations

If the return flows are diverted for storage in the proposed Mid-Basin Reservoir by LCRA, the potential benefit for agriculture that would come from those flows traveling further downstream and being available for run-of-river irrigation diversions would be negligible.

Issues and Considerations

Issues related to ownership of treated wastewater effluent are discussed in Chapter 8 (*Section 8.1.8*).

5.2.2 **Conservation**

The LCRWPG supports conservation as an important component of water planning. It is more effective and less costly to use less water than to develop new sources. Conservation can be implemented at the municipal, industrial, and agricultural levels.

All entities applying for a new water right or an amendment to an existing water right are required to prepare and implement a water conservation plan. The plan is to be submitted to TCEQ along with the application.

Additional entities that are required to prepare and submit conservation plans include municipal, industrial, and other non-agricultural water right holders of 1,000 acre-feet per year or greater; and agricultural water right holders of 10,000 acre-feet per year or greater.

Online model water conservation plans are available at the following link:

https://www.tceq.texas.gov/permitting/water_rights/conserve.html/#plans

As a new requirement by TWDB for the 2011-2016 Planning Cycle, this section of the report consolidates the recommended conservation-related strategies.

5.2.2.1 LCRA Conservation

5.2.2.1.1. Enhanced Municipal and Industrial Conservation

LCRA recently completed its 2014 Water Conservation Plan that addresses water conservation practices for its firm water customers (municipal, industrial, power generation and recreational). These efforts include five-year and 10-year implementation plans that will guide effective water conservation throughout communities in LCRA's rapidly growing service area. More details on the 2014 Water Conservation Plan can be found online at:
http://www.lcra.org/water/save-water/Documents/2014-Water-Conservation-Plan.pdf

Conservation measures include regulations, financial incentives and education for water efficiency. All customers with new or renewing contracts must develop and implement water conservation plans. Along with the basic requirements, staff actively encourages customers to adopt additional measures such as a permanent watering schedule limiting use to twice per week and irrigation standards for new development. Financial incentives include providing cost-share_ grants to firm water customers and offering financial incentives for landscape irrigation technologies. Education efforts include providing irrigation evaluation training and assistance for wholesale customers' staff, community outreach presentations and participating in the coordination of the Central Texas Water Efficiency Network annual water conservation symposium.

Table 5-4 below shows the expected additional water savings from the enhanced municipal and industrial conservation strategy.

Table 5-4: Additional Water Savings from Enhanced Conservation (ac-ft/yr)

Decade	Water Savings (ac-ft/yr)
2020	4,500
2030	10,000
2040	15,000
2050	20,000
2060	20,000
2070	20,000

Cost Implications of the Proposed Strategy

The cost for this strategy was developed as part of the *Water Supply Resource Plan: Water Supply Option Analysis* for LCRA. For the 2016 Region K Plan, capital costs were updated to $45,875,000 (September

2013 dollars). The TWDB Cost Estimating Tool was used to calculate total project costs at $64,099,000. The total annual cost is $5,634,000, generating a unit cost of $268 per ac-ft of water saved. The cost per volume of water is expected to vary over implementation, and LCRA anticipates a range between $300 and $400 per ac-ft, allowing that some of the costs associated with the conservation measures would not be capital. The most cost effective conservation measures would be expected to be implemented first, and thus the cost per volume saved would expect to increase over time.

Environmental Impact

Conservation program does not require additional infrastructure which has the potential to require environmental mitigation or other measures to address impacts.

The impacts of this strategy should be considered negligible, as the impacts are already accounted for in the individual conservation strategies identified in *Sections 5.2.2.2*, *5.2.2.3*, and *5.2.2.4*.

Agricultural and Natural Resources Considerations

Impacts to agriculture are anticipated to be negligible, as enhanced municipal and industrial conservation will reduce a just a small portion of the expected increases to firm demands over time.

5.2.2.1.2. Agricultural Conservation

Irrigators in Colorado, Wharton, and Matagorda Counties have the largest irrigation needs in Region K. LCRA's strategies to be implemented as part of its sale of water to Williamson County under HB 1437 and those under its Agricultural Water Supply Resource Plan (WSRP)[1] are designed to extend the availability of interruptible water supply to meet irrigation demands beyond that which would be expected without those improvements. The recommended plan to meet the rice irrigation shortage that is reflected in the Agricultural WSRP is based on the studies done for the LCRA-SAWS water project, published between 2006 and 2008, and incorporated in the 2011 Regional Water Plan. Stakeholders participating in these studies included several rice irrigators, representatives from the affected counties, representatives from LCRA, environmental representatives, and representatives interested in the impacts on the Highland Lakes. The strategies, which are outlined in detail in *Section 5.2.2.4* rely heavily on adoption of the various strategies in the Agricultural WSRP.

5.2.2.2 COA Conservation

The COA began an aggressive water conservation campaign in the mid-1980s in response to rapid growth and a series of particularly dry years. COA has achieved significant reductions in both per capita consumption and peak day to average day demand ratio. For the per capita use calculations, the COA used a modified GPCD from year 2011 approved by the LCRWPG and TWDB as their base year since the COA had mandatory water conservation measures in place from September through December that year.

In 1990, the City's conservation program evolved from primarily reacting to high summertime demands to a comprehensive program with the goals of reducing both per capita consumption and peak day

[1] "Water Supply Strategies for Agriculture, a supplement to the water supply resource plan." LCRA. November 2011.

demand. To achieve these broader goals, the City has implemented and anticipates continuing water conservation efforts and programs in a number of areas including:

- Leak reduction, leak response, and water loss reduction
- Water main replacement program
- Drought tolerant WaterWise landscaping
- Irrigation system audits and efficiency programs
- Water use efficiency programs including irrigation system and vehicle wash facility assessments
- Public education and outreach including school programs
- Rebate and incentive programs
- Local ordinances that increase water efficiency by customers
- Support of legislation that increases water efficiency in plumbing products and appliances at both the State and Federal level,
- Increased water efficiency in utility operations
- Conservation-oriented rate structures
- A/C Condensate recovery and cooling tower rebates
- Meter and water use efficiency programs

Through its various water conservation programs, the COA has made significant advances in reducing per capita water use in its service area. The COA is committed to continuing to seek ways to reduce its per capita demands as a best management practice for its utility. In 2009, the Austin City Council charged the Citizens Water Conservation Implementation Task Force (CWCITF) with producing a list of possible conservation measures to reduce water use in Austin beyond the savings that were expected from recommendations from a previous City Council created water conservation task force, the 2007 Water Conservation Task Force. As directed by Council resolution in May 2010, Austin Water evaluated the savings potential of the CWCITF strategies along with the savings expected from ongoing and planned efforts and developed an action plan to reduce water use in Austin to 140 gallons per capita, per day or lower by 2020. In harmony with this goal, efforts are made to increase Austin's customers' understanding of their water use and to educate them on ways to use water more efficiently. The following strategies were identified by Austin Water 140 GPCD Conservation Plan (140 Plan) to meet the following program goals:

- Reach 140 GPCD by 2020
- Reduce peak demand
- Pursue cost effective strategies
- Ensure conservation reaches all customer sectors
- Ensure consumer awareness of conservation
- Promote innovation in water conservation

Projected savings from municipal and manufacturing conservation are shown in the following table. Note that these projected savings from conservation represent estimated savings from programs generally outlined above. These savings do not include additional potential savings from water conservation and demand reduction measures such as graywater use, rainwater harvesting, and water reuse. Additional conservation savings from these other demand reduction strategies are discussed in upcoming sections.

Table 5-5: Water Management Strategies (ac-ft/yr)

Water Management Strategies (ac-ft/yr)					
2020	**2030**	**2040**	**2050**	**2060**	**2070**
22,969	24,559	28,317	31,220	33,822	36,899

Costs Implications of Proposed Strategy

Costs were calculated to include a variety of conservation measures. The Texas Water Development Board (TWDB) Cost Estimating Tool methodology was used to determine capital costs, annual costs, and unit costs, once the construction costs were developed. The unit cost is presented as an average, with some conservation measures being more expensive and some being less. A change from previous Region K water planning cycles is that capital costs have been included for conservation measures. Capital costing efforts focused on smart meters and leak detection and repair, but were meant to encompass other types of capital-cost associated conservation measures as well. Capital costs for leak detection and repair were estimated using information from City of Austin on their current expenditures for water line replacements. Smart meters were assumed a cost of $100 per home. Non-capital cost conservation measures were included in the total costs at an average of $250/acre-foot of water savings. Many of the non-capital cost measures are mentioned above, but it is not an exclusive list, and Region K encourages the TWDB to provide funding for all types of conservation measures for WUGs and wholesale water providers within Region K and around the state.

Table 5-6 Cost Estimate for City of Austin Conservation

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$41,434,437	$41,434,437	$7,855,398	$342.00

Environmental Considerations

Water conservation holds several advantages over alternative strategies. For example, water conservation strategies do not require the movement of water between locations. Water conservation can cause changes to wastewater concentrations over time, in which case treatment processes may need to be adjusted to maintain permitted discharge parameters. In addition, water conservation generally does not result in adverse impacts to environmental flows or other environmental considerations. Conservation by the City of Austin could leave up to approximately 37,000 acre-feet/year in the lakes and aquifers.

Agricultural & Natural Resources Considerations

Negligible impacts to agriculture are anticipated as a result of this strategy.

5.2.2.3 Municipal Conservation

Reduction of municipal water demand through conservation was a focal point of the 2011 round of Regional Water Planning in Texas and continues to be a focal point for the 2016 round. The water demands approved by TWDB and the individual Regional Water Planning Groups (RWPGs) have already been adjusted to incorporate the effects of the 1991 State Water Saving Performance Standards for Plumbing Fixtures Act. In addition, RWPGs are required to consider further water conservation measures in their plan or explain reasons for not recommending conservation for Water User Groups (WUG) with water needs.

The LCRWPA currently anticipates 61 municipal WUGs with shortages in the year 2070. Forty-one (41) of these WUGs have per capita water demands in excess of the 140 gallons per capita per day (gpcd) limit proposed by the Water Conservation Implementation Task Force (WCITF) and may be able to reduce their shortages through conservation practices. In addition, many of the WUGs have per capita water demands in excess of 200 gpcd.

A methodology was developed to determine the anticipated municipal water conservation savings for the WUGs within the LCRWPA. First, WUGs were required to meet the following criteria to be chosen for conservation measures:

- Be a municipal WUG.
- Have a year 2020 per capita water usage of greater than 140 gpcd indicating a potential for savings through conservation.
- Conservation was considered, regardless of whether a municipality had a water need.

Per capita water demands were determined from the measured or projected population and water demands for each WUG during each decade. The following methodology was used in calculating water demand reductions:

- If the 2020 GPCD is greater than 200
    - Apply a 10% GPCD reduction per decade until 200 GPCD is reached.
    - Then apply a 5% GPCD reduction per decade until 140 GPCD is reached.
- If the 2020 GPCD is greater than 140
    - 5% GPCD reduction per decade until 140 GPCD is reached.
- If the 2020 GPCD is less than 140
    - No conservation considered

- Defer to Water Conservation goals, if applicable

This method follows the recommendation of a 1 percent per year reduction in per capita water demand in order to reach of 200 gpcd, followed by a 0.5 percent per year reduction in per capita water demand until the target demand of 140 gpcd was reached, as proposed by WCITF. Conservation was applied immediately in 2020 regardless of the beginning year of a WUG shortage so that conservation could be implemented early enough to have significant effects on demand by the time the shortage was realized.

A lower limit of 140 gpcd was set, unless a WUG specified in their Water Conservation Plan their intent to reduce further. This was done so that conservation was only recommended to reach reasonable levels. For WUGs that were anticipated to reach a per capita usage below 140 gpcd without conservation in later decades, the lower demands approved by the Regional Planning Group and TWDB were carried forward.

The new per capita usage for each decade was then used along with the WUG population to determine the new water demands for each decade. These values were subtracted from the original water demands to determine the amount of water conserved in each decade.

Burnet County-Other did not fall under the above criteria, but is recommended to receive water from the Buena Vista Regional Project (*Section 5.2.4.5.1*) through an interbasin transfer, requiring that the highest practicable level of achievable water conservation be considered. Therefore, municipal conservation is recommended for Burnet County-Other, Brazos Basin, based on the achievement of 130 gpcd by 2020 and 125 gpcd by 2030.

This strategy is recommended using the criteria above, and is shown in *Table 5-7*. The City of Austin Water Conservation is a separate strategy and is discussed in *Section 5.2.2.2*; therefore, it is not included in this table.

Examples of measures that can be implemented to meet this strategy include the following:

Utility water loss audits and repair. System water audits are required every five years for all retail utilities and every year for utilities over 3,300 connections. To maximize the benefits of this measure, a utility would use the information from the water audit to revise meter testing and repair practices, reduce unauthorized water use, improve accounting for unbilled water, and implement effective water loss management strategies. Water loss strategies for new development to minimize the need for line flushing can include the addition of extra meters along various line routes to collect more accurate data on water flowing through those routes, creating loops in the water distribution lines, and placing chlorine injection stations strategically throughout the development to avoid the need for excessive flushing to keep chlorine residuals in compliance.

“Smart” meters and automatic meter infrastructure (AMI). A "smart" water meter is a measuring device that has the ability to store and transmit consumption data frequently. Sometimes "smart" meters are referred to as "time-of-use" meters because in addition to measuring the volume consumed, they also record the date and time the consumption occurs. "Smart" meters can be read remotely and more frequently, providing instant access to water consumption information for both customers and water utilities. "Smart" water meters are one component of an automated meter infrastructure (AMI) system that water utilities may choose to deploy. AMI systems using "smart" water meters are capable of measuring, collecting, and analyzing water use information and then communicating this information back to the customer via the internet either on request or on a fixed schedule. AMI systems can include hardware, software, communications, consumer water use portals and controllers, and other related systems. AMI differs from automatic meter reading (AMR) in that it enables two-way communications with the meter and the water utility. AMI extends current advanced meter reading (AMR) technology by providing two-way meter communications for purposes such as real-time usage and pricing information, leak and abnormal usage detection, and targeted water efficiency messaging.

Customer behavioral engagement software. Software programs are now available that utilize customer water use data to develop individual water use reports for customers. This software works best when a utility has AMI, but can also be used without AMI. The objectives of this measure are to assist customers with their personal water management, identify potential water savings, achieve water and cost savings, and increase customer participation in the utility's incentive programs. These software programs can provide information in a variety of ways and have the ability to run on multiple platforms, including computers, tablets and mobile phone devices. One utility utilizing this type of program identified a 3-5% savings in total water use of customers utilizing this information compared to a control group.

A permanent landscape watering schedule limiting spray irrigation of ornamental landscape to no more than twice per week. Several communities in Region K have already adopted a permanent watering schedule for the hot periods of the year, typical from May 1 to September 30 each year. The City of Austin has adopted a year round similar schedule on a year-round basis. This measure, if enforced, saves a substantial amount of water and also lowers peak use during the summer, reducing pressure on water treatment plants and extending the period of time before a new plant is needed.

TCEQ 344 landscape irrigation standards for all new development. House Bill 1656, passed in 2007, requires all municipalities with a population of more than 20,000 to adopt these standards. Municipal utility districts and water control improvement districts were also allowed to adopt the standards. Some of the requirements include requiring licensed irrigators to properly design and install the irrigation including proper pressure and zoning for plan requirements, installing a rain sensor, no spray on narrow strips of landscape and other design standards. The licensed irrigator is also required to leave a water schedule and design plan with the customer.

Landscape standards for new development. Several Region K WUGs have adopted a variety of landscape standards, including requiring the use of native and adapted plants and drought tolerant turf, limits on irrigated landscape or turf area and a minimum of six inches of adequate soil. The Capital Area Homebuilder's Association has recently adopted recommended standards for new development that have many of these same requirements.

Landscape irrigation evaluations. WUGs can provide or hire a service to provide this service if a majority of customers in the utility service area utilize automatic in-ground irrigation systems. These evaluations can identify irrigation system issues such as leaks, as well as provide the customer with an efficient, appropriate watering schedule. This service also provides a positive customer service image for the utility and can effect positive behavior change through face to face site visits with individual customers.

Public outreach and education programs. To be effective, water conservation education and outreach should be planned and implemented in a consistent and continual manner. Traditional methods such as print and electronic media activities and staffing of community events can be combined effectively with social media applications to relay messaging quickly and frequently to a wide audience with little cost. For smaller utilities, there are many low-cost or free resources available that can be utilized to implement effective public outreach and education programs.

Region K encourages the TWDB to provide funding for all types of conservation measures for WUGs and wholesale water providers within Region K and around the state. The Texas Water Conservation Advisory Council provides ongoing development and updates of many conservation measures – or best management practices (BMPs) – that can meet a WUGs water conservation strategy. More information can be found at the Council's website www.savetexaswater.org.

Table 5-7: Municipal Water Conservation Savings (ac-ft/yr)

WUG Name	County	River Basin	Conservation Water Savings (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
AQUA WSC	BASTROP	BRAZOS	6	9	10	11	15	20
AQUA WSC	BASTROP	COLORADO	619	895	960	1,128	1,499	1,992
AQUA WSC	BASTROP	GUADALUPE	5	7	8	9	12	14
BASTROP	BASTROP	COLORADO	195	440	688	1,084	1,459	1,958
COUNTY-OTHER	BASTROP	BRAZOS	1	2	4	7	8	10
COUNTY-OTHER	BASTROP	COLORADO	89	191	337	403	515	663
COUNTY-OTHER	BASTROP	GUADALUPE	2	3	3	4	4	4
SMITHVILLE	BASTROP	COLORADO	44	72	76	88	117	155
BLANCO	BLANCO	GUADALUPE	19	32	28	26	27	27
JOHNSON CITY	BLANCO	COLORADO	18	30	30	28	26	26
BERTRAM	BURNET	BRAZOS	41	64	91	126	164	204
BURNET	BURNET	BRAZOS	1	1	2	3	4	4
BURNET	BURNET	COLORADO	183	281	403	568	736	913
COTTONWOOD SHORES	BURNET	COLORADO	22	21	20	19	21	23
COUNTY-OTHER	BURNET	BRAZOS	60	93	83	80	87	94
HORSESHOE BAY	BURNET	COLORADO	75	194	343	519	710	901
MARBLE FALLS	BURNET	COLORADO	234	587	1,016	1,397	1,764	2,059
MEADOWLAKES	BURNET	COLORADO	84	188	309	443	573	708
COLUMBUS	COLORADO	COLORADO	112	206	296	347	404	464
WEIMAR	COLORADO	COLORADO	19	24	30	39	47	57
WEIMAR	COLORADO	LAVACA	37	50	60	78	97	114
AQUA WSC	FAYETTE	COLORADO	0	1	1	0	1	1
FLATONIA	FAYETTE	GUADALUPE	4	6	9	12	16	20
FLATONIA	FAYETTE	LAVACA	13	23	34	48	68	85
LA GRANGE	FAYETTE	COLORADO	42	21	0	0	0	0
SCHULENBURG	FAYETTE	LAVACA	37	63	96	141	188	232
FREDERICKSBURG	GILLESPIE	COLORADO	317	599	733	916	1,094	1,301
BUDA	HAYS	COLORADO	88	206	434	552	709	888
DRIPPING SPRINGS	HAYS	COLORADO	48	67	98	141	195	262
DRIPPING SPRINGS WSC	HAYS	COLORADO	54	124	152	187	232	283
WEST TRAVIS COUNTY PUA	HAYS	COLORADO	405	1,070	2,064	3,501	5,348	7,674
HORSESHOE BAY	LLANO	COLORADO	189	360	509	638	791	938
LLANO	LLANO	COLORADO	88	118	143	169	209	252
BAY CITY	MATAGORDA	BRAZOS-COLORADO	252	199	114	94	95	96
GOLDTHWAITE	MILLS	COLORADO	10	13	24	38	54	58
SAN SABA	SAN SABA	COLORADO	114	211	302	377	463	510

WUG Name	County	River Basin	Conservation Water Savings (ac-ft/yr)					
			2020	**2030**	**2040**	**2050**	**2060**	**2070**
AQUA WSC	TRAVIS	COLORADO	74	94	87	87	96	103
BARTON CREEK WEST WSC	TRAVIS	COLORADO	42	77	108	122	137	152
BEE CAVE VILLAGE	TRAVIS	COLORADO	175	374	608	863	1,136	1,323
CEDAR PARK	TRAVIS	COLORADO	246	479	614	724	822	921
JONESTOWN	TRAVIS	COLORADO	20	36	51	73	96	122
LAGO VISTA	TRAVIS	COLORADO	187	301	426	604	773	972
LAKEWAY	TRAVIS	COLORADO	702	1,652	2,408	3,052	3,640	3,921
LOOP 360 WSC	TRAVIS	COLORADO	116	224	333	441	546	648
LOST CREEK MUD	TRAVIS	COLORADO	108	137	171	215	254	294
PFLUGERVILLE	TRAVIS	COLORADO	604	2,105	2,625	3,029	3,514	3,966
POINT VENTURE	TRAVIS	COLORADO	34	82	139	191	241	301
ROLLINGWOOD	TRAVIS	COLORADO	38	67	79	91	104	118
ROUND ROCK	TRAVIS	COLORADO	13	11	10	8	9	10
SHADY HOLLOW MUD	TRAVIS	COLORADO	38	16	0	0	0	0
SUNSET VALLEY	TRAVIS	COLORADO	38	90	158	241	305	366
THE HILLS	TRAVIS	COLORADO	144	272	386	487	581	665
TRAVIS COUNTY MUD #4	TRAVIS	COLORADO	262	564	912	1,302	1,705	2,114
TRAVIS COUNTY WCID #10	TRAVIS	COLORADO	213	445	707	996	1,316	1,533
TRAVIS COUNTY WCID #17	TRAVIS	COLORADO	853	1,825	2,399	2,889	3,325	4,645
TRAVIS COUNTY WCID #18	TRAVIS	COLORADO	60	95	87	87	96	104
TRAVIS COUNTY WCID #19	TRAVIS	COLORADO	50	92	131	166	199	229
TRAVIS COUNTY WCID #20	TRAVIS	COLORADO	59	110	153	197	234	268
WEST LAKE HILLS	TRAVIS	COLORADO	157	286	398	505	609	700
WEST TRAVIS COUNTY PUA	TRAVIS	COLORADO	234	505	809	1,164	1,526	1,900
EAST BERNARD	WHARTON	BRAZOS-COLORADO	19	29	42	56	78	97
WHARTON	WHARTON	BRAZOS-COLORADO	111	88	116	113	116	120
WHARTON	WHARTON	COLORADO	57	46	60	58	60	62
Total Region K Water Savings			**8,181**	**16,573**	**23,527**	**30,982**	**39,270**	**48,664**

Opinion of Probable Cost

Costs were calculated to include a variety of conservation measures. The Texas Water Development Board (TWDB) Cost Estimating Tool methodology was used to determine capital costs, annual costs, and unit costs, once the construction costs were developed. The unit cost is presented as an average, with some conservation measures being more expensive and some being less.

A change from previous Region K water planning cycles is that capital costs have been included for conservation measures. Capital costing efforts focused on smart meters and leak detection and repair, but were meant to encompass other types of capital-cost associated conservation measures as well. Capital costs for leak detection and repair were estimated using information from City of Austin on their current expenditures for water line replacements, and applied proportionally to the smaller municipal WUGs in the region by comparing populations. Smart meters were assumed a cost of $100 per home, with the assumption that 50 percent of homes would implement this strategy in the first decade.

Non-capital cost conservation measures were included in the total costs at an average of $250/acre-foot of water savings. These costs could include both labor and materials associated with implementing standards, incentives and education and outreach. The following table provides the cost information for the WUGs that have a recommended conservation strategy.

Table 5-8 Cost Estimate for Municipal Conservation Strategies

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
AQUA WSC	BASTROP	BRAZOS	$12,126	$12,126	$2,126	$352
AQUA WSC	BASTROP	COLORADO	$1,217,517	$1,217,517	$217,485	$352
AQUA WSC	BASTROP	GUADALUPE	$8,625	$8,625	$1,691	$352
BASTROP	BASTROP	COLORADO	$224,866	$224,866	$59,136	$303
COUNTY-OTHER	BASTROP	BRAZOS	$2,918	$2,918	$391	$374
COUNTY-OTHER	BASTROP	COLORADO	$225,540	$225,540	$33,303	$374
COUNTY-OTHER	BASTROP	GUADALUPE	$4,278	$4,278	$707	$374
SMITHVILLE	BASTROP	COLORADO	$109,412	$109,412	$16,524	$376
BLANCO	BLANCO	GUADALUPE	$47,867	$47,867	$7,181	$378
JOHNSON CITY	BLANCO	COLORADO	$45,790	$45,790	$6,805	$378
BERTRAM	BURNET	BRAZOS	$41,421	$41,421	$11,952	$292
BURNET	BURNET	BRAZOS	$762	$762	$291	$291
BURNET	BURNET	COLORADO	$183,624	$183,624	$53,199	$291
COTTONWOOD SHORES	BURNET	COLORADO	$30,672	$30,672	$7,087	$322
COUNTY-OTHER	BURNET	BRAZOS	$164,771	$164,771	$23,754	$396
HORSESHOE BAY	BURNET	COLORADO	$44,289	$44,289	$19,252	$257
MARBLE FALLS	BURNET	COLORADO	$221,276	$221,276	$66,986	$286
MEADOWLAKES	BURNET	COLORADO	$64,541	$64,541	$22,755	$271
COLUMBUS	COLORADO	COLORADO	$100,974	$100,974	$31,570	$282
WEIMAR	COLORADO	COLORADO	$18,316	$18,316	$5,495	$290
WEIMAR	COLORADO	LAVACA	$37,462	$37,462	$10,780	$290
AQUA WSC	FAYETTE	COLORADO	$531	$531	$352	$352
FLATONIA	FAYETTE	GUADALUPE	$7,126	$7,126	$1,321	$330
FLATONIA	FAYETTE	LAVACA	$30,427	$30,427	$4,633	$356
LA GRANGE	FAYETTE	COLORADO	$117,647	$117,647	$16,612	$396
SCHULENBURG	FAYETTE	LAVACA	$78,947	$78,947	$12,692	$343
FREDERICKSBURG	GILLESPIE	COLORADO	$291,489	$291,489	$90,113	$284
BUDA	HAYS	COLORADO	$221,686	$221,686	$32,923	$374

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
DRIPPING SPRINGS	HAYS	COLORADO	$49,510	$49,510	$14,081	$293
DRIPPING SPRINGS WSC	HAYS	COLORADO	$68,043	$68,043	$16,895	$313
WEST TRAVIS COUNTY PUA	HAYS	COLORADO	$292,384	$292,384	$108,146	$267
HORSESHOE BAY	LLANO	COLORADO	$109,915	$109,915	$48,496	$257
LLANO	LLANO	COLORADO	$87,599	$87,599	$25,621	$291
BAY CITY	MATAGORDA	BRAZOS-COLORADO	$405,403	$405,403	$84,675	$336
GOLDTHWAITE	MILLS	COLORADO	$41,809	$41,809	$4,486	$449
SAN SABA	SAN SABA	COLORADO	$91,823	$91,823	$31,295	$275
AQUA WSC	TRAVIS	COLORADO	$146,071	$146,071	$26,025	$352
BARTON CREEK WEST WSC	TRAVIS	COLORADO	$38,391	$38,391	$11,855	$282
BEE CAVE VILLAGE	TRAVIS	COLORADO	$137,097	$137,097	$47,590	$272
CEDAR PARK	TRAVIS	COLORADO	$238,695	$238,695	$71,011	$289
JONESTOWN	TRAVIS	COLORADO	$46,456	$46,456	$7,130	$356
LAGO VISTA	TRAVIS	COLORADO	$187,406	$187,406	$54,394	$291
LAKEWAY	TRAVIS	COLORADO	$544,773	$544,773	$191,119	$272
LOOP 360 WSC	TRAVIS	COLORADO	$71,683	$71,683	$29,963	$258
LOST CREEK MUD	TRAVIS	COLORADO	$108,519	$108,519	$31,382	$291
PFLUGERVILLE	TRAVIS	COLORADO	$1,701,900	$1,701,900	$238,299	$395
POINT VENTURE	TRAVIS	COLORADO	$31,028	$31,028	$9,605	$282
ROLLINGWOOD	TRAVIS	COLORADO	$36,238	$36,238	$10,881	$286
ROUND ROCK	TRAVIS	COLORADO	$36,147	$36,147	$5,131	$395
SHADY HOLLOW MUD	TRAVIS	COLORADO	$106,952	$106,952	$15,088	$397
SUNSET VALLEY	TRAVIS	COLORADO	$31,520	$31,520	$10,479	$276
THE HILLS	TRAVIS	COLORADO	$97,374	$97,374	$37,930	$263
TRAVIS COUNTY MUD #4	TRAVIS	COLORADO	$137,248	$137,248	$65,793	$251
TRAVIS COUNTY WCID #10	TRAVIS	COLORADO	$171,890	$171,890	$58,492	$275
TRAVIS COUNTY WCID #17	TRAVIS	COLORADO	$828,248	$828,248	$246,200	$289
TRAVIS COUNTY WCID #18	TRAVIS	COLORADO	$147,665	$147,665	$22,512	$375
TRAVIS COUNTY WCID #19	TRAVIS	COLORADO	$28,215	$28,215	$12,726	$255
TRAVIS COUNTY WCID #20	TRAVIS	COLORADO	$38,290	$38,290	$15,423	$261
WEST LAKE HILLS	TRAVIS	COLORADO	$112,784	$112,784	$41,973	$267
WEST TRAVIS COUNTY PUA	TRAVIS	COLORADO	$169,070	$169,070	$62,486	$267

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
EAST BERNARD	WHARTON	BRAZOS-COLORADO	$52,607	$52,607	$7,512	$395
WHARTON	WHARTON	BRAZOS-COLORADO	$139,162	$139,162	$34,639	$312
WHARTON	WHARTON	COLORADO	$71,670	$71,670	$17,798	$312

Environmental Impact

Conservation has other potential impacts for WUGs that are served by groundwater. Communities that are served by surface water will divert less water from streams, meaning more water will remain in channels for downstream uses. However, groundwater communities contribute to streamflow by discharging treated groundwater into streams (typically 60 percent of water supplied is discharged following treatment.) Conservation measures implemented by these WUGs may lead to an overall decrease in streamflow, which is derived from groundwater sources. However, streamflow would not be expected to be decreased if the conservation is in the irrigation usage sector. Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 49,000 acre-feet/year in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.

5.2.2.4 Irrigation Conservation

Several types of conservation measures are recommended to meet Irrigation needs, specifically in Colorado, Matagorda, and Wharton counties. The following sections describe the recommended measures in more detail.

5.2.2.4.1. On-Farm Conservation

The water needed for irrigation in Colorado, Wharton, and Matagorda Counties is the largest deficit identified within the LCRWPA. On-farm water conservation for irrigation is one of the water management strategies developed to address the issue.

Analysis

It is anticipated that significant water savings can be achieved through the use of precision land leveling, multiple field inlets, and reduced levee intervals. The estimated amount of water savings from on-farm water conservation accomplished from 2011 to 2014 is substantial with more than 20,000 acres of land leveled and almost 20,000 acres with multiple inlets installed during that timeframe. Seventy percent of the land leveled and 80 percent of the acreage with multiple inlets installed was in Colorado County. This is likely due to the fact that since 2011, the only irrigation division receiving water from the Colorado River was Garwood, which is 70 percent in Colorado County. However, for many years there has been low participation in Matagorda County, so for maximum water savings to be realized, participation in NRCS's Environmental Quality Incentives Program (EQIP) in Matagorda County must increase substantially. The maximum potential acreage was taken from LCRA's Agricultural WSRP, which was based on the studies done for the LCRA-SAWS water project from 2006-2008.

The conservation estimate was based on updated estimates of total rice acreage in each of LCRA's irrigation operations, developed from an LCRA-SAWS water project study in 2008. These acreages are the same as those used in the 2011 Region K Water Plan. The estimate also assumes 50 percent adoption of conservation tillage, 55 percent adoption of land leveling, 10 percent adoption of tailwater recovery, and 70 percent adoption of multiple inlets.

Recent changes to the conservation water savings estimates are reflected in *Table 5-9*.

Table 5-9: On-Farm Conservation Estimates of Water Savings

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	**2030**	**2040**	**2050**	**2060**	**2070**
Irrigation	Colorado	Brazos-Colorado	1,292	1,654	2,003	2,336	2,652	2,949
Irrigation	Colorado	Colorado	306	356	383	385	357	298
Irrigation	Colorado	Lavaca	1,923	2,431	2,901	3,328	3,708	4,034
Irrigation	Matagorda	Brazos-Colorado	4,210	5,539	6,905	8,312	9,765	11,269
Irrigation	Matagorda	Colorado	718	951	1,192	1,445	1,709	1,986
Irrigation	Matagorda	Colorado-Lavaca	5,019	6,619	8,272	9,984	11,760	13,610
Irrigation	Wharton	Brazos-Colorado	4,153	5,416	6,689	7,973	9,268	10,577
Irrigation	Wharton	Colorado	1,152	1,437	1,689	1,904	2,077	2,203
Irrigation	Wharton	Colorado-Lavaca	1,228	1,597	1,965	2,334	2,704	3,073
TOTAL			**20,000**	**26,000**	**32,000**	**38,000**	**44,000**	**50,000**

Note: Demand reductions through advanced conservation were distributed to county-basin irrigation WUGs based on the location of shortages.

Rice utilizes significantly more water than many other Texas crops because of the growing environment adopted for rice production. Rice is grown in standing water primarily due to the plant's requirement for saturated soil moisture conditions during most of its vegetative and reproductive stages, and secondarily to minimize competition from undesirable plants. The flood culture is not required to grow rice, but is currently the only practical method for maintaining the required saturated soil conditions.

Levees are used to separate the individual cuts in a rice field. Maintenance of a uniform shallow water depth allows the levees to maintain greater freeboard or levee height above the water surface. If there is insufficient freeboard, rainfall can cause the levees to overtop and fail with the worst-case result being loss of water from the entire field. Minimizing the flooding depth allows the producer to capture rainwater, replacing an equal amount of water that would normally have been diverted from the river or pumped from wells. The amount of water saved can vary with rainfall during the growing season, but can replace a significant quantity of the water normally diverted from the river and minimize the amount of tail water or rice field runoff water.

There are many potential on-farm irrigation improvements, but in general water savings can best be achieved by minimizing flooding depth and improving management of the flushing and flooding operations. The techniques that have the most significant impact in accomplishing these goals include precision or laser land leveling, use of permanent levees with permanent water control structures, use of a field lateral with multiple field inlets, reducing the vertical interval or elevation difference between levees, and improved management of water control activities. Individual water conservation measures are discussed in the following sections.

Opinion of Probable Cost

The total estimated cost for the on-farm strategies recommended in the LCRA's Agricultural Water Supply Resource Plan is $97,578,000. Many of these on-farm conservation strategies are eligible for funding of up to 70 percent through the EQIP program. Funding for this program in the affected Region K counties may be expanded due to a recent federal grant. Individual producers and landowners bear the costs associated with these on-farm strategies except for that portion that may be eligible for re-imbursement through EQIP or HB1437 grants. *Table 5-10* shows the cost of the various conservation strategies based on September 2013 costs. *Table 5-11* shows the construction, capital, annual, and unit cost by WUG.

Table 5-10 Estimated Unit Cost of Agricultural Conservation Improvements

Improvement	Improvement Cost per Acre
Land Leveling	**$430**
Multiple Inlets	**$88**
Reduced Levee Interval	**$67**
Irrigation Pipeline	**$244**

Table 5-11 On-Farm Conservation Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Irrigation	Colorado	Brazos-Colorado	$ 4,111,095	$ 5,755,533	$ 477,709	$ 161.98
Irrigation	Colorado	Colorado	$ 415,512	$ 581,716	$ 48,282	$ 161.98
Irrigation	Colorado	Lavaca	$ 5,623,900	$ 7,873,461	$ 653,497	$ 161.98
Irrigation	Matagorda	Brazos-Colorado	$ 15,708,645	$ 21,992,102	$ 1,825,345	$ 161.98
Irrigation	Matagorda	Colorado	$ 2,768,735	$ 3,876,229	$ 321,727	$ 161.98
Irrigation	Matagorda	Colorado-Lavaca	$ 18,971,269	$ 26,559,777	$ 2,204,461	$ 161.98
Irrigation	Wharton	Brazos-Colorado	$ 14,743,949	$ 20,641,529	$ 1,713,247	$ 161.98
Irrigation	Wharton	Colorado	$ 3,071,511	$ 4,300,115	$ 356,910	$ 161.98
Irrigation	Wharton	Colorado-Lavaca	$ 4,283,956	$ 5,997,539	$ 497,796	$ 161.98

Environmental Considerations

On-farm conservation for rice production could influence the instream water balance during dry, summer months in two ways: (1) by reducing the amount of return flows introduced to streams, and (2) by reducing the amount of water diverted from streams. The balance of these two impacts could potentially result in a net gain or loss in dry weather instream flows, depending on the farming practices used. First, the reduced return flows from irrigated fields would negatively impact flows downstream of the fields. These return flows would typically occur during the summer months when this discharge can provide habitat for species and other ecological benefits. However, conservation could have a positive impact on instream flows by reducing the amount of water diverted for irrigation thereby increasing the amount of store water potentially available to meet environmental flow needs over the long term. Overall, it is likely that there would be negligible impacts to streamflow and the bay.

Agricultural and Natural Resources Considerations

On-farm conservation methods have the potential benefit to agriculture in that by reducing the demand for water overall, they increase the likelihood that demands for water could be met on a more consistent basis. In some cases, grant funding and low-interest loan funding availability is critical to local implementation. Impacts to agriculture are mainly cost-related, as shown in *Table 5-11*.

Laser Land Leveling

In the production of rice, there are many benefits to having fields that are almost level but still have some slope for drainage, typically 0.15 foot or less in elevation change for 100 feet of distance. An almost level field will allow a more uniform shallow water depth across the field, reducing the total amount of water applied to the field. Land grading can give a field this desired condition by using a laser-guided grader.

Precision leveling or land grading can reduce the amount of water used by 25 to 30 percent and increase production by 10 to 15 percent. A 2012 savings verification study prepared for LCRA by the University of Texas LBJ School of Public Affairs[2] found that precision leveling, in and of itself, accounts for a 0.30 ac-ft/ac reduction in on-farm water use for the first crop at a 95 percent confidence interval when compared to water use in unleveled fields. Fields where permanent levees were utilized as part of the precision leveling process saved more water than fields that were just land leveled. Fields that were precision leveled and had some levees removed showed an average savings of 0.70 acre-feet per acre. Unfortunately, this higher estimate is not statistically significant. From 2009 to 2012, this study developed, tested and validated qualitative and statistical methods for evaluating how on-farm water usage varies in LCRA's Lakeside Irrigation Division between fields and between farmers by analyzing water use data from 2006-2011. This study estimates the water savings from precision land leveling, compared to other factors that influence water use.

Interest in large investments in long-term land improvements such as precision land leveling in the rice industry is greater among those rice growers who own their own land. In that case, improvements benefit the landowner and make sense economically, particularly when there is matching grant money available from the Natural Resources Conservation Service. However, in many cases, land is leased on an annual basis for rice production. There is no long-term agreement between the landowner and farmer. This

[2] Ramirez, A.K. and Eaton, D. J. "Statistical Testing for Precision Graded Verification," a report from the University of Texas at Austin to the Lower Colorado River Authority, Austin, TX, September, 2012

makes it difficult for the farmer to justify a significant capital expenditure, and limits the amount of land where precision leveling is being implemented. The topography and soil type also may limit the amount of land where this practice could be implemented.

Use of Multiple Field Inlets

Another method used by rice producers to conserve water is the utilization of multiple field inlets for applying water to the individual cuts or land sections between levees. The use of multiple inlets allows for many benefits that result in water savings. The water savings is further enhanced when multiple inlets are applied in combination with land leveling. Most of the acreage that has been land leveled through EQIP since 2011 had multiple inlets installed as well. Limited funding and increased competitiveness of the EQIP program led many producers to include both practices in their EQIP applications as a means of increasing their chances of having their applications funded. The most significant benefit of multiple inlets is the ability to apply water where and when it is needed and at a shallower depth. Because of the shallow water, rice production is increased while the total water applied is minimized. A side lateral with multiple inlets is often paired with a similar drain, as opposed to draining all water from a field through the lowest cut. This allows the field to drain more quickly, shortening the time to harvest and increasing the potential for production of a ratoon crop.

Reduced Levee Intervals

Another approach to minimizing the water depth is to reduce the typical contour interval between levees from 0.2 feet to 0.15 feet. The cost associated with making this change can be minimal with only a few additional levees plowed into place at the beginning of the rice growing season. There would be additional costs associated with 1) reduced yield due to a higher percentage of acreage being in levees that produce significantly less rice than flat field areas; 2) increased labor costs associated with monitoring and managing more levees and water control structures; and 3) increased number of water control structures required to be purchased and installed. The smaller interval allows average flooding depth to be minimized, allowing more freeboard for capturing rainfall. Reducing the levee interval can save about 0.3 feet per acre irrigated when used in conjunction with precision land leveling and 0.4 feet per acre irrigated when applied without precision leveling.

Permanent Perimeter Levees

In addition to reduced levee intervals, permanent, taller levees can be installed around the perimeter and in the interior of the rice field. Permanent levees can allow a farmer the ability to hold deeper water for the purpose of safely utilizing rainfall without the fear of breaching the smaller, more traditional levees. The permanent levees are much less likely to be damaged or breached by heavy rain events.

Combining Land Leveling With Multiple Field Inlets

Several combinations of conservation practices could be evaluated, but the LCRWPG Rice Irrigation Working Group decided that the most common combined approach that would result in the greatest water savings would be the combination of land leveling with the use of multiple inlets. In many cases the farmers that use these two conservation practices may also implement permanent levees or reduced levee interval, but the cost associated with the additional combination of conservation practices becomes less discernible as does the water savings.

5.2.2.4.2. Irrigation Operations Conveyance Improvements

The water needed for irrigation in Colorado, Wharton, and Matagorda Counties is the largest deficit identified within the LCRWPA. Irrigation operation conveyance improvement is one of the water management strategies identified in LCRA's Agricultural WSRP to address the issue.

Analysis

In addition to the water conservation measures implemented on-farm, substantial water can be saved by improving the efficiency of the canal systems that deliver water to the individual irrigator. These improvements would include: 1) improving the efficiency of water delivery in canal systems by automating the operation of major checks structures within the irrigation division; 2) creating a centralized control system for each irrigation division, allowing each canal system to be monitored and operated remotely; 3) automating the operation of flow control structures delivering water to individual fields (turnouts); 4) adding flow regulating reservoirs to balance flows; 5) targeted lining of high-loss canal segments; and 6) regular maintenance of canal banks, including vegetation control and repairing sections damaged by cattle and other animals.

Centralized SCADA control is an essential back bone to upgrading the efficiency of water delivery in the canal systems and can be accomplished at a much lower cost in LCRA's irrigation divisions than originally anticipated in the LCRA-SAWS water project studies by taking advantage of existing SCADA infrastructure that currently connects each of LCRA's pumping plants to LCRA's radio-based communications system. LCRA has automated the majority of major check structures in the eastern canal section of the Gulf Coast Irrigation Division, and began improvements on the western canal section of the Gulf Coast Irrigation Division in 2014. The combination of centralized control and automation of all major check structures required to operate the system remotely are expected to eliminate 50 to 70 percent of estimated overflows lost from the end of the system, for a savings of 3.5 percent of average historical water use. This savings estimate was developed for upstream control gates. LCRA is pursuing the development of software to allow downstream control of these gates, which could increase savings substantially by relaying downstream water demand information real-time to upstream gates, rather than simply maintaining a constant upstream level at each site. The estimated total cost to complete the Gulf Coast system is $2.3 million, with $1.4 million spent as of 2015.

The 2008 LSWP PVA estimated 65,000 ac-ft/yr of water savings from improved efficiency of rice irrigation delivery system by the LCRA irrigation divisions in an average scenario. This amount of water savings was shown in the 2011 Region K Plan. A slightly smaller total amount of water savings is shown in the 2016 Region K Plan.

Details of this conservation estimate can be found in a report titled Conservation Strategies in the LCRA Irrigation Divisions – 2007 dated May 23, 2008. Recent changes to the conservation estimates are reflected in the table below.

Table 5-12: Irrigation District Conveyance Improvement Estimates

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Irrigation	Colorado	Brazos-Colorado	336	1,082	1,815	2,521	3,195	3,793
Irrigation	Colorado	Colorado	80	233	347	415	431	383
Irrigation	Colorado	Lavaca	500	1,589	2,629	3,591	4,466	5,188
Irrigation	Matagorda	Brazos-Colorado	1,095	3,622	6,258	8,969	11,762	14,492
Irrigation	Matagorda	Colorado	187	622	1,081	1,559	2,059	2,554
Irrigation	Matagorda	Colorado-Lavaca	1,305	4,328	7,497	10,772	14,165	17,502
Irrigation	Wharton	Brazos-Colorado	1,080	3,541	6,062	8,602	11,164	13,602
Irrigation	Wharton	Colorado	299	940	1,531	2,054	2,501	2,834
Irrigation	Wharton	Colorado-Lavaca	319	1,044	1,781	2,519	3,257	3,952
TOTAL			**5,200**	**17,000**	**29,000**	**41,000**	**53,000**	**64,300**

Note: Demand reductions through advanced conservation were distributed to county-basin irrigation WUGs based on the location of shortages.

Opinion of Probable Cost

The total estimated cost for the irrigation district conveyance improvement strategies recommended in the LCRA's Agricultural Water Supply Resource Plan is $155,057,000, excluding the Lane City Reservoir Project. There is currently no mechanism in place to pay for the irrigation conveyance improvements recommended in this plan with the exception of the lower basin reservoir project. *Table 5-13* shows the construction, capital, annual, and unit cost by WUG. The unit cost shown in the table represents an average of more expensive strategies, such as balancing reservoirs, and less expensive options, such as automated canal gates.

Table 5-13 Irrigation District Conveyance Improvements Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Irrigation	Colorado	Brazos-Colorado	$ 6,532,764	$ 9,145,869	$ 759,107	$ 200.15
Irrigation	Colorado	Colorado	$ 660,272	$ 924,380	$ 76,724	$ 200.15
Irrigation	Colorado	Lavaca	$ 8,936,698	$ 12,511,377	$ 1,038,444	$ 200.15
Irrigation	Matagorda	Brazos-Colorado	$ 24,961,931	$ 34,946,703	$ 2,900,576	$ 200.15
Irrigation	Matagorda	Colorado	$ 4,399,677	$ 6,159,548	$ 511,243	$ 200.15
Irrigation	Matagorda	Colorado-Lavaca	$ 30,146,427	$ 42,204,998	$ 3,503,015	$ 200.15
Irrigation	Wharton	Brazos-Colorado	$ 23,428,975	$ 32,800,565	$ 2,722,447	$ 200.15
Irrigation	Wharton	Colorado	$ 4,880,805	$ 6,833,128	$ 567,150	$ 200.15
Irrigation	Wharton	Colorado-Lavaca	$ 6,807,450	$ 9,530,431	$ 791,026	$ 200.15

Environmental Impact

The improvement of existing irrigation conveyances that provide water to farms will allow for customers to be served with fewer losses in transmission. This will result in a reduced overall demand for water and will reduce the volume of diversions that will have to be dedicated to maintaining flow in canals. If fully implemented, impacts to streamflows and the bay are approximately 50% of the conservation savings, or up to 32,150 ac-ft/yr by 2070.

Agricultural and Natural Resources Considerations

Irrigation conveyance improvement conservation methods have the potential benefit to agriculture in that by reducing the demand for water overall, they increase the likelihood that demands for water could be met on a more consistent basis. Impacts to agriculture are mainly cost-related, as shown in *Table 5-13*.

5.2.2.4.3. Conservation through Sprinkler Irrigation

An additional form of conservation that farmers could undertake to reduce water demands when growing rice involves converting the method used from field flooding to sprinkler irrigation. The following is an excerpt from the Texas Rice Producers Legislative Group's supporting documentation for submittal of an ETF grant application, and was provided by Ronald Gertson. The excerpt has been slightly modified from its original form.

Analysis

Recently, in South America and the US Midwest, rice growers have had moderate success in growing rice under sprinkler irrigation. New technologies need to be demonstrated and adopted for rice farmers to decrease annual water use while maintaining profitable production. Pivot/linear-move sprinkler shows great promise as being an economic alternative to flood irrigation with much lower water use. The development of these alternative systems while maintaining a saturated soil environment to allow maximum yields and restrict weed growth is key for rice growing. Water use efficiency in rice is focused on having an effective water delivery system and optimizing grower water management decision-making.

The primary concept being deployed in this investigation is the use of sprinkler-delivered irrigation water as a means of both eliminating the standard two to four flushing periods at the beginning of the growing season and as a means of shortening the duration of the traditional flood irrigation period. Flushing is the standard method for maintaining soil moisture during the early growing season when rice plants are not sufficiently mature to thrive in a flood culture. A flush is essentially a temporary flood in which water is moved through the field by gravity. Each flush results in the loss of considerable tailwater as water is removed from the field. One flush uses 5 to 7 inches of water, while a sprinkler could efficiently accomplish the needed field wetting with the application of only 1 to 2 inches, yielding a water use reduction of 4 to 5 inches per flush. A number of commonly used weed herbicides in rice require water applications for maximum effectiveness. Timely sprinkler applications for the activation of these herbicides offers some hope for reducing weed pressures early thereby potentially enabling the delay of the permanent flood and therefore reducing the period that flood waters are lost to direct evaporation.

Weed control has been the major limiting factor in the use of sprinkler technology in rice production. LEPA (low elevation precision application) is one of the most efficient irrigation technologies. LEPA discharges water from very low hanging and closely spaced nozzles, which may enhance weed control in comparison to other sprinkler irrigation. LEPA also makes possible the elimination of water application to the panicles of mature rice plants (as occurs with traditional impact sprinkler nozzles). This should greatly reduce the fissuring of rice grains which often occurs with the use of sprinkler irrigation in rice.

Table 5-14 provides the potential water savings for each WUG by implementing sprinkler irrigation as a strategy. An assumed water savings of 12 inches per acre was used for the calculation.

Table 5-14 Sprinkler Irrigation Estimate of Water Savings

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Irrigation	Colorado	Brazos-Colorado	92	455	895	1,099	1,099	1,099
Irrigation	Colorado	Colorado	22	98	171	181	181	181
Irrigation	Colorado	Lavaca	137	668	1,296	1,565	1,565	1,565
Irrigation	Matagorda	Brazos-Colorado	301	1,523	3,086	3,910	3,910	3,910
Irrigation	Matagorda	Colorado	51	261	533	680	680	680
Irrigation	Matagorda	Colorado-Lavaca	359	1,820	3,697	4,696	4,696	4,696
Irrigation	Wharton	Brazos-Colorado	297	1,489	2,989	3,750	3,750	3,750
Irrigation	Wharton	Colorado	82	395	755	895	895	895
Irrigation	Wharton	Colorado-Lavaca	88	439	878	1,098	1,098	1,098
TOTAL			**1,430**	**7,150**	**14,300**	**17,875**	**17,875**	**17,875**

Note: Demand reductions through advanced conservation were distributed to county-basin irrigation WUGs based on the location of shortages.

Cost Implication of Proposed Strategy

Costs for the strategy were assumed using a study performed for Region A on water management strategies for reducing irrigation demands. The cost for converting to sprinkler irrigation, updated to September 2013 dollars, was $310 per acre modified. Capital costs, annual costs, and unit costs were determined using the TWDB Cost Estimating Tool. Unit costs were calculated to be $36 per acre-foot of water savings. *Table 5-15* shows the breakdown of cost by WUG.

Table 5-15 Sprinkler Irrigation Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Irrigation	Colorado	Brazos-Colorado	$ 340,663	$ 476,928	$ 39,585	$ 36.02
Irrigation	Colorado	Colorado	$ 56,099	$ 78,538	$ 6,519	$ 36.02
Irrigation	Colorado	Lavaca	$ 485,278	$ 679,389	$ 56,389	$ 36.02
Irrigation	Matagorda	Brazos-Colorado	$ 1,212,120	$ 1,696,967	$ 140,848	$ 36.02
Irrigation	Matagorda	Colorado	$ 210,701	$ 294,981	$ 24,483	$ 36.02
Irrigation	Matagorda	Colorado-Lavaca	$ 1,455,834	$ 2,038,168	$ 169,168	$ 36.02
Irrigation	Wharton	Brazos-Colorado	$ 1,162,570	$ 1,627,598	$ 135,091	$ 36.02
Irrigation	Wharton	Colorado	$ 277,573	$ 388,603	$ 32,254	$ 36.02
Irrigation	Wharton	Colorado-Lavaca	$ 340,413	$ 476,578	$ 39,556	$ 36.02

Environmental Considerations

This type of irrigation will reduce the flooding in the fields that is released as return flows. If fully implemented, impacts to streamflows and the bay are approximately 100% of the conservation savings, or up to 17,185 ac-ft/yr by 2070.

Agricultural and Natural Resources Considerations

The proposed strategy replaces the method of water supply to rice field. No impact is expected as a result of this strategy. One of the important considerations is whether irrigators' have the ability to pay for the improvements. Grant funding and low-interest loan funding availability is a critical factor in local implementation. Impacts to agriculture are mainly cost-related, as shown in *Table 5-15*.

5.2.3 **Wholesale Water Provider Management Strategies**

There are two Wholesale Water Providers, as defined by the State planning process in Region K, LCRA and the COA. The COA is also a water customer of LCRA, and together they supply a large portion of Region K's water needs for multiple beneficial purposes.

5.2.3.1 LCRA Water Management Strategies

LCRA holds surface water rights to over 2.1 million ac-ft of water in the Colorado River Basin, and also holds groundwater permits for industrial use, as well as rights to develop groundwater in Bastrop County. Combined, LCRA's surface water rights authorize every legal purpose of use, and also help meet certain environmental flow needs. The LCRA is directed by the Texas Legislature to be the steward of its water rights in serving as the regional water supplier. The LCRA supplies water for municipal, agricultural, manufacturing, steam electric, mining, and other water uses. The LCRA currently has contracts to supply water to entities in Bastrop, Burnet, Colorado, Fayette, Gillespie, Hays, Lampasas (Region G), Llano, Mason, Matagorda, San Saba, Travis, Wharton, and Williamson (including the portion of Williamson in Region G) counties.

LCRA has firm municipal and industrial water needs beginning in 2060, as identified in *Table 4.16* of Chapter 4. With additional new contracts and contract amendments that are recommended in this plan, the firm water needs for LCRA begin in the 2020 decade. In addition, the new critical drought period and reduced water availability is requiring LCRA to look at a variety of water supply options. LCRA's strategy for meeting the region's changing and future water needs will be predicated on LCRA's ability to continue to use all of its water rights as a system. This includes not only the amendment of its water rights to meet changing and future water needs, but also an aggressive water conservation efforts program and the development of new water supplies. *Table 5-16* below provides a summary of all of the recommended strategies related to the LCRA as a wholesale water provider. The sections following the tables discuss the strategies in more detail.

Table 5-16: Summary of LCRA Water Management Strategies (ac-ft/yr)

Recommended Strategy	2020	2030	2040	2050	2060	2070
Lane City Off-Channel Reservoir	90,000	90,000	90,000	90,000	90,000	90,000
Prairie Site Off-Channel Reservoir	0	18,000	18,000	18,000	18,000	18,000
Mid-Basin Off-Channel Reservoir	18,000	18,000	18,000	18,000	18,000	18,000
Excess Flows Permit (5731) Off-Channel Reservoir	15,257	15,543	15,830	16,117	16,404	16,691
Enhanced Municipal and Industrial Conservation	4,500	10,000	15,000	20,000	20,000	20,000
Development of New Groundwater - Onsite FPP	700	700	700	700	700	700
Development of New Groundwater - Offsite FPP	2,500	2,500	2,500	2,500	2,500	2,500
Expand Use of Groundwater - Carrizo-Wilcox aquifer	300	300	300	300	300	300
Downstream Return Flows	5,086	5,834	6,784	8,636	8,997	10,453
Acquire New Water Rights	250	250	250	250	250	250
Amendment of ROR Water Rights, including Garwood	N/A	N/A	N/A	N/A	N/A	N/A
New Firm Contracts	(2,877)	(14,154)	(19,154)	(22,154)	(28,654)	(33,654)
Firm Contract Amendments	(32,963)	(40,487)	(45,037)	(54,323)	(65,634)	(77,263)

5.2.3.1.1. General LCRA Strategy - LCRA System Operation Approach

The State has directed LCRA to optimize and conserve available water to meet the existing and future water needs of the region. To meet existing water needs in the basin, LCRA has traditionally used its larger water rights together as a system, including its water rights for lakes Buchanan and Travis as well as its downstream run-of-river (ROR) rights. To date, LCRA has largely done this through its Water Management Plan (discussed below) and thus, its efforts have been focused on the management of lakes Buchanan and Travis to meet projected firm municipal and industrial customer demands while continuing to provide interruptible supplies to downstream agricultural operations and provide both firm and interruptible supplies to help meet certain environmental flow needs.[3] More recently, LCRA has increased use of its ROR rights and groundwater rights to meet downstream needs that would otherwise have been met from stored water released from lakes Buchanan and Travis. Indeed, most of LCRA's firm contracts provide operational flexibility to LCRA by recognizing that LCRA can meet its commitments from any source available to LCRA. As water needs increase and change over time, LCRA will continue to employ a system approach that considers *all* of its water supplies and the most efficient way to meet water needs within LCRA's service area. LCRA may pursue amendments to its existing water rights, acquire or develop new water supplies, and implement aggressive water conservation measures and water use efficiencies, all to provide LCRA with the flexibility it needs to help meet future water demands within its service area.

Issues and Considerations

The use of a system approach allows LCRA greater flexibility to help meet water needs throughout its service area from a variety of water supply sources. The system approach may involve a number of specific strategies, including amendments to its existing water rights, acquisition or development of new water supplies, and implementation of aggressive water conservation measures and water use efficiencies, which are examined in greater detail in succeeding sections, with an analysis of the environmental consequences of each.

5.2.3.1.2. Amendments to Water Management Plan

LCRA's current Water Management Plan was approved in January 2010 (2010 WMP) and, for the last several years, because of the ongoing drought, LCRA has operated under emergency orders issued by TCEQ that have allowed it to depart from various requirements of the 2010 WMP related to supply of interruptible stored water and water for instream flows during spawning of the Blue Sucker. In addition, LCRA has pending an application to amend the 2010 WMP to adjust the conditions under which it will provide water from lakes Buchanan and Travis for interruptible agricultural purposes and environmental flows to ensure that it can satisfy the demands of its firm customers, considering a level of demand about halfway between year 2010 and year 2020 projected demands and 2010 demands for downstream agricultural operations. To ensure that LCRA can meet projected firm customer demands over the fifty-year planning horizon covered by this plan, and as LCRA implements other water supply strategies that affect how it operates its system of water supplies, 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.

Environmental Flow Assumptions for WMP Revisions

For the simulation of 2020 and 2070 conditions, the modeling incorporates all of the key environmental flow elements of the 2010 WMP , including critical instream flow and bay and estuary freshwater inflow criteria engaged all of the time, and target instream flow criteria, target freshwater inflow criteria and the maximum environmental flow caps implemented as stipulated in the 2010 WMP. The RWPG used the

[3] For a general description of the LCRA Water Management Plan (WMP), see Section 3.2.1.1.2.1.

2010 WMP because this is the WMP in effect. LCRA filed a proposed new WMP in October 2014 that is still under review by TCEQ and which proposes a number of significant changes from the 2010 WMP as it relates to environmental flow criteria and other issues.

Issues and Considerations

The 2010 WMP commits 33,440 acre feet of firm water for instream and bay and estuary inflows. In addition, interruptible water is also supplied to help meet environmental flow needs under the 2010 WMP. Firm and interruptible water provided by LCRA will provide some additional benefit to instream flows and bay and estuary inflows. However, the main issue of growth in municipal, manufacturing and steam electric demand has a potential to reduce the amount of interruptible supply LCRA can make available for environmental flow needs in the future. To the extent that LCRA is able to provide interruptible water to the lower counties for agricultural use could also benefit environmental flows. Interruptible water traveling downstream to the point of diversion also helps meet instream flow needs. In addition, some agricultural return flows make their way to the river and Matagorda Bay system.

Available Interruptible Water Supply for Agriculture

The LCRA supplies interruptible water to four major agricultural operations within the three lower counties. These operations include the Lakeside, Gulf Coast, and Garwood agricultural divisions, which are owned and operated by LCRA and Pierce Ranch. Historically, LCRA has supplied water to these four agricultural operations using its four ROR water rights to the extent that flows in the river are available. However, often in the height of the irrigation season, ROR flows available in the Colorado River are insufficient to meet the needs of the four operations. LCRA may make stored water from lakes Buchanan and Travis available on an interruptible basis at any time that the actual demand for stored water under firm commitments is less than the combined firm yield of lakes Buchanan and Travis. The conditions under which LCRA can provide interruptible stored water are set forth in detail in the LCRA's Water Management Plan, as amended from time to time. Consistent with these conditions, LCRA has provided interruptible stored water from lakes Buchanan and Travis to meet the demands of these four operations consistent with the Water Management Plan, except when operating pursuant to TCEQ emergency orders from 2012-2015 suspended releases of interruptible stored water for downstream agricultural use in Gulf Coast, Lakeside and Pierce Ranch. Generally speaking, the amount of interruptible stored water that can be made available from lakes Buchanan and Travis is curtailed as combined storage in the lakes drops. The 2010 WMP provides that, when storage in the two lakes on January 1 is at 1.4 MAF, 273,000 acre-feet of interruptible stored water may be made available for diversion. This amount decreases to 195,000 acre-feet at 1.15 MAF of storage and to 160,000 acre-feet at 325,000 acre-feet of storage. The 2010 WMP provides that all interruptible supply is cut off when the combined storage is less than 325,000 ac-ft on January 1 or after certain specific criteria have been met and the LCRA Board has declared a drought worse than a drought of record at 600,000 acre-feet of storage.

LCRA's firm customers' demands are well below their full contract commitments and LCRA does not expect firm customers' demands to increase to their full commitments for some time. Therefore, LCRA expects that, absent extraordinary drought conditions such as those that have been experienced since 2011, it will be able to supply interruptible water to the agricultural operations in many years without frequent or significant curtailment. However, over time, as the LCRA's current firm customers draw fully on their commitments and as LCRA contracts to provide more firm water, there will be less interruptible water available for agricultural purposes in the lower basin and the conditions of curtailment and allocation of available interruptible supply among the agricultural operations will be modified.[4]

LCRA has submitted a request to amend the 2010 WMP that substantially changes the curtailment triggers, but these proposed amendments are still under review by TCEQ. Therefore, this plan incorporates the 2010 WMP curtailment triggers that affect the availability for interruptible water from the Highland Lakes to meet agricultural demands within the four irrigation operations.

As discussed above, *Table 5-17* presents an analysis of the amount of interruptible water expected to be available during each decade of the planning period using a modified version of the Region K Cutoff Model based on incorporating regional water planning demand projections for LCRA's existing firm customers, updated estimates for future agricultural water needs in LCRA's lower basin agricultural operations, and assumed levels of water conservation discussed elsewhere in this plan. The amount of interruptible water available for agricultural use is estimated to decrease from approximately 77,880 ac-ft/yr in 2020 to 0 ac-ft/yr in 2060 due to increased firm demands in the basin. Interruptible water availability reported in this section is for the Gulf Coast, Lakeside and Pierce Ranch water rights. Irrigation water available to the Garwood water right is reported in Chapter 3.

Table 5-17: Available Interruptible LCRA Water Supply for Agricultural Use

Decade	Available [1] Interruptible Water Supply (ac-ft/yr)
2020	77,880
2030 [2]	48,664
2040	19,448
2050 [2]	9,724
2060 [2]	0
2070	0

[1] Annual supply of interruptible stored water available during the critical drought year having the minimum run-of-river supply for the LCRA's downstream water rights (1956).
[2] Simulations were conducted for only 2020, 2040, and 2070. Information for other decades was interpolated from the results from those decades.

As the table indicates, the availability of interruptible water supply is expected to decrease significantly in the future as the demands for firm water increase.

Cost Implications of Proposed Strategy

Capital expenditures for water supply purposes would not be required to implement this alternative since diversions would be made under existing water rights. Where allowed, the cost of raw water is included in the overall cost of service to deliver the water within each agricultural operation under this alternative. Rates between LCRA's agricultural divisions vary based on various factors, including canal operation costs and contractual restrictions. The cost in 2011, when LCRA last supplied interruptible water to the Gulf Coast and Lakeside divisions was ranged from about $40 to $50 per ac-ft of water delivered from the canal system. Current (2015) Garwood rates are about $50 per ac-ft.

[4] When LCRA purchased both the Garwood Irrigation Company and Pierce Ranch water rights, it made certain commitments to provide interruptible stored water based upon specific requirements in the purchase agreements. This affects the manner in which LCRA allocates available interruptible water supply among the four irrigation operations.

Issues and Considerations

The availability of interruptible supply is determined under the 2010 WMP on an annual basis as a function the content of the lakes on January 1. LCRA's pending amendments to the WMP would determine availability of interruptible supply more frequently, by season. How this may be handled in future amendments to the WMP during the planning period cannot be known at this time; however, it is clear that 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.

Environmental Considerations

As noted above, the increasing municipal, manufacturing and steam electric demands will reduce the amount of interruptible water that is available over time for the downstream agricultural operations. This could indirectly reduce the water available in the lower basin to help meet instream and bay and estuary inflows needs. In the earlier planning decades, this strategy can provide additional streamflow of up to approximately 78,000 ac-ft/yr, as shown in *Table 5-17*.

Agricultural & Natural Resources Considerations

Interruptible water, when it's available, has a positive impact on agriculture. The impact decreases over time as the availability decreases over time. In the earlier planning decades, this strategy can provide additional water for agriculture of up to approximately 78,000 ac-ft/yr, as shown in *Table 5-17*.

5.2.3.1.3. Amendments to ROR Rights, including Garwood

LCRA owns run-of-river (ROR) water rights authorizing diversions of up to 503,750 ac-ft/yr on the lower Colorado River in the Lakeside, Gulf Coast, and Pierce Ranch agricultural divisions. Projected 2030 agricultural water demand used in the LCRA WMP amendment application for these three operations is projected to be approximately 274,000 ac-ft/yr.

LCRA also owns the most senior portion of the former Garwood Irrigation Company water right, which authorizes the diversion of up to 133,000 ac-ft of water per year from the Colorado River at a November 1, 1900 priority date. Projected water demands in the Garwood operation are estimated to be approximately 87,000 ac-ft/yr.

Potential exists to make additional water supplies from these water rights available to meet future water demands throughout the LCRA service area. These water rights are already authorized for multiple beneficial purposes. Portions of these ROR water rights could be used as part of a LCRA's management of its entire system of water rights to meet firm demands in their existing locations, or elsewhere in the LCRA service area by amending the rights to add new diversion points and the right to store the water in off-channel reservoirs or existing reservoirs.

For example, LCRA is already using part of its Gulf Coast ROR water rights to supply industrial demands and has amended the right to add off-channel storage as part of its new Lane City reservoir project. LCRA also has a pending application to amend its Garwood water right to add additional points of diversion from Lake Travis and various points downstream, so that it can use the right to meet firm customer demands to the extent the water is not needed to meet its contractual obligations within the Garwood operations. This water management strategy recognizes that LCRA intends to amend any and all of its downstream water rights to meet future and changing water needs.

Cost Implications of Proposed Strategy

Capital expenditures for water supply purposes would not be required to implement this strategy to the extent that the diversions of these rights for other purposes will be done at locations already authorized for diversion under other water rights held by LCRA using existing infrastructure and stored in existing reservoirs. The annual cost of providing raw water under this alternative is the September 2013 LCRA system rate for water diverted, which is $151 per ac-ft.

Issues and Considerations

Conversion of agricultural rights to serve municipal, manufacturing, and steam electric needs may not have a significant impact on downstream instream and bay and estuary flows if the firm water demands that are being satisfied are located downstream or as long as water from other sources is provided to meet the downstream agricultural needs. In addition, use of ROR water for municipal needs upstream could result in a greater volume of return flows, which if returned to the river in the Austin and surrounding area locations, would help off-set any reduction in downstream ROR flows and help provide for instream flow needs. In addition, municipal return flows are more constant than the flows required for agricultural use. Municipal return flows are expected to be discharged year round whereas downstream agricultural demands are significantly reduced during the winter months.

Environmental Considerations

Impacts related to the amendment of the Gulf Coast and Lakeside water rights can be considered negligible because they are already quantified and accounted for under the off-channel reservoir strategies, as discussed in *Section 5.2.3.1.10*. It's anticipated that amendments to the Pierce Ranch water right would have negligible impacts during times of drought, due to the limited available water. The water right has an authorized diversion of 55,000 ac-ft/yr. Depending on the location of the new diversion and the diversion amount based on the amendment, instream flows could be reduced during wet years. Impacts will be evaluated during the TCEQ permitting process and the amended water right will be subject to instream flow requirements. The Garwood water right is less impacted by drought years. To the extent the water is not needed to meet its contractual obligations, up to 133,000 ac-ft/yr could be diverted at alternative locations and reduce instream flows (See *Section 5.5.3* for additional information). Any impacts will be evaluated during the TCEQ regulatory process for evaluating such amendments and the amended water right will be subject to instream flow requirements.

Agricultural & Natural Resources Considerations

Amendments to LCRA's ROR rights could reduce availability of that water for agricultural purposes. Impacts related to the amendment of the Gulf Coast and Lakeside water rights can be considered negligible because they are already quantified and accounted for under the off-channel reservoir strategies, as discussed in *Section 5.2.3.1.10*. It's anticipated that amendments to the Pierce Ranch water right would have negligible impacts during times of drought, due to the limited available water. The water right has an authorized diversion of 55,000 ac-ft/yr. However, LCRA has a contractual obligation to deliver up to 30,000 ac-ft/yr to Pearce Ranch. Run-of-river water deliveries to irrigation above 30,000 ac-ft/yr are not from this water right and no impact would occur to agriculture by the transfer of a portion of this water right. The Garwood water right is less impacted by drought years. To the extent the water is not needed to meet its contractual obligations, water for irrigation could be reduced by up to 100,000 ac-ft/yr.

5.2.3.1.4. LCRA Contract Amendments

LCRA has contracts or Board reservations for raw water supply with numerous water user groups (WUGs). LCRA has indicated that it expects to continue providing water to these entities throughout the 50-year planning period and expects to meet these customers' projected increased demands for water through amendments to existing contracts to increase contract quantities. For purposes of this plan, water supplied to these customers largely comes from lakes Buchanan and Travis. However, as discussed in more detail elsewhere in this chapter, LCRA operates its water rights as a system. To the extent that these customers have obtained contracts or amendments to contracts since 1999, their current LCRA contract provides that water may be supplied under the contract from any source available to LCRA at the time the customer uses water. Water sources include supply from lakes Buchanan and Travis, LCRA's ROR rights, groundwater, or other sources that might come under LCRA's control. To the extent that existing customers' contracts do not contain this language, and such customers need to renew their contracts or increase the contract quantity, the new contracts will include similar language regarding source of supply.

In most cases, capital expenditures for water supply purposes were not assumed to be required to implement this alternative. In some cases, the contract amendments are associated with other capital projects that are discussed later in the chapter. The average cost of providing raw water under this alternative is $151 per ac-ft in September 2013 dollars. *Table 5-18* contains a summary of the WUGs for which this strategy applies and the amount of water planned for in the contract amendment (where increased amounts of water are needed). The WUGs that will have new planned infrastructure associated with the LCRA contract amendment are identified in the table with an asterisk, and the infrastructure projects themselves are discussed in more detail in *Section 5.2.4.5.*

Table 5-18: Recommended LCRA Contract Amendments

WUG	County	LCRA Contract Amendments (ac-ft/yr)					
		2020	2030	2040	2050	2060	2070
Burnet*	Burnet	1,000	2,000	2,000	2,000	2,000	2,000
Cottonwood Shores*	Burnet	376	700	700	700	700	700
Granite Shoals	Burnet	0	0	0	250	250	250
Horseshoe Bay	Burnet/Llano	0	200	550	550	1,050	1,050
Marble Falls**	Burnet	500	4,000	4,000	4,000	4,000	4,000
Steam-Electric (COA)	Fayette	6,000	7,000	9,000	11,000	13,000	15,000
Steam-Electric (STP)	Matagorda	22,787	22,787	22,787	22,787	22,787	22,787
West Travis County PUA	Hays/Travis	300	700	2,900	3,400	6,200	6,200
Leander (Region K and G)	Travis/Williamson	0	0	0	3,336	9,347	15,976
Pflugerville	Travis	0	0	0	3,000	3,000	6,000
Point Venture	Travis	0	100	100	300	300	300
Travis County WCID #17	Burnet	2,000	3,000	3,000	3,000	3,000	3,000
TOTAL		**32,963**	**40,487**	**45,037**	**54,323**	**65,634**	**77,263**

* These WUGs require additional surface water infrastructure in Burnet County.

Cost Implications of Proposed Strategy

Capital expenditures for water supply purposes were not assumed to be required to implement this alternative. The average cost of providing raw water under this strategy is currently (September 2013) $151 per ac-ft. The additional infrastructure costs associated with the WUGs listed in *Table 5-18* with an asterisk are detailed in *Section 5.2.4.5.*

Issues and Considerations

Amendment of existing contracts to meet increasing municipal, manufacturing, and steam electric demands will provide for the needs of a growing population, but could reduce the amount of interruptible water available for agricultural use and environmental flows, as demands actually materialize and depending on what other strategies are implemented by LCRA to further enhance and optimize operation of its system of water supplies. Similarly, as firm water customers use more and more of their contracted water, the available interruptible supply could be reduced.

Environmental Considerations

Depending on the location of the contracted water, some environmental impacts to instream flows and freshwater inflows to Matagorda Bay can be expected from increased use of water under LCRA contracts, including amendments to existing contracts and new water sale contracts. Increased firm demands for municipal and industrial uses will reduce the amount of interruptible water available for release.

Interruptible water provides a benefit to instream flows as it travels downstream to the diversion points. Increased contract volumes for users at the downstream end of the basin would also increase instream flows. Individual WUG implementation of this strategy has negligible impacts to streamflows and the bay, but full regional implementation could remove up to 77,000 ac-ft/yr from the Highland Lakes or other proposed LCRA reservoirs by 2070 (See *Section 5.5.3* for additional information). Approximately 23,000 ac-ft/yr would provide additional instream flows from the release point down to Matagorda County.

Agricultural & Natural Resources Considerations

The increasing municipal and manufacturing needs for water will have a significant impact on agriculture as the available supply of interruptible water gradually diminishes over time. See *Section 5.2.3.1.2.* for additional details and volumes. The extent of these impacts to interruptible water availability will be affected by the rate at which firm demands actually materialize and could also be affected by the timing and implementation of other strategies by LCRA to further enhance and optimize operation of its system of water supplies.

5.2.3.1.5. LCRA New Water Sale Contracts

Region K has identified shortages within LCRA's service area that are not currently covered by a water sale contract from LCRA but for which LCRA may be willing and able to provide raw water. In particular, many of these include rural communities in the upper portion of the LCRWPA and certain current wholesale customers of the City of Austin whose contract is expected to expire during the planning period. Certain wholesale customers currently receiving water from Austin may need to obtain raw water contracts directly from LCRA in the future. Austin plans to continue to treat and transport this water. This raw water contracting approach generally does not apply to City of Austin wholesale customers that are Municipal Utility Districts (MUDs), since the City generally plans to annex these areas in the future, consistent with the MUD's creation agreements with the City.

Additional new contracts are also recommended for several municipal WUGs throughout the region that will require new infrastructure to obtain and treat the water. These WUGs are highlighted in *Table 5-19* with an asterisk or two, and they are discussed in more detail in *Section 5.2.4.5*, *Section 5.2.5.2* , and *Section 5.2.5.3*. As new customers, contracts for water supplied to these customers will come from any source available to LCRA at the time the customer uses water. *Table 5-19* summarizes recommended new LCRA contracts over the planning horizon.

Table 5-19: Recommended New LCRA Contracts

WUG	County	LCRA New Contracts (ac-ft/yr) 2020	2030	2040	2050	2060	2070
Aqua WSC*	Bastrop	0	0	5,000	5,000	10,000	15,000
Bastrop*	Bastrop	0	0	0	2,500	2,500	2,500
Elgin*	Bastrop	0	3,500	3,500	3,500	3,500	3,500
Volente*	Travis	142	142	142	142	142	142
Bertram**	Burnet	500	884	884	884	884	884
County-Other**	Burnet	2,235	3,813	3,813	3,813	3,813	3,813
Creedmoor-Maha WSC	Travis	0	400	400	400	400	400
Manville WSC	Travis	0	0	0	500	2,000	2,000
Rollingwood	Travis	0	400	400	400	400	400
Sunset Valley	Travis	0	715	715	715	715	715
Travis County WCID #10	Travis	0	3,000	3,000	3,000	3,000	3,000
West Lake Hills	Travis	0	1,300	1,300	1,300	1,300	1,300
TOTAL		**2,877**	**14,154**	**19,154**	**22,154**	**28,654**	**33,654**

* These WUGs require additional surface water infrastructure in Bastrop County or Travis County.

**These WUGs require additional surface water infrastructure in Burnet County.

Cost Implications of Proposed Strategy

For the WUGs listed in *Table 5-19* without an asterisk, capital expenditures for water supply purposes were not assumed to be required to implement this strategy. The average cost of providing raw water under this strategy is $151 per ac-ft in September 2013 dollars. The additional infrastructure costs associated with the WUGs listed in *Table 5-19* with an asterisk or two are detailed in *Section 5.2.4.5*, *Section 5.2.5.2* , and *Section 5.2.5.3.*

Issues and Considerations

Much of the water that would be dedicated to new LCRA contracts in Travis County is already being supplied from LCRA's water rights through the City of Austin. Based on Austin's raw water contracting plans in this manner, the only change will be that LCRA will contract directly with those certain wholesale customers for raw water instead of the City of Austin and Austin will continue to treat and transport the water to these entities.

Environmental Considerations

Individual WUG implementation of this strategy has negligible impacts to streamflows and the bay, but full regional implementation could remove up to 34,000 ac-ft/yr from the Highland Lakes or other proposed LCRA reservoirs by 2070 (See *Section 5.5.3* for additional information).

Agricultural & Natural Resources Considerations

Any large new contracts that would need to use supplies from lakes Buchanan and Travis or other LCRA firm water supplies may decrease over time the amount of interruptible water available for agriculture. See *Section 5.2.3.1.2.* for additional details and volumes. The extent of these impacts to interruptible water availability will be affected by the rate at which firm demands actually materialize and could also be affected by the timing and implementation of other strategies by LCRA to further enhance and optimize operation of its system of water supplies.

5.2.3.1.6. Conservation

TWDB requires that all conservation strategies be located within a single Conservation section in the 2016 Region K Water Plan. LCRA conservation strategies are covered in *Section 5.2.2.1*, LCRA Conservation.

5.2.3.1.7. Groundwater Supply for FPP (On-site)

LCRA and the City of Austin jointly own the Fayette Power Project (FPP) in Fayette County. LCRA has been evaluating possible water supplies to augment LCRA's share of the surface water supply provided to the FPP cooling water reservoir (Cedar Creek Reservoir) used for process and cooling water. Currently, water at FPP is diverted from Cedar Creek Reservoir, and LCRA's share of water in Cedar Creek Reservoir comes water from local inflows from Cedar Creek, and stored water released from the Highland Lakes.

For its share of water supply for FPP, the City of Austin relies on a firm water contract with LCRA as well as a run-of-river water right it owns that allows diversion and use at FPP. Groundwater may provide another source of water to address surface water filtering concerns (algae) and help alleviate potential drought contingency plan cutbacks from the Colorado River. Water supply sources identified include groundwater from the Oakville Sandstone and the Catahoula Tuff, which are part of the Gulf Coast Aquifer. The general well field location was assumed to be on-site of the FPP.

Available groundwater under the MAG (Modeled Available Groundwater – See Chapter 3) will be used for sizing potential water supply strategies. Based on these criteria, this groundwater source strategy will consist of:

- Obtain a groundwater pumping permit from the Fayette County Groundwater Conservation District, construction of groundwater wells, raw water transmission line, and a pump station.

As stated previously, groundwater can be provided from the Catahoula Tuff or the Oakville Sandstone both of which are part of the Gulf Coast Aquifer. The available yield for groundwater in this aquifer would be approximately 700 acre-feet/year (0.6 MGD Average) for all planning decades.

The infrastructure required for this strategy was determined by LCRA consultants. The quantity and sizing of the infrastructure was modified to match the water yield projected for the aquifers. The following infrastructure was proposed.

- Two (2) 500 gpm Water Supply Wells and well transmission piping

- Approximately one (1) mile of raw water transmission piping and appurtenances
- Pump Station

Cost Implications of Proposed Strategy

In order to provide a comparable cost consistent with other strategies in this report, costs were developed using the Texas Water Development Board (TWDB) Cost Estimating Tool in September 2013 dollars. The Cost Estimating Tool was also used to determine operating costs. The capital cost for this strategy is primarily driven by the cost of the well field and pump station.

The following table shows the estimated costs associated with this strategy.

Table 5-20 LCRA Groundwater for FPP (on-site) Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$1,954,000	$2,749,000	$347,000	$496.00

Environmental Considerations

This strategy would replace surface water supplied from the Colorado River, which could reduce releases from the Highland Lakes (thus increasing lake levels), and cause a resulting reduction in river flows that help meet instream flow needs. However, it is also possible that LCRA will continue to have an obligation to provide water to help meet certain instream flows that offset any such impacts. The water supply is within the Modeled Available Groundwater (MAG), so drawdown in the aquifer could be up to 12 feet, relative to 1999 conditions (See *Section 5.5.3* for additional information). It is assumed that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.

Refer to Chapter 1, Appendix 1A, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

No impacts to agriculture are expected, as a result of implementing this strategy.

5.2.3.1.8. Groundwater Supply for FPP (Off-site)

LCRA has been evaluating water supply sources to replace the stored water supply from the Highland Lakes to the FPP cooling water reservoir (Cedar Creek Reservoir). The LCRA has been working with consultants to develop water supply strategies for these sources. A water supply source identified is groundwater in northwestern Fayette County.

The preliminary analysis indicates that a groundwater well field could not be located near the FPP due to high levels of total dissolved solids (TDS). It was recommended that a groundwater well field could be constructed in the Carrizo Wilcox Aquifer in Fayette and/or Bastrop counties. Additional studies would be required to determine a specific location.

For cost estimating purposes, the general well field location is approximately 24 miles from the Cedar Creek Reservoir in Fayette County. There are two options for delivery of groundwater to the Cedar Creek Reservoir. The first option (Option 1) proposed a 24-mile pipeline from the well field to the Cedar Creek Reservoir. The second option (Option 2) proposed piping the groundwater to the Colorado River and obtaining a bed & banks permit to convey the water in the Colorado River to an existing LCRA river intake/pump station being used for FPP.

For the 2016 Regional Water Plan, only Option 1 is evaluated. The source water balance values will be used for sizing potential water supply strategies. Based on these criteria, the groundwater source strategy will consist of:

- Obtain a groundwater pumping permit from the regulating groundwater conservation district, construction of groundwater wells, raw water transmission line, and a pump station.

Groundwater could be provided from the Carrizo-Wilcox Aquifer or the Yegua-Jackson Aquifer or from both. It was assumed for this analysis that groundwater would be provided from both the Carrizo-Wilcox Aquifer and the Yegua-Jackson Aquifer, both located in Fayette County for this analysis, but the Carrizo-Wilcox aquifer water could potentially be from Bastrop County as well. The estimated volumes of groundwater for this project would be approximately 500 acre-feet/year from the Carrizo-Wilcox Aquifer and 2,000 acre-feet/year from the Yegua-Jackson Aquifer for a total of 2,500 acre-feet/year (2.2 MGD Average) for all planning decades.

The quantity and sizing of the infrastructure was modified, from that determined by LCRA consultants, to match the water yield projected for the aquifers. The following infrastructure was proposed.

- Three (3) 1,000 gpm Water Supply Wells and well transmission piping
- Approximately 24 miles of raw water transmission piping and appurtenances
- Primary Pump Station
- Three (3) Booster Pump Stations and Storage Tanks

Cost Implications of Proposed Strategy

A capital cost estimate was provided by LCRA consultants as part of their analysis. However, the cost estimate was for larger infrastructure than what was sized based on availability under the MAG. In order to provide a comparable cost consistent with other strategies in this report, costs were developed using the Texas Water Development Board (TWDB) Cost Estimating Tool in September 2013 dollars. The Cost Estimating Tool was also used to determine operating costs.

The capital cost for this strategy is primarily driven by the cost of the transmission pipeline and pump stations. Groundwater purchase rates for municipal and industrial customers were not available and were not included in the costing.

The following table shows the estimated costs associated with this strategy.

Table 5-21 LCRA Groundwater for FPP (off-site) Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$13,475,000	$20,107,000	$2,782,000	$1,113.00

Environmental Considerations

This strategy would replace surface water supplied from the Colorado River, which could reduce releases from the Highland Lakes (thus increasing lake levels), and cause a resulting reduction in river flows that help meet instream flow needs. However, it is also possible that LCRA will continue to have an obligation to provide water to help meet certain instream flows that offset any such impacts. The water supply is within the Modeled Available Groundwater (MAG), so drawdown in the aquifer could be up to 75 feet (See *Section 5.5.3* for additional information). It is assumed that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.

Refer to Chapter 1, Appendix 1A, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

No impacts to agriculture are expected, as a result of implementing this strategy.

5.2.3.1.9. Expand Use of Groundwater in Bastrop County (Carrizo-Wilcox Aquifer)

LCRA plans to pursue expansion of groundwater sources to meet future demands. LCRA currently holds groundwater permits from the Lost Pines Groundwater Conservation District for production wells in the Carrizo-Wilcox Aquifer in Bastrop County and LCRA plans obtain and develop additional groundwater in Bastrop County.

A preliminary analysis from LCRA indicated that a well field would be located on the Griffith League Ranch in central Bastrop County and pumped to Lake Bastrop for municipal or industrial use.

For the 2016 Regional Water Plan, water available under the MAG was used for sizing potential water supply strategies. Based on these criteria, the groundwater source strategy will consist of:

- Construction of groundwater wells, raw water transmission line, and a pump station.

The available groundwater under the MAG in the Carrizo-Wilcox Aquifer in the Colorado Basin would be approximately 300 acre-feet/year (0.3 MGD Average) for all planning decades. If permits become available, this water yield value could increase to as much as 10,000 acre-feet/year (8.9 MGD Average).

The following infrastructure would be required.

- Two (2) 300 gpm Water Supply Wells and well transmission piping
- Approximately 4.5 miles of raw water transmission piping and appurtenances
- Primary and Booster Pump Stations
- Booster Pump Storage Tank

Cost Implications of Proposed Strategy

In order to provide a comparable cost consistent with other strategies in this report, costs were developed using the Texas Water Development Board (TWDB) Cost Estimating Tool in September 2013 dollars. The Cost Estimating Tool was also used to determine operating costs.

The capital cost for this strategy is primarily driven by the cost of the well field and pump station.

The following table shows the estimated costs associated with this strategy.

Table 5-22: LCRA Expand Use of Groundwater (Carrizo-Wilcox) Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$3,152,000	$4,564,000	$455,000	$1,517.00

Environmental Considerations

This strategy would replace surface water supplied from the Colorado River, which could reduce releases from the Highland Lakes (thus increasing lake levels), and cause a resulting reduction in river flows that help meet instream flow needs. However, it is also possible that LCRA will continue to have an obligation to provide water to help meet certain instream flows that offset any such impacts. The water supply is within the Modeled Available Groundwater (MAG), so drawdown in the aquifer could be up to 237 feet (See *Section 5.5.3* for additional information). It is assumed that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.

The Griffith League Ranch and part of the identified route of the transmission main to Lake Bastrop are located in an area of Bastrop County that is home to the Houston Toad, and thus is impacted by the Lost Pines Habitat Conservation Plan. In addition, there are several endangered or threatened species that may need to be taken into consideration during design. Appendix 1A in Chapter 1 provides a list of rare, threatened, and endangered species by County. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

No impacts to agriculture are expected, as a result of implementing this strategy.

5.2.3.1.10. Off-Channel Reservoirs

Lane City

In January 2012, the LCRA Board of Directors adopted a goal of adding 100,000 acre-feet per year to the region's water supply by 2017. In order to meet this objective, the LCRA is in the process of constructing the Lane City Reservoir Project in the lower Colorado River Basin. The reservoir will be off the main channel of the Colorado River, near Lane City, in Wharton County and is expected to add up to 90,000 acre-feet per year to LCRA's firm water supply.

Though final design is not complete, the proposed project anticipates construction of an off-channel reservoir of up to 40,000 acre-feet normal storage, a new river outfall, a new re-lift pump station, and upgrades to the existing pump station and canal system. The project will use existing surface water rights to increase the LCRA's overall available water supply.

The normal storage capacity in the reservoir will be up to 40,000 acre-feet of water at a time and could potentially be filled, released, and refilled multiple times within a year, allowing LCRA to capture available stream flows that are not needed by senior water rights. The enhanced operational flexibility and efficiencies provided by this project will assist the LCRA in meeting firm customer and environmental needs and will also improve availability of interruptible water.

Except where LCRA's ROR rights can be used, LCRA releases Highland Lakes' water to its firm industrial and interruptible agricultural customers near the coast and to fulfill environmental flow requirements. The Lane City Reservoir will lessen the need for Highland Lakes' releases and improve the reliability and efficiency of water distribution for downstream uses. Currently, when water is released from the Highland Lakes to downstream water users, it takes a long time (several days) to reach those users, because the lakes are far from the point of use. If it rains in the time it takes for the stored water to get from the release point to the point of use, the released stored water may no longer be needed at that time, but could be captured and stored in the off-channel reservoir to be beneficially used at a later time in lieu of additional releases of stored water. Additionally, since this off-channel reservoir would be located a shorter distance to the users than the existing release points, released water from this reservoir would reach the users sooner.

In September 2014, the Texas Water Development Board approved a $255 million loan to fund the project.

The LCRA began construction in early 2015 and the reservoir is anticipated to be operational in 2017.

Cost Implications of Proposed Strategy

The LCRA has received approval for a TWDB loan for $255 million, including a 50-year repayment term and interest-only payments for the first 10 years which will cover the costs of planning, acquisition, design, and construction.

A capital cost estimate was provided by LCRA from the preliminary engineering report prepared by CH2MHill in April 2014. For regional water planning purposes, and in order to provide a comparable cost consistent with other strategies in this report, loan interest and operation and maintenance costs were developed using the Texas Water Development Board (TWDB) Cost Estimating Tool in September 2013 dollars. The following table shows the estimated costs associated with this strategy.

Table 5-23: LCRA Lane City Off-Channel Reservoir Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$156,800,000	$218,593,000	$20,027,000	$223.00

Issues and Considerations

The Lane City Reservoir is in early stages of implementation and no identified issues or considerations to completion are anticipated at the time of this plan's writing. Construction began in early 2015, with project completion expected in early 2018.

Environmental Considerations

The Lane City Reservoir is off-channel and relies on using existing water rights and capturing available river flows for its yield. Thus environmental impacts, as compared to an on-channel reservoir, are minimal. In addition, the reservoir will enable LCRA to enhance its ability to manage flows in the lower portion of the Colorado Basin, including releases to Matagorda Bay, and to manage waterfowl habitat and coastal wetlands.

The environmental impacts to instream flows and bay and estuary inflows were analyzed for this project as part of the 2016 Region K Plan. Because the reservoir uses existing water rights, the instream flows showed some variation, both increases and decreases, as compared to a model without the reservoir. Certain assumptions were included in this analysis. Future changes to how LCRA might manage its system could change the variations. This strategy could potentially remove up to 90,000 ac-ft/yr from the Colorado River, but will create additional waterfowl habitat (See *Section 5.5.3* for additional information).

Due to this project being mostly located in an upland area and largely on prior disturbed land, very little of the project is subject to Section 404 of the Clean Water Act.

Agricultural & Natural Resources Considerations

Agricultural users in the lower Colorado River Basin predominantly rely on interruptible water supply provided from ROR rights and stored water released from the Highland Lakes. Due to recent historic drought in the Basin, characterized by low inflows and reservoir storage condition, interruptible water releases from the Highland Lakes for agricultural use were largely stopped after 2011, with the exception of the Garwood operations. The construction of the Lane City Reservoir will lessen the need to release Highland Lakes' water to meet firm water demands near the coast, and improve interruptible agricultural water reliability and efficiency. The new reservoir will increase LCRA's operational flexibility, which, in turn, has the potential to enhance the water availability in the lower basin for a variety of purposes, including agriculture. This strategy could potentially make available up to 54,000 ac-ft/yr of water for agricultural purposes, depending on firm customer needs.

Prairie Site

This strategy consists of a new earthen ring dike off-channel reservoir of normal storage up to 40,000 acre-feet, located near the City of Eagle Lake, approximately 2.9 miles from the Colorado River.

The purpose of an off-channel reservoir is to capture river flows when available under the water right and store the captured water for later use. The reservoir could either release water directly into Lakeside agricultural division canals or back to the river. The source of the water is diversions from the Colorado River under LCRA's existing water rights. The demands served by this strategy could range from industrial or other firm demands, to agricultural users near the coast, and environmental flow needs.

This strategy would provide other benefits. Currently, when water is released from the Highland Lakes to downstream water users, it takes a long time (several days) to reach those users, because the lakes are far from the point of use. If it rains in the time it takes for the stored water to get from the release point to the point of use, the released stored water may no longer be needed at that time, but could be captured and stored in the off-channel reservoir to be beneficially used at a later time in lieu of additional releases of stored water. Additionally, since this off-channel reservoir would be located a shorter distance to the users than the existing release points, released water from this reservoir would reach the users sooner.

The infrastructure required to implement this strategy includes:

- New 40,000 acre-foot earthen ring dike reservoir
- Modified existing river intake and pump station (to pump from Colorado River to Prairie Canal)
- Modified Prairie Canal (expand canal and provide new geo membrane liner with concrete cover)
- Modified existing Prairie Re-Lift Pump Station (to pump from Prairie Canal to new reservoir)
- New pipeline from new reservoir back to Colorado River (to return flows back to river)
- New pipeline from Re-Lift Pump Station to Reservoir

The firm yield from this strategy is projected to be about 20,000 acre-feet per year, and is not projected to be implemented until the year 2030, but could be implemented earlier depending on funding opportunities. This assumes the Lane City off-channel reservoir (currently under construction as of early 2015) is completed and online.

Cost Implications of Proposed Strategy

Costs for this strategy were developed based on information provided by LCRA, and the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars. The following table shows the estimated costs associated with this strategy.

Table 5-24: LCRA Prairie Site Off-Channel Reservoir Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$269,000,000	$376,000,000	$27,805,000	$1,545

Environmental Considerations

The Prairie Reservoir is off-channel and would rely on utilizing existing water rights and capturing available river flows for its yield. Thus environmental impacts, as compared to an on-channel reservoir, are minimal. In addition, the reservoir will enable LCRA to enhance its ability to manage flows in the lower portion of the Colorado River, including releases to Matagorda Bay, and to manage waterfowl habitat and coastal wetlands.

The environmental impacts to instream flows and bay and estuary inflows were analyzed for this project as part of the 2016 Region K Plan. Because the reservoir uses existing water rights, the instream flows showed some variation, both increases and decreases, as compared to a model without the reservoir. Certain assumptions were included in this analysis. Future changes to how LCRA might manage its system could change the variations. This strategy could potentially remove up to 18,000 ac-ft/yr from the Colorado River, but will create additional waterfowl habitat (See *Section 5.5.3* for additional information).

Agricultural & Natural Resources Considerations

Agricultural users in the lower Colorado River Basin predominantly rely on interruptible water supply provided from ROR rights and stored water released from the Highland Lakes. Due to current historic drought in the Basin, characterized by low inflows and reservoir storage condition, interruptible water releases from the Highland Lakes for agricultural use were largely stopped after 2011, with the exception of the Garwood operations. The construction of the Prairie Reservoir will lessen the need to release Highland Lakes' water to meet firm water demands near the coast and improve interruptible agricultural water reliability and efficiency. The new reservoir will increase LCRA's operational flexibility, which, in turn, has the potential to enhance the water availability in the lower basin for a variety of purposes, including agriculture. This strategy could potentially make available up to 18,000 ac-ft/yr of water for agricultural purposes, depending on firm customer needs.

Mid-Basin

This strategy consists of a new off-channel reservoir, preliminarily named the Mid-Basin Off-Channel Reservoir. The precise location and size are yet to be determined, but for this planning process, the location is assumed to be in Bastrop County and the size is expected to be comparable to the Lane City off-channel reservoir at up to 40,000 acre-feet of normal storage.

The purpose of an off-channel reservoir is to capture available flows from the Colorado River that are not needed to meet senior water rights or environmental flow obligations. The source of the water would be diversions under existing water rights, although a water right permit amendment would be required to authorize diversion and storage of available flows at a mid-basin location. The demands served by this strategy would be municipal, industrial, agricultural, environmental flows, and other beneficial uses near the site and downstream.

The infrastructure required to implement this strategy includes:

- New off-channel reservoir.
- A new river intake, pump station, and pipeline, to pump from the river to the reservoir.
- A new pipeline from the reservoir to the river, to return flows.
- A new pump station and/or pipeline from the reservoir to the point of use.

The firm yield from this strategy is projected to be about 20,000 acre-feet per year, and is not projected to be implemented until the year 2020, but could be implemented earlier depending on funding opportunities. This assumes the Lane City off-channel reservoir (currently under construction as of early 2015) is completed and online.

Cost Implications of Proposed Strategy

For planning purposes, costs for this strategy were estimated by taking the average of the Lane City and Prairie Site reservoir capital costs. These costs were developed based on information provided by LCRA. The Texas Water Development Board (TWDB) Cost Estimating Tool was used to develop the project, annual, and unit costs. Consistent with the tool, all costs are given in September 2013 dollars. The following table shows the estimated costs associated with this strategy.

Table 5-25: LCRA Mid-Basin Reservoir Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$213,000,000	$298,000,000	$22,089,000	$1,227

Environmental Considerations

The Mid-Basin Off-Channel Reservoir is off-channel and would rely on capturing available river flows under existing amended water rights for its yield. Thus environmental impacts compared to an on-channel reservoir are minimal. In addition, the reservoir will enable LCRA enhanced ability to manage flows in the river, including releases to Matagorda Bay, managed waterfowl habitat, and coastal wetlands.

The environmental impacts to instream flows and bay and estuary inflows were analyzed for this project as part of the 2016 Region K Plan. Because the reservoir uses existing water rights, the instream flows showed some variation, both increases and decreases, as compared to a model without the reservoir. Certain assumptions were included in this analysis. Future changes to how LCRA might manage its system could change the variations. This strategy could potentially remove up to 18,000 ac-ft/yr from the Colorado River, but will create additional waterfowl habitat (See *Section 5.5.3* for additional information).

Agricultural & Natural Resources Considerations

Agricultural users in the lower Colorado River Basin predominantly rely on interruptible water supply provided from ROR rights and stored water released from the Highland Lakes. Due to current historic drought in the Basin, characterized by low inflows and reservoir storage condition, interruptible water releases from the Highland Lakes for agricultural use were largely stopped after 2011, with the exception of the Garwood operations. The construction of the Mid-Basin Off-Channel will lessen the need to release Highland Lakes' water to meet firm water demands near the coast and could improve interruptible agricultural water reliability and efficiency. The new reservoir will increase LCRA's operational flexibility, which, in turn, has the potential to enhance the water availability in the lower basin for a variety of purposes, including agriculture. This strategy could potentially make available up to 18,000 ac-ft/yr of water for agricultural purposes, depending on firm customer needs.

Excess Flows Permit

This strategy consists of a new off-channel reservoir, preliminarily named the Excess Flows Off-Channel Reservoir. LCRA already holds TCEQ Water Use Permit No. 5731, which authorizes LCRA to divert, store and use for various beneficial purposes up to 853,514 ac-ft per year from the Colorado River, subject to significant environmental flow requirements, into one or more off-channel reservoirs (up to 500,000 acre-feet of off-channel storage) located within Colorado, Wharton, and Matagorda counties. No location and size are yet determined, but for cost estimating purposes and assignment with the TWDB database, Colorado County is used as the location, and the size is expected to be comparable to the Lane City off-channel reservoir at 40,000 acre-feet, although it could be smaller or larger. This facility is one of a potential series of reservoirs that are authorized under this permit. This proposed strategy differs from two of the other potential off-channel reservoirs discussed in previous sections of this report (Prairie and Mid-Basin OCR) in that the TCEQ Permit No. 5731 already authorizes the storage facility, subject to a permit amendment specifying its location, and various other requirements, including but not limited to dam safety review It is also possible that, in lieu of a separate additional off-channel reservoir, the Excess Flows Permit could be used in conjunction with other water rights as a source of supply for the Prairie Site or Lane City reservoirs.

The purpose of an off-channel reservoir is to capture available river flows not needed downstream and store the captured water for later use. The reservoir could supply water directly to end users, or release water back to the river for use downstream. The demands served by this strategy could range from municipal and industrial uses to agricultural users near the coast, and environmental flow needs.

This strategy would provide other benefits. Currently, when water is released from the Highland Lakes to downstream water users; it takes a long time (several days) to reach those users, because the lakes are far from the point of use. If it rains in the time it takes for the water to get from the release point to the point of use, the released stored water may no longer be needed at that time, but could be captured and stored in the off-channel reservoir to be beneficially used at a later time in lieu of additional releases of stored water. Additionally, since this off-channel reservoir would be located a shorter distance to the users than the existing release points, released water from this reservoir would reach the users sooner.

The infrastructure required to implement this strategy includes:

- New off-channel reservoir.
- A new river intake, pump station, and pipeline, to pump from the river to the reservoir.
- A new pipeline from the reservoir to the river, to return flows.
- A new pump station and/or pipeline from the reservoir to the point of use.

The projected yields from this strategy were determined using the Region K Cutoff Model, and are shown by decade in *Table 5-26*.

Table 5-26: LCRA Excess Flows Reservoir Project Yield

Excess Flows Reservoir Firm Yield (ac-ft/yr)					
2020	**2030**	**2040**	**2050**	**2060**	**2070**
15,257	15,543	15,830	16,117	16,404	16,691

Cost Implications of Proposed Strategy

For planning purposes, costs for this strategy were estimated by taking the average of the Lane City and Prairie reservoir costs. These costs were developed based on information provided by LCRA, and the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars. The following table shows the estimated costs associated with this strategy.

Table 5-27: LCRA Excess Flows Reservoir Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$213,000,000	$298,000,000	$22,065,000	$1,446.00

Environmental Considerations

The Excess Flows Off-Channel Reservoir is off-channel and would rely for its yield on capturing river flows available only after meeting significant instream flow and freshwater inflow requirements. Due to the environmental restrictions in the permit, diversions are not expected to have any significant environmental impacts. In addition, the reservoir will enhance LCRA's ability to manage flows in the lower Basin, including potential use of the water for managed waterfowl habitat and, with further amendments, water stored in the reservoir might be released to help meet inflow needs of Matagorda Bay.

This strategy could potentially remove up to 16,691 ac-ft/yr from the Colorado River (See *Section 5.5.3* for additional information).

Agricultural & Natural Resources Considerations

Agricultural users in the lower Colorado River Basin predominantly rely on interruptible water supply provided from ROR rights and stored water released from the Highland Lakes. Due to current historic drought in the Basin, characterized by low inflows and reservoir storage condition, interruptible water releases from the Highland Lakes for agricultural use were largely stopped after 2011, with the exception of the Garwood operations. The construction of the Excess Flows Off-Channel Reservoir will lessen the need to release Highland Lakes' water to meet firm water demands near the coast and improve interruptible agricultural water reliability and efficiency. The new reservoir will increase LCRA's operational flexibility, which, in turn, has the potential to enhance the water availability in the lower basin for a variety of purposes, including agriculture. This strategy could potentially make available up to 16,691 ac-ft/yr of water for agricultural purposes, depending on firm customer needs.

<u>5.2.3.1.11.</u> <u>Acquire Additional Water Rights</u>

From time to time, some owners offer to sell water rights and there are situations where it could be useful to LCRA to buy water rights. These situations include: the desire to acquire water rights that are "senior" to the priority date of the Highland Lakes, thereby reducing independent water rights that affect the reliable supply of the lakes; acquisition of water rights in order to streamline management of river diversions; acquisition of water rights in an area where LCRA needs additional water resources to meet needs, and other situations. Acquisition of water rights by LCRA could occur in any of LCRA's water service area counties, and these counties include all of the counties in the Region K regional planning area. For purposes of describing a water management strategy, the acquisition could be for a water right authorizing run-of-river diversions up to 500 ac-ft per year. However, the quantity could also vary considerably from the amount assumed, dependent on the actual amount and location of water rights available for purchase, which cannot be predicted with any certainty at this time. Further, for planning purposes, the water right is assumed to have a reliable supply of about one-half of its diversion right, or about 250 ac-ft/year of reliable water acquired for each water right.

Issues and Considerations

Issues and considerations for the transfer of ownership and/or use of a surface water right is site-specific and depends on several factors, including: whether the water right is currently being used; whether the water right will continue being used for its current purpose, or moved elsewhere; current environmental requirements on the water right; amended environmental requirements added by TCEQ; and, whether the diversion point of the water right may be moved.

Cost Implications of Proposed Strategy

The acquisition cost used for the analysis is $500 per ac-ft of reliable water (one-time cost, which can be considered a capital investment). This will be a capital cost of $125,000.

Environmental Considerations

There is a potential positive benefit of up to 250 ac-ft/yr to environmental flows for the situation where upstream water rights are acquired and the diversion point is moved downstream, thereby leaving water in a portion of the river that otherwise would have been diverted upstream. For the situation where a water right is moved upstream, the TCEQ typically will impose permit conditions to protect intervening water right holders and address instream environmental impacts.

Agricultural & Natural Resources Considerations

If existing agricultural irrigation water rights are acquired, and the water rights are currently being used, and the purchased water rights are converted to another use, then there could be an impact to agriculture of up to 250 ac-ft/yr due to the slightly reduced water supply unless the farmer has an alternate source of supply.

5.2.3.1.12. Downstream Return Flows

Downstream return flows from the City of Pflugerville are discussed in *Section 5.2.1.2*. This benefit is assigned to LCRA, and through a bed and banks permit, the return flows could be transported to a diversion location for an LCRA customer or to be stored in an off-channel reservoir.

5.2.3.1.13. Description of the Impact of the Management Strategies on Navigation

The overall impact on navigation in Region K is negligible in the area of the Colorado River and Matagorda Bay that is tidally influenced. This is the area where the most shipping occurs and navigation will be least affected in this zone. Once beyond the tidally influenced areas, the overall impact of the management strategies will be to reduce the amount of currently available interruptible water supplies as the current WUGs increase in demand over time through growth in population. However, the current LCRA Water Management Plan calls for a release of up to 33,440 acre feet. Navigation on the Colorado upstream of the tidally influenced areas is primarily for pleasure craft, and the impact of the mandated releases under the LCRA Management Plan plus other downstream flows may provide sufficient water for navigation purposes. Based in terms of a high, medium, or low impact, the estimated impact to navigation will be low.

5.2.3.2 City of Austin (COA) Water Management Strategies

The COA provides water for municipal, manufacturing, and steam electric water uses. COA's existing service area covers portions of Travis, Williamson, and Hays Counties. The COA water management strategies and total water amounts for each strategy are summarized in the following table.

Table 5-28: COA Water Management Strategies (ac-ft/yr)

COA Strategies	2020	2030	2040	2050	2060	2070
Municipal and Manufacturing						
Conservation - Leak reduction, landscaping, efficiency, etc.	22,969	24,559	28,317	31,220	33,822	36,899
Rainwater Harvesting	83	828	4,141	8,282	12,423	16,564
City of Austin Direct Reuse	5,429	10,429	20,429	22,929	25,429	27,929
Other Reuse - decentralized, graywater, etc.	1,000	1,000	1,500	2,000	2,500	3,000
Drought Management	16,516	19,260	22,206	24,484	26,524	28,937
Longhorn Dam Operation Improvements	3,000	3,000	3,000	3,000	3,000	3,000
Lake Long Enhanced Storage – COA Municipal and Manufacturing	20,000	20,000	20,000	20,000	20,000	20,000
Capture local inflows to Lady Bird Lake	1,000	1,000	1,000	1,000	1,000	1,000
Aquifer Storage and Recovery	10,000	25,000	25,000	50,000	50,000	50,000
Strategies for Drought Management						
Indirect Potable Reuse through Lady Bird Lake	20,000	20,000	20,000	20,000	20,000	20,000
Lake Austin operations	2,500	2,500	2,500	2,500	2,500	2,500
Alternate Strategies						
Down-dip brackish groundwater	0	5,000	5,000	5,000	5,000	5,000
Reclaimed water bank infiltration to Colorado Alluvium	0	15,000	20,000	25,000	30,000	30,000
Steam Electric						
Lake Long Enhanced Storage - COA Steam Electric	2,000	2,000	2,000	2,000	2,000	2,000
Additional LCRA Contracts	6,000	7,000	9,000	11,000	13,000	15,000
Direct Reuse - Steam Electric	3,500	7,500	7,500	8,500	9,500	10,500

5.2.3.2.1. Water Conservation

The COA conservation strategy is discussed in detail in *Section 5.2, Conservation*, as required by the TWDB.

5.2.3.2.2. Water Reclamation Initiative (Direct Reuse)

The COA reclaimed water program is also referred to as the City's Water Reclamation Initiative. This direct reuse program includes continued development of water distribution systems to provide reclaimed water to meet non-potable water demands within the City's service area. The City has established its Central Reclaimed Water System from the Walnut Creek Wastewater Treatment Plant (WWTP) and its South system from the South Austin Regional WWTP. These systems are expected to have a planning horizon capacity of over 40,000 ac-ft/yr. Austin has also evaluated the feasibility of developing reclaimed water facilities in other areas of the City as part of its reclaimed water system master planning efforts. The City projects that it will need to develop the use of reclaimed water to the maximum extent possible, up to and if necessary, 100 percent reuse of its effluent to meet future needs. As the level of authorized reclaimed water use in the COA increases, the amount of flow it returns to the Colorado River may decrease accordingly.

In addition to the water conservation measures the COA has implemented to reduce water demands, the COA is pursuing the development of reclaimed water as an additional supply of water to meet non-potable demands in the area. To meet the total projected water demands, the Water Reclamation Initiative would need to supply up to an additional 28,000 ac-ft/yr for direct municipal and manufacturing non-potable purposes by the year 2070, plus approximately 10,500 ac-ft/yr of COA direct non- potable use for steam electric needs in Travis County. The approximate total amount of this direct reuse supply in Travis County is approximately 43,000 ac-ft/yr, which includes approximately 4,600 ac-ft/yr of existing direct reuse supply.

The City is currently using reclaimed water from its existing reclaimed system to irrigate several golf courses, provide water for cooling towers, and meet other non-potable needs. The City estimates this use to be approximately 4,600 ac-ft/yr. In order to expand the availability and use of reclaimed water, the COA has completed a series of planning activities, including the publication of the 1998 Water Reclamation Initiative (WRI) Planning Document, and completion of the north and south system master plans. In addition, COA completed a Title XVI federal cost-share program feasibility study in conjunction with the Federal Bureau of Reclamation (FBR).

The City anticipates that the use of reclaimed water will increase steadily from the current level of 4,600 ac-ft/yr with construction of additional major infrastructure components of the reclaimed system, including pump stations, storage, reclaimed water mains, and wastewater treatment plant filter and process improvements at multiple facilities. The COA will continue to pursue implementation of its WRI and anticipates that additional capacity will be available in the future as the needs increase over the planning horizon. *Table 5-29* shows the projected capacity increases for the three main categories of reuse for each decade of the planning period. Note: WRI system master plans have been developed to a system capacity level of approximately 30,000 ac-ft/yr. Additional non-potable water demand and system infrastructure will be required to increase the direct reuse system capacity to achieve the increased volumes included in this plan.

Table 5-29: Anticipated Reclaimed Water Capacity (Direct Reuse)

Decade	Direct Reuse - Municipal and Manufacturing (ac-ft/yr)	Direct Reuse – Steam-Electric Travis County (ac-ft/yr)
2020	5,429	3,500
2030	10,429	7,500
2040	20,429	7,500
2050	22,929	8,500
2060	25,429	9,500
2070	27,929	10,500

Note: Anticipated capacity information provided by COA.

Through its ongoing water resources planning efforts, COA evaluates its water reuse program and options for expansion. Future plan updates will reflect changes as additional Austin water reclamation program information becomes available.

Projected Reduction of Return Flows

The COA recognizes that the water demand projections contained in the Lower Colorado Regional Water Plan are only projections. Actual water demands may increase faster or slower than projected. The City will monitor the growth of its water demands and adjust its reclaimed water program, as well as its other water conservation programs, accordingly. As a result, the City has indicated that it may increase the use of reclaimed water at a faster rate than projected in this plan. The City believes that the increased use of reclaimed water will provide, in addition to the benefit of conserving sources of raw water, a monetary benefit to the COA through decreased raw water costs and delayed capital expenditures. As return flows discharged by Austin diminish in the future due to increasing reclamation of water, other sources may need to be dedicated or developed to meet needs that may currently be met by return flows discharged by Austin.

Any decrease in municipal return flows will likely be gradual. However, the City projects that it will increase its use of reclaimed water to the maximum extent feasible to meet demands above 325,000 ac-ft/yr, whether those demands occur before or after 2070.

Opinion of Probable Costs

In addition to water conservation, the use of reclaimed water has been identified as a significant source of water to meet the COA's projected demand deficits in 2070. The City has completed planning studies for a Reclaimed Water System to serve potential customers in the City. The system will provide a portion of the water supply required to meet the COA's identified needs.

Cost Implications of Proposed Strategy

Costs for this strategy were developed based on background information provided by the City of Austin, and the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars.

The following table shows the estimated costs associated with this strategy for the planning, design, and construction of the additional major infrastructure components of the reclaimed system, including pump stations, storage, reclaimed water mains, and wastewater treatment plant filter and process improvements at multiple facilities.

Table 5-30: Cost Estimate for City of Austin Direct Reuse Strategy

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$380,214,000	$536,176,000	$51,776,000	$1,347.00

Environmental Considerations

The water quality impacts from direct reuse of reclaimed water are regulated by the TCEQ through 30 TAC Chapter 210. Reclaimed water projects authorized under these regulations are presumed to be protective of human health and the environment. The potential impacts generated through the construction of the proposed pipelines and pump stations will need to be addressed in the preliminary engineering studies to be conducted for these projects.

The use of reclaimed water presents an alternative for providing water for non-potable uses without the development of new water supplies for the City of Austin for the planning period. The costs and environmental impacts of expanding the City's current reuse system will have to be determined as more specific information, such as the locations of customers to be served, is identified. The extent of pipeline and other transmission facilities will have to be determined before specific environmental impacts can be estimated. However, the majority of the facilities needed will most likely be placed in existing easements and, therefore, minimize the impact upon natural resources.

Table 5-2 shows the expected return flows from the COA after accounting for reuse and other demand reduction measures. Over the planning period, return flow amounts are projected to increase. The environmental impact analysis for this strategy compared the impact of return flows less the amount of reuse to the impact of no return flows for 2020 and 2070 scenarios. As would be expected, the impacts to instream flows and freshwater inflows to Matagorda Bay showed mainly flow increases.

Agricultural & Natural Resources Considerations

Impact to agriculture is low based on the projected return flow amounts over the planning period, as shown in *Table 5-31*.

Table 5-31: Projected COA Return Flows by Decade*

COA Return Flows	2020	2030	2040	2050	2060	2070
Projected COA Return Flows	77,013	73,057	80,023	85,707	89,806	101,578

*Based on data provided by COA. These are projected return flow amounts after accounting for the City's projected conservation, direct reuse, and other projects utilizing the City's treated effluent. These projections are subject to change and are updated each planning cycle.

As allowed by state law and as contemplated by the City of Austin and LCRA 2007 Settlement Agreement, the City intends to use reclaimed water to the maximum extent feasible to meet demands above 325,000 ac-ft/yr, whether those demands occur before or after 2070. As a result, although current projections do not indicate that the City will need to reuse all of its effluent during this planning cycle, this strategy could result in the City potentially reusing all of its effluent to meet growing demands and, ultimately, the City could have zero return flow to the Colorado River from its wastewater treatment plants (WWTP).

5.2.3.2.3. Aquifer Storage and Recovery

Aquifer storage and recovery is a strategy in which water can be stored in an aquifer during wetter periods and recovered for use during drier periods. Storing water in an aquifer can improve drought preparedness by providing supply during drier periods if water is banked underground, especially during wetter periods. Additionally, storing water underground reduces the amount of water that evaporates compared to water storage in above ground reservoirs. By providing a water-banking system and reducing evaporation, aquifer storage and recovery offers an opportunity to improve water supply during drought and to reduce evaporative losses. This type of strategy is currently being used by cities in Texas including San Antonio, Kerrville and El Paso.

This strategy requires a suitable aquifer with sufficient available storage capabilities. For the City of Austin aquifer storage and recovery strategy, treated Colorado River water under the City's existing water rights and contract agreements is a potential source of water particularly during non-drought years. Additionally, treated effluent from the Walnut Creek Wastewater Treatment Plant (WWTP) is one of the water sources to be considered for the aquifer storage and recovery project. Potential storage aquifers to be considered for the strategy include the Northern Edwards Aquifer, the Trinity Aquifer, brackish Edwards Aquifer, and the Carrizo/Wilcox Aquifer.

An aquifer and project study would be required for the identified aquifer to determine feasibility and implementation requirements. Significant land acquisition by the City of Austin may be required for the aquifer storage and recovery wells and other facilities. Analysis of treatment requirements to provide acceptable water quality for aquifer injection and for distribution will be conducted. Pipelines from the water source to the wells and from the wells to the distribution system will be required.

This strategy will likely have an implementation time of 3 to 5+ years. The estimated yield is shown in the following table.

Table 5-32: City of Austin Aquifer Storage and Recovery Project Yields

Water Management Strategies (ac-ft/yr)					
2020	**2030**	**2040**	**2050**	**2060**	**2070**
10,000	25,000	25,000	50,000	50,000	50,000

Cost Implications of Proposed Strategy

Costs for this strategy were developed based on background information provided by the City of Austin, and the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars.

The capital cost for this strategy is primarily driven by additional treatment, length of the proposed new pipelines, the purchase of easement/land, and the construction of the proposed aquifer storage and recovery wells.

The following table shows the estimated costs associated with this strategy.

Table 5-33: City of Austin Aquifer Storage and Recovery Strategy Costs

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$225,000,000	$312,316,000	$30,185,000	$604.00

Environmental Considerations

The aquifer storage and recovery stagey will require extensive permitting to ensure it complies with all environmental considerations. An aquifer study is required to determine the impact of the strategy on the proposed storage aquifer. Project planning will include identification of permit requirements, including environmental permitting, to implement the strategy.

Limited environmental impacts are assumed for the reduced effluent flow in project options using reclaimed water as a portion of the supply that will be diverted to the aquifer storage and recovery wells. See *Table 5-31* for the volume of return flows to the Colorado River after reuse strategy volumes are accounted for. While reusing water supplies rather than returning them downstream can reduce instream flows and bay and estuary inflows, particularly during drought or low flow conditions, reuse is a responsible way of increasing water supplies over time and should be encouraged when possible.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

Limited impacts are expected to agriculture or natural resources in project options using reclaimed water as a portion of the supply that will be diverted to the aquifer storage and recovery wells. Reuse could potentially reduce return flows that become available run-of-river water for downstream water users. See *Table 5-31* for the volume of return flows to the Colorado River after reuse strategy volumes are accounted for.

5.2.3.2.4. Longhorn Dam Operation Improvements

This storage efficiency strategy consists of making improvements to the operation of the Longhorn Dam. The Longhorn Dam bascule gates are used as the primary source for the releases for water from the dam. The bascule gates operate by lowering the crest height of the gate to allow water to flow through the gate. Austin Energy has recently completed an improvement project for the dam's two bascule gates, thus improving their hydraulic efficiency.

Additionally, Austin Energy and LCRA have coordinated on making additional gate adjustments for improved hydraulic efficiency through the dam's two existing knife gates. The hydraulic efficiency improvements to the bascule gates and the adjustments to the existing knife gates are expected to deliver approximately 3,000 acre-feet per year of water savings, as shown in the following table.

Table 5-34: City of Austin Longhorn Dam Operation Improvements Yield

Water Management Strategies (ac-ft/yr)					
2020	**2030**	**2040**	**2050**	**2060**	**2070**
3,000	3,000	3,000	3,000	3,000	3,000

Cost Implications of Proposed Strategy

Costs for this strategy were developed based on background information provided by the City of Austin, and the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars.

The capital cost for this strategy is primarily driven by the improvements to the bascule gates. There are also operations and maintenance costs associated with making adjustments to the knife gate. The following table shows the estimated costs associated with this strategy.

Table 5-35: City of Austin Longhorn Dam Operations Improvements Costs

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$741,000	$1,036,000	$87,000	$29.00

Environmental Considerations

No environmental impacts are assumed for completing the bascule gate improvement project and adjusting the existing knife gates at the Longhorn Dam.

Agricultural & Natural Resources Considerations

No impacts to agriculture or natural resources are expected as a result of implementing this strategy.

5.2.3.2.5. Rainwater Harvesting

The implementation of rainwater harvesting as a water management strategy is dependent upon the catchment area, storage capacity, rainfall frequency and water demand of the end user. On average, the Austin area generally receives about 32 inches of rainfall per year. This rainfall is not distributed uniformly during the year and, as a result, implementation of rainwater harvesting as a water management strategy should consider water demands and supplies over multi-month period.

Typically, rooftops serve as the catchment area for rainwater harvesting systems, either from a single residence or a group of buildings. A catchment area of 2,000 square feet basically yields about 1,000 gallons for 1 inch of rainfall. The required storage capacity is a function of the rainfall frequency and water demand. As stated above, the variability of rainfall results in a need to consider sizing facilities to provide storage over a multi-month period in order to balance rainfall with water demand.

If rainwater harvesting is considered for non-potable, secondary uses, as opposed to being a primary water supply, the significance of storage is lessened and the only remaining concern is the distribution system to deliver the water. This distribution system typically consists of a pump and pressure tank. However, some rainwater catchment systems are gravity driven, where pressurized systems are not required.

If rainwater harvesting is considered as the primary potable water supply, additional considerations concerning filtration and disinfection must be considered. The filtration is readily available with cloth and carbon filtration units. The disinfection is readily available with either chemical or ultraviolet systems. Similar to the non-potable use, a distribution system is required and includes a pump and pressure tank.

For the purposes of this planning round, it is envisioned that the City's rainwater harvesting water management strategy provides supplemental auxiliary water for meeting on-site non-potable needs.

However, rainwater harvesting and rainwater capture is to be studied in more detail as part of the City's Integrated Water Resources Planning (IWRP) process which is beginning in early 2015. Through this IWRP process, it is anticipated that rainwater harvesting concepts will be further explored and developed in through the City's IWRP process.

During the summer of 2014, an Austin City Council-appointed Water Resource Planning Task Force made a number of recommendations related to further evaluation of rainwater harvesting and exploration of ways to increase its use including storm water treatment systems to maximize infiltration, etc.

The estimated yield from this strategy is shown in the following table.

Table 5-36: City of Austin Rainwater Harvesting Yield

Water Management Strategies (ac-ft/yr)					
2020	**2030**	**2040**	**2050**	**2060**	**2070**
83	828	4,141	8,282	12,423	16,564

Cost Implications of Proposed Strategy

Costs for this strategy, were developed based on maximizing the use of the City of Austin's current rainwater harvesting rebate program allowances. Austin's current rebate program allows up to a total maximum lifetime rebate amount of $5,000 per site. Cost estimates are based on the long-term decade utilization of this strategy using the yield estimate for 2070. It was assumed that this strategy could meet an average water demand of 0.12 acre feet per year per site. Based on the projected yield of this strategy in 2070, approximately 138,000 sites or systems would be required to produce an approximately 16,500 acre-feet/year level of use. It should be noted that this assumption would be an average across the system for all customer types for non-potable purposes, such as irrigation, washing equipment, and filling fountains. Additionally, in coordination with the City's Watershed Protection Department, Austin Water is participating in processes to explore potentially expanded use of rainwater harvesting for additional non-potable auxiliary water purposes such as toilet flushing and other non-potable purposes around the home.

For the purposes of estimating the costs of this strategy as a City of Austin water management strategy, the current $5,000 maximum rebate per site amount was used to calculate an overall Total Capital and Project Cost (in 2070) of just over $690,000,000 based on this rebate amount and estimated number of sites. This represents the strategy cost that would be potentially incurred by the City of Austin. While based on the maximum lifetime rebate, this cost is only a portion of the cost of installing a full system and does not include full system costs or operations and maintenance costs which would be borne by the system owner. Another infrastructure option for this water management strategy may be to plan, design, and construct City of Austin rainwater harvesting facilities on a community scale. For additional information on rainwater harvesting and Austin Water rebates:

http://www.austintexas.gov/department/rainwater-harvesting-rebates

The following table shows the estimated rebate costs that would be potentially incurred by the City of Austin associated with this strategy.

Table 5-37: City of Austin Rainwater Harvesting Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$690,167,000	$690,167,000	$57,752,712	$3,487

Environmental Considerations

The benefit of rainfall harvesting is a decreased use of surface water or groundwater. The close distance between the rainwater storage and the end use on the property, the gravity fed collection system, and the small footprints of storage tanks, this option does not have significant environmental or energy consumption impacts. Rainwater harvesting can additionally be beneficial from a stormwater management standpoint by reducing runoff during large storm events. Overall impacts to the environment and agricultures are expected to be negligible.

In some states, water rights permits or authorizations are required for rainwater harvesting projects. Texas, however, does not require authorization for rainwater harvesting projects.

5.2.3.2.6. Lake Long Enhanced Storage

Decker Power Station Plant takes its cooling water needs from Lake Long (sometimes also referred to as Decker Lake). Currently, water from Colorado River is diverted to make up for evaporation losses, and maintain the level required for steam-electric cooling purposes at Decker Power Station Plant. Enhanced operation of Lake Long would allow for more fluctuation in lake level, up to approximately 25 feet. This strategy is aimed at increasing use of Lake Long storage by operating the lake as an off-channel reservoir with a variable lake level. This would help in saving water in lakes Travis and Buchanan through strategic Lake Long refill and release operations. The power plant would need to be taken off-line as part of this strategy. Austin Energy is exploring options for replacing the current power plant, which creates potential opportunities for this strategy to be implemented.

Lake Long holds approximately 30,000 acre-feet of water when full. The strategy can be implemented through coordination with LCRA, and through timely releases from Lake Long’s dam to satisfy downstream environmental flow requirements and other beneficial water uses, including a portion of Austin’s steam-electric needs in Fayette County. Improvements to Colorado River pump station will be required as part of this strategy, to increase pumping capacity and ability to refill lake. Additionally, a reclaimed water pipeline from Walnut Creek WWTP to Lake Long will be required. The proposed reclaimed water line can serve other purposes beyond the needs of this strategy in future.

The estimated yield for this strategy is shown in the following table.

Table 5-38: City of Austin Lake Long Enhanced Storage Project Yields

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Austin	Travis	Colorado	20,000	20,000	20,000	20,000	20,000	20,000
Steam-Electric	Fayette	Colorado	2,000	2,000	2,000	2,000	2,000	2,000

Costs Implications of Proposed Strategy

The capital cost for this strategy is primarily driven by the length of the proposed new pipelines, and Colorado River pump station improvements. The cost of this strategy was estimated based on delivering 22,000 acre-feet per year. The pipeline proposed for this strategy is 30-inch in diameter, spanning approximately 5.0 miles from Lake Long to Walnut Creek WWTP, and 2.2 miles from existing Colorado River pump station to the southern edge of Lake Long.

Costs for this strategy were developed based on the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars.

The following table shows the estimated costs associated with this strategy.

Table 5-39: City of Austin Lake Long Enhanced Storage Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$22,320,000	$31,041,000	$4,119,000	$187.00

Environmental Considerations

Water rights, including amendments to existing City of Austin rights, should be addressed as part of this strategy. Additionally, wastewater discharge permits will be required. This strategy has potential to impact recreational water users. As discussed earlier, the power plant will need to be taken off-line when this strategy is engaged, which requires approval by Electric Reliability Council of Texas (ERCOT).

The environmental impact analysis for reuse compares the impact of return flows less the amount of reuse to the impact of no return flows. As would be expected, the impacts to instream flows and freshwater inflows to Matagorda Bay showed mainly flow increases. See *Table 5-31* for the volume of return flows to the Colorado River after reuse strategy volumes are accounted for.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

Negligible impacts to agriculture are anticipated as a result of this strategy.

5.2.3.2.7. Other Reuse

Concepts such as decentralization and graywater use are types of reuse projects that can be implemented on a local level.

The decentralized concept is the idea that reuse of storm water and treated wastewater can be efficiently managed by treating it and reusing it as close as possible to where it is generated. The City currently operates and maintains a number of decentralized wastewater treatment facilities. The effluent from some of these facilities is used in the area for turf irrigation. Decentralized infrastructure improvements are typically funded through Austin Water's (AW) capital improvements program, through developer funded improvements, or City cost participation with the developer.

For the 2016 Regional Water Plan, this other water reuse strategy would consist of providing localized treatment of storm water and wastewater and local storage and transmission capabilities. These reuse strategies including decentralized concepts and graywater reuse are to be studied in more detail as part of the City's Integrated Water Resources Planning (IWRP) process which is beginning in early 2015. Through this IWRP process, it is anticipated that rainwater harvesting concepts will be further explored and developed in through the City's IWRP process.

For this strategy, it was assumed that two (2) neighborhoods would be identified to implement the decentralized concept.

Based on this assumption, the following infrastructure was proposed for each neighborhood.

- One (1) 1.0 MGD Average Wastewater Treatment Plant
- Booster Pump Station with one (1) Storage Tank
- Approximately one (1) mile of transmission piping and appurtenances

A component of decentralization includes gray water. Graywater is defined as relatively clean wastewater containing minimal to no amounts of human waste, and is differentiated from blackwater or sewage which is discharged by toilets. Graywater is generated from hand washing basins, showers, and baths, and can also include wastewater from washing machines, dishwashers, and kitchen sinks. This water can be recycled locally for such uses as toilet flushing and landscape irrigation. The amount of infrastructure required for graywater is small compared to the infrastructure required for overall decentralization, so the graywater infrastructure and costs are assumed to be part of the overall decentralization infrastructure and costs.

Table 5-40: City of Austin Other Reuse Project Yield

Water Management Strategies (ac-ft/yr)					
2020	**2030**	**2040**	**2050**	**2060**	**2070**
1,000	1,000	1,500	2,000	2,500	3,000

Cost Implications of Proposed Strategy

A capital cost estimate was developed using the Texas Water Development Board (TWDB) Cost Estimating Tool in September 2013 dollars. The Cost Estimating Tool was also used to determine operating costs.

The capital cost for this strategy is primarily driven by the cost of a treatment facility.

The following table shows the estimated costs associated with this strategy.

Table 5-41: City of Austin Other Reuse Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$15,518,000	$21,772,000	$3,067,000	$1,022.00

Environmental Considerations

There are no environmental impacts from this strategy. The City of Austin currently has large regional wastewater treatment collection and treatment systems. The decentralized concept will reduce contributions to these systems from new development. It would eliminate additional discharges of treated wastewater from the regional treatment plants.

Agricultural and Natural Resources Considerations

No impacts to agriculture are expected, as a result of implementing this strategy.

5.2.3.2.8. Capture Local Inflows to Lady Bird Lake

This strategy consists of installing floating pump intake below Tom Miller Dam, and constructing transmission main to pump water from Lady Bird Lake (LBL) to the intake at Ullrich Water Treatment Plant. The strategy also includes capturing spring flows, including Barton Springs, and storm flows when they are not need for environmental flow maintenance or for downstream senior water rights.

This strategy is expected to provide approximately 1,000 acre-feet per year, once implemented, as shown in the following table.

Table 5-42: City of Austin Capture Local Inflows to Lady Bird Lake Project Yield

Water Management Strategies (ac-ft/yr)					
2020	**2030**	**2040**	**2050**	**2060**	**2070**
1,000	1,000	1,000	1,000	1,000	1,000

Cost Implications of Proposed Strategy

The cost of this strategy was estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool in September 2013 dollars. The capital cost for this strategy is primarily driven by the length of the proposed new pipeline, floating intake barge, and pump station additions. The cost of this strategy was estimated based on delivering 1,000 acre-feet per year of flow. The pipeline would span approximately 1,000 ft from Lady Bird Lake, downstream of Tom Miller Dam, and connecting to the intake of Ullrich Water Treatment Plant.

The following table shows the estimated costs associated with this strategy.

Table 5-43: City of Austin Capture Local Inflows to Lady Bird Lake Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$2,108,000	$2,949,000	$297,000	$297.00

Environmental Considerations

Capturing storm and spring flows that would otherwise spill downstream could minimally reduce instream flows and possibly bay and estuary inflows, although needed environmental flows or flows to be passed downstream to meet the needs of senior water right would not be captured. The relatively small volume associated with this strategy should have negligible impacts on the overall volume of water in the Colorado River downstream to Matagorda Bay.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

Negligible impacts to agriculture are anticipated as a result of this strategy.

5.2.3.2.9. Indirect Potable Reuse through Lady Bird Lake

Due to the on-going drought conditions and water supply status, the City of Austin has been evaluating demands that can be met with water supply augmentation sources, water supply system operational enhancement projects, and demand-side management options. As part of their plan for potential water management strategies, the City of Austin is considering a potential river and reservoir system operational enhancement using Indirect Potable Reuse through Lady Bird Lake as a strategy in the 2016 Regional Water Plan.

The strategy would consist of conveying a portion of the South Austin Regional (SAR) Wastewater Treatment Plant (WWTP) discharge to Lady Bird Lake via reclaimed water mains. Water would be withdrawn from Lady Bird Lake with an intake pump station and pumped into the Ullrich Water Treatment Plant (WTP) intake line. The City's 2014 Austin Water Resource Planning Task Force (AWRPTF) recommended that this option be considered for implementation in the event of 400,000 acre-feet of combined storage or less in Lakes Buchanan and Travis. Therefore, this option is only being considered at this time as a source of supply under certain extreme drought conditions.

Consultants for the City of Austin estimated that yields up to 20,000 acre-feet/year could be provided with this strategy, as shown in the following table.

Table 5-44: City of Austin Indirect Potable Reuse through Lady Bird Lake Project Yield

Water Management Strategies (ac-ft/yr)					
2020	**2030**	**2040**	**2050**	**2060**	**2070**
20,000	20,000	20,000	20,000	20,000	20,000

The major infrastructure required for this strategy includes:

- Acceleration of construction of reclaimed water lines identified in the Reclaimed Master Plan
- Water Intake and Pump Station
- Transmission piping and appurtenances

Improvements at SAR WWTP for a portion of the effluent to have additional treatment before discharge into Lady Bird Lake

As part of developing the indirect potable reuse strategy a number of permitting and engineering analyses will need to be conducted. Project components to be addressed include water quality modeling and TCEQ permitting.

Cost Implications of Proposed Strategy

A capital cost estimate was provided by the City of Austin. In order to provide a comparable cost consistent with other strategies in this report, operational costs were developed using the Texas Water Development Board (TWDB) Cost Estimating Tool in September 2013 dollars.

The following table shows the estimated costs associated with this strategy.

Table 5-45: City of Austin Indirect Potable Reuse through Lady Bird Lake Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$30,000,000	$41,970,000	$3,593,000	$180.00

Environmental Considerations

As stated previously, additional treatment for nutrient removal may be required for the portion of water potentially being discharged in Lady Bird Lake. The AWRPTF recommended that discharge into the Lake should occur for the shortest possible time. Additional investigation will be required to evaluate environmental and water quality considerations and permitting in Lady Bird Lake.

The environmental impact analysis for reuse compared the impact of return flows less the amount of reuse to the impact of no return flows. As would be expected, the impacts to instream flows and freshwater inflows to Matagorda Bay showed mainly flow increases. See *Table 5-31* for the volume of return flows to the Colorado River after reuse strategy volumes are accounted for.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

No impacts to agriculture are expected, as a result of implementing this strategy.

5.2.3.2.10. Lake Austin Operations

Lake Austin is normally operated as a relatively constant level lake. This strategy would allow Lake Austin to operate with a varying level in the event that combined storage in Lakes Travis and Buchanan drops below 600,000 acre feet, as recommended by the AWRPTF. This would allow local flows to be captured during storm events and stored for use. The level could vary by approximately 3 feet during months outside of the peak recreational period for Lake Austin. The period of time for operating with a variable level was recommended to potentially be in the months of October through May.

There are no capital costs and no new permits associated with this strategy, and it could be implemented fairly quickly. However, potential stored water benefits would only be available when rainfall and lake level conditions allow. The City of Austin plans to conduct a robust public outreach and education process in advance of possible implementation of this strategy.

The projected yields from this strategy are shown in the following table.

Table 5-46: City of Austin Lake Austin Operations Project Yield

Water Management Strategies (ac-ft/yr)					
2020	**2030**	**2040**	**2050**	**2060**	**2070**
2,500	2,500	2,500	2,500	2,500	2,500

Cost Implications of Proposed Strategy

Annual and unit costs were provided by consultants to the City of Austin and are shown in the table below. No capital and project costs were assumed.

Table 5-47: City of Austin Lake Austin Operations Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$0	$0	$25,000	$10.00

Environmental Considerations

Environmental impacts are expected to be negligible.

Agricultural and Natural Resources Considerations

No impacts to agriculture are expected, as a result of implementing this strategy.

5.2.4 **Regional Water Management Strategies**

There are several water management strategies that apply to multiple WUG categories, applied throughout the region. These strategies are discussed in this regional water management section of the report. For strategies specific to a category of water use, (Municipal, Irrigation, Manufacturing, Mining, and Steam Electric Power) refer to later sections of the report.

For municipal WUGs with shortages, water conservation was considered before these regional strategies, please refer to *Section 5.2.2.3*.

5.2.4.1 Expansion of Current Groundwater Supplies

This group of strategies includes WUGs with existing groundwater sources that may be seeking to expand the amount of groundwater they produce from that source or sources to meet their increasing needs.

5.2.4.1.1. Carrizo-Wilcox Aquifer

This alternative would involve pumping additional groundwater from the Carrizo-Wilcox aquifer, either using the WUG's existing wells or drilling additional wells. This additional water, referred to as remaining supply, was determined by subtracting the water that is currently allocated from the available water under the Modeled Available Groundwater (MAG).

Table 5-48 presents the WUGs that would utilize this strategy along with the implementation decade and the amount of water to be pumped. Additional groundwater was only allocated to meet each WUG's individual shortage.

Table 5-48: Carrizo-Wilcox Aquifer Expansions

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Aqua WSC	Bastrop	Brazos (to Colorado)	2,500	2,500	4,000	4,000	4,000	4,000
Bastrop County Total for Brazos River Basin			**2,500**	**2,500**	**4,000**	**4,000**	**4,000**	**4,000**
Bastrop County WCID #2	Bastrop	Colorado	0	0	0	0	550	550
County-Other	Bastrop	Colorado	60	60	60	60	60	0
Elgin	Bastrop	Colorado	300	300	0	0	0	0
Manufacturing	Bastrop	Colorado	55	87	120	151	174	199
Bastrop County Total for Colorado River Basin			**415**	**447**	**180**	**211**	**784**	**749**

This strategy was applied to the following WUGs in Bastrop County: Aqua WSC, Bastrop County WCID #2, County-Other, and Elgin. Elgin falls into both Bastrop and Travis Counties in Region K, and a portion of the strategy supplies for Elgin were allocated to the Travis County portion.

Cost Implications of Proposed Strategy

Table 5-49 presents a summary of the probable costs for each WUG utilizing this strategy. The four cost components analyzed during cost estimation of this strategy were: Total Construction Cost, Total Capital Cost, Annual Cost, and Unit Cost.

The costs of the groundwater supply strategies were estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool. For all these strategies, it was assumed that a new well field and transmission piping (interconnecting well piping) was provided.

A peaking factor of two (2) was assumed (twice the largest quantity of water supplied). The number of new wells was determined in the Cost Estimating Tool, based on the largest quantity of water supplied over the planning period. Wells were all assumed to be the same type, size, at the same elevation, and to have an efficiency of 80%. The well field layout was determined by two wells per “node”, a 0.5 mile transmission line between each well and its node, and an additional 0.5 mile “trunk” line connecting to the next node.

No new distribution piping was assumed for expansion projects, and a 5-mile distribution pipeline (with no pump station) was assumed for new projects. From a cost standpoint, the Carrizo-Wilcox Aquifer Expansion for Aqua WSC was treated as a new project, due to its large size. The distribution line was assumed to be one pipe, five miles long, with a diameter based on a velocity of 5 ft/s at peak flow.

Additional capital costs including engineering, legal services, contingencies, environmental and archeology studies and mitigation, land acquisition and surveying, and interest during construction were estimated using the Cost Estimating Tool. Annual costs including debt service, operation and maintenance, and pumping energy costs were also estimated using the tool.

Table 5-49: Carrizo-Wilcox Aquifer Expansion Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Aqua WSC	Bastrop	Brazos (to Colorado)	$6,891,000	$9,777,000	$1,037,000	$259.00
Bastrop County WCID #2	Bastrop	Colorado	$1,514,000	$2,150,000	$203,000	$369.00
County-Other	Bastrop	Colorado	$1,514,000	$2,150,000	$196,000	$3,267.00
Elgin	Bastrop	Colorado	$1,514,000	$2,150,000	$200,000	$667.00
Manufacturing	Bastrop	Colorado	$1,514,000	$2,150,000	$198,000	$995.00

Environmental Considerations

The environmental impacts of expanded groundwater use will vary depending upon site characteristics. Some impacts may occur from the expansion of existing groundwater infrastructure, but well sites are generally small in areal extent, and the disturbance from pipeline construction is temporary. Availability numbers were developed by the Lost Pines Groundwater Conservation District for this aquifer in Bastrop County, and they attempt to limit the groundwater use to the amount that can be replenished on an annual basis. If this is the case, then the impact on the environment should be low. The water supply is within the Modeled Available Groundwater (MAG), so drawdown in the aquifer could be up to 237 feet. It is assumed that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored. The Groundwater Conservation Districts will monitor the aquifer levels for any needed changes to the identified available volume.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

There are currently no irrigation WUGs with supplies of irrigation water or livestock water from the Carrizo-Wilcox Aquifer in Region K. This is not a source of choice, probably because of the depth of the aquifer. In addition, the terrain in Bastrop County is often not conducive to irrigated agriculture. Therefore, the impact on agriculture is negligible.

5.2.4.1.2. Ellenburger-San Saba Aquifer

This alternative would involve pumping additional groundwater from the Ellenburger-San Saba aquifer, either using the WUG's existing wells or drilling additional wells. This additional water, referred to as remaining supply, was determined by subtracting the water that is currently allocated from the available water.

Table 5-50 presents the WUGs that would utilize this strategy along with the implementation decade and the amount of water to be pumped. Additional groundwater was only allocated to meet each WUG's individual shortage.

Table 5-50: Ellenburger-San Saba Aquifer Expansions

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
County-Other	Blanco	Colorado	0	0	0	55	55	55
Johnson City	Blanco	Colorado	175	175	175	175	175	175
Blanco County Total for Colorado River Basin			**175**	**175**	**175**	**230**	**230**	**230**
Bertram	Burnet	Colorado (to Brazos)	180	180	180	180	180	180
Mining	Burnet	Colorado	1,500	1,500	1,500	1,500	1,500	1,500
Burnet County Total for Colorado River Basin			**1,680**	**1,680**	**1,680**	**1,680**	**1,680**	**1,680**
Manufacturing	Gillespie	Colorado	626	626	626	626	626	626
Gillespie County Total for Colorado River Basin			**626**	**626**	**626**	**626**	**626**	**626**

This strategy was applied to the following WUGs: County-Other and Johnson City in Blanco County, Bertram and Mining in Burnet County, and Manufacturing in Gillespie County.

Cost Implications of Proposed Strategy

Table 5-51 presents a summary of the probable costs for each WUG utilizing this strategy. The four cost components analyzed during cost estimation of this strategy were: Total Construction Cost, Total Capital Cost, Annual Cost, and Unit Cost.

The costs of the groundwater supply strategies were estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool. For all these strategies, it was assumed that a new well field and transmission piping (interconnecting well piping) was provided.

A peaking factor of two (2) was assumed (twice the largest quantity of water supplied). The number of new wells was determined in the Cost Estimating Tool, based on the largest quantity of water supplied over the planning period. Wells were all assumed to be the same type, size, at the same elevation, and to have an efficiency of 80%. The well field layout was determined by two wells per "node", a 0.5 mile transmission line between each well and its node, and an additional 0.5 mile "trunk" line connecting to the next node. No new distribution piping was assumed.

Additional capital costs including engineering, legal services, contingencies, environmental and archeology studies and mitigation, land acquisition and surveying, and interest during construction were estimated using the Cost Estimating Tool. Annual costs including debt service, operation and maintenance, and pumping energy costs were also estimated using the tool.

Table 5-51: Ellenburger-San Saba Aquifer Expansion Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
County-Other	Blanco	Colorado	$546,000	$821,000	$76,000	$1,382.00
Johnson City	Blanco	Colorado	$947,000	$1,505,000	$140,000	$800.00
Bertram	Burnet	Colorado (to Brazos)	$1,369,000	$2,031,000	$188,000	$1,044.00
Mining	Burnet	Colorado	$9,048,000	$13,418,000	$1,268,000	$845.00
Manufacturing	Gillespie	Colorado	$2,535,000	$3,880,000	$372,000	$594.00

Environmental Considerations

The environmental impacts of expanded groundwater use from the Ellenburger-San Saba Aquifer will vary depending upon site characteristics but are not expected to be significant. Some impacts may occur from the expansion of existing groundwater infrastructure, but well sites are generally small in areal extent and the disturbance from pipeline construction is temporary. The water supply is within the Modeled Available Groundwater (MAG), so drawdown in the aquifer could be up to 2 feet. It is assumed that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored. The Groundwater Conservation Districts will monitor the aquifer levels for any needed changes to the identified available volume.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

The Ellenburger-San Saba is a source of water supply for agricultural interests in Burnet, Blanco, Gillespie and Llano Counties. The additional drafting of this aquifer has the potential to draw down the static and pumping water levels and increase the cost of production for agricultural users, but impacts are likely to be negligible.

5.2.4.1.3. Edwards-BFZ Aquifer

This alternative would involve pumping additional groundwater from the Edwards-BFZ aquifer, either using the WUG's existing wells or drilling additional wells. This additional water, referred to as remaining supply, was determined by subtracting the water that is currently allocated from the available water.

Table 5-52 presents the WUG that would utilize this strategy along with the implementation decade and the amount of water to be pumped. Additional groundwater was only allocated to meet each WUG's individual shortage.

Table 5-52: Edwards-BFZ Aquifer Expansions

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Pflugerville	Travis	Colorado	0	0	1,000	1,000	1,000	1,000

This strategy was applied to the Pflugerville WUG in Travis County.

Cost Implications of Proposed Strategy

Table 5-53 presents a summary of the probable costs for each WUG utilizing this strategy. The four cost components analyzed during cost estimation of this strategy were: Total Construction Cost, Total Capital Cost, Annual Cost, and Unit Cost.

The costs of the groundwater supply strategies were estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool. For all these strategies, it was assumed that a new well field and transmission piping (interconnecting well piping) was provided.

A peaking factor of two (2) was assumed (twice the largest quantity of water supplied). The number of new wells was determined in the Cost Estimating Tool, based on the largest quantity of water supplied over the planning period. Wells were all assumed to be the same type, size, at the same elevation, and to have an efficiency of 80%. The well field layout was determined by two wells per “node”, a 0.5 mile transmission line between each well and its node, and an additional 0.5 mile “trunk” line connecting to the next node. No new distribution piping was assumed.

Additional capital costs including engineering, legal services, contingencies, environmental and archeology studies and mitigation, land acquisition and surveying, and interest during construction were estimated using the Cost Estimating Tool. Annual costs including debt service, operation and maintenance, and pumping energy costs were also estimated using the tool.

Table 5-53: Edwards-BFZ Aquifer Expansion Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Pflugerville	Travis	Colorado	$2,564,000	$3,729,000	$371,000	$371.00

Environmental Considerations

The environmental impacts of expanded groundwater use will vary depending upon site characteristics. Some impacts may occur from the expansion of existing groundwater infrastructure, but well sites are generally small in areal extent, and the disturbance from pipeline construction is temporary. Water supply is within the MAG, so spring/streamflow should be maintained at 42 ac-ft/month or higher. It is assumed that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

Negligible impacts to agriculture are expected as a result of implementing this strategy.

5.2.4.1.4. Gulf Coast Aquifer

This alternative would involve pumping additional groundwater from the Gulf Coast aquifer, either using the WUG's existing wells or drilling additional wells. This additional water, referred to as remaining supply, was determined by subtracting the water that is currently allocated from the available water.

Table 5-54 presents the WUGs that would utilize this strategy along with the implementation decade and the amount of water to be pumped. Additional groundwater was only allocated to meet each WUG's individual shortage.

Table 5-54: Gulf Coast Aquifer Expansions

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
County-Other	Colorado	Colorado	226	226	226	226	226	226
Colorado County Total for Colorado River Basin			**226**	**226**	**226**	**226**	**226**	**226**
County-Other	Fayette	Colorado	345	345	345	345	345	345
Mining	Fayette	Colorado	1,576	1,176	717	274	0	0
Fayette County Total for Colorado River Basin			**1,921**	**1,521**	**1,062**	**619**	**345**	**345**
County-Other	Fayette	Lavaca	294	294	294	294	294	294
Flatonia	Fayette	Lavaca	100	100	100	100	100	100
Manufacturing	Fayette	Lavaca	391	391	391	391	391	391
Mining	Fayette	Lavaca	344	344	344	344	344	344
Fayette County Total for Lavaca River Basin			**1,129**	**1,129**	**1,129**	**1,129**	**1,129**	**1,129**

This strategy was applied to County-Other in Colorado County, and County-Other, Mining, Flatonia, and Manufacturing in Fayette County;

Cost Implications of Proposed Strategy

Table 5-55 presents a summary of the probable costs for each WUG utilizing this strategy. The four cost components analyzed during cost estimation of this strategy were: Total Construction Cost, Total Capital Cost, Annual Cost, and Unit Cost.

The costs of the groundwater supply strategies were estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool. For all these strategies, it was assumed that a new well field and transmission piping (interconnecting well piping) was provided.

A peaking factor of two (2) was assumed (twice the largest quantity of water supplied). The number of new wells was determined in the Cost Estimating Tool, based on the largest quantity of water supplied over the planning period. Wells were all assumed to be the same type, size, at the same elevation, and to have an efficiency of 80%. The well field layout was determined by two wells per "node", a 0.5 mile transmission line between each well and its node, and an additional 0.5 mile "trunk" line connecting to the next node. No new distribution piping was assumed.

Additional capital costs including engineering, legal services, contingencies, environmental and archeology studies and mitigation, land acquisition and surveying, and interest during construction were estimated using the Cost Estimating Tool. Annual costs including debt service, operation and maintenance, and pumping energy costs were also estimated using the tool.

Table 5-55: Gulf Coast Aquifer Expansion Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
County-Other	Colorado	Colorado	$1,022,000	$1,466,000	$136,000	$602.00
County-Other	Fayette	Colorado	$1,581,000	$2,279,000	$214,000	$620.00
Mining	Fayette	Colorado	$3,651,000	$5,241,000	$532,000	$338.00
County-Other	Fayette	Lavaca	$1,581,000	$2,279,000	$213,000	$724.00
Flatonia	Fayette	Lavaca	$1,502,000	$2,241,000	$206,000	$2,060.00
Manufacturing	Fayette	Lavaca	$1,581,000	$2,279,000	$214,000	$547.00
Mining	Fayette	Lavaca	$1,581,000	$2,279,000	$214,000	$622.00

Environmental Considerations

The environmental impacts of expanded groundwater use will vary depending upon site characteristics but are not expected to be significant. Some impacts may occur from the expansion of existing groundwater infrastructure, but well sites are generally small in areal extent and the disturbance from pipeline construction is temporary. No Gulf Coast aquifer use is expected to surpass the current, available yield of the aquifers as determined in Chapter 3. However, personal observation of springs in the area by Bob Pickens has occurred. Based on his observations, it is not possible to tell whether the springs noted are from perched water tables from years of higher precipitation or springs from the Gulf Coast Aquifer. In any event, the Gulf Coast Aquifer formally had springs identified, but the known springs from the past have not flowed for many years. The water supply is within the Modeled Available Groundwater (MAG), so drawdown in the aquifer could be up to 12 feet, relative to 1999 conditions. It is assumed that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

Impacts to agriculture from this strategy are negligible, due to the locations and volumes of water.

5.2.4.1.5. Hickory Aquifer

This alternative would involve pumping additional groundwater, either using their existing wells or drilling additional wells. The WUGs were assumed to pump this additional water from their current supply. *Table 5-56* presents the WUGs that would utilize this strategy along with the implementation decade and the amount of water to be pumped. Additional groundwater was only allocated to meet each WUG's individual shortage.

Table 5-56: Hickory Aquifer Expansions

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
County-Other	Blanco	Colorado	0	0	0	55	55	55
Blanco County Total for Colorado River Basin			**0**	**0**	**0**	**55**	**55**	**55**
Mining	Burnet	Colorado	0	500	1,000	1,800	1,800	1,800
Burnet County Total for Colorado River Basin			**0**	**500**	**1000**	**1800**	**1800**	**1800**

This strategy was applied to County-Other in Llano County and to Mining in Burnet County.

Cost Implications of Proposed Strategy

Table 5-57 presents a summary of the probable costs for each WUG utilizing this strategy. The four cost components analyzed during cost estimation of this strategy were: Total Construction Cost, Total Capital Cost, Annual Cost, and Unit Cost.

The costs of the groundwater supply strategies were estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool. For all these strategies, it was assumed that a new well field and transmission piping (interconnecting well piping) was provided.

A peaking factor of two (2) was assumed (twice the largest quantity of water supplied). The number of new wells was determined in the Cost Estimating Tool, based on the largest quantity of water supplied over the planning period. Wells were all assumed to be the same type, size, at the same elevation, and to have an efficiency of 80%. The well field layout was determined by two wells per "node", a 0.5 mile transmission line between each well and its node, and an additional 0.5 mile "trunk" line connecting to the next node. No new distribution piping was assumed.

Additional capital costs including engineering, legal services, contingencies, environmental and archeology studies and mitigation, land acquisition and surveying, and interest during construction were estimated using the Cost Estimating Tool. Annual costs including debt service, operation and maintenance, and pumping energy costs were also estimated using the tool.

Table 5-57: Hickory Aquifer Expansion Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
County-Other	Blanco	Colorado	$912,000	$1,316,000	$120,000	$2,182.00
Mining	Burnet	Colorado	$9,281,000	$13,437,000	$1,293,000	$718.00

Environmental Considerations

The sustainable yield of the Hickory aquifer has been provided by analysis of drawdown and pumping records, in the absence of a current model of the aquifer. The impacts from well construction and pipeline construction are limited to the disturbance during construction, and should not be a major environmental factor. The intent is to use no more from the aquifer than is returned to it on an annual basis, maintaining 100% saturated thickness in Burnet County. Drawdown of up to 7 feet could occur in Blano County, based on the MAG. This aquifer has limited springs, but in the absence of a model, it is assumed that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

The Hickory aquifer is used for both livestock watering and irrigation in Burnet, Gillespie, Llano, and San Saba Counties. The amounts used for these activities are far in excess of the amounts proposed in this strategy. As a result, anticipated impact on agriculture is negligible.

5.2.4.1.6. Marble Falls Aquifer

This alternative would involve pumping additional groundwater from the Marble Falls aquifer, either using the WUG's existing wells or drilling additional wells. This additional water, referred to as remaining supply, was determined by subtracting the water that is currently allocated from the available water.

Table 5-58 presents the WUG that would utilize this strategy along with the implementation decade and the amount of water to be pumped. Additional groundwater was only allocated to meet each WUG's individual shortage.

Table 5-58: Marble Falls Aquifer Expansions

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Mining	Burnet	Colorado	0	0	0	0	1,000	1,500

This strategy was applied to the Mining WUG in Burnet County.

Cost Implications of Proposed Strategy

Table 5-59 presents a summary of the probable costs for each WUG utilizing this strategy. The four cost components analyzed during cost estimation of this strategy were: Total Construction Cost, Total Capital Cost, Annual Cost, and Unit Cost.

The costs of the groundwater supply strategies were estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool. For all these strategies, it was assumed that a new well field and transmission piping (interconnecting well piping) was provided.

A peaking factor of two (2) was assumed (twice the largest quantity of water supplied). The number of new wells was determined in the Cost Estimating Tool, based on the largest quantity of water supplied over the planning period. Wells were all assumed to be the same type, size, at the same elevation, and to have an efficiency of 80%. The well field layout was determined by two wells per "node", an 0.5 mile transmission line between each well and its node, and an additional 0.5 mile "trunk" line connecting to the next node. No new distribution piping was assumed.

Additional capital costs including engineering, legal services, contingencies, environmental and archeology studies and mitigation, land acquisition and surveying, and interest during construction were estimated using the Cost Estimating Tool. Annual costs including debt service, operation and maintenance, and pumping energy costs were also estimated using the tool.

Table 5-59: Marble Falls Aquifer Expansion Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Mining	Burnet	Colorado	$4,956,000	$7,257,000	$703,000	$469.00

Environmental Considerations

The environmental impacts of expanded groundwater use will vary depending upon site characteristics. Some impacts may occur from the expansion of existing groundwater infrastructure, but well sites are generally small in areal extent, and the disturbance from pipeline construction is temporary. The water supply is within the Modeled Available Groundwater (MAG), so 100% saturated thickness should be maintained. It is assumed that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

No impacts to agriculture are expected as a result of implementing this strategy.

5.2.4.1.7. Sparta Aquifer

This alternative would involve pumping additional groundwater, either using their existing wells or drilling additional wells. *Table 5-60* presents the WUGs that would utilize this strategy along with the implementation decade and the amount of water to be pumped. Additional groundwater was only allocated to meet each WUG's individual shortage.

Table 5-60: Sparta Aquifer Expansions

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Mining	Fayette	Guadalupe	66	42	13	0	0	0

This strategy was applied to the Mining WUG in Fayette County.

Cost Implications of Proposed Strategy

Table 5-61 presents a summary of the probable costs for each WUG utilizing this strategy. The four cost components analyzed during cost estimation of this strategy were: Total Construction Cost, Total Capital Cost, Annual Cost, and Unit Cost.

The costs of the groundwater supply strategies were estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool. For all these strategies, it was assumed that a new well field and transmission piping (interconnecting well piping) was provided.

A peaking factor of two (2) was assumed (twice the largest quantity of water supplied). The number of new wells was determined in the Cost Estimating Tool, based on the largest quantity of water supplied over the planning period. Wells were all assumed to be the same type, size, at the same elevation, and to have an efficiency of 80%. The well field layout was determined by two wells per "node", a 0.5 mile transmission line between each well and its node, and an additional 0.5 mile "trunk" line connecting to the next node. No new distribution piping was assumed.

Additional capital costs including engineering, legal services, contingencies, environmental and archeology studies and mitigation, land acquisition and surveying, and interest during construction were estimated using the Cost Estimating Tool. Annual costs including debt service, operation and maintenance, and pumping energy costs were also estimated using the tool.

Table 5-61: Sparta Aquifer Expansion Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Mining	Fayette	Guadalupe	$512,000	$753,000	$68,000	$1,030.00

Environmental Impact

Water from this strategy is within the identified available groundwater from the aquifer. The impact on the environment from construction of wells and pipelines is expected to be low, with most of the impact occurring during the construction process itself. The water supply is within the Modeled Available Groundwater (MAG), so drawdown in the aquifer could be up to 60 feet. It is assumed that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

Sparta water is used extensively for agricultural purposes in Fayette County. The increase in demand for mining is small in comparison to amounts already produced for irrigation, and should have a negligible impact on agriculture.

5.2.4.1.8. Trinity Aquifer

This alternative would involve pumping additional groundwater, either using their existing wells or drilling additional wells. The WUGs were assumed to pump this additional water from their current supply. *Table 5-62* presents the WUGs that would utilize this strategy along with the implementation decade and the amount of water to be pumped. Additional groundwater was only allocated to meet each WUGs individual shortage.

Table 5-62: Trinity Aquifer Expansions

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Mining	Hays	Colorado	531	761	1,047	1,047	1,047	1,047
Hays County Total for Colorado River Basin			**531**	**761**	**1,047**	**1,047**	**1,047**	**1,047**
Irrigation	Mills	Colorado (to Brazos)	480	480	480	480	480	480
Mills County Total for Colorado River Basin			**480**	**480**	**480**	**480**	**480**	**480**
Lakeway	Travis	Colorado	500	500	500	500	500	500
Manor	Travis	Colorado	0	600	600	600	600	600
Manville WSC	Travis	Colorado	0	0	0	1,000	1,000	1,000
Travis County Total for Colorado River Basin			**500**	**1,100**	**1,100**	**2,100**	**2,100**	**2,100**

This strategy was applied to Mining in Hays County; Irrigation in Mills County; and Lakeway, Manor, and Manville WSC in Travis County.

Cost Implications of Proposed Strategy

Table 5-63 presents a summary of the probable costs for each WUG utilizing this strategy. The four cost components analyzed during cost estimation of this strategy were: Total Construction Cost, Total Capital Cost, Annual Cost, and Unit Cost.

The costs of the groundwater supply strategies were estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool. For all these strategies, it was assumed that a new well field and transmission piping (interconnecting well piping) was provided.

A peaking factor of 2 was assumed (twice the largest quantity of water supplied). The number of new wells was determined in the Cost Estimating Tool, based on the largest quantity of water supplied over the planning period. Wells were all assumed to be the same type, size, at the same elevation, and to have an efficiency of 80%. The well field layout was determined by two wells per “node”, a 0.5 mile transmission line between each well and its node, and an additional 0.5 mile “trunk” line connecting to the next node. No new distribution piping was assumed.

Additional capital costs including engineering, legal services, contingencies, environmental and archeology studies and mitigation, land acquisition and surveying, and interest during construction were estimated using the Cost Estimating Tool. Annual costs including debt service, operation and maintenance, and pumping energy costs were also estimated using the tool.

Table 5-63: Trinity Aquifer Expansion Cost

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Mining	Hays	Colorado	$3,265,000	$4,652,000	$457,000	$436
Irrigation	Mills	Colorado (to Brazos)	$5,426,000	$8,289,000	$777,000	$1,619
Lakeway	Travis	Colorado	$2,016,000	$2,985,000	$285,000	$570
Manor	Travis	Colorado	$2,328,000	$3,442,000	$327,000	$545
Manville WSC	Travis	Colorado	$3,672,000	$5,431,000	$537,000	$537

Environmental Considerations

The Trinity aquifer was modeled to allow the use of water from the aquifer until the simulated drought of record springflow with no pumpage from the aquifer was still equal to 90 percent of the observed springflow during the drought of record. In Travis County, water supply within the MAG could cause drawdown of up to 124 feet, depending on the formation. It is assumed that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored. The impacts of construction of wells and pipelines, if properly managed, are expected to produce negligible impacts to the environment, and primarily during the construction period itself.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

This strategy provides small amounts of water for irrigation in Mills County, which will have a positive impact on agriculture. Increased drawdown from the municipal demands to be served from the aquifer will likely have a negligible impact on agriculture.

5.2.4.2 Development of New Groundwater Supplies

This group of strategies includes those WUGs that are obtaining groundwater from new groundwater sources which they have not tapped previously.

<u>5.2.4.2.1. Carrizo-Wilcox Aquifer</u>

This strategy would involve developing a new well field to pump water from the Carrizo-Wilcox aquifer in the Colorado and Guadalupe river basins. A new well field will consist of acquisition of a site, new wells, 5 miles of transmission line, one-half mile segments of line between wells and nodes, and will assume that the WUG has the available storage capacity to store this additional water. *Table 5-64* presents the WUGs that would utilize this strategy along with the implementation decade and the amount of water needed. Additional groundwater was only allocated as available under the MAG.

Table 5-64: Carrizo-Wilcox Aquifer Development

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Bastrop	Bastrop	Colorado	300	300	300	300	300	0
Mining	Bastrop	Guadalupe	0	0	466	466	466	466

This strategy was applied to the City of Bastrop and the Mining WUG in Bastrop County.

Cost Implications of Proposed Strategy

Table 5-65 presents a summary of the probable costs for each WUG utilizing this strategy. The four cost components analyzed during cost estimation of this strategy were: Total Construction Cost, Total Capital Cost, Annual Cost, and Unit Cost.

The costs of the groundwater supply strategies were estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool. For all these strategies, it was assumed that a new well field and transmission piping (including interconnecting well piping) was provided.

A peaking factor of two (2) was assumed (twice the largest quantity of water supplied). The number of new wells was determined in the Cost Estimating Tool, based on the largest quantity of water supplied over the planning period. Wells were all assumed to be the same type, size, at the same elevation, and to have an efficiency of 80%. The well field layout was determined by two wells per “node”, a 0.5 mile transmission line between each well and its node, and an additional 0.5 mile “trunk” line connecting to the next node.

A 5-mile transmission pipeline (with no pump station) was assumed. The transmission line was assumed to be one pipe, five miles long, with a diameter based on a velocity of 5 ft/s at peak flow.

Additional capital costs including engineering, legal services, contingencies, environmental and archeology studies and mitigation, land acquisition and surveying, and interest during construction were estimated using the Cost Estimating Tool. Annual costs including debt service, operation and maintenance, and pumping energy costs were also estimated using the tool.

Table 5-65: Carrizo-Wilcox Aquifer Development Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Bastrop	Bastrop	Colorado	$2,032,000	$2,976,000	$281,000	$937.00
Mining	Bastrop	Guadalupe	$2,340,000	$3,391,000	$321,000	$689.00

Environmental Considerations

The impacts to the environment from the additional yield being sought from the Carrizo-Wilcox aquifer area expected to be low. Impacts from construction of wells and pipelines should be limited primarily to the construction period as long as care is taken to avoid environmentally sensitive areas and provide proper restoration to the surface when complete. The water supply is within the Modeled Available Groundwater (MAG), so drawdown in the aquifer could be up to 237 feet. It is assumed that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

There are currently no irrigation WUGs with supplies of irrigation water or livestock water from the Carrizo-Wilcox Aquifer in Region K. This is not a source of choice, probably because of the depth of the aquifer. In addition, the terrain in Bastrop County is often not conducive to irrigated agriculture. Therefore, the impact on agriculture should be negligible.

5.2.4.2.2. Gulf Coast Aquifer

This alternative would involve developing a new well field to pump water from the Gulf Coast aquifer. A new well field will consist of acquisition of a site, new wells, 5 miles of transmission line, one-half mile segments of line between wells and nodes, and will assume that the WUG has the available storage capacity to store this additional water. *Table 5-66* presents the WUGs that would utilize this strategy along with the implementation decade and the amount of water needed. Additional groundwater was only allocated to meet each WUG's individual shortage.

Table 5-66: Gulf Coast Aquifer Development

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Steam-Electric	Wharton	Brazos-Colorado	0	0	0	0	200	200

This strategy was applied to the Steam-Electric WUG in Wharton County.

Cost Implications of Proposed Strategy

Table 5-67 presents a summary of the probable costs for the WUG utilizing this strategy. The four cost components analyzed during cost estimation of this strategy were: Total Construction Cost, Total Capital Cost, Annual Cost, and Unit Cost.

The costs of the groundwater supply strategies were estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool. For all these strategies, it was assumed that a new well field and transmission piping (interconnecting well piping) was provided.

A peaking factor of two (2) was assumed (twice the largest quantity of water supplied). The number of new wells was determined in the Cost Estimating Tool, based on the largest quantity of water supplied over the planning period. Wells were all assumed to be the same type, size, at the same elevation, and to have an efficiency of 80%. The well field layout was determined by two wells per "node", a 0.5 mile transmission line between each well and its node, and an additional 0.5 mile "trunk" line connecting to the next node.

A 5-mile transmission pipeline (with no pump station) was assumed. The transmission line was assumed to be one pipe, five miles long, with a diameter based on a velocity of 5 ft/s at peak flow.

Additional capital costs including engineering, legal services, contingencies, environmental and archeology studies and mitigation, land acquisition and surveying, and interest during construction were estimated using the Cost Estimating Tool. Annual costs including debt service, operation and maintenance, and pumping energy costs were also estimated using the tool.

Table 5-67: Gulf Coast Aquifer Development Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Steam-Electric	Wharton	Brazos-Colorado	$1,502,000	$2,237,000	$207,000	$1,035.00

Environmental Considerations

The impacts to the environment from the additional yield being sought from the Gulf Coast aquifer area expected to be negligible. Impacts from construction of wells and pipelines should be limited primarily to the construction period as long as care is taken to avoid environmentally sensitive areas and provide proper restoration to the surface when complete.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

Negligible impacts to agriculture are expected as a result of implementing this strategy.

5.2.4.2.3. Hickory Aquifer

This strategy would involve developing a new well field to pump water from the Hickory aquifer. A new well field will consist of acquisition of a site, new wells, 5 miles of transmission line, one-half mile segments of line between wells and nodes, and will assume that the WUG has the available storage capacity to store this additional water. *Table 5-68* presents the WUG that would utilize this strategy along with the implementation decade and the amount of water needed.

Table 5-68: Hickory Aquifer Development

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Llano	Llano	Colorado	200	200	200	200	200	200

Cost Implications of Proposed Strategy

Table 5-69 presents a summary of the probable costs for each WUG utilizing this strategy. The four cost components analyzed during cost estimation of this strategy were: Total Construction Cost, Total Capital Cost, Annual Cost, and Unit Cost.

The costs of the groundwater supply strategies were estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool. For all these strategies, it was assumed that a new well field and transmission piping (interconnecting well piping) was provided.

A peaking factor of two (2) was assumed (twice the largest quantity of water supplied). The number of new wells was determined in the Cost Estimating Tool, based on the largest quantity of water supplied over the planning period. Wells were all assumed to be the same type, size, at the same elevation, and to have an efficiency of 80%. The well field layout was determined by two wells per "node", a 0.5 mile transmission line between each well and its node, and an additional 0.5 mile "trunk" line connecting to the next node.

A 5-mile transmission pipeline (with no pump station) was assumed. The transmission line was assumed to be one pipe, five miles long, with a diameter based on a velocity of 5 ft/s at peak flow.

Additional capital costs including engineering, legal services, contingencies, environmental and archeology studies and mitigation, land acquisition and surveying, and interest during construction were estimated using the Cost Estimating Tool. Annual costs including debt service, operation and maintenance, and pumping energy costs were also estimated using the tool.

Table 5-69: Hickory Aquifer Development Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Llano	Llano	Colorado	$1,848,000.00	$2,743,000	$254,000	$1,270.00

Environmental Considerations

The additional pumping from the Hickory aquifer is within the available yield of the aquifer for all decades. The construction of well sites and pipelines is anticipated to have a low environmental impact primarily during the construction period, if proper precautions are taken to avoid environmentally sensitive areas. The water supply is within the Modeled Available Groundwater (MAG), so drawdown in the aquifer could be up to 7 feet. It is assumed that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

The location of this proposed strategy currently has no irrigation wells, so no impact to agriculture is expected.

5.2.4.2.4. Queen City Aquifer

This strategy would involve developing a new well field to pump water from the Queen City aquifer. A new well field will consist of acquisition of a site, new wells, 5 miles of transmission line, one-half mile segments of line between wells and nodes, and will assume that the WUG has the available storage capacity to store this additional water. *Table 5-70* presents the WUGs that would utilize this strategy along with the implementation decade and the amount of water needed.

Table 5-70: Queen City Aquifer Development

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Mining	Bastrop	Guadalupe	110	306	0	0	0	0
Smithville	Bastrop	Colorado	0	0	0	0	0	150

Cost Implications of Proposed Strategy

Table 5-71 presents a summary of the probable costs for the WUG utilizing this strategy. The four cost components analyzed during cost estimation of this strategy were: Total Construction Cost, Total Capital Cost, Annual Cost, and Unit Cost.

The costs of the groundwater supply strategies were estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool. For all these strategies, it was assumed that a new well field and transmission piping (interconnecting well piping) was provided.

A peaking factor of two (2) was assumed (twice the largest quantity of water supplied). The number of new wells was determined in the Cost Estimating Tool, based on the largest quantity of water supplied over the planning period. Wells were all assumed to be the same type, size, at the same elevation, and to have an efficiency of 80%. The well field layout was determined by two wells per “node”, a 0.5 mile transmission line between each well and its node, and an additional 0.5 mile “trunk” line connecting to the next node.

A 5-mile transmission pipeline (with no pump station) was assumed. The transmission line was assumed to be one pipe, five miles long, with a diameter based on a velocity of 5 ft/s at peak flow.

Additional capital costs including engineering, legal services, contingencies, environmental and archeology studies and mitigation, land acquisition and surveying, and interest during construction were estimated using the Cost Estimating Tool. Annual costs including debt service, operation and maintenance, and pumping energy costs were also estimated using the tool.

Table 5-71: Queen City Aquifer Development Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Mining	Bastrop	Guadalupe	$1,654,000	$2,446,000	$231,000	$755.00
Smithville	Bastrop	Colorado	$1,776,000	$2,620,000	$241,000	$1,607.00

Environmental Considerations

The additional pumping from the Queen City aquifer is within the available yield of the aquifer for all decades. The construction of well sites and pipelines is anticipated to have a low environmental impact primarily during the construction period, if proper precautions are taken to avoid environmentally sensitive areas. The water supply is within the Modeled Available Groundwater (MAG), so drawdown in the aquifer could be up to 13 feet. It is assumed that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

Negligible impacts to agriculture are expected as a result of implementing this strategy.

5.2.4.2.5. Trinity Aquifer

This strategy would involve developing a new well field to pump water from the Trinity aquifer. A new well field will consist of acquisition of a site, new wells, 5 miles of transmission line, one-half mile segments of line between wells and nodes, and will assume that the WUG has the available storage capacity to store this additional water. *Table 5-72* presents the WUGs that would utilize this strategy along with the implementation decade and the amount of water needed.

Table 5-72: Trinity Aquifer Development

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Sunset Valley	Travis	Colorado	0	0	200	200	200	200

Cost Implications of Proposed Strategy

Table 5-73 presents a summary of the probable costs for the WUG utilizing this strategy. The four cost components analyzed during cost estimation of this strategy were: Total Construction Cost, Total Capital Cost, Annual Cost, and Unit Cost.

The costs of the groundwater supply strategies were estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool. For all these strategies, it was assumed that a new well field and transmission piping (interconnecting well piping) was provided.

A peaking factor of two (2) was assumed (twice the largest quantity of water supplied). The number of new wells was determined in the Cost Estimating Tool, based on the largest quantity of water supplied over the planning period. Wells were all assumed to be the same type, size, at the same elevation, and to have an efficiency of 80%. The well field layout was determined by two wells per "node", a 0.5 mile transmission line between each well and its node, and an additional 0.5 mile "trunk" line connecting to the next node.

A 5-mile transmission pipeline (with no pump station) was assumed. The transmission line was assumed to be one pipe, five miles long, with a diameter based on a velocity of 5 ft/s at peak flow.

Additional capital costs including engineering, legal services, contingencies, environmental and archeology studies and mitigation, land acquisition and surveying, and interest during construction were estimated using the Cost Estimating Tool. Annual costs including debt service, operation and maintenance, and pumping energy costs were also estimated using the tool.

Table 5-73: Trinity Aquifer Development Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Sunset Valley	Travis	Colorado	$1,464,000	$2,228,000	$207,000	$1,035.00

Environmental Considerations

As noted during the section on expansion of groundwater, this aquifer was modeled to maintain 90 percent of springflow with no pumping during the critical period of the drought of record. If that level is sufficiently protective of local species, then environmental impacts are expected to be low. Impacts from construction of well sites and pipelines are also expected to be negligible, and confined primarily to the construction period. In Travis County, water supply within the MAG could cause drawdown of up to 124 feet, depending on the formation. It is assumed that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

This area of the aquifer has limited agricultural activity associated with it. As such, impacts to agriculture should be negligible.

5.2.4.3 Groundwater Importation

The strategies discussed in this section bring groundwater into Region K from outside of the region. These strategies have been requested for inclusion in both the Region K Plan and the South Central Texas (Region L) Plan. Coordination with Region L has occurred on the strategies in this section.

5.2.4.3.1. Hays County Pipeline

This strategy encompasses two regions, Region K and Region L. It involves bringing water from a delivery point near the Kyle area to Western Hays County. It is not itself a source of supply, but rather provides the infrastructure required to import potential water supplies from multiple areas around Central Texas.

The Region L portion of this strategy includes a pipeline capable of conveying up to 15,000 acre-feet per year from multiple potential sources to Wimberley. The Region K portion of this strategy would upsize this pipeline to allow conveyance of an additional 4,000 acre-feet per year, or 19,000 acre-feet/year total. It would also add an additional pipeline capable of conveying the 4,000 acre-feet per year from a point to be determined between Kyle and Wimberley to Dripping Springs. This strategy for Region K assumes the 4,000 acre-feet/year of water is from the Carrizo-Wilcox aquifer in Gonzales County.

The table below shows the projected use for only the Region K water user groups.

Table 5-74: Hays County Pipeline Water Supplies

WUG Name	County	River Basin	Importing From			Water Management Strategies (ac-ft/yr)					
			Region	County	Aquifer	2020	2030	2040	2050	2060	2070
County-Other	Hays	Colorado	L	Gonzales	Carrizo-Wilcox	0	2,000	2,000	2,000	2,000	2,000
Dripping Springs WSC	Hays	Colorado	L	Gonzales	Carrizo-Wilcox	0	1,000	1,000	1,000	1,000	1,000
West Travis County PUA	Hays	Colorado	L	Gonzales	Carrizo-Wilcox	0	1,000	1,000	1,000	1,000	1,000

Cost Implications of Proposed Strategy

The table below shows the estimated costs for this strategy. Only the additional costs required for the Region K portion of the strategy are shown. The Region L costs are shown in the separate 2016 South Central Texas Regional Water Plan.

Table 5-75: Hays County Pipeline Costs for Region K

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
County-Other	Hays	Colorado	$8,159,500	$11,739,500	$1,416,000	$708.00
Dripping Springs WSC	Hays	Colorado	$4,079,750	$5,869,750	$708,000	$708.00
West Travis County PUA	Hays	Colorado	$4,079,750	$5,869,750	$708,000	$708.00

Environmental and Other Considerations

The environmental impacts of the construction should be able to be minimized, as long as care is taken to avoid environmentally sensitive areas and provide proper restoration to the surface when complete. There are local groups who have voiced concerns with this proposed strategy, so communication with the public may be key in the development of this project. Water supply is within the MAG. It is assumed that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.

Refer to the 2016 South Central Texas Regional Water Plan, Region L, for any impacts associated with the Region L portion of the strategy.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

Negligible impacts are anticipated on agriculture and natural resources. Refer to the 2016 South Central Texas Regional Water Plan for any impacts associated with the Region L portion of the strategy.

5.2.4.3.2. HCPUA Pipeline

This strategy involves the withdrawal and transport of groundwater from the Carrizo-Wilcox aquifer in Gonzales County to the I-35 Corridor area near San Marcos, Kyle and Buda. This is primarily a Region L strategy, but a large portion of Buda is within Region K. The infrastructure required to implement this strategy includes:

- New well fields in Caldwell and Gonzales Counties.
- New treatment facilities near the new well fields.
- New pump stations and pipelines to convey the water to a delivery point near the Hays-Caldwell county line, approximately 5 miles northeast of San Marcos.

The following table below lists the projected water use of this strategy.

Table 5-76: HCPUA Pipeline Water Supplies for Region K

WUG Name	County	River Basin	Importing From			Water Management Strategies (ac-ft/yr)					
			Region	County	Aquifer	2020	2030	2040	2050	2060	2070
Buda	Hays	Colorado	L	Gonzales	Carrizo-Wilcox	0	667	1,690	2,467	2,467	2,467

Detailed information on this strategy, including Region L water user groups and yields, are included in the 2016 South Central Texas Regional Water Plan.

Cost Implications of Proposed Strategy

The following table below describes the estimated costs for this strategy. The costs identified are Buda's portion of the overall project cost.

Table 5-77: HCPUA Pipeline Costs for Region K

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Buda	Hays	Colorado	$22,423,790	$34,996,869	$4,751,402	$1,926.00

More detailed cost information for this strategy is included in the 2016 South Central Texas Regional Water Plan.

Environmental Considerations

Water supply is within the MAG. It is assumed that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored. There are also several rare species that are located in the vicinity of the project. Of these, the only one that is protected by USFWS or TPWD is the Cagle's map turtle.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

Negligible impacts are anticipated on agriculture and natural resources.

5.2.4.4 Aquifer Storage and Recovery

5.2.4.4.1. BS/EACD –Edwards/Middle Trinity ASR

The basic definition of aquifer storage and recovery (ASR) is the storage of water in a suitable aquifer during times of excess water supply, and the recovery of the water from the same aquifer during times of greater water demand. Water is injected and removed from the aquifer through wells. ASR has the benefit of underground storage, so there is no evaporation, and dedicated storage tanks or reservoirs do not have to be built. There are also fewer environmental issues compared to surface storage because it does not change the surface of the land. This type of strategy is currently being used by cities in Texas including San Antonio, Kerrville and El Paso.

One of the key challenges of this strategy is that it requires an aquifer with suitable storage characteristics, which is not currently being utilized by another entity. Preferably, the aquifer should be located close to the water source for injection into the aquifer and close to the distribution system once removed from the aquifer.

The proposed aquifer for this strategy by the Barton Springs/Edwards Aquifer Conservation District (BS/EACD) is the Middle Trinity aquifer. This aquifer overlaps with the Edwards aquifer and is located deeper.

The proposed source of water for this strategy is the Edwards (Balcones Fault Zone, or BFZ) aquifer. Water would be drawn only during non-drought years.

The potential users identified to date for this water include the City of Buda, small rural users in Hays County, mining industrial use in Hays County, and residential users in Sunset Valley and Mountain City.

The infrastructure required to implement this strategy includes:

- New extraction wells, to extract the water from the Edwards aquifer.
- New treatment facilities to treat the water to standards suitable for injection into the Middle Trinity aquifer. A minimal level of treatment is assumed, as the extracted groundwater should be relatively clean.
- New injection wells, to inject the water into the Middle Trinity aquifer. Since the Middle Trinity aquifer overlaps with the Edwards aquifer, it is assumed that the wells extracting from Edwards and the wells injecting into Middle Trinity can be located in close proximity. Thus, no intermediate pump stations or pipelines are assumed.
- New extraction wells, to extract the water from Middle Trinity for use.
- New transmission pump stations and pipelines to convey the water to the points of use. It is assumed that 1 mile of pipeline is sufficient to convey the water into the existing distribution system, for the various water users. Costs would be higher or lower, depending on actual distance.

Other requirements for this strategy include an extensive aquifer study for the identified aquifer to determine feasibility and implementation requirements. The land required for the aquifer storage and recovery wells would also have to be purchased.

The yield from this strategy is projected to be 1,144 acre-feet/year. This includes 600 acre-feet per year for the City of Buda, 200 for Hays County rural users, 100 for mining, 200 for Sunset Valley, and 44 for

Mountain City (Region L). The water use for each is projected to start in the 2030 planning decade. The table below shows the yields by decade for this strategy.

Table 5-78: Edwards / Middle Trinity ASR Project Yields

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Buda	Hays	Colorado	0	600	600	600	600	600
County-Other	Hays	Colorado	0	200	200	200	200	200
Mining	Hays	Colorado	0	100	100	100	100	100
Mountain City	Hays (L)	Guadalupe	0	44	44	44	44	44
Sunset Valley	Travis	Colorado	0	200	200	200	200	200

Cost Implications of Proposed Strategy

Costs for this strategy were developed based on background information provided by BS/EACD, and the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars.

The table below shows the estimated costs for this strategy.

Table 5-79: Edwards / Middle Trinity ASR Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Buda	Hays	Colorado	$4,840,909	$6,818,182	$734,266	$1,291.00
County-Other	Hays	Colorado	$1,613,636	$2,272,727	$244,755	$1,291.00
Mining	Hays	Colorado	$806,818	$1,136,364	$122,378	$1,291.00
Mountain City	Hays (L)	Guadalupe	$355,000	$500,000	$53,846	$1,291.00
Sunset Valley	Travis	Colorado	$1,613,636	$2,272,727	$244,755	$1,291.00

Environmental Considerations

While environmental considerations for underground storage are less than that for surface storage, extensive permitting will still be required to ensure the facility complies with all environmental considerations. This includes an aquifer study to determine the impact of the strategy on the proposed storage aquifer. During average rainfall, the strategy may decrease springflow by removing up to an additional 1,140 ac-ft/yr for storage. There should be negligible impacts during drought periods.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

Negligible impacts to agriculture or natural resources are expected as a result of implementing this strategy. It is possible that agricultural users will benefit from increased water availability during times of drought, but this depends on whether there will be any agricultural users of this water source.

5.2.4.4.2. BS/EACD – Saline Edwards ASR

The basic definition of aquifer storage and recovery (ASR) is the storage of water in a suitable aquifer during times of excess water supply, and the recovery of the water from the same aquifer during times of greater water demand. Water is injected and removed from the aquifer through wells. ASR has the benefit of underground storage, so there is no evaporation, and dedicated storage tanks or reservoirs do not have to be built. There are also fewer environmental issues compared to surface storage because it does not change the surface of the land. This type of strategy is currently being used by cities in Texas including San Antonio, Kerrville and El Paso.

One of the key challenges of this strategy is that it requires an aquifer with suitable storage characteristics, which is not currently being utilized by another entity. Preferably, the aquifer should be located close to the water source for injection into the aquifer and close to the distribution system once removed from the aquifer.

The proposed aquifer for this strategy by the Barton Springs/Edwards Aquifer Conservation District (BS/EACD) is the saline portion of the Edwards (BFZ) aquifer. This portion of the aquifer is more suited for storage, as it has lower transmission rates and much higher residence times than the freshwater portion. This is a benefit for storage; however, it also results in the water staying in contact with limestone longer, dissolving mineral solids and increasing in salinity. Depending on the length of storage time, when extracted, the water may need to be treated through desalination.

There are multiple potential sources for the water for this strategy, including freshwater Edwards aquifer wells, desalinated water, or municipal supply. Depending on the water source, the water may have to be treated prior to injection as well. For the purposes of this report, the water source is assumed to be groundwater from the freshwater Edwards aquifer. Since the stored water may need to be desalinated, to increase the yield of the project, it is assumed that additional wells would pump water directly from the Saline Zone. Blending the saline water with the ASR water would reduce the salinity and decrease treatment costs.

The potential users identified to date for this water include the City of Buda, small rural users in Hays County, and residential users through the Creedmoor-Maha Water Supply Corporation.

The infrastructure required to implement this strategy includes:

- Depending on what is used as the water source, new treatment facilities to treat the water to standards suitable for injection.
- New transmission pump stations and pipelines to transport the water from the source to the injection location. The injection and extraction location is assumed to be the Texas Disposal Systems site in Creedmoor, TX. The source is assumed to be in the vicinity of northeast Buda, near the boundary of the freshwater and saline zones of the Edwards aquifer. The pipeline between the source and injection location is assumed to be 5 miles long.
- New injection wells, to inject the water into the saline zone of the Edwards aquifer.
- New extraction wells, to extract the water from the saline zone for use.
- New desalination treatment facilities to treat the water once extracted. It is assumed that the water will be brackish groundwater.
- New transmission pump stations and pipelines to convey the water to the points of use. It is assumed that 1 mile of pipeline is sufficient to convey the water into the existing distribution system, for the various water users.

Other requirements for this strategy include an aquifer study for the identified aquifer to determine feasibility and implementation requirements. The land required for the aquifer storage and recovery wells would also have to be purchased.

The yield from this strategy is projected to be 1,000 acre-feet per year. This includes 500 acre-feet per year for the City of Buda, 200 for Hays County rural users, and 300 for the Creedmoor-Maha WSC. The water use for each is projected to start in the 2030 planning decade. Of the total yield of 1,000 acre-feet per year, 301 is projected to come from the freshwater Edwards aquifer and 699 from the saline zone. The table below shows the projected yields by decade for this strategy.

Table 5-80: Saline Edwards ASR Project Yields

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Buda	Hays	Colorado	0	500	500	500	500	500
County-Other	Hays	Colorado	0	200	200	200	200	200
Creedmoor-Maha WSC	Travis	Colorado	0	300	300	300	300	300

Cost Implications of Proposed Strategy

Costs for this strategy were developed based on background information provided by BS/EACD, and the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars.

The table below shows the estimated costs for this strategy.

Table 5-81: Saline Edwards ASR Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Buda	Hays	Colorado	$5,350,000	$7,500,000	$1,015,000	$2,031.00
County-Other	Hays	Colorado	$2,140,000	$3,000,000	$406,000	$2,031.00
Creedmoor-Maha WSC	Travis	Colorado	$3,210,000	$4,500,000	$609,000	$2,031.00

Environmental Considerations

While environmental considerations for underground storage is less than that for surface storage, extensive permitting will still be required to ensure the facility complies with all environmental considerations. This includes an aquifer study to determine the impact of the strategy on the proposed storage aquifer. It also includes consideration of environmental impacts of disposal of the brine generated by the desalination treatment process.

Using up to 700 AFY of water from the Saline Zone may allow the same volume to remain in the freshwater zone during drier times. During average rainfall, may decrease springflow by removing an additional 300 ac-ft/yr for storage. There should be negligible impacts during drought periods.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

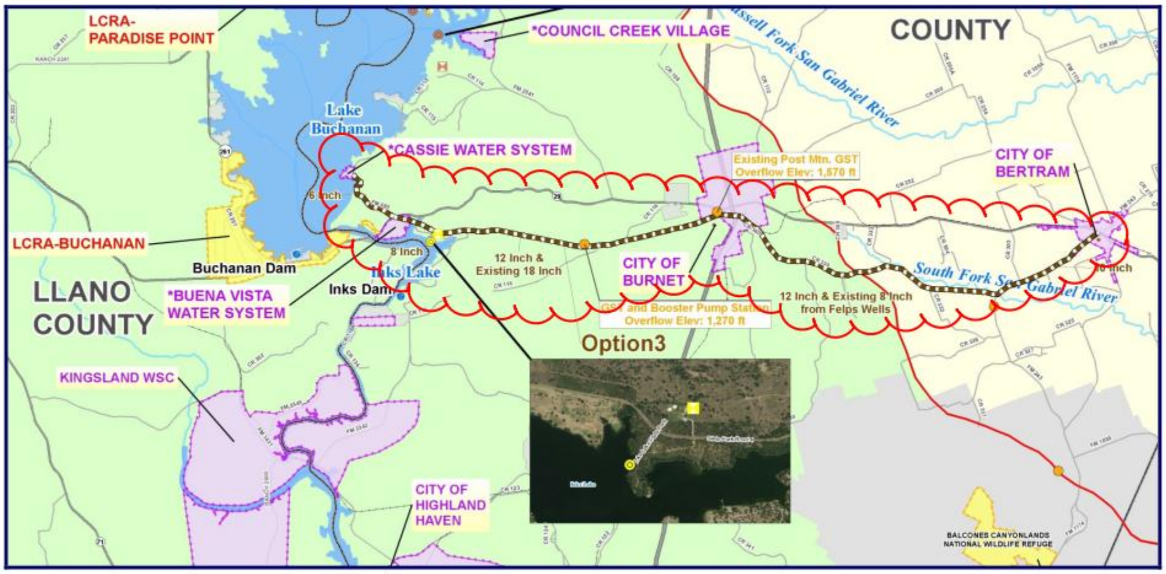
Negligible impacts to agriculture or natural resources are expected as a result of implementing this strategy. It is possible that agricultural users will benefit from increased water availability during times of drought, but this depends on whether there will be any agricultural users of this water source.

5.2.4.5 Burnet County Regional Projects

5.2.4.5.1. Buena Vista[5]

The Buena Vista Regional Project would serve the Cities of Burnet and Bertram and the Cassie and Buena Vista subdivisions as shown below in *Figure 5.1*.

Figure 5.1 Buena Vista Regional Water Project Location



Currently, the City of Burnet gets its water from Inks Lake via a raw water intake (RWI), water treatment plant (WTP), and 18-inch transmission main. The City of Bertram obtains it water from four (4) groundwater wells in the Felps Well field with additional backup supply of groundwater wells pulling from the Trinity aquifer. The Cassie subdivision has a small water system supplied by two wells and supplemented by private wells of homeowners. The Buena Vista Water System has a fixed RWI on Inks Lake and small treatment facilities serving a gravity distribution system. Between these systems water reliability, quality, and pressure requirements within the system are all concerns. Additionally, future demand exceeds current capacity provided by the existing systems. Thus, possible benefits could be achieved by converting to a regional water system as discussed below.

The following table shows the yields for this strategy.

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[5] *Source: Roth, S. (2011). North Option 3: Burnet, Bertram, Buena Vista, and Cassie. In Burnet-Llano County Regional Facility Study (pp. 72-74).*

Table 5-82: Buena Vista Regional Project Yields

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Bertram	Burnet	Brazos	500	884	884	884	884	884
Burnet	Burnet	Colorado	1,000	2,000	2,000	2,000	2,000	2,000
County-Other	Burnet	Brazos	500	1,000	1,000	1,000	1,000	1,000
County-Other	Burnet	Colorado	500	1,000	1,000	1,000	1,000	1,000

The City of Bertram and a portion of County-Other is located in the Brazos River basin and because the water supplied by the Buena Vista Regional Project is coming from Lake Buchanan in the Colorado River basin, the project will require an interbasin transfer permit (IBT) under Texas Water Code 11.085. However, many provisions of 11.085, including 11.085(k), which requires an analysis of the water needs in the basin of origin and the receiving basin, will not apply to an IBT permit for this project. TWC 11.085(v)(4) stipulates that projects transferring water from one river basin to another, but within a single county, must obtain authorization for the interbasin transfer, but that only TWC 11.085(a) applies. Because City of Bertram and County-Other are in Burnet County, which is also the location of the water supply, the exemption provided by TWC 11.085(v)(4) applies.

Proposed Water Supply Infrastructure and Capacity

For the proposed Buena Vista Regional Project, the City of Burnet's existing RWI, WTP, and 18-inch transmission main would remain in place and serve as the core of the regional water system. The RWI, WTP and associated high service pump station (HSPS) firm capacities would all be expanded to 5,130 ac-ft/yr (4.58 MGD) by the year 2015 to meet the added demand of the other entities.

Over time, the RWI, WTP, and HSPS will each be expanded incrementally, reaching an ultimate firm capacity of 9,766 ac-ft/yr (8.72 MGD) in the year 2040. This includes a peaking factor of two on the yields shown in the table above.

In 2015, new transmission mains (8-inch for Buena Vista; 6-inch extension for Cassie) would be extended west and northwest from the WTP to serve the Buena Vista and Cassie Subdivision areas. Additionally, an 18-inch raw water pipeline sized to meet the year 2040 water demands will be installed alongside the existing 16-inch raw water line that runs from the RWI to the WTP. The flow within the existing 18-inch potable water transmission line would also need to be increased, requiring the construction of a 200,000 gallon ground storage tank and booster pump about 3.1 miles east of the existing WTP.

The City of Bertram would maintain the Felps well field with an approximate capacity 1,048 ac-ft/yr (0.94 MGD) but would need to meet future water demands with treated surface water from the City of Burnet system. Current estimates project that the City of Bertram demand will exceed this capacity by 2019. At that time, a new regional transmission main (10-12 inches) that run from the City of Burnet to Bertram would be constructed. Treated surface water from the existing plant could then be delivered to Bertram via excess capacity in the City of Burnet's existing 18-inch transmission main that runs from the WTP to Burnet and then flow by gravity from Burnet to Bertram via the proposed 10-inch and 12-inch regional transmission main, assuming the City of Burnet would be in favor of using its existing Post Mountain tanks to balance the system.

It is estimated that the combined water demand of Burnet and Bertram will exceed the capacity provided via the 18-inch line, booster pump, and storage tank in the year 2034. When this occurs, a new 12-inch transmission main would be constructed along the route of the existing 18-inch transmission main from the WTP to the City of Burnet to supplement its capacity. The new transmission main would be tied into the intermediate storage tank and booster pump station.

Cost Implications of Proposed Strategy

Costs for this strategy were developed using the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars.

The table below shows the estimated costs for this strategy.

Table 5-83: Buena Vista Regional Project Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Bertram	Burnet	Brazos	$3,176,843	$4,523,170	$707,707	$800.57
Burnet	Burnet	Colorado	$7,187,428	$10,233,415	$1,601,147	$800.57
County-Other	Burnet	Brazos	$3,593,714	$5,116,708	$800,573	$800.57
County-Other	Burnet	Colorado	$3,593,714	$5,116,708	$800,573	$800.57

Note that there is an additional $151 per acre-foot required for water purchase that is not included in the annual and unit costs above. This cost is captured in the additional LCRA contracts section of this report.

Environmental and Agricultural Considerations

This project covers several miles. This project could remove up to 5,000 ac-ft/yr of water from the Highland Lakes, with no return flows. Impacts from construction of intakes, treatment plants, and pipelines should be limited primarily to the construction period as long as care is taken to avoid environmentally sensitive areas and provide proper restoration to the surface when complete.

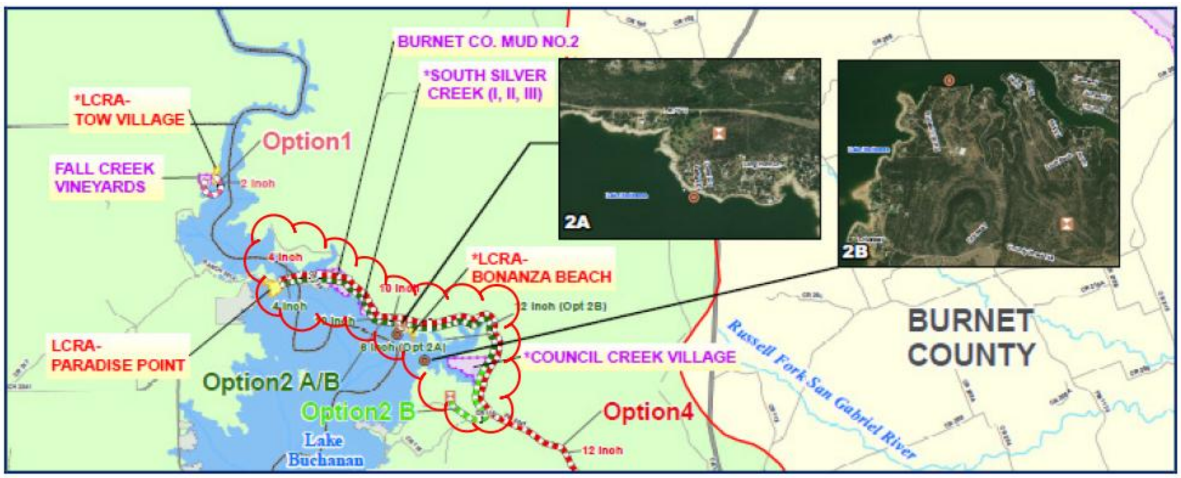
Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Impacts to agriculture should be relatively limited. Up to 5,000 ac-ft/yr would be removed from the Highland Lakes. As firm municipal and industrial demands increase in the future, less interruptible water will be available to meet downstream agriculture demands.

5.2.4.5.2. East Lake Buchanan[6]

A portion of the water user group (WUG) defined as County-Other in Burnet County currently receives their water from multiple groundwater sources. This water supply is unreliable and contaminated with radionuclides. To help alleviate concerns of water reliability and quality, Burnet County has proposed the East Lake Buchanan Project, a water supply system for the surrounding region. The project consists of replacing the existing groundwater sources with a new surface water supply. A new raw water intake would pump to a regional water treatment plant located near Bonanza Beach, along the northeast side of Lake Buchanan, as shown below in *Figure 5.2*. This location was chosen because it is a relatively undeveloped part of the lake's eastern shore that offers access to an even deeper part of the lake. A proposed high service pump station and transmission mains would deliver water south to Council Creek Village and north to the other participants in this area.

Figure 5.2 East Lake Buchanan Regional Project Location



The following table shows the yield for this strategy.

Table 5-84: East Lake Buchanan Project Yield

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
County-Other	Burnet	Colorado	935	935	935	935	935	935

Proposed Water Supply Infrastructure and Capacity

Based on the LCRA Lake Buchanan bathometry map, the lowest contour near the proposed intake structure location is 950 ft-MSL, which is 33.7 feet below the historical low water surface elevation for

6 *Source: Roth, S. (2011). North Option 2A: NE Buchanan Regional Alternative (Intake near Bonanza Beach). In Burnet-Llano County Regional Facility Study (pp. 71-72).*

the lake. The raw water intake and pump station are planned to have a firm capacity of 997 ac-ft/yr (0.89 MGD) in the year 2015. Both will subsequently be expanded to reach a capacity of 1,871 ac-ft/yr (1.67 MGD) by the year 2040 to meet increased demand in the area. This includes a peaking factor of two on the yield shown in the table above.

A 10-inch raw water pipeline will be used to transport pumped raw water from the intake to the water treatment plant. This 10-inch line will be sized to meet the demands of 1,871 ac-ft/yr expected for the year 2040. This includes a peaking factor of two on the yield shown in the table above.

A high service pump station will be constructed, initially with a capacity of 997 ac-ft/yr, at the water treatment plant to pump finished water from the water treatment plant to the regional transmission main and then to the participating distribution systems. This high service pump station will later be expanded to reach a capacity of 1,871 ac-ft/yr. This includes a peaking factor of two on the yield shown in the table above.

A 12-inch regional transmission main will be constructed east along an easement to FM 2341 at the southern edge of Council Creek Village. The 12-inch main will extend to the delivery point to Council Creek Village, where it would be reduced to a 10-inch transmission main extending northwest along FM 2341 to Bonanza Beach, South Silver Creek (I, II and III), and Burnet County MUD No. 2 with a branch to other northeast Lake Buchanan developments. An extension would provide treated water to Paradise Point via a 4-inch underwater crossing of Lake Buchanan. The regional transmission mains would deliver water to each participant’s existing distribution system or into their existing water storage tanks. A 50,000 gallon regional storage tank is also recommended to maintain system pressure and improve pump operating conditions at the high service pump station.

Cost Implications of Proposed Strategy

Costs for this strategy were developed using the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars.

The table below shows the estimated costs for this strategy.

Table 5-85: East Lake Buchanan Regional Project Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
County-Other	Burnet	Colorado	$7,103,600	$10,337,000	$1,612,000	$1,724.06

Note that there is an additional $151 per acre-foot required for water purchase that is not included in the annual and unit costs above. This cost is captured in the additional LCRA contracts section of this report.

Environmental and Agricultural Considerations

This project covers several miles. This project could remove up to 935 ac-ft/yr of water from the Highland Lakes, with no return flows. Impacts from construction of intakes, treatment plants, and pipelines should be limited primarily to the construction period as long as care is taken to avoid environmentally sensitive areas and provide proper restoration to the surface when complete.

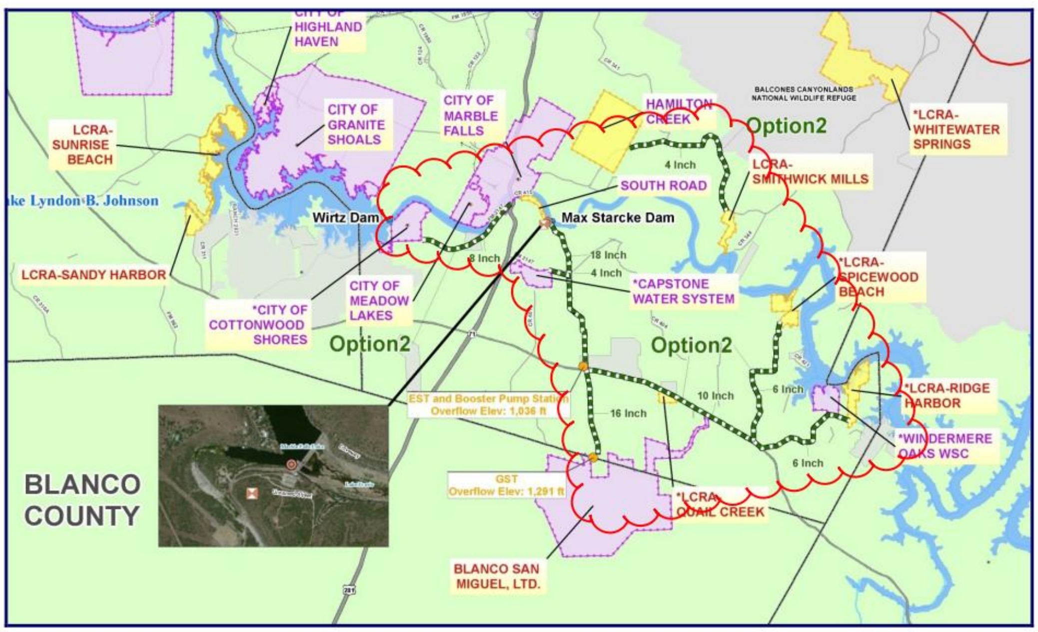
Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Impacts to agriculture should be relatively limited. Up to 935 ac-ft/yr would be removed from the Highland Lakes. As firm municipal and industrial demands increase in the future, less interruptible water will be available to meet downstream agriculture demands.

5.2.4.5.3. Marble Falls[7]

The Marble Falls Regional Water System would serve the City of Marble Falls and surrounding areas including the City of Cottonwood Shores, and County-Other entities, including Blanco San Miguel, Capstone Water System, Quail Creek Water System, Windermere Oaks WSC, Ridge Harbor Water System, Spicewood Beach Water System, and Smithwick Mills Water System. This regional system has been proposed to address water reliability issues in several of these communities and to serve future development needs along Highway 281 and Highway 71. The system would also provide interconnects for either permanent or emergency water needs throughout the service area, which is shown in *Figure 5.3* below.

Figure 5.3 Marble Falls Regional Project Location



The following table shows the yields for this strategy.

[7] *Source: Roth, S. (2011). South Option 2: Southeast Burnet County Regional System. In Burnet-Llano County Regional Facility Study (pp. 76-78).*

Table 5-86: Marble Falls Regional Project Yields

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Cottonwood Shores	Burnet	Colorado	376	700	700	700	700	700
County-Other	Burnet	Colorado	300	878	878	878	878	878
Marble Falls	Burnet	Colorado	500	4,000	4,000	4,000	4,000	4,000

Proposed Water Supply Infrastructure and Capacity

The Marble Falls Regional Water Supply System would keep the City of Marble Falls' existing 4,257 ac-ft/yr (3.80 MGD) raw water pump station (RWPS) and water treatment plant (WTP) in service. However, a new raw water intake (RWI) and pump station and WTP would be constructed upstream of Max Starcke Dam. A high service pump station (HSPS) would also be constructed at the WTP to pump finished potable water out into the transmission system. The regional plan also includes the incorporation of existing and addition of new transmission lines to serve the City of Cottonwood Shores and future County-Other Burnet community developments along Highways 71 and 281. Two new storage tanks (one ground, one elevated) and a booster pump station out in the transmission system are also planned.

The new RWI, RWPS, WTP, and HSPS are planned to be built in 2015 and will be expanded incrementally to its ultimate capacity based on the projected demand in 2040. The raw water and transmission pipelines will be installed in 2015, but the capacity will be based on the anticipated flow rates of 2040.

The pump stations and plant would be installed to a firm capacity of 2,352 ac-ft/yr (2.10 MGD) in 2015, and have a planned ultimate firm capacity of 11,155 ac-ft/yr (9.96 MGD) in 2040. The suggested expansions within this strategy will take place between the years 2015 and 2035.

As mentioned previously, the Marble Falls Regional Water System also involves the addition of the several transmission mains. An 18" main would need to be constructed that runs from the proposed WTP located at Max Starcke Dam to a new elevated storage tank (EST) and booster pump station located at Highway 71. At Highway 71, the main transitions into a 16" line that runs to a proposed ground storage tank (GST) at the Blanco/Burnet county line for water to serve Blanco San Miguel. Blanco San Miguel would be responsible for building their own pump station at the GST.

Additionally, a new 10" line would be built starting at the EST and booster pump station at Highway 71 and heading 2.6 miles southeast to Quail Creek and another 2.7 miles to the Spicewood Turnoff. At this point one 6-inch water transmission main would extend to Windermere Oaks WSC and another 6-inch water main extends to Spicewood Beach. Furthermore, a proposed 8" transmission main that extends 3.1 miles from the intersection of Highway C415 and Highway 71 southeast to the City of Cottonwood Shores would need to be built. Finally, a 4" main is needed that originates in Hamilton Creek and extends 5.1 miles northwest to LCRA Smithwick Mills.

Cost Implications of Proposed Strategy

Costs for this strategy were developed using the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars.

The table below shows the estimated costs for this strategy.

Table 5-87: Marble Falls Regional Project Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Cottonwood Shores	Burnet	Colorado	$4,312,944	$6,099,086	$956,508	$1,366.00
County-Other	Burnet	Colorado	$5,409,664	$7,649,996	$1,199,734	$1,366.00
Marble Falls	Burnet	Colorado	$24,645,393	$34,851,918	$5,465,758	$1,366.00

Environmental and Agricultural Considerations

This project covers several miles. This project could remove up to 5,600 ac-ft/yr of water from the Highland Lakes, with no return flows. Impacts from construction of intakes, treatment plants, and pipelines should be limited primarily to the construction period as long as care is taken to avoid environmentally sensitive areas and provide proper restoration to the surface when complete.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Impacts to agriculture should be relatively limited. Up to 5,600 ac-ft/yr would be removed from the Highland Lakes. As firm municipal and industrial demands increase in the future, less interruptible water will be available to meet downstream agriculture demands.

5.2.4.6 Water Purchase

This strategy acknowledges that certain WUGs in the region purchase water from water providers other than the two Wholesale Water Providers in Region K. It is likely that these WUGs will purchase additional water as population and demands increase over time.

Table 5-88 lists the WUGs that will implement this strategy, along with the volume of water needed and the entity supplying the water. The assumption used for this strategy is that the water is sold at retail cost, so there is no additional cost to the WUG. No capital costs are associated with this strategy.

There are no environmental, agricultural, or natural resource impacts associated with this strategy.

Table 5-88: Water Purchase Strategy Suppliers and Yields

WUG Name	County	River Basin	Supplier	Water Management Strategies (ac-ft/yr)					
				2020	2030	2040	2050	2060	2070
Dripping Springs	Hays	Colorado	Dripping Springs WSC	0	31	104	198	307	432
Goforth SUD	Hays	Colorado	GBRA	0	0	0	0	0	46
Goforth SUD	Travis	Colorado	GBRA	0	0	0	0	0	2
Mining	Hays	Colorado	Buda (Reuse)	0	0	500	500	500	500
Bee Cave Village	Travis	Colorado	West Travis County PUA	300	300	600	600	800	800
Lakeway	Travis	Colorado	Travis County WCID #17	1,000	1,000	1,000	1,000	1,000	1,000
Manor	Travis	Colorado	Manville WSC	0	0	0	1,000	1,000	1,000

5.2.4.7 Brush Control

The following is a condensed version of the draft "Brush Control as a Water Management Strategy" prepared by HDR for Region G Planning Group and proposed for inclusion in Region K.

Introduction

Brush control is a potential water management strategy that could possibly create additional water supply in Texas. The Texas Brush Control Program, created in 1985 and operated by the Texas State Soil and Water Conservation Board (TSSWCB), served to study and implement brush control programs until September 2011. HB1808 established a new program in 2012, the Water Supply Enhancement Program (WSEP), with the purpose and intent of increasing available surface and ground water supplies through the selective control of brush species detrimental to water conservation.

The TSSWCB collaborates with soil water conservation districts and other local, regional, state, and federal agencies to identify watersheds across the state where it is feasible to implement brush control in order to enhance water supplies. The TSSWCB uses a competitive grant process to rank feasible projects and allocate WSEP grant funds, giving priority to projects that balance the most critical water conservation need of municipal water user groups with the highest projected water yield from brush control.

Brush control for water supply enhancement is addressed differently by the 16 Regional Water Planning Groups (RWPG). It typically is described as, alternatively, brush control, brush management, land stewardship, or range management. Brush control is a possible recommended or alternative Water Management Strategy which may have a quantified yield or a zero yield; the 2012 State Water Plan identifies only 2 regions (Regions F and J) where it is a recommended strategy with a corresponding entry in the TWDB water planning database.

In prioritizing projects for funding, brush control for water supply enhancement must be viewed favorably by the RWPG where the proposed project is located. “Viewed favorably” is distinguished 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).

Brush Control Implementation

Brush control is a land management practice that converts land that is covered with brush (such as juniper, mesquite, and saltcedar) to grasslands. The impact of these practices can increase water availability through reduced extraction of soil water for transpiration and increased recharge to shallow groundwater and emergent springs. To a lesser extent, there is the potential for increased runoff during rainfall events (Brush Control and Range Management: 2011 Brazos G Regional Water Plan).

Grazing management is very important following any type of upland brush control to allow the desirable forages to exert competition with the brush plants and to maintain good herbaceous groundcover, which hinders establishment of woody plant seedlings. Continued maintenance of brush is necessary to ensure the benefits of this potential strategy.

Target species are those noxious brush species that consume water to a degree that is detrimental to water conservation (i.e., phreatophytes).

Eligible Species:

- mesquite (Prosopis spp.)
- juniper (Juniperus spp.)
- saltcedar (Tamarix spp.)

Other species of interest conditionally eligible:

- huisache (Acacia smallii)
- Carrizo cane (Arundo donax)

The following methods of brush control are commonly practiced in Texas and have shown to have effective results.

Mechanical Brush Control

A wide variety of mechanical brush control methods are available. The simplest is selective brush control with a hand axe and chain saw. Grubbing and piling is frequently done with a bulldozer. This may be either clear-cut or selective.

Moderate to heavy mesquite or cedar can be grubbed (bulldozer with a 3-foot-wide grubbing attachment) or root plowed for $110 to $185/acre. Two-way chaining can be effective on moderate to heavy cedar, but it often just breaks off mesquite and they re- sprout profusely from the bud zones below ground. Using hydraulic shears mounted on Bobcat loaders can be effective on blueberry juniper (a non-sprouting species) for a cost of $55 to $160/acre. If the shears are used on mesquite or redberry juniper one must spray the stump immediately with a herbicide, which will cost in the range of $0.10 to $0.35 per plant.

Chemical Brush Control

Several herbicides are approved for brush control and may be applied by aircraft, from booms on tractor-pulled spray rigs, or from hand tanks. Some herbicides are also available in pellet form.

Chemical treatments with Triclopyr (Remedy®) and Clopyralid methyl (Reclaim®) were shown to achieve about 70 percent root kill in studies around the state and in adjacent states. Generally, commercial aerial applications are not as effective, which is most likely due to fewer controls. Other herbicide treatments are available, but many will achieve little root kill. Aerial spraying of brush such as mesquite costs about $28 per acre and does not vary with plant density or canopy cover.

Brush Control by Prescribed Burning

Prescribed burning is defined as the application of fire to a predetermined area. The burn is conducted under prescribed conditions to achieve the desired effects. Prescribed burning allows for the control or suppression of undesirable vegetation to facilitate distribution of grazing and browsing animals, to improve forage production and/or quality, and to improve wildlife habitat.

Prescribed burning is estimated at $17 per acre for the TSSWCB programs. Actual costs will depend on how rocky the soils are and the amount of large brush to remove from the fire guards (i.e., a once-over pass with a maintainer versus clearing heavy brush with a bulldozer, then smoothing up the fire guard). Prescribed burning will only be effective under the right environmental conditions, and with an adequate amount of fine fuel (dead or dormant grasses). For successful burns, a pasture deferment is essential for part or all of the growing season prior to burning, and burned pastures must be rested after the burn. On average, a 12-month deferment is necessary, which may increase costs if a rancher cannot utilize the land for livestock grazing.

Burning rarely affects moderate to heavy stands of mature mesquite. Burning only topkills the smooth-bark of mesquite plants and they re-sprout profusely. For mesquite, fire only gives short-term suppression, and stimulates the development of heavier canopy cover than was present pre-burn. Burning is not usually an applicable tool in moderate to heavy cedar (juniper) because these stands suppress production of an adequate amount of grass for fine fuel. Burning can be excellent for controlling junipers over 4 feet tall, if done correctly. Prescribed burning is often not recommended for initial clearing of heavy brush due to the concern that the fire could become too hot and sterilize the soil. Burning is often used for maintenance of brush removal.

Bio-Control of Brush

Bio-control of salt cedar is a relatively new technique to be used in Texas. This control method has been studied for nearly 20 years and there have been pilot studies in the Lake Meredith watershed and most recently in the Colorado River Basin. Research has shown that the Asian leaf beetle can consume substantial quantities of salt cedar in a relatively short time period, and generally does not consume other plants. Different subspecies of the Asian beetle appear to be sensitive to varying climatic conditions, and there is on-going research on appropriate subspecies for Texas. It is recommended that this control method be integrated with chemical and mechanical removal to best control re-growth. The cost per acre is unknown.

Supply Attained by Brush Control

Although the actual supply benefit resulting from a brush control project is site specific, a recent study of the Pedernales River/Lake Travis watershed projected an annual water yield of approximately 3,400 acre-feet/year. Based on this projection, this yield has been allocated to eight counties west of I-35 in the Region K area. This allocation is listed under County-Other at a value of 425 acre-feet per county, as shown in *Table 5-89*.

Table 5-89: Brush Control Yields

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
County-Other	Blanco	Colorado	425	425	425	425	425	425
County-Other	Burnet	Colorado	425	425	425	425	425	425
County-Other	Gillespie	Colorado	425	425	425	425	425	425
County-Other	Hays	Colorado	425	425	425	425	425	425
County-Other	Llano	Colorado	425	425	425	425	425	425
County-Other	Mills	Colorado	425	425	425	425	425	425
County-Other	San Saba	Colorado	425	425	425	425	425	425
County-Other	Travis	Colorado	425	425	425	425	425	425

Cost Implications of Proposed Strategy

Brush control projects are site specific and costs can vary widely. For this strategy, costs were taken from the Pedernales/Lake Travis Watershed study and applied across the counties. *Table 5-90* identifies the capital, project, annual, and unit costs associated with brush control in the region.

Table 5-90: Brush Control Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
County-Other	Blanco	Colorado	$2,137,000	$2,137,000	$213,700	$500.00
County-Other	Burnet	Colorado	$2,137,000	$2,137,000	$213,700	$500.00
County-Other	Gillespie	Colorado	$2,137,000	$2,137,000	$213,700	$500.00
County-Other	Hays	Colorado	$2,137,000	$2,137,000	$213,700	$500.00
County-Other	Llano	Colorado	$2,137,000	$2,137,000	$213,700	$500.00
County-Other	Mills	Colorado	$2,137,000	$2,137,000	$213,700	$500.00
County-Other	San Saba	Colorado	$2,137,000	$2,137,000	$213,700	$500.00
County-Other	Travis	Colorado	$2,137,000	$2,137,000	$213,700	$500.00

Environmental Considerations

Brush control can positively affect the environment depending on the type of control method used, location, and extent of application. However, if brush removal is not planned properly or implemented as part of a comprehensive range management strategy, negative environmental impacts can result.

Mechanical treatment using mechanized equipment to root plow, brush mow, bulldoze or scrape the ground surface could result in moderate to high levels of soil disturbance causing erosion and sedimentation into adjacent streams and water bodies. There would also be a change in vegetation communities toward earlier succession species. Soil disturbance would favor re-establishment of both grasses and forbs (herbaceous) in addition to re-invasion of woody brush and shrub species, prompting the need for re- treatment in future years. Soil disturbance would also have the potential of disturbing cultural or archeological artifacts, if present within 12 inches of the ground surface. The probability of cultural and archeological artifacts being present is higher for sites along water courses and old homesteads and settlements. However, cultural and archeological surveys are not required for private property included in the State Brush Program. Some federal cost sharing programs may require archeological surveys.

The State Brush Program requires all participants to follow recommended practices in the application of herbicides. The two most commonly used herbicides in the State Program are Triclopyr (Remedy®) and Clopyralid methyl (Reclaim®). Both of these chemicals are to be used only on upland areas and are not approved for use in or near water. If improperly applied, aerial or ground spraying could have possible biological impacts to wildlife through direct contact and/or potential pollution of surface water. Remedy® is toxic to aquatic organisms, while the toxicity of Reclaim® to birds, mammals and fish is low. A number of other herbicides are also toxic to aquatic life. There could also be effects to non-target plant species from broadcast applications.

Prescribed fire could adversely affect other vegetation such as damaging or killing established trees not intended for treatment. In addition, prescribed fire can be difficult to control if applied during the wrong season or during improper weather conditions and could affect air quality regulated under federal and state laws.

Overall implementation of this strategy could increase streamflow in the region by up to 3,400 ac-ft/yr. Overall impacts to agriculture can be considered negligible.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area.

Implementation Issues

The extent of brush control that may be desired by landowners will depend on how they plan to manage their land for wildlife and how the brush control will affect the value of the land for wildlife recreation purposes. In recent years, the value of ranch lands which have sufficient brush cover to support wildlife populations, particularly white-tailed deer, wild turkey, bobwhite and scaled quail, has increased at a faster rate than the value of those lands which are void of brush or woody vegetation. Consequently, many landowners can be expected to support brush control to the extent that it does not exclude wildlife populations.

Other implementation issues for land owner participation include the perceived economic benefit of brush control. If the land is currently not actively managed for ranching or wildlife recreation the owner may choose not to participate. Decreased profitability of sheep, goat and cattle grazing systems will influence the economics of brush control by ranchers, and consequently their willingness to participate. Also, the size of the land tracts can affect the total amount of brush removed and the effectiveness of a program. Watersheds that contain many small tracts are less likely to have the contiguous land owner participation that is needed to realize the water supply benefits associated with brush control.

On specific tracts where brush control would incorporate state or federal funding, regulatory compliance with the Texas Antiquities Code and National Historic Preservation Act may be required that may involve cultural resource surveys and incorporation of preservation measures. The Texas Commission on Environmental Quality has established regulations governing prescribed burning. There may also be local and county regulations associated with burning practices.

Recommendation as a Water Management Strategy

Brush control is a recommended water management strategy in the 2016 Region K Regional Water Plan. For purposes of obtaining funding from the TSWWCB, a recommended brush control project is any project located in the Region K Regional Water Planning Area.

5.2.4.8 Drought Management

With the extremely low rainfall that occurred during 2011, severe, and even exceptional, states of drought continued in certain parts of Texas. As 2011 was the base year for developing the water demand projections for this planning cycle, drought management as a water management strategy was looked at more closely by several of the regional water planning groups, including the LCRWPG.

Drought Management is different from conservation in that conservation tends to look at the long-term, and takes more permanent steps to reduce a community's GPCD slowly over time. Actions such as replacing old water fixtures with new low-flow fixtures, providing public education to the community about native vegetation that requires less water, and performing audits on waterlines to check for leaks are examples of conservation measures that over time can reduce the amount of water that a community needs. Drought management, on the other hand, attempts to reduce a community's GPCD by a larger amount over a shorter period of time. Both drought management and conservation can be important and effective in their own ways.

The GPCD numbers used in this plan are an annual average. The actual amount of water used is generally higher in the summer and lower in the winter, mainly due to outdoor watering in the warmer months. By restricting outdoor watering during the warmer months as a way of managing drought, the annual average GPCD for a community can be significantly lowered, depending on the level of restriction and the effort to provide the appropriate information to the public. Tiered water rates, which charge higher $/1000 gallon rates once a customer uses more than a specified amount, have also been found to be effective in reducing water use.

5.2.4.8.1. Municipalities

Some WUGs implemented mandatory water use restrictions during the summer of 2011. The Edwards-BFZ aquifer in Hays County and Travis County that is permitted by the BS/EACD reached Critical Drought Stage, which requires users to reduce water use by 30 percent. The City of Austin restricted outdoor watering to one day per week. Both types of restrictions were effective in reducing water use. The City of Austin showed that municipal WUGs that currently have their demands met (no shortage/need) can still be proactive by implementing drought management during times of reduced rainfall. Many others did not implement mandatory water restrictions until late in 2011 or early 2012. Thus, the water demand projections in the Region K Water Plan generally do not reflect implemented drought management water restrictions inherently. Based upon the restrictions implemented in recent years, it can be anticipated that in the future, during times of reduced rainfall comparable to 2011, water use restrictions would be implemented in a large portion of the region. Triggers associated with these recommended strategies include those referenced in the LCRA Water Management Plan and the individual municipality drought contingency plans. The Palmer Drought Severity Index is another resource that could be used for determining triggers for these strategies.

The methodology applied for the drought management strategy for municipalities is as follows:

- Base GPCD (Year 2011) greater than 100 – 15% water demand reduction each decade
- Base GPCD (Year 2011) less than 100 – 5% water demand reduction each decade
- Defer to a WUG's Drought Contingency Plan "Severe" trigger goal, when possible.
- Consider whether mandatory water use restrictions were in place in 2011.

For this planning cycle, drought management is recommended for most municipal WUGs regardless of need. The LCRWPG encourages municipalities to follow their Drought Contingency Plans, as appropriate. For some of the WUGs that have drought management recommended as a strategy, the percent of water use reduction is as high as 30 percent because that is the amount they have to reduce by during a critical drought. *Table 5-91* below shows the municipal WUGs that would utilize this strategy along with the implementation decade and the amount of water saved.

Table 5-91: Drought Management for Municipal WUGs

COUNTY	WUG NAME	BASIN	Drought Management Water Savings (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
BASTROP	AQUA WSC	BRAZOS	14	17	23	30	39	52
BASTROP	AQUA WSC	COLORADO	1,361	1,746	2,258	2,967	3,935	5,277
BASTROP	AQUA WSC	GUADALUPE	10	12	16	21	28	37
BASTROP	BASTROP	COLORADO	294	390	517	692	930	1,248
BASTROP	BASTROP COUNTY WCID #2	COLORADO	19	27	38	53	74	102
BASTROP	COUNTY-OTHER	BRAZOS	4	5	6	8	10	14
BASTROP	COUNTY-OTHER	COLORADO	272	328	402	504	643	827
BASTROP	COUNTY-OTHER	GUADALUPE	5	5	5	5	4	4
BASTROP	CREEDMOOR-MAHA WSC	COLORADO	1	1	2	2	3	4
BASTROP	ELGIN	COLORADO	195	248	319	417	552	732
BASTROP	SMITHVILLE	COLORADO	126	161	208	273	362	480
BLANCO	BLANCO	GUADALUPE	55	63	68	71	73	74
BLANCO	CANYON LAKE WATER SERVICE COMPANY	GUADALUPE	19	23	24	25	26	27
BLANCO	COUNTY-OTHER	COLORADO	86	99	107	111	113	115
BLANCO	COUNTY-OTHER	GUADALUPE	58	67	72	74	77	78
BLANCO	JOHNSON CITY	COLORADO	71	82	89	92	95	96
BURNET	BERTRAM	BRAZOS	62	73	83	93	102	109
BURNET	BURNET	BRAZOS	2	2	2	2	3	3
BURNET	BURNET	COLORADO	368	439	498	557	609	655
BURNET	COTTONWOOD SHORES	COLORADO	45	54	61	68	74	80
BURNET	COUNTY-OTHER	BRAZOS	175	207	234	260	284	306

COUNTY	WUG NAME	BASIN	Drought Management Water Savings (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
BURNET	COUNTY-OTHER	COLORADO	351	359	316	333	362	405
BURNET	GRANITE SHOALS	COLORADO	33	38	43	48	53	57
BURNET	HORSESHOE BAY	COLORADO	187	262	326	386	440	487
BURNET	KINGSLAND WSC	COLORADO	2	3	3	3	4	4
BURNET	MARBLE FALLS	COLORADO	466	674	968	1,122	1,225	1,277
BURNET	MEADOWLAKES	COLORADO	170	204	233	261	286	308
COLORADO	COLUMBUS	COLORADO	170	175	178	185	191	197
COLORADO	COUNTY-OTHER	BRAZOS-COLORADO	23	23	23	24	25	26
COLORADO	COUNTY-OTHER	COLORADO	150	151	151	155	160	165
COLORADO	COUNTY-OTHER	LAVACA	48	49	49	50	52	54
COLORADO	EAGLE LAKE	BRAZOS-COLORADO	24	24	24	25	26	27
COLORADO	EAGLE LAKE	COLORADO	54	55	55	57	59	60
COLORADO	WEIMAR	COLORADO	27	28	29	30	30	32
COLORADO	WEIMAR	LAVACA	56	57	58	60	62	64
FAYETTE	AQUA WSC	COLORADO	1	1	1	1	1	1
FAYETTE	COUNTY-OTHER	COLORADO	133	145	153	161	168	173
FAYETTE	COUNTY-OTHER	GUADALUPE	6	6	6	7	7	8
FAYETTE	COUNTY-OTHER	LAVACA	47	51	54	57	59	61
FAYETTE	FAYETTE WSC	COLORADO	96	106	113	119	125	129
FAYETTE	FAYETTE WSC	GUADALUPE	6	7	7	8	8	8
FAYETTE	FAYETTE WSC	LAVACA	11	12	13	14	15	15
FAYETTE	FLATONIA	GUADALUPE	10	11	11	12	12	13
FAYETTE	FLATONIA	LAVACA	41	45	48	51	53	55
FAYETTE	LA GRANGE	COLORADO	130	144	153	161	168	174
FAYETTE	LEE COUNTY WSC	COLORADO	30	33	35	37	38	40

COUNTY	WUG NAME	BASIN	Drought Management Water Savings (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
FAYETTE	SCHULENBURG	LAVACA	110	123	132	139	146	150
GILLESPIE	COUNTY-OTHER	COLORADO	263	274	284	299	315	331
GILLESPIE	COUNTY-OTHER	GUADALUPE	10	10	11	11	12	12
GILLESPIE	FREDERICKSBUR G	COLORADO	472	499	521	551	580	609
HAYS	AUSTIN	COLORADO	1	13	25	63	152	275
HAYS	BUDA	COLORADO	177	251	342	456	586	734
HAYS	COUNTY-OTHER	COLORADO	466	554	693	852	987	1,121
HAYS	DRIPPING SPRINGS	COLORADO	96	107	122	141	163	188
HAYS	DRIPPING SPRINGS WSC	COLORADO	107	136	172	218	271	330
HAYS	GOFORTH SUD	COLORADO	21	33	46	64	84	106
HAYS	PLUM CREEK WATER COMPANY	COLORADO	8	13	14	15	16	16
HAYS	WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	COLORADO	819	1,152	1,559	2,069	2,645	3,302
LLANO	COUNTY-OTHER	COLORADO	31	28	28	28	27	25
LLANO	HORSESHOE BAY	COLORADO	464	486	484	474	490	507
LLANO	KINGSLAND WSC	COLORADO	45	51	50	47	52	56
LLANO	LLANO	COLORADO	129	134	132	128	133	137
LLANO	SUNRISE BEACH VILLAGE	COLORADO	4	4	4	3	3	3
MATAGORDA	BAY CITY	BRAZOS-COLORADO	567	578	581	590	598	605
MATAGORDA	BAY CITY	COLORADO	1	1	1	1	1	1
MATAGORDA	COUNTY-OTHER	BRAZOS-COLORADO	42	42	42	42	42	43
MATAGORDA	COUNTY-OTHER	COLORADO	9	9	9	9	9	9
MATAGORDA	COUNTY-OTHER	COLORADO-LAVACA	30	30	30	30	30	31

COUNTY	WUG NAME	BASIN	Drought Management Water Savings (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
MATAGORDA	PALACIOS	COLORADO-LAVACA	102	104	104	105	107	108
MILLS	COUNTY-OTHER	BRAZOS	29	29	28	29	30	31
MILLS	COUNTY-OTHER	COLORADO	48	48	47	49	51	53
MILLS	GOLDTHWAITE	COLORADO	53	53	53	55	57	59
SAN SABA	COUNTY-OTHER	COLORADO	47	48	47	46	47	48
SAN SABA	RICHLAND SUD	COLORADO	25	26	25	25	25	26
SAN SABA	SAN SABA	COLORADO	228	236	235	230	235	240
TRAVIS	AQUA WSC	COLORADO	163	184	204	229	251	272
TRAVIS	AUSTIN	COLORADO	15,745	18,293	20,997	22,989	24,659	26,641
TRAVIS	BARTON CREEK WEST WSC	COLORADO	65	64	64	63	63	63
TRAVIS	BEE CAVE	COLORADO	355	409	459	516	567	614
TRAVIS	BRIARCLIFF	COLORADO	26	30	33	37	40	44
TRAVIS	CEDAR PARK	COLORADO	486	516	553	553	552	552
TRAVIS	CREEDMOOR-MAHA WSC	COLORADO	28	31	34	38	41	45
TRAVIS	CREEDMOOR-MAHA WSC	GUADALUPE	1	2	2	2	2	2
TRAVIS	ELGIN	COLORADO	38	53	67	83	98	112
TRAVIS	GOFORTH SUD	GUADALUPE	2	3	3	3	3	4
TRAVIS	JONESTOWN	COLORADO	82	86	90	95	99	104
TRAVIS	LAGO VISTA	COLORADO	374	437	498	566	628	686
TRAVIS	LAKEWAY	COLORADO	1,395	1,823	1,819	1,816	1,815	1,815
TRAVIS	LEANDER	COLORADO	170	436	753	813	843	882
TRAVIS	LOOP 360 WSC	COLORADO	176	183	190	197	204	211
TRAVIS	LOST CREEK MUD	COLORADO	218	214	211	211	211	211
TRAVIS	MANOR	COLORADO	171	234	294	362	422	477

COUNTY	WUG NAME	BASIN	Drought Management Water Savings (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
TRAVIS	MANVILLE WSC	COLORADO	448	541	630	733	825	911
TRAVIS	NORTH AUSTIN MUD #1	COLORADO	12	12	12	11	11	11
TRAVIS	NORTHTOWN MUD	COLORADO	104	120	135	152	167	180
TRAVIS	PFLUGERVILLE	COLORADO	3,194	4,276	5,311	6,474	7,503	8,463
TRAVIS	POINT VENTURE	COLORADO	52	66	80	96	109	122
TRAVIS	ROLLINGWOOD	COLORADO	58	57	56	56	56	57
TRAVIS	ROUND ROCK	COLORADO	19	21	24	26	29	31
TRAVIS	SHADY HOLLOW MUD	COLORADO	117	114	111	110	110	110
TRAVIS	SUNSET VALLEY	COLORADO	116	150	182	218	250	280
TRAVIS	THE HILLS	COLORADO	217	217	216	216	216	216
TRAVIS	TRAVIS COUNTY MUD #4	COLORADO	522	602	677	762	837	907
TRAVIS	TRAVIS COUNTY WCID #10	COLORADO	532	607	679	761	835	905
TRAVIS	TRAVIS COUNTY WCID #17	COLORADO	1,268	1,508	1,653	1,678	1,722	1,776
TRAVIS	TRAVIS COUNTY WCID #18	COLORADO	168	190	211	236	259	280
TRAVIS	TRAVIS COUNTY WCID #19	COLORADO	100	99	99	99	99	99
TRAVIS	TRAVIS COUNTY WCID #20	COLORADO	118	117	117	117	116	116
TRAVIS	VOLENTE	COLORADO	4	4	5	6	7	7
TRAVIS	WELLS BRANCH MUD	COLORADO	82	80	79	78	78	78
TRAVIS	WEST LAKE HILLS	COLORADO	313	310	308	307	306	306
TRAVIS	WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	COLORADO	473	544	611	688	755	818
TRAVIS	WILLIAMSON-TRAVIS COUNTY MUD #1	COLORADO	23	22	22	22	22	22

COUNTY	WUG NAME	BASIN	Drought Management Water Savings (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
WHARTON	COUNTY-OTHER	BRAZOS-COLORADO	181	185	188	195	202	208
WHARTON	COUNTY-OTHER	COLORADO	87	89	90	94	97	100
WHARTON	COUNTY-OTHER	COLORADO-LAVACA	28	29	29	30	31	32
WHARTON	COUNTY-OTHER	LAVACA	3	3	3	3	3	3
WHARTON	EAST BERNARD	BRAZOS-COLORADO	57	59	61	63	65	67
WHARTON	EL CAMPO	COLORADO	1	1	1	1	1	1
WHARTON	WHARTON	BRAZOS-COLORADO	165	171	175	181	187	192
WHARTON	WHARTON	COLORADO	85	88	90	93	96	99
WILLIAMSON	AUSTIN	BRAZOS	770	954	1,184	1,432	1,713	2,021
WILLIAMSON	NORTH AUSTIN MUD #1	BRAZOS	116	112	109	107	107	107
WILLIAMSON	WELLS BRANCH MUD	BRAZOS	6	6	6	6	6	6
TOTAL REGION K			38,852	46,136	53,328	60,085	66,877	74,531

Cost Implications of Proposed Strategy

There are two types of costs associated with drought management. One is the cost associated with this strategy are related mainly to public outreach and enforcement. Depending on the number of customers who need to be informed of the water use restrictions, and the methods chosen to reach the customers, along with the level of enforcement, the annual costs can vary. In some cases, increased water rates and fines can recover the expenses of public outreach. The East Bay Municipal Utility District (EBMUD) in California provided an example for costs by hiring a public outreach consultant with the goal of saving a certain amount of water. The contract was for $1.75 million with a goal of saving 36,000 ac-ft of water. After updating to September 2013 dollars, this works out to a unit cost of $50/ac-ft. (*See www.ebmud.com, Meeting Action Summary 06/10/08 #9a for more information.*) The second type of cost is that to the water supplier (utility) in reduced water sold, as well as economic impacts to the local area by not having that water. That cost will be determined using the *TWDB Socioeconomic Impact Analysis of Unmet Needs*, which will be provided to the LCRWPG by the TWDB after the Initially Prepared Plan is submitted.

Environmental Considerations

In many cases, reducing groundwater use during a drought allows for more springflow to provide water downstream. Reducing surface water use allows more water to remain in the streams, rivers, and lakes. Individual WUG implementation would be expected to have negligible impacts to the environment.

Agricultural and Natural Resources Considerations

No impacts to agriculture are expected.

5.2.4.8.2. Irrigation

Drought management is recommended for several of the Irrigation WUGs as well. Irrigation in Colorado, Matagorda, and Wharton counties has severe shortages throughout the planning period, and drought management may be a necessary strategy to implement. Rice farming is prominent in the lower basin, and generally involves growing both a first and second (ratoon) crop. Drought management would assume that most rice farmers would grow only a first crop, and not a second crop. To calculate water saved, it was determined that the ratoon crop requires a volume of water equal to approximately 25% of the total water demand for rice. It was assumed that 75% of rice growers would implement the strategy (no ratoon crop). The total water demand by decade was multiplied by the % rice in the county, the 75% implementation rate, and the 25% water volume to calculate a water savings for each Irrigation WUG in Colorado, Matagorda, and Wharton counties. The volumes of water saved (ac-ft/yr) are shown below in *Table 5-92*. Triggers associated with these recommended strategies include those referenced in the LCRA Water Management Plan.

In addition, drought management is recommended for Irrigation in Mills County (Brazos Basin.) There are limited supplies of water in that area of the county, and it is assumed that the growth of agriculture would be reduced based on water available. The Palmer Drought Severity Index is a resource that could be used for determining triggers for these strategies. As demand decreases over the planning period, the need for drought management as a strategy goes away over time. The volumes of water saved (ac-ft/yr) are also shown below in *Table 5-92*.

Table 5-92: Drought Management for Irrigation WUGs

COUNTY	WUG NAME	BASIN	Drought Management Water Savings (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
COLORADO	IRRIGATION	BRAZOS-COLORADO	8,822	8,584	8,354	8,129	7,910	7,697
COLORADO	IRRIGATION	COLORADO	5,001	4,866	4,735	4,608	4,484	4,363
COLORADO	IRRIGATION	LAVACA	15,719	15,296	14,885	14,484	14,095	13,716
MATAGORDA	IRRIGATION	BRAZOS-COLORADO	16,484	16,034	15,596	15,170	14,756	14,353
MATAGORDA	IRRIGATION	COLORADO	2,354	2,290	2,227	2,167	2,108	2,050

COUNTY	WUG NAME	BASIN	Drought Management Water Savings (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
MATAGORDA	IRRIGATION	COLORADO-LAVACA	18,406	17,904	17,415	16,939	16,476	16,026
MILLS	IRRIGATION	BRAZOS	125	95	65	36	7	0
WHARTON	IRRIGATION	BRAZOS-COLORADO	15,042	14,637	14,243	13,860	13,487	13,125
WHARTON	IRRIGATION	COLORADO	8,078	7,861	7,649	7,443	7,243	7,048
WHARTON	IRRIGATION	COLORADO-LAVACA	4,735	4,608	4,484	4,363	4,246	4,132
TOTAL REGION K			94,766	92,175	89,653	87,199	84,812	82,510

Cost Implications of Proposed Strategy

Costs for drought management for irrigation were determined using the *TWDB Socioeconomic Impact Analysis of Unmet Needs* from the *2011 Region K Water Plan*. The costs from the plan were adjusted to September 2013 dollars, and then applied proportionally to the volume of water savings achieved. Unit costs range from county to county. The unit cost for Irrigation WUGs in Colorado County is $163 per ac-ft; the unit cost for Irrigation WUGs in Matagorda County is $649 per ac-ft; the unit cost for Irrigation WUGs in Mills County is $123 per ac-ft; and the unit cost for Irrigation WUGs in Wharton County is $260 per ac-ft. No capital costs are associated with this strategy.

Environmental Considerations

In many cases, reducing groundwater use during a drought allows for more springflow to provide water downstream. Reducing surface water use generally allows more water to remain in the streams, rivers, and lakes. In the case of irrigation in the lower portion of the basin, second crop return flows can be valuable sources of streamflow during later summer months. This strategy would reduce irrigation return flows by up to 19,100 ac-ft/yr. It would also reduce the acreage of potential feedstock for migratory birds by approximately 48,000.

Agricultural and Natural Resources Considerations

The second rice crop is an important part of the economy in the lower three counties in the region. Not supplying water to meet irrigation needs has negative economic impacts to the entire agriculture economy and rural local economies. Cost impacts are described above.

5.2.5 **Municipal Water Management Strategies**

The municipal WUGs include cities, water utilities, and County-Other (rural/unincorporated areas of municipal water use aggregated on a county basis).

Several strategies were identified to meet the municipal shortages including conservation; conservation was the first strategy considered for municipal WUGs with needs. For several municipal WUGs with shortages, the following regional management strategies were selected:

- Expansion of Current Groundwater Supplies
- Development of New Groundwater Supplies
- Groundwater Importation
- Aquifer Storage and Recovery
- Water Purchase
- Drought Management

These regional strategies are explained in detail in *Section 5.2.4* of this report.

In addition to these strategies, several municipal WUGs with shortages purchase water from the LCRA. Amendments to these LCRA contracts or new LCRA contracts are also identified as a strategy to meet shortages. These strategies are explained in *Sections 5.2.3.1.4* and *5.2.3.1.5*.

In addition to the strategies identified above, additional municipal strategies have been identified to meet specific WUG needs. The following sections provide a description, analysis, and cost breakdown for these municipal strategies.

5.2.5.1 Municipal Conservation

Municipal conservation is covered in the required consolidated Conservation section of Chapter 5. More specifically, it is discussed in *Section 5.2.2.3*, Municipal Conservation.

5.2.5.2 Volente

Drought-created lake levels have lowered the water table surrounding Lake Travis. The Village of Volente is at risk of being unable to access their current groundwater source. As such, the Village of Volente requested inclusion of a surface water source strategy in the 2016 Regional Water Plan. The surface water source strategy would consist of:

Constructing an intake on Lake Travis (Highland Lakes) to obtain water and provide treatment, storage, and transmission capabilities for the Village of Volente. This particular strategy would require obtaining a contract for surface water with the Lower Colorado River Authority (LCRA), and as a potential new customer, they have been included in Section *5.2.3.1.5* as part of the new LCRA contracts strategy. If the Village of Volente were to seek other options for surface water, such as purchasing treated water, a portion of the infrastructure detailed in this strategy would still be required, and the source of the water would still be the Highland Lakes.

Project yields were based on maximum planning period demands for the Village of Volente, and are estimated to be 142 acre-feet/year from 2020 to 2070, as shown in the following table.

Table 5-93: Village of Volente Yield Associated with New Surface Water Infrastructure

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Volente	Travis	Colorado	142	142	142	142	142	142

The infrastructure required for this strategy was determined by Gray Engineering in a preliminary design memorandum dated April 17, 2014 prepared for the Village of Volente. In this memorandum, it was determined that there are approximately 500 individual lots. Facility sizing for a potable water system supply was based on current Texas Commission on Environmental Quality (TCEQ) standards for potable water system supply.

Based on these requirements, the following infrastructure was proposed.

- Raw Water Intake and Pump Station
- Approximately five (5) miles of transmission piping and appurtenances
- 0.1 MGD Average (0.5 MGD Peak) Water Treatment Plant
- Booster Pump Station with one (1) Storage Tank

Cost Implications of Proposed Strategy

A construction cost estimate was provided by the Village of Volente from the preliminary design memorandum prepared by Gray Engineering. The cost estimate was in April 2014 dollars. In addition, the cost estimate included costs associated with distribution piping. In order to provide a comparable cost consistent with other strategies in this report, distribution piping was removed from this strategy and costs were developed using the Texas Water Development Board (TWDB) Cost Estimating Tool in September 2013 dollars. The Cost Estimating Tool was also used to determine operating costs.

The capital cost for this strategy is primarily driven by the cost of a water treatment facility and the transmission system piping. The LCRA water rate for municipal and industrial customers in September 2013 was $151 per acre-foot.

The following table shows the estimated costs associated with this strategy.

Table 5-94: Village of Volente Infrastructure Costs Needed for a Surface Water Contract

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$5,812,000	$8,263,000	$1,064,000	$7,493.00

Environmental Considerations

Water within Lake Travis is managed by the LCRA and the LCRA currently has multiple contracts with cities, industries, and agriculture farmers for water usage. It is not anticipated that a contract of this size with the Village of Volente will have any additional environmental impacts on this reservoir.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

No impacts to agriculture are expected, as a result of implementing this strategy.

5.2.5.3 Bastrop County

In order to meet future water demands, the following entities within Bastrop County are likely to require a new contract with LCRA for surface water supply from the Highland Lakes; the City of Bastrop, the City of Elgin, and Aqua Water Supply Corporation (WSC). All would require new infrastructure to treat surface water as they currently have groundwater treatment and distribution infrastructure. Descriptions of the water strategies for each entity are described below.

City of Bastrop

The surface water source strategy for the City of Bastrop would consist of obtaining a contract for surface water with the Lower Colorado River Authority (LCRA) and building an intake on the Colorado River to obtain water and provide treatment, storage, and transmission capabilities for the City of Bastrop.

Surface water demands for the City of Bastrop are projected to be 2,500 acre-feet/year (2.2 MGD Average) starting in 2050. A peaking factor of 2.8 was used for infrastructure sizing.

The source of the raw water would likely be from the Colorado River, as part of LCRA's additional water supply created by proposed projects. For planning purposes, distance for transmission was assumed to be two (2) miles. The infrastructure proposed was based on TCEQ standards for potable water system supply. Based on these requirements, the following infrastructure was proposed.

- Raw Water Intake and Pump Station
- Approximately two (2) miles of transmission piping and appurtenances
- 2.2 MGD Average (6.2 MGD Peak) Water Treatment Plant

The project yield is shown in the following table.

Table 5-95: City of Bastrop New Surface Water Infrastructure for LCRA Contract Yield

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Bastrop	Bastrop	Colorado	0	0	0	2,500	2,500	2,500

Cost Implications of Proposed Strategy

Capital Cost Estimates for each entity were developed using the Texas Water Development Board (TWDB) Cost Estimating Tool in September 2013 dollars. The Cost Estimating Tool was also used to determine operating costs.

The capital cost for the City of Bastrop strategy is primarily driven by the cost of the water treatment plant. The LCRA water rate for municipal and industrial customers in September 2013 was $151 per acre-foot.

The following table shows the estimated costs associated with this new LCRA Contract strategy.

Table 5-96: City of Bastrop Infrastructure Costs Needed for New LCRA Contract

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$24,903,000	$34,858,000	$5,526,000	$2,210.00

Environmental Considerations

Water for this strategy would likely come from additional LCRA water supply created by one or more of the recommended or alternative strategies in the 2016 Region K Plan. Most of the projects divert and store water under existing water rights. This particular strategy should not have instream and bay and estuary inflow impacts that are additional in nature to any potential impacts from the LCRA projects.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

Large new contracts that would need to utilize supplies from Lakes Buchanan and Travis or other LCRA firm water supplies may decrease the amount of water available for agriculture. For this strategy, that amount would be up to 2,500 ac-ft/yr.

City of Elgin

The surface water source strategy for the City of Elgin would consist of obtaining a contract for surface water with the Lower Colorado River Authority (LCRA) and building an intake on the Colorado River to obtain water and provide treatment, storage, and transmission capabilities for the City of Elgin.

Surface water demands for the City of Elgin are projected to be 3,500 acre-feet/year (3.1 MGD Average) starting in 2030. A peaking factor of 2.8 was used for infrastructure sizing.

The source of the raw water would likely be from the Colorado River, as part of LCRA's additional water supply created by proposed projects. For planning purposes, distance for transmission was assumed to be thirteen (13) miles. The infrastructure proposed was based on TCEQ standards for potable water system supply. Based on these requirements, the following infrastructure was proposed.

- Raw Water Intake and Pump Station
- Approximately thirteen (13) miles of transmission piping and appurtenances
- 3.1 MGD Average (8.7 MGD Peak) Water Treatment Plant
- Booster Pump Station with one (1) Storage Tank

The project yield is shown in the following table.

Table 5-97: City of Elgin New Surface Water Infrastructure for LCRA Contract Yield

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Elgin	Bastrop	Colorado	0	3,500	3,500	3,500	3,500	3,500

Cost Implications of Proposed Strategy

The capital cost for the City of Elgin strategy is primarily driven by the cost of the water treatment plant. The LCRA water rate for municipal and industrial customers in September 2013 was $151 per acre-foot.

The following table shows the estimated costs associated with this strategy.

Table 5-98: City of Elgin Infrastructure Costs Needed for New LCRA Contract

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$43,955,000	$61,623,000	$8,986,000	$2,567.00

Environmental Considerations

Water for this strategy would likely come from additional LCRA water supply created by one or more of the recommended or alternative strategies in the 2016 Region K Plan. Most of the projects divert and store water under existing water rights. This particular strategy should not have instream and bay and estuary inflow impacts that are additional in nature to any potential impacts from the LCRA projects.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

Large new contracts that would need to utilize supplies from Lakes Buchanan and Travis or other LCRA firm water supplies may decrease the amount of water available for agriculture. For this strategy, that amount would be up to 3,500 ac-ft/yr.

Aqua WSC

The surface water source strategy for Aqua WSC would consist of obtaining a contract for surface water with the Lower Colorado River Authority (LCRA) and building an intake on the Colorado River to obtain water and provide treatment, storage, and transmission capabilities for the Aqua WSC service area. The service area for Aqua WSC comprises most of Bastrop County along with portions of Travis, Fayette, Lee, and Caldwell Counties. The service area is divided into eight (8) zones.

Surface water demands for Aqua WSC are projected to be 5,000 acre-feet/year (4.4 MGD Average) starting in 2050, increasing to 10,000 acre-feet/year (8.9 MGD Average) starting in 2060, and ultimately reaching 15,000 acre-feet/year (13.4 MGD Average) in 2070. A peaking factor of 2.8 was used for infrastructure sizing.

The source of the raw water would likely be from the Colorado River, as part of LCRA's additional water supply created by proposed projects. For planning purposes, transmission piping was assumed to consist of two (2) pipe segments, one (1) to the northern zones and one (1) to the southern zones. The northern transmission pipeline was assumed to be nineteen (19) miles and the southern transmission pipeline was assumed to be six (6) miles. The infrastructure proposed was based on TCEQ standards for potable water system supply. Based on these requirements, the following infrastructure was proposed.

- Two (2) Raw Water Intakes and Pump Stations
- Approximately nineteen (19) miles of transmission piping and appurtenances for the northern zone and approximately six (6) miles of transmission piping and appurtenances for the southern zone
- Two (2) 6.7 MGD Average (18.8 MGD Peak) Water Treatment Plants

The demands are shown in the following table.

Table 5-99: Aqua WSC New Surface Water Infrastructure for LCRA Contract Yield

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Aqua WSC	Bastrop	Colorado	0	0	5,000	5,000	10,000	15,000

Cost Implications of Proposed Strategy

The capital cost for Aqua WSC strategy is primarily driven by the cost of the two (2) water treatment plants. The LCRA water rate for municipal and industrial customers in September 2013 was $151 per acre-foot.

The following table shows the estimated costs associated with this strategy.

Table 5-100: Aqua WSC Infrastructure Costs Needed for New LCRA Contract

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$91,491,000	$127,538,000	$18,940,000	$1,263.00

Environmental Considerations

Water for this strategy would likely come from additional LCRA water supply created by one or more of the recommended or alternative strategies in the 2016 Region K Plan. Most of the projects divert and store water under existing water rights. This particular strategy should not have instream and bay and estuary inflow impacts that are additional in nature to any potential impacts from the LCRA projects.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

Large new contracts that would need to utilize supplies from Lakes Buchanan and Travis or other LCRA firm water supplies may decrease the amount of water available for agriculture. For this strategy, that amount would be up to 15,000 ac-ft/yr.

5.2.5.4 Reuse

Reuse is recommended as a strategy for several municipal WUGs within Region K. *Table 5-101* and *Table 5-102* summarize the project yields and associated costs, respectively, for each of the WUGs, with the exception of City of Austin, which is discussed in *Section 5.2.3.2.2*. Following the tables, each WUG then has an individual section where details are discussed further. Other municipal WUGs that have active reuse programs, but do not have a recommended reuse strategy include City of Burnet, City of Cedar Park, City of Lago Vista, Travis County MUD #4, Travis County WCID #17, and West Travis County PUA.

Table 5-101: Direct Reuse Summary of Project Yields

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Bastrop	Bastrop	Colorado	0	0	300	600	1,120	1,120
Horseshoe Bay	Burnet	Colorado	50	50	50	50	50	50
Marble Falls	Burnet	Colorado	11	11	11	11	11	11
Flatonia	Fayette	Lavaca	134	149	159	168	176	182
Buda	Hays	Colorado	2,240	2,240	2,240	2,240	2,240	2,240
Horseshoe Bay	Llano	Colorado	50	50	50	50	50	50
Llano	Llano	Colorado	100	100	100	100	100	100
Pflugerville	Travis	Colorado	500	1000	2,000	2,000	4,000	4,000

Table 5-102: Direct Reuse Summary of Project Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Bastrop	Bastrop	Colorado	$3,255,000	$4,625,000	$502,000	$448.00
Horseshoe Bay	Burnet	Colorado	$0	$0	$0	$0.00
Marble Falls	Burnet	Colorado	$0	$0	$0	$0.00
Flatonia	Fayette	Lavaca	$853,000	$1,226,000	$110,000	$821.00
Buda	Hays	Colorado	$4,398,000	$6,075,000	$592,000	$264.00
Horseshoe Bay	Llano	Colorado	$0	$0	$0	$0.00
Llano	Llano	Colorado	$473,000	$689,000	$66,000	$660.00
Pflugerville	Travis	Colorado	$5,597,000	$7,959,000	$911,000	$228.00

5.2.5.4.1. City of Bastrop

The City of Bastrop currently owns and operates two wastewater treatment plants. The reuse strategy consists of using effluent treated by the City of Bastrop's wastewater treatment plants to supply reclaimed water to Lost Pines Golf Club and other potential users with irrigation needs. It is projected that the implementation of this strategy would decrease the water supply demand needed by the City of Bastrop beginning in the year 2020.

This strategy is estimated to deliver 300 acre-feet per year by 2020. An expansion of reclaimed water is considered and added for subsequent decades, depending on the expected increase in the flow received and treated by the City of Bastrop's sewer treatment plants, up to 1,120 acre-feet per year in 2060. Future additions, mainly driven by growth will likely call for infrastructure expansion needed to meet higher demand volumes.

Cost Implications of Proposed Strategy

The cost of this strategy was estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool. The capital cost for this strategy is primarily driven by the length of the proposed new pipeline, and pump station additions. It is assumed that the plants already have conventional treatment process for BOD removal and disinfection in replace to meet TCEQ reclaimed water type I requirements. The pipeline proposed for this strategy is 8-inch in diameter, spanning approximately 5.0 miles from the City of Bastrop's Wastewater Treatment Plant to Lost Pines Golf Club or other irrigation sites of interest. It has been assumed that the reclaimed water users would bear the costs associated with this strategy and that the water would be for non-potable use only.

In September 2013 values, the probable cost for City of Bastrop to meet the identified reclaimed water needs is approximately $4,625,000. This strategy will have a total annual cost (including operations and maintenance) of approximately $502,000 per year. The opinion of probable unit cost of reclaimed water is $448 per ac-ft, or approximately $1.38 per 1,000 gallons.

Environmental Considerations

The main advantage the reuse water strategy has over other strategies is that it may be implemented at a low cost, while reducing the need for expanded water supplies. Return flows to the Colorado River will be reduced by up to 1,120 ac-ft/yr. The City of Bastrop is partially located within the Lost Pines Habitat Conservation Plan Area. Coordination and planning will be required during the design and construction to follow the Conservation Plan requirements.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

Limited impacts to agriculture are expected, as a result of implementing this strategy. Return flows would be reduced by up to 1,120 ac-ft/yr, as a result of reusing the effluent.

5.2.5.4.2. City of Buda

The City of Buda (City) currently owns one wastewater treatment plant, which is operated and maintained by the Guadalupe-Blanco River Authority (GBRA). Reclaimed water implementation for the City consists of multiple related projects funded through the City's "Purple Pipe Fund." This funding is provided for irrigation of some parks & road medians with Type I reclaimed water, along with the bulk sale of Type I reclaimed water for non-potable uses, improving the condition of grass/landscaping while reducing demand on the city's drinking water supply. The City intends to expand reclaimed water implementation through its Capital Projects program, and anticipates the implementation of this strategy will continue to reduce the potable water supply demand by the City.

In addition to the current City projects, an expansion of reclaimed water service is currently under consideration, and will be capable of providing an additional 1.9 million gallons per day to the Sunfield subdivision east of the City. This strategy could deliver approximately 2,240 acre-feet per year by 2020 to the proposed subdivision. Another potential user identified through the planning process is the Mining WUG in Hays County. Mining has water needs in Hays County, and does not require potable water to meet a large portion of those needs. Mining in Hays County is identified in *Section 5.2.4.6* as a potential water purchaser of reuse water from the City of Buda. Effluent flow rates are expected to increase in subsequent years based on the demand projections of the contributing areas of the City. Future additions, mainly driven by growth will likely call for infrastructure expansion needed to meet higher demand volumes.

Cost Implications of Proposed Strategy

The cost of this strategy was estimated by the consulting engineer responsible for the Preliminary Design of the Effluent Pump Station as part of the Buda Wastewater Treatment Plant Phase III Expansion project. The capital cost for this strategy is primarily driven by the length of the proposed new pipeline and new effluent pump station additions. It is assumed that the plant already has conventional treatment processes for BOD removal and disinfection in place to meet TCEQ reclaimed water Type I requirements. The pipeline proposed for this strategy is 24-inch in diameter, spanning approximately 3.8 miles from the City's wastewater treatment plant to the proposed Sunfield subdivision east of Buda, or other irrigation sites of interest, such as Stagecoach Park, City Park or various roadway medians. It has been assumed that the reclaimed water users would bear the costs associated with this strategy and that the water would be for non-potable use only.

In September 2013 values, the probable cost for City to meet the identified reclaimed water needs is approximately $6,075,000. This strategy will have a total annual cost (including operations and maintenance) of approximately $592,000 per year. The opinion of probable unit cost of reclaimed water is $264 per ac-ft, or approximately $0.81 per 1,000 gallons.

Environmental Considerations

The main advantage the reuse water strategy has over other strategies is that it may be implemented at a low cost, while reducing the need for expanded water supplies. The City discharges treated effluent to tributaries of Plum Creek, and by increasing the effluent reuse, will reduce the effluent discharge to natural waterways by up to 2,240 ac-ft/yr.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

No impacts to agriculture are expected, as a result of implementing this strategy.

Texas Disposal Systems

Under TCEQ Chapter 210 authorization, the treated effluent from could be used for new commercial and industrial developments in and around a Texas Disposal Systems (TDS) site. In exchange, a desalination facility on the TDS site would treat and produce desalinated Saline Edwards Aquifer water. This desalination strategy is covered in the "Aquifer Storage and Recovery – BSEACD Saline Edwards ASR Project" section of this report.

5.2.5.4.3. City of Flatonia

The City of Flatonia has requested the consideration of a water reuse strategy in the 2016 Regional Water Plan. The reuse strategy would consist of using effluent treated by the City of Flatonia's Wastewater Treatment Plant to supply the Flatonia Golf Course and two nearby baseball parks with irrigation. It is projected that the implementation of this strategy would decrease the water supply demand needed by the City of Flatonia by the year 2020.

The volume of water available for reuse was determined based on water demands of Fayette County (in both the Guadalupe and Lavaca river basin). The strategy would utilize 40 percent of total demand for reuse by year 2020, resulting in approximately 134 acre-feet/year of supply. Based on demand projections it is expected that reuse strategy supply would increase to 182 acre-feet/year by year 2070.

City of Flatonia leaders have mentioned the reuse water strategy may later be expanded to include supply to restroom facilities such as, toilets and urinals. These future additions were excluded from the reuse strategy supply projections.

Cost Implications of Proposed Strategy

The cost of this strategy was based on a cost estimate provided by the City of Flatonia for the water reuse system, and estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool.

The capital cost for this strategy is primarily driven by the length of the proposed new pipeline, pump station additions (such as tanks, hydrotank, pumps, etc), and the amount of effluent yield predicted for irrigation. The pipeline proposed for this strategy is composed of polyvinyl chloride (PVC) material, spanning 10,200 ft from the City of Flatonia's Wastewater Treatment Plant to the local irrigation sites of interest. It has been assumed that the water would be for non-potable use only.

The direct reuse of the non-potable system would have a capacity of 134 ac-ft/year by 2020, increasing to 182 acre-feet/year in 2020. In September 2013 values, the probable cost for Flatonia to meet all of its planning horizon identified direct reuse needs through the use of reclaimed water is approximately $1,226,000. This would result in a total annual cost (including operations and maintenance [O&M]) of approximately $110,000 per year. The opinion of probable unit cost of reclaimed water is $821 per ac-ft, or approximately $2.52 per 1,000 gallons.

Capital costs for this strategy were updated to September 2013 dollars using the *Engineering News Record* (ENR) Construction Cost Index (CCI). No land acquisition costs were assumed for this project, while the remainder of the project costs were calculated using the TWDB Cost Estimating Tool.

Environmental Considerations

The main advantage the reuse water strategy has over other strategies is that it may be implemented at a very low cost, while reducing the need for expanded water supplies. Return flows will be reduced by up to 182 ac-ft/yr. Using effluent for irrigation purposes reduces the demands placed on the local groundwater aquifers.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

No impacts to agriculture are expected, as a result of implementing this strategy.

5.2.5.4.4. City of Llano

The reuse strategy consists of using effluent treated by the City of Llano's wastewater treatment plant to supply reclaimed water to Llano Junior High School athletic field and other potential users with irrigation needs. It is projected that the implementation of this strategy would decrease the water supply demand needed by the City of Llano beginning in 2020.

This strategy will approximately deliver 100 acre-feet per year by 2020. An expansion of reclaimed water can be considered and added for subsequent years, depending on the expected increase in the flow received and treated by the City of Llano's sewer treatment plants. Future additions, mainly driven by growth will likely call for infrastructure expansion needed to meet higher demand volumes.

Cost Implications of Proposed Strategy

The cost of this strategy was estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool. The capital cost for this strategy is primarily driven by the length of the proposed new pipeline, and pump station additions. It is assumed that the plant already has conventional treatment process for BOD removal and disinfection in place to meet TCEQ reclaimed water type I requirements. The pipeline proposed for this strategy is 2-inch in diameter, spanning approximately 1.6 miles from the City of Llano's Wastewater Treatment Plant to Llano Junior High School athletic field. The pipeline can be further extended to also serve Llano River Gold Course, which approximately another 3.4 miles away. The cost presented in this strategy is for serving the athletic field only, and does not include the construction cost associated with extending the pipeline to the golf course.

In September 2013 values, the probable cost for City of Llano to meet the identified non-potable reclaimed water needs is approximately $689,000,. This strategy will have a total annual cost (including operations and maintenance) of approximately $66,000 per year. The opinion of probable unit cost of reclaimed water is $660 per ac-ft, or approximately $2.03 per 1,000 gallons.

The City of Llano also requested this strategy to be evaluated for indirect potable use for discharge into Llano River Lake. According to a white paper published by Water Reuse Association, the additional cost for potable reuse treatment is in the range of $820 to $2,000 per ac-ft, which includes about $120 ac-ft for conveyance at the lower end of the cost range. For the City of Llano, the total opinion of probable cost for indirect potable water at the high end is about $3,027 per ac-ft, or $9.29 per 1,000 gallons.

Environmental Considerations

The main advantage the reuse water strategy has over other strategies is that it may be implemented at a low cost, while reducing the need for expanded water supplies. The amount of effluent that is reused will decrease the amount of flow returned to the river. For this strategy, it is a relatively small amount and should have negligible impacts.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

No impacts to agriculture are expected as a result of implementing this strategy.

5.2.5.4.5. City of Pflugerville

As a means of meeting future water demands, the City of Pflugerville is considering a water reuse strategy to increase their use of effluent treated by the City of Pflugerville's wastewater treatment plant. The City of Pflugerville's wastewater treatment plant currently supplies reclaimed water to the Travis County Northeast Metropolitan Park to irrigate athletic fields and offers reclaimed water to local businesses with non-potable water demands. An increase in demand using reclaimed water could be for additional irrigation purposes at parks, medians, and golf courses and potential industrial purposes such as cooling supply. The reuse water source strategy would consist of:

- Expanding the reuse storage and transmission capability of the City of Pflugerville wastewater treatment plant.

Estimated projections for reuse yields generated by this strategy for the City of Pflugerville are 500 acre-feet/year (0.45 MGD Average) in 2020 with projected growth to 4,000 acre-feet/year (3.6 MGD Average) in 2070.

An expansion of the water reuse facilities will be dependent on the expected increase in flow received and treated by the City of Pflugerville. The wastewater treatment plant is currently permitted for 5.85 MGD but is not yet at this treatment capacity.

For planning purposes, distance for transmission was assumed to be 5.5 miles from the wastewater treatment plant north on State Highway 130 to the northern limits of Pflugerville. Since the City of Pflugerville is already providing reuse water, no additional treatment improvements are proposed at the wastewater plant since these will be included with future treatment capacity expansion. Based on these requirements, the following infrastructure was proposed.

- Reuse Pump Station and Storage Tank
- Approximately 5.5 miles of transmission piping and appurtenances

Cost Implications of Proposed Strategy

A capital cost estimate was developed using the Texas Water Development Board (TWDB) Cost Estimating Tool in September 2013 dollars. The Cost Estimating Tool was also used to determine operating costs.

The capital cost for this strategy is primarily driven by the length of the proposed reuse transmission pipeline. In September 2013 values, the probable cost for the City of Pflugerville to meet all of its planning horizon identified reuse supply needs is approximately $7,959,000. This would result in a total annual cost (including operations and maintenance of approximately $911,000 per year. The opinion of probable unit cost of water is $228 per acre foot, or approximately $0.70 per 1,000 gallons.

Environmental Considerations

The main advantage of a reuse water strategy is that it can be implemented at a low cost, while reducing the need to expand water supplies. Currently, the City of Pflugerville discharges into Gilleland Creek along with seven (7) other wastewater treatment facilities. During low flow, the water in Gilleland Creek consists mostly of treated wastewater effluent. With this water reuse strategy, the City of Pflugerville will discharge up to 4,000 ac-ft/yr less effluent into Gilleland Creek.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural and Natural Resources Considerations

No impacts to agriculture are expected, as a result of implementing this strategy.

5.2.5.4.6. City of Horseshoe Bay

The City of Horseshoe Bay currently supplies approximately 516 acre-feet per year of reuse water for irrigation of golf courses. This strategy assumes that an additional small amount of reuse will be used in the future. Because of the relatively small volume of additional water, no costs were associated with the strategy. There are no anticipated environmental or agricultural impacts associated with this strategy.

5.2.5.4.7. City of Marble Falls

The City of Marble Falls currently supplies approximately 750 acre-feet per year of reuse water for irrigation of city parks. The City requested a strategy to show that an additional 11 ac-ft/yr of reuse will be used in the future to irrigate athletic fields. Because of the small volume of additional water, no treatment or transmission-related costs were associated with the strategy. Distribution-level costs are not included in regional water planning. There are no anticipated environmental or agricultural impacts associated with this strategy.

5.2.6 Irrigation Water Management Strategies

Region K has 246 WUGs, with 26 of them being Irrigation. The existing water supplies available to the irrigators in Region K are not sufficient to meet the projected needs. A shortage would occur in all decades of the planning period should the critical drought be repeated. Using the Region K Cutoff Model with no return flows and assuming full use of the ROR irrigation rights to meet irrigation demands in those operations, the maximum annual shortage is projected to decrease from 335,000 ac-ft/yr in 2020 to approximately 260,000 ac-ft/yr in 2070. The calculated shortages are expected to decrease due to projected decreases in water demand. *Table 5-103* shows the water needs for all of the Irrigation WUGs in Region K and the number of WUGs with water deficits for each decade, and *Table 5-104* shows the irrigation needs for the rice-growing counties (Colorado, Matagorda, and Wharton) in Region K.

Table 5-103 Irrigation Water Needs (ac-ft/yr)

Category Name	2020 Needs	2030 Needs	2040 Needs	2050 Needs	2060 Needs	2070 Needs
Irrigation	(335,489)	(319,584)	(304,106)	(289,044)	(274,387)	(260,124)
No. of WUGs	10	10	10	10	10	10

Irrigation in Mills County has water needs decreasing from 605 acre-feet per year in 2020 to 460 acre-feet per year in 2070. The strategies identified to meet those needs are as follows:

- Drought Management (Discussed in *Section 5.2.4.8.2*)
- Expand Use of the Trinity Aquifer (Discussed in *Section 5.2.4.1.8*)

The water needs for Irrigation in Mills County are fully met through these two strategies.

Table 5-104: Irrigation Water Needs in the Rice-Growing Counties (ac-ft/yr)

County Name	2020 Needs	2030 Needs	2040 Needs	2050 Needs	2060 Needs	2070 Needs
Colorado	(58,954)	(54,493)	(50,152)	(45,927)	(41,817)	(37,816)
Matagorda	(166,548)	(160,843)	(155,291)	(149,889)	(144,632)	(139,516)
Wharton	(109,382)	(103,673)	(98,118)	(92,712)	(87,451)	(82,332)
TOTAL	**(334,884)**	**(319,009)**	**(303,561)**	**(288,528)**	**(273,900)**	**(259,664)**

The remaining Irrigation needs are identified in *Table 5-104* and correspond to Colorado, Matagorda, and Wharton Counties. The strategies recommended by the LCRWPG for Irrigation in these counties are summarized in *Table 5-105*.

All of the recommended strategies are discussed in other sections of Chapter 5. The identified sections are as follows:

- Drought Management (Discussed in *Section 5.2.4.8.2*)
- On-Farm Conservation (Discussed in *Section 5.2.2.4.1*)
- Irrigation Conveyance Improvements (Discussed in *Section 5.2.2.4.2*)

- Sprinkler Irrigation (Discussed in *Section 5.2.2.4.3*)
- Return Flows (Discussed in *Section 5.2.1.1*)
- LCRA WMP Interruptible Water (Discussed in *Section 5.2.3.1.2*)

In addition, while not a yield-producing strategy, HB 1437 is a funding mechanism for implementing strategies including those for irrigation. HB 1437 requires water being transported out of the Colorado River Basin to the Brazos River Basin to be replaced to the extent that there is no net loss of surface water in the Colorado River Basin. One of the methods for replacing that water is through on-farm conservation in the lower three counties. Through the HB 1437 process, farmers within LCRA's irrigation divisions will receive funding of about 80 percent of the total costs, with farmers bearing 20 percent of the cost for implementing conservation.

Table 5-105 Summary of Recommended Water Management Strategies to Meet Irrigation Needs in Colorado, Matagorda, and Wharton Counties

WMS	2020 Needs	2030 Needs	2040 Needs	2050 Needs	2060 Needs	2070 Needs
	(334,884)	**(319,009)**	**(303,561)**	**(288,528)**	**(273,900)**	**(259,664)**
	Strategy Yields (AFY)					
Drought Management	94,641	92,080	89,588	87,163	84,805	82,510
On-Farm Conservation	20,000	26,000	32,000	38,000	44,000	50,000
Irrigation Conveyance Improvements	5,200	17,000	29,000	41,000	53,000	64,300
Sprinkler Irrigation	1,430	7,150	14,300	17,875	17,875	17,875
Return Flows	15,193	15,820	19,038	20,893	22,907	26,044
LCRA WMP Interruptible Water (2010 WMP)	77,880	48,664	19,448	9,724	0	0
(Future LCRA WMP, including OCR supplies)	*	*	*	*	*	*
Remaining Shortage/Surplus	(120,540)	(112,295)	(100,187)	(73,873)	(51,313)	(18,935)

* Availability of interruptible water will be increased using the Lane City OCR and other recommended OCRs; the estimated quantity is subject to WMP amendments through TCEQ and the hydrologic outcome of the current drought.

After the recommended strategies, there are remaining unmet needs for Irrigation in Colorado, Matagorda, and Wharton counties for the 2016 Region K Plan. The remaining unmet needs are identified in *Table 5-105*.

5.2.7 **Manufacturing Water Management Strategies**

Several expand use of groundwater strategies have been identified to meet manufacturing WUG needs. The following regional water management strategies were selected to meet Manufacturing needs:

- Expand Use of the Carrizo-Wilcox Aquifer (Discussed in *Section 5.2.4.1.1*)
- Expand Use of the Ellenburger-San Saba Aquifer (Discussed in *Section 5.2.4.1.2*)
- Expand Use of the Gulf Coast Aquifer (Discussed in *Section 5.2.4.1.4*)

5.2.8 **Mining Water Management Strategies**

The following regional water management strategies were selected to meet Mining needs:

- Expand Use of current groundwater supplies (Discussed in *Section 5.2.4.1*
- Development of new groundwater supplies (Discussed in *Section 5.2.4.2*)
- Edwards/Middle Trinity ASR (Discussed in *Section 5.2.4.4.1*)
- Water Purchase (Discussed in *Section 5.2.4.6*)

There is also identified unmet Mining needs in the 2016 Region K Plan. These needs were identified in Bastrop County in coordination with Region G. The mining industry in that area pumps groundwater to lower the water table in order to allow access to mining activities. It was determined that the Mining demands were not true demands, and therefore did not need to have recommended water management strategies. The unmet Mining WUG needs are as follows:

Table 5-106 Unmet Mining Needs in Region K

WUG Name	County	River Basin	Unmet Needs (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Mining	Bastrop	Brazos	(173)	(409)	(450)	(496)	(545)	(600)
Mining	Bastrop	Colorado	(449)	(3,947)	(4,556)	(5,235)	(5,967)	(6,777)

5.2.9 **Steam Electric Power Water Management Strategies**

Steam-electric needs in the region include those for City of Austin in Fayette and Travis counties, STPNOC in Matagorda County, and a smaller steam-electric entity in Wharton County. The following sections discuss the recommended strategies for meeting the Steam-Electric water needs.

5.2.9.1 COA Steam Electric Water Management Strategies

The City of Austin has steam-electric power needs in Fayette, Matagorda, and Travis Counties. Austin's portion of the South Texas Project (STP) demand is included in the STP total steam-electric demand in

Matagorda County, and is therefore not addressed here. The table below shows the steam-electric water demands in Fayette and Travis Counties.

Table 5-107: COA Steam Electric Power Water Demand (ac-ft/yr)

County Name	2020 Demand	2030 Demand	2040 Demand	2050 Demand	2060 Demand	2070 Demand
Fayette – Austin's portion	14,702	14,702	14,702	14,702	20,702	20,702
Travis	18,500	22,500	22,500	23,500	24,500	26,500
TOTAL	**33,202**	**37,202**	**37,202**	**38,202**	**45,202**	**47,202**

To meet Austin's steam electric power needs, Austin has identified three main water management strategies in addition to current supplies. These are use of water released from the Increased Use of Lake Long Storage strategy (*Section 5.2.3.2.6*), LCRA contract amendment (*Section 5.2.3.1.4*), and additional direct water reuse (*Section 5.2.3.2.2*). These are summarized in the following table showing the steam-electric supplies and water management strategies in Fayette and Travis counties.

Table 5-108: COA Steam-Electric Supplies and Water Management Strategies (ac-ft/yr)

COA Supplies & Strategies	2020	2030	2040	2050	2060	2070
Fayette County						
Supplies						
Existing Supply (Steam Electric - Fayette)	7,887	7,016	7,016	7,016	7,016	7,016
Strategies						
Long Lake Enhanced (Steam Electric) Fayette	2,000	2,000	2,000	2,000	2,000	2,000
LCRA Contract Amendment (Steam Electric) Fayette	6,000	7,000	9,000	11,000	13,000	15,000
Fayette Total	**15,887**	**16,016**	**18,016**	**20,016**	**22,016**	**24,016**
Travis County						
Supplies						
Existing Supply (Steam Electric - Travis)	21,126	21,126	21,126	21,126	21,126	21,126
Strategies						
Direct Reuse (Steam Electric) Travis	3,500	7,500	7,500	8,500	9,500	10,500
Travis Total	**24,626**	**28,626**	**28,626**	**29,626**	**30,626**	**31,626**
Total Steam-Electric	**40,513**	**44,642**	**46,642**	**49,642**	**52,642**	**55,642**

It is anticipated that there will be additional infrastructure needed. The probable costs associated with Austin's direct reuse water management strategy for supplying steam electric needs in Travis County are estimated to be approximately $1,347/ac-ft (as shown in the City of Austin direct reuse section of this chapter). The probable costs associated with Austin's Long Lake off-channel enhanced storage strategy are estimated to be approximately $187/ac-ft (as shown in the City of Austin Long Lake section of this chapter). Costs to amend Austin Energy's contract with LCRA are shown at $151/ac-ft, and are included in the LCRA Contract Amendment section of this chapter.

5.2.9.2 STP Nuclear Operating Company Water Management Strategies

The South Texas Project Electric Generating Station (STP) is a nuclear power facility located southwest of Bay City, in Matagorda County. The facility's demand of 105,000 acre-feet/year is based on higher availability of generation capacity, added generating capacity, and blowdown of the reservoir to maintain water quality. This demand during the 50-year planning horizon will be satisfied significantly through (1) the management strategies of continued run-of-the-river diversions of up to 102,000 ac-ft/yr, under Certificate of Adjudication No. 14-5437[8], (2) continued use of STPNOC's existing off-channel reservoirs authorized under Certificate of Adjudication No. 14-5437; and (3) continued pumpage of groundwater for the purposes of incorporation in STPNOC's processes. Supplementing its run-of-the-river diversions, STPNOC also has a contract with LCRA for firm backup water of 20,000 acre-feet for 2-unit operation and 40,000 acre-feet for additional generating units, for so long as electric generation facilities are operated at the site.

Based on current projections completed for the 2016 Region K Plan, shortages of approximately 25,000 ac-ft/yr or more have been identified commencing as early as 2020 for Steam Electric supplies in Matagorda County during a repeat of the DOR. It is of additional note that STPNOC's run-of-the-river diversions can be affected by water quality at the STPNOC diversion point. In order to support a long-term reliable electric supply for Texas, alternative strategies have been identified for offsetting these shortages and to guard against the continuing escalation in upstream demands which may affect water quality at the current permitted diversion point near the plant, although the recent amendment to the water right to allow diversion upstream of the LCRA Bay City dam may provide some ability to mitigate any water quality impacts.

STPNOC and LCRA negotiated an extension and amendment to the water supply contract in 2006, which helps ensure a long-term, cost effective water supply for the STP plant. Additional and alternative strategies include but are not limited to the following:

- Blend brackish surface water in STPNOC reservoir
- Alternate canal delivery
- LCRA contract amendment
- Dedication of return flows from other users
- Water right permit amendment

Conservation also is an integral part of STPNOC's operational philosophy as documented in the Water Conservation Plan filed with the TCEQ.

5.2.9.2.1. Blend Brackish Surface Water in STPNOC Reservoir

During an emergency situation, when the STPNOC reservoir reaches 30 feet mean sea level (MSL), STPNOC and LCRA will pursue relief from the TCEQ to be allowed to pump brackish surface water to blend in with the existing fresh water in the STPNOC reservoir. A firm yield of 3,000 acre-feet was determined for each decade in the planning period. This strategy has no cost associated with it, no environmental impacts, and no impacts to agriculture.

[8] STPNOC's interest in the water rights evidenced in the certificate are as agent for the STPNOC owners, the City of San Antonio acting through the City Public Service Board, COA, and NRG South Texas, LP.

5.2.9.2.2. Alternate Canal Delivery

The STP facility currently has run of river rights and withdraws cooling water directly from the Lower Colorado River. However, the existing diversion point is very close to Matagorda Bay, which means it is mixed with high salinity water from the bay.

For this strategy, water would be withdrawn from the Lower Colorado River, upstream of the Bay City Dam, and transported to the cooling water reservoir adjacent to the STP. The water pulled upstream of the dam would be better quality (less saline) than the water withdrawn from the existing diversion point. STP's current contract allows diversion from this point, but currently there are no physical means in place to facilitate this.

The source of the water is the same as the current source, flows from the Colorado River. Since this withdrawal is downstream of the new Lane City Off-Channel Reservoir (currently under construction as of the time of this report), releases from this reservoir, or other proposed sources of new LCRA supply, are also a potential source.

The infrastructure required to implement this strategy includes:

- Existing LCRA pump station and irrigation canals, to transport the water through the canals as close as possible to the existing cooling water reservoir.

- New pipeline to transport the water from the irrigation canals to the cooling water reservoir.

STP would have to pay LCRA for the use of their pump station and irrigation canal. The estimated cost is approximately $120-150 per acre-foot.

Since the existing irrigation canals are fairly close to the existing reservoir, the pipeline length to convey water from the canals to the reservoir is expected to be relatively short. For the purposes of this report, the length is assumed to be 1,000 feet.

The yield from this strategy is projected to be 12,727 acre-feet per year. This is based on continuous pumping of 32,000 gallons per minute over only the winter months out of the year. This duration is assumed at 90 days. This will only make up a small percentage of the currently permitted 102,000 acre-feet per year, so the majority of the volume is still expected to come from the existing diversion point. There are no plans to increase the permitted amount at the time of this report.

The project yield from this strategy is shown in the following table.

Table 5-109: Alternate Canal Delivery Project Yield

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Steam-Electric	Matagorda	Colorado	12,727	12,727	12,727	12,727	12,727	12,727

Cost Implications of Proposed Strategy

Costs for this strategy were developed based on background information provided by STP, and the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars.

The following table shows the estimated costs associated with this strategy.

Table 5-110: Cost Estimate for STP Alternate Canal Delivery

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$5,475,000	$7,669,000	$2,593,000	$204.00

Environmental Considerations

Minimal environmental impacts are expected as a result of implementing this strategy, since the same amount of water is being withdrawn, only at a different point. The only potential impact would be to environmental uses between the new withdrawal point (Bay City Dam) and the existing withdrawal point. However, withdrawal could be managed to meet any environmental flows first, before withdrawing from the new withdrawal point. If additional flow is still required, it could be taken from the existing withdrawal point. Thus, environmental impacts should be negligible.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

Negligible impacts to agriculture or natural resources are expected as a result of implementing this strategy since the diversion is planned for the winter months (non-irrigation season).

5.2.9.2.3. LCRA Contract Amendment

An additional contract amendment for 10,000 acre-feet per year with LCRA for each of the planning decades is another way to meet STP needs. LCRA projects such as the Lane City Off-Channel Reservoir are ways to increase LCRA's supply to meet these increased demands for new firm contracts and contract amendments. This strategy, and others, is described in detail in the Off-Channel Reservoirs section of the LCRA Water Management Strategies section.

5.2.9.2.4. Water Right Permit Amendment

A 5 year joint application (14-5437C) between STP and LCRA was filed in 2010 with TCEQ. The application is to amend the water right to allow an average diversion of 102,000 AF over any 5 consecutive years with a single year cap not to exceed 245,000 AF. There is no impact to existing water rights. There is no additional yield, no costs, and no impacts associated with this permit amendment. The joint application was filed with TCEQ in 2010 and is under "technical review".

5.2.9.3 Other Steam Electric Water Management Strategies

An existing industrial plant in Wharton County has a need in 2060 based on their current demands, but also has future plans for expansion. Their run-of-river water right on the San Bernard River does not provide enough firm water to meet their current demands in 2060, leaving the plant with a need of 94 acre-feet per year, which increases to 200 acre-feet per year in 2070. The strategy recommended to meet this need and any potential future needs is the development of a new well field in the Gulf Coast Aquifer. The strategy is discussed further in *Section 5.2.4.2.2*.

Table 5-111: Gulf Coast Aquifer Development Costs

WUG Name	County	River Basin	Total Capital Cost	Total Project Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Steam-Electric	Wharton	Brazos-Colorado	$1,502,000	$2,237,000	$207,000	$1,035.00

5.3 ALTERNATIVE WATER MANAGEMENT STRATEGIES

Due to the ongoing drought, LCRA and the City of Austin are looking at several options to help meet future needs in the decades to come, and would like to include some of the potential strategies as alternative strategies while the evaluation process continues. In addition, one of the Groundwater Importation strategies that have been coordinated with Region L has a modified version that is included in this Alternative Strategy section, and the City of Buda has a Direct Potable Reuse strategy as well.

5.3.1 **Alternative Strategies for LCRA Wholesale Water Supply**

This section contains alternative new water supply options for LCRA. This water would provide additional firm yield to LCRA as a wholesale water provider and could be used to meet various needs throughout Region K. Certain strategies were developed as part of the *Water Supply Resource Plan: Water Supply Option Analysis*, prepared by CH2M Hill for LCRA in July 2009, and the details from that Plan are provided in this report.

Table 5-112: LCRA Wholesale Water Supply Alternative Water Management Strategies (ac-ft/yr)

LCRA Alternative Strategy	2020	2030	2040	2050	2060	2070
Aquifer Storage and Recovery	0	0	5,048	5,048	5,048	5,048
Enhanced Recharge and Conjunctive Use	10,000	10,000	10,000	10,000	10,000	10,000
Import Return Flows from Williamson County	25,000	25,000	25,000	25,000	25,000	25,000
Supplement Bay and Estuary Inflows with Brackish Groundwater	12,000	12,000	12,000	12,000	12,000	12,000
Baylor Creek Reservoir	0	0	18,000	18,000	18,000	18,000
Brackish Groundwater Desalination	0	0	22,400	22,400	22,400	22,400
Groundwater Importation - Carrizo-Wilcox	0	0	35,000	35,000	35,000	35,000
Total	47,000	47,000	127,448	127,448	127,448	127,448

5.3.1.1 Groundwater Importation - Carrizo-Wilcox to LCRA System

As part of their Water Supply Resource Plan, the LCRA developed several alternative water supply options to meet future demands. These new water supply options would provide additional firm yield to LCRA as a regional water provider and could be used to meet various needs throughout Region K. This water supply strategy involves developing approximately 35,000 acre-feet of untreated groundwater from outside the Planning Area and Colorado River Basin and transporting the water to eastern Travis County. This water supply option would utilize groundwater produced from the Simsboro Formation of the Carrizo-Wilcox aquifer in northern Burleson County. A pipeline with a single booster pump station would be required to convey the water to the conceptual delivery point in Travis County.

The basic infrastructure required to accomplish this transfer would include production wells, collection piping and other wellfield facilities, as well as an approximately 80-mile conveyance pipeline and pump stations. For purposes of including this alternate strategy, the well field is assumed to be located in Burleson County, with a delivery point in eastern Travis County at approximately State Highway 130 (SH130) and the Colorado River, but exact location of the well field and delivery point could depart from this assumption. The pipeline alignment conceptually follows SH21, FM 696, and US Highway 290 to its delivery point in the vicinity of SH130. Groundwater pumping rights are assumed to be leased, with annual payments included in the operation and maintenance costs. An alternative option would be to purchase the groundwater via a third party contract.

Cost Implications of Proposed Strategy

Costs for this strategy were developed using the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars. The following table shows the estimated costs associated with this strategy.

Table 5-113: LCRA Alternative Groundwater Importation Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$440,000,000	$614,790,000	$51,445,000	$1,470.00

Environmental Considerations

A quantitative analysis of instream flows and freshwater inflows to Matagorda Bay was performed as part of the 2011 Region K Plan by assuming that 60 percent of the imported groundwater would be discharged as effluent to the Colorado River somewhere downstream of Lady Bird Lake. These additional return flows could increase instream flows and freshwater inflows by up to 21,000 ac-ft/yr.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

No groundwater modeling was conducted as part of this analysis. It is assumed that the production of this volume would conform to the water management plan and rules of the Post Oak Savannah Groundwater Conservation District. However, review of the groundwater conservation district's management plan suggests that 35,000 acre-ft may be available for production and use.

Agricultural & Natural Resources Considerations

There are no direct impacts to agriculture or natural resources anticipated from this strategy; however, to the extent that this strategy were implemented in a manner that reduced firm demands on the Colorado River supplies, it is possible that additional interruptible water of up to 35,000 ac-ft/yr could be made available for agricultural purposes.

5.3.1.2 Import Return Flows from Williamson County

LCRA has been evaluating water management strategies to develop water supplies by importing 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.

A recent engineering study evaluated various options for returning water back to the Colorado River basin. The most likely source of return flows is the Brushy Creek Regional Wastewater Treatment Plant (BCRWWTP) which currently discharges into Brushy Creek which is in the Brazos River Basin, but return flows could also be secured from the Leander wastewater treatment plant, which also discharges further upstream into Brushy Creek, in the Brazos River basin.

Two options have been considered: 1) return flows could be pumped directly from the BCRWWTP through a 16-mile transmission pipeline to the mid-basin reservoir proposed as an LCRA strategy in this regional plan or to other terminal storage, or 2) return flows could be discharged to Brushy Creek from the BCRWWTP and/or the Leander WWTP and a bed-and-banks permit would be used to transport the water downstream for diversion at a pump station that would pump the water through an 11-mile transmission pipeline to Wilbarger Creek which feeds into the Colorado River. The return flows can be transported by the bed-and-banks of Wilbarger Creek and the Colorado River to diversions points of LCRA's firm customers, or to one of the off-channel reservoirs. Alignments and cost estimates were prepared for LCRA by the engineering consultant. LCRA may need to obtain an interbasin transfer permit to import return flows from the Brazos River basin to the Colorado River basin. LCRA will likely also secure a bed and banks permit to retain ownership and control of the imported return flows once discharged into the Colorado River basin.

For the 2016 Regional Water Plan, Option 1 has been evaluated since it has more infrastructure requirements and a longer pipeline route. Based on these criteria, the water management strategy will consist of:

- Obtain necessary water rights permits, construction of tertiary treatment upgrades at BCRWWTP, a pump station and storage tank at BCRWWTP, and a water transmission pipeline.

The BCRWWTP is located east of the city of Round Rock on Highway 79. For purposes of this strategy, the available yield of water from this project is assumed to be approximately 25,000 acre-feet/year (22.3 MGD Average) for all planning decades.

The infrastructure required for this strategy was determined by LCRA's engineering consultant. The following infrastructure was proposed.

- Pump Station and Storage Tank at BCRWWTP
- Tertiary Treatment upgrade at BCRWWTP
- Approximately sixteen (16) miles of transmission piping and appurtenances

Cost Implications of Proposed Strategy

A capital cost estimate was provided by the engineering consultant using the Texas Water Development Board (TWDB) Cost Estimating Tool. The Cost Estimating Tool was also used to determine operating costs. The capital cost for this strategy is primarily driven by the cost of the transmission pipeline.

The following table shows the estimated costs associated with this strategy. Costs are given in September 2013 dollars.

Table 5-114: LCRA Alternative Import Return Flows from Williamson County Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$38,072,000	$54,193,000	$5,476,000	$219.00

Environmental Considerations

Either option will need to ensure that water quality is not degraded as a result of discharge to a mid-basin reservoir or Wilbarger Creek. Infrastructure improvements identified at the WWTP include tertiary treatment for phosphorus removal before effluent can be discharged into a reservoir.

The discharge point shall be at a point in the reservoir or creek where it has sufficient capacity to handle the additional flow without detrimental effects to a reservoir or stream banks. The environmental impact should be low.

Depending on where the imported return flows are used, water available to help meet instream flows in the Colorado River could increase up to 25,000 ac-ft/yr as a result of the imported return flows. Return flows that are not stored and/or used to meet local or downstream demands could help meet freshwater inflow needs of Matagorda Bay.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

Depending on firm demands, imported return flows could be used by LCRA to meet firm demands that would otherwise be met from stored water releases from the Highland Lakes, potentially increasing availability of interruptible water supply up to 25,000 ac-ft/yr. Imported return flows may also be used to directly increase the amount of interruptible water supply available for agricultural water users.

Interbasin Transfer Considerations

In order 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. In order to implement this strategy, LCRA would need to comply with all of the provisions stated in the Code. One of the provisions requires a comparison of the water needs in the basin of origin to the water needs in the proposed receiving basin. The projected water needs (2020-2070) for the Brazos River Basin and the Colorado River Basin, as determined using data from DB17 provided by TWDB, are shown in the table below.

Table 5-115: Total Water Needs Comparison between Brazos and Colorado River Basins (Ac-Ft/Yr)

Total Water Needs	2020	2030	2040	2050	2060	2070
Brazos River Basin	1,362,351	1,471,274	1,601,219	1,719,960	1,795,282	1,974,436
Colorado River Basin	504,701	606,420	697,358	776,096	873,078	1,018,290

LCRA recently completed its 2014 Water Conservation Plan that addresses water conservation practices for its firm water customers (municipal, industrial, power generation and recreational). These efforts include five-year and 10-year implementation plans that will guide effective water conservation throughout communities in LCRA's rapidly growing service area and may achieve highest practicable levels of water conservation. More details on the 2014 Water Conservation Plan can be found online at:

http://www.lcra.org/water/save-water/Documents/2014-Water-Conservation-Plan.pdf

Details related to the conservation efforts recommended for LCRA as a wholesale water provider are discussed in *Section 5.2.2.1*.

5.3.1.3 Supplement Bay and Estuary Inflows with Brackish Groundwater

Brackish groundwater delivery to the Matagorda Bay Delta is considered as a potential water management strategy for the LCRA (wholesale water provider) to offset required releases from the Highland Lakes. By developing a new source to meet environmental needs, the firm supply normally released from the Highland Lakes to meet bay and estuary inflow requirements can remain in the Highland Lakes and become a firm supply for LCRA's existing and future customers. Equivalence of brackish groundwater to achieve the same effect as a volume of water released from the Highland Lakes would be a function of the brackish and groundwater total dissolved solids (TDS) values, the effectiveness of delivery directly to the lower marsh versus through the channel, and the amount of released water that reaches the Bay.

As part of its plan for growth, LCRA is considering brackish groundwater delivery for Bay & Estuary needs as a potential water source strategy in the 2016 Regional Water Plan. The strategy would consist of:

- Obtaining a permit from Coastal Plains GCD
- Developing a well field in the Matagorda Bay Delta with associated piping for discharge into the lower marsh.

A preliminary project concept sizes the well field supply with a capacity of 12,000 ac-ft/yr and a peak pumping capacity of 3,150 ac-ft per month could be potentially feasible, depending on results of future studies.

The infrastructure required for this strategy consists of:

- Twelve (12) brackish groundwater wells, depths up to 1,200 ft
- Simple Outfall Structure

Cost Implications of Proposed Strategy

A project cost estimate was provided by LCRA. The capital cost estimate is in September 2013 dollars using the Texas Water Development Board (TWDB) Cost Estimating Tool. The capital cost for this strategy is primarily driven by the cost of the well fields.

The following table shows the estimated costs associated with this strategy.

Table 5-116: LCRA Alternative Supplement Bay & Estuary Inflows with Brackish Groundwater Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$22,871,000	$34,966,000	$6,003,000	$500.00

Environmental Considerations

Timing and location of delivery of brackish groundwater could have equal or possibly more effective impacts to the bay than releases from Highland Lakes' storage. Modeling and potential pilot testing would be necessary to determine effects of incoming salinity and delivery location. Instream flows would possibly be reduced by up to 12,000 ac-ft/yr as a result of not releasing stored water.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

This strategy could be used by LCRA to help meet environmental needs that would otherwise be met from stored water releases from the Highland Lakes, potentially increasing availability of interruptible water supply by up to 12,000 ac-ft/yr.

5.3.1.4 Brackish Groundwater Desalination from the Gulf Coast Aquifer (Desalination)

This alternative strategy includes the extraction of brackish groundwater from the Gulf Coast Aquifer in Matagorda County, its treatment using reverse osmosis (RO), and the delivery of approximately 22,400 acre-feet per year (20 mgd) of potable to Bay City are for municipal and industrial use, beginning in the 2040 decade. The RO permeate (waste generated in the RO process) would be disposed of directly into the ground via a deep injection wellfield.

Cost Implications of Proposed Strategy

Costs for this strategy were developed using the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars. The following table shows the estimated costs associated with this strategy.

Table 5-117: LCRA Alternative Brackish Groundwater Desalination Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$198,250,000	$277,006,000	$23,180,000	$1,035.00

Environmental Considerations

The Matagorda Bay region includes a significant amount of acreage designated as wetlands, which serve as the habitat for numerous terrestrial and marine species, some of which are threatened and/or endangered. Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Some additional potential environmental impacts would be related to the potential degradation of the quality of the groundwater in the vicinity of the proposed wells, and the management of the RO waste and byproducts such as concentrated salt solution. The current groundwater availability models do not include quality information or capability to model changes in water quality. For that reason, it is not possible to determine whether or not the flows being pumped will impact the overall quality of the aquifer in this area. Management of the concentrated salt solution by deep well injection should adequately confine the materials within deep aquifers with similar salt concentrations to minimize any negative impacts.

Using local groundwater sources could reduce the amount of water released by the Highland Lakes to meet downstream customer needs by up to 22,400 ac-ft/yr. The released water provides instream flows on its way to the customer, so the instream flows in the Colorado River could potentially be reduced by 22,400 ac-ft/yr.

Agricultural & Natural Resources Considerations

This strategy does not put increased demand on water supplies already being used by agriculture and does not move supply from agricultural uses to other usage. To the extent that the supplies would be used to offset a demand that may otherwise need to be met with Colorado River water, and depending on when those demands materialize, it is possible that incorporation of these supplies into LCRA's system will allow additional interruptible water of up to 22,400 ac-ft/yr to be made available for agricultural purposes.

5.3.1.5 Baylor Creek Reservoir

This strategy consists of a new, 48,390 acre-foot earthen dam reservoir, located in Fayette County, adjacent to the Cedar Creek Reservoir (Lake Fayette) and the Fayette Power Project power plant. This facility is permitted by TCEQ; however, the permit states construction was to begin by September 18, 2014, and complete by September 18, 2017. LCRA has applied for a time extension to the permit for construction to start and a draft permit amendment has been issued by TCEQ.

The purpose of this reservoir is to capture available river not needed downstream and store the captured water for later use. The demand served by this strategy would be industrial use, in the form of cooling water requirements for the adjacent power plant. With water right amendments, the project could also provide water to downstream industrial demands and environmental uses.

The infrastructure required to implement this strategy includes:

- New 48,390 acre-foot earthen dam reservoir.

- A new river intake, pump station, and two 108-inch diameter, 20,600-foot long pipelines, to pump from the river to the reservoir.
- Two 108-inch diameter, 100-foot long pipelines, bypassing the pump station to return flows to the river.
- Two stilling basins, one in the new reservoir and one in the existing river.

The maximum authorized impoundment amount for this reservoir is 48,390 acre-feet. Currently, the Baylor Creek permit only authorizes diversion and storage of water appropriated under the Highland Lakes water rights and use of that water for industrial purposes (steam-electric cooling). In order to develop a firm yield from the project, multiple permit amendments would be needed to the existing Baylor Creek permit and perhaps other LCRA ROR permits to authorize diversion and storage of ROR flows. Based on information provided by LCRA, the firm yield from this strategy could be 18,000 acre-feet per year, starting in the year 2040. This assumes the Lane City off-channel reservoir (currently under construction as of early 2015) is completed and online.

Cost Implications of Proposed Strategy

Costs for this strategy were developed based on information provided by LCRA, and the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars.

The following table shows the estimated costs associated with this strategy.

Table 5-118: LCRA Alternative Baylor Creek Reservoir Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$130,000,000	$179,000,000	$16,200,000	$900

Environmental Considerations

The Baylor Creek Reservoir would rely on capturing available river flows for its yield. Thus environmental impacts compared to a reservoir on the Colorado River should be negligible.

This reservoir has limited environmental impact as diversions would be made under amended existing rights. The LCRA off-channel reservoir strategies (Lane City, Mid-Basin, and Excess Flows OCRs) allow for releases of water for improved water quantity and quality for environmental uses. This strategy could potentially remove up to 18,000 ac-ft/yr from the Colorado River that otherwise might not have been captured (See *Section 5.5.3* for additional information).

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

The construction of the Baylor Creek Reservoir will lessen the need to send Highland Lakes' water to customers near the coast and could improve agricultural water reliability and efficiency. The new reservoir will increase LCRA's operational flexibility, which, in turn, has the potential to enhance the availability of freshwater to the region, including farmlands, managed waterfowl habitat and coastal wetlands. This project could potentially provide up to 18,000 ac-ft/yr of water for agriculture purposes, depending on firm customer needs.

5.3.1.6 Aquifer Storage and Recovery (ASR) Carrizo-Wilcox

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. A firm yield of 5,048 ac-ft/yr was determined for this strategy, beginning in 2040, which assumes the water is diverted when river flows exceed immediate water demands. 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.

The volume of surface water diversions is based on the October 2014 Colorado River basin water availability model. This project assumed the diversion would be a new appropriation, and thus a junior water right, and subject to yield determination from the TCEQ Colorado River WAM, rather than the Region K Cutoff Model, and that the TCEQ SB3 environmental flow standards apply to the permit. To create a firm supply, surface water flows are diverted when available, treated, and either delivered directly for use or stored in an adjacent aquifer for subsequent recovery. ASR wells will be required regardless of the aquifer that is used for storage. In the event the Carrizo-Wilcox Aquifer is used, the proposed ASR wells would likely be located in Bastrop County.

The source of the water for the project is assumed to be the Colorado River through a raw water intake in Bastrop County. Raw water would be conveyed to a new water treatment plant. Components of the WTP include an inline rapid mix, backwash supply pump station, recarbonation basin, gravity thickener, clarifier, oxidant/disinfection contactor, backwash waste equalization basing, centrifuges, all chemical storage and feed systems, media filters, treated water storage, high service pump station, and operations and maintenance buildings.

To satisfy the water demand, a high service pump station would feed treated water through a 5 mile, 24-inch diameter pipeline along the SH-71 right-of-way, to a currently undetermined delivery point. The pipeline diameter was designed to maintain flow velocities between 5 and 7 feet per second.

Treated water in excess of the demand would be sent to the ASR wellfield. A medium service pump station and ground storage tank are required at both the water treatment plant and the ASR wellfield. The dual locations are required to meet the peak day demands at all times. The ASR wellfield, would include nine (9), 6-inch diameter wells that are spaced at 0.5 mile intervals.

Cost Implications of Proposed Strategy

Costs for this strategy were developed using the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars. The following table shows the estimated costs associated with this strategy.

Table 5-119: LCRA Aquifer Storage and Recovery Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$28,162,000	$39,590,000	$5,430,000	$1,076.00

Environmental Considerations

Any diversion of surface water as a new appropriation will be subject to TCEQ's SB3 environmental flow standards which are considered adequate to support a sound ecological environment, to the maximum extent reasonable, considering other public interests and other relevant factors. Therefore, since diversions will be subject to the standards, this strategy is not expected to significantly adversely impact environmental flows because diversions are not likely to be possible at times that could impair water quality or other environmental flow considerations.

Limited impacts are anticipated to instream flows and freshwater inflows, due to the junior status of the diversion. Compliance with target bay and estuary inflows would be slightly reduced, although applied SB3 environmental flow requirements are met. The environmental impacts of this strategy on the Colorado River and Matagorda Bay were re-evaluated in this round of planning. Discussion of the methodology behind the impact analysis is in *Section 5.5*. Results of the impact comparison are provided in Appendix 5D.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

The implementation of this strategy would lessen the need to send Highland Lakes' water to potential customers in the Bastrop County area and could improve agricultural water reliability and efficiency. This strategy could increase LCRA's operational flexibility, which, in turn, has the potential to enhance the availability of freshwater to the region, including farmlands, managed waterfowl habitat and coastal wetlands, of up to 5,048 ac-ft/yr.

5.3.1.7 Enhanced Recharge

Enhanced recharge is considered as a potential water management strategy for the LCRA for agricultural shortages in the lower Colorado River Basin. Enhanced recharge can be accomplished in a variety of ways: spreading basins, vadose zone injection wells, direct injection wells, and aquifer storage and recovery (ASR) wells. Only spreading basins are considered in this strategy.

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. The recharge basins would be designed and maintained to promote rapid entry of the water in the basins into the aquifer. The source of recharge water could be a low reliability junior water right, or it could be from one of LCRA's senior ROR water rights, particularly in the winter months when water is not otherwise being diverted. If a new junior water right is used, environmental flow requirements and senior water rights must be satisfied before water can be diverted from the river, resulting in very low reliability as a direct supply. Water for recharge is not clearly defined by the water code as a beneficial use and if existing permits are used, amendments are likely needed to add recharge as an authorized use. 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.

This project provides a place to store water diverted during high flows, prevents evaporative losses of the stored water, and provides a distribution system of the water through the groundwater aquifer.

The strategy would consist of:

- Providing engineered rapid infiltration basins and providing recovery wells utilizing existing diversions and canal systems.

Water conveyance capacity for the proposed recharge basins was evaluated for LCRA by a consultant and estimated an aquifer transmission capacity of 10,000 ac-ft/yr.

The following infrastructure was proposed.

- Four (4) recharge basins 600' wide x 1,500' long x 4' high
- Simple Intake Structure with pipe extending to existing canal
- Two (2) Pump Stations
- Approximately 0.5 miles of transmission piping and appurtenances
- Combination of 28 new and 27 leased wells

Cost Implications of Proposed Strategy

A capital cost estimate was provided by LCRA from a preliminary feasibility analysis. The capital cost estimate was in August 2011 dollars. In order to provide a comparable cost consistent with other strategies in this report, costs were adjusted to September 2013 dollars using the ENR Construction Cost Index. The capital cost for this strategy is primarily driven by the cost of the recharge basins and well fields.

Costs for this strategy were developed using the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars. The following table shows the estimated costs associated with this strategy.

Table 5-120: LCRA Alternative Enhanced Recharge Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$37,352,000	$53,504,000	$8,335,000	$834.00

Environmental Considerations

If a new junior water right is used, instream flow and freshwater inflow requirements would be met before water can be diverted, thereby limiting impacts to the environment. Pulse flows in the river could potentially be reduced by up to 10,000 ac-ft/yr (See *Section 5.5.3* for additional information).

Agricultural & Natural Resources Considerations

Positive impacts of up to 10,000 ac-ft/yr to agriculture are expected as a result of implementing this strategy, due to the ability to provide water supply for agricultural purposes that can be accessed during drought periods.

5.3.2 City of Austin Alternative Strategies

The City of Austin is looking at a number of strategies as a result of the work done by their Water Resources Planning Task Force in 2014. Two of the strategies they would like to keep in consideration, but did not wish to include as recommended strategies.

5.3.2.1 COA Brackish Groundwater Desalination

This strategy includes the extraction of brackish groundwater from down-dip brackish zone of the Edwards Aquifer, in the southeast area of Austin, near US Highway 183 and SH 130. Another potential source of brackish groundwater for consideration includes the Carrizo/Wilcox aquifer. This strategy will require a desalination plant, drilling and completion of 21 production wells and 8 disposal wells, and extensive land purchase. This strategy is expected to deliver approximately 5,000 acre-feet per year, once implemented.

The projected yield from the strategy is shown in the following table.

Table 5-121: COA Alternative Brackish Groundwater Desalination Project Yield

Water Management Strategies (ac-ft/yr)					
2020	2030	2040	2050	2060	2070
0	5,000	5,000	5,000	5,000	5,000

Cost Implication of Proposed Strategy

The cost of this strategy was estimated using the Texas Water Development Board (TWDB) Cost Estimating Tool. A source water TDS of 3,000 mg/L is assumed for cost calculations.

The following table shows the estimated costs associated with this strategy. All costs are given in September 2013 dollars.

Table 5-122: COA Alternative Brackish Groundwater Desalination Costs

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$38,672,000	$54,582,000	$7,613,000	$1,523.00

Environmental Considerations

Appropriate permits need to be obtained for disposal of concentrate brine. The strategy will require obtaining a permit from Baron Springs/Edward Aquifer Conservation District (BS/EACD). If water volumes for this strategy stay within the MAG, negligible impacts to aquifer levels and springflows are expected.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

No impact to agricultural resources is expected as part of this strategy.

5.3.2.2 COA Reclaimed Water Bank Infiltration to Colorado Alluvium

This storage strategy consists of using an infiltration basin to recharge the local Colorado Alluvium formation. Water in the Colorado Alluvium formation would be available for recapture, treatment and use by the City of Austin.

For this strategy, treated effluent from the South Austin Regional Wastewater Treatment Plant (SAR WWTP) is proposed as the water source. The effluent would be discharged into an infiltration basin where the water would be spread over the local Colorado Alluvium formation as a form of subsurface storage. Alluvial wells along the Colorado River would be constructed to recapture the water from the alluvium formation. The recaptured water would be pumped to a Water Treatment Plant (WTP) for treatment and distribution into the water system.

The application of this strategy would require the completion of several tasks. Significant land purchases would be required to construct the infiltration basin and alluvial wells. An infiltration basin and alluvial wells will have to be constructed for withdrawal of the water from the local Colorado Alluvium formation. The recaptured water will have to be pumped to the WTP requiring construction of a pump station, piping, and easements.

This strategy will have an implementation time of 5 to 10 years. The estimated yield is shown in the following table.

Table 5-123: COA Alternative Reclaimed Water Bank Infiltration Project Yield

Water Management Strategies (ac-ft/yr)					
2020	**2030**	**2040**	**2050**	**2060**	**2070**
0	15,000	20,000	25,000	30,000	30,000

Cost Implications of Proposed Strategy

Costs for this strategy were developed based on background information provided by the City of Austin, and the Texas Water Development Board (TWDB) Cost Estimating Tool. Consistent with the tool, all costs are given in September 2013 dollars.

The capital cost for this strategy is primarily driven by the purchase of the required easements/land and construction of the proposed infiltration basin, alluvial wells, reclaimed pump station and pipelines.

The following table shows the estimated costs associated with this strategy.

Table 5-124: COA Alternative Reclaimed Water Bank Infiltration Costs

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$108,675,000	$151,846,000	$12,706,000	$424.00

Environmental Considerations

The reclaimed water bank infiltration strategy will require treatment and other environmental permitting.

No environmental impacts are assumed for the reduced effluent flow from the SAR WWTP as a result of the effluent being diverted to the local Colorado Alluvium formation. Use of the effluent flow from the SAR WWTP will lower the effluent flow available for the City of Austin water reuse system. See *Table 5-31* for the volume of return flows to the Colorado River after reuse strategy volumes are accounted for.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

No impacts to agriculture or natural resources are expected as a result of implementing this strategy.

5.3.3 Other Alternative Water Management Strategies

The following two strategies are included in the 2016 Region K Water Plan as alternative strategies for the City of Buda.

5.3.3.1 HCPUA Pipeline (Alternative)

This strategy is described in detail in the Groundwater Importation section of this report as a recommended strategy. See *Section 5.2.4.3.2* for additional information. This same strategy is included here as an alternative strategy. The only difference is for this alternative strategy, the amount of available groundwater is assumed to be greater, providing a larger yield for the WUG recipients of water from the project. This results in a greater size for the overall project and a better unit cost per acre-foot of water.

The following table below lists the projected water use of this strategy.

Table 5-125: Alternative HCPUA Pipeline Project Yield

WUG Name	County	River Basin	Importing From			Water Management Strategies (ac-ft/yr)					
			Region	County	Aquifer	2020	2030	2040	2050	2060	2070
Buda	Hays	Colorado	L	Gonzales	Carrizo-Wilcox	0	667	1,690	2,974	4,033	4,426

The following table below describes the estimated costs for this strategy. The unit cost decreases in the alternative version due to economy of scale for a larger overall project.

Table 5-126: Alternative HCPUA Pipeline Project Costs

WUG Name	County	River Basin	Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
Buda	Hays	Colorado	$33,355,990	$51,128,546	$7,308,685	$1,664.00

Detailed information for this strategy is included in the previously mentioned section, and also in the 2016 South Central Texas Regional Water Plan.

5.3.3.2 Direct Potable Reuse

The City of Buda (City) has contracted with the consulting engineer responsible for design of the Buda WWTP Phase III Expansion project to perform a Feasibility Study for evaluation of direct potable water reuse (DPR) alternatives. A draft Feasibility Study Report was submitted in May, 2015 defining feasibility, anticipated treatment process, proposed improvements, regulatory requirements, and planning-level cost estimates for a potential 1.5 MGD to 2 MGD Direct Potable Reuse project. This reuse project would be in addition to the non-potable direct reuse project recommended for the City, as discussed in *Section 5.2.5.4.2*.

As part of the feasibility study phase, the City of Buda met with all TCEQ staff involved in approval of DPR projects. This meeting confirmed the regulatory feasibility of the proposed DPR project and provided definition of the procedures required by TCEQ for implementation. The City of Buda plans to conduct 12 months of detailed effluent water quality sampling in 2016 in accordance with TCEQ's requirements, in order to finalize the Feasibility Study Report for the City's use in a decision on whether to proceed with DPR. If this decision (anticipated in 2017) is to proceed with development of a potential DPR project, the City will then proceed with pilot study design and pilot testing, to be followed by full scale design and construction of DPR facilities. Pilot testing through construction would take place over a 5 year period.

This strategy is expected to provide 2,240 ac-ft/yr of potable water supply, beginning in the 2020 decade and extending through the planning period to 2070.

Cost Implications of Proposed Strategy

Based on the Feasibility Study Report assumptions and preliminary findings, the cost estimate includes a DPR WTP with 2.0 MGD capacity; modifications at the Buda WWTP site including effluent transfer pumping facilities and biological denitrification process; facilities for treatment and disposal of wastes from the DPR WTP treatment process under a TPDES permit; and offsite finished water pipeline, storage, and blending facilities.

In September 2013 values, the probable cost for City to develop this DPR project is approximately $26,779,000. This strategy will have a total annual cost (including operations and maintenance) of approximately $2,941,000 per year. The opinion of probable unit cost of reclaimed water is $1,313 per ac-ft.

Environmental Considerations

If the City of Buda decides to proceed with implementation of Direct Potable Reuse, it is anticipated that residuals from the DPR WTP treatment process would be further treated, then co-disposed with the Buda WWTP effluent under a TPDES permit. As a result, the Total Dissolved Solids (TDS) concentration of the WWTP effluent return flow to the Plum Creek watershed would be increased, but would remain within water-quality based limits authorized by TCEQ through the TPDES permitting process. Regulated constituents (chloride, sulfate) concentrations in the return flow to Plum Creek would also be increased, subject to TPDES permit limits.

For discharge to Andrews Branch, TCEQ's water quality modeling method is based on existing ambient segment concentrations of 867.8 mg/L TDS, 117.5 mg/L chloride, and 88 mg/L sulfate, and segment criteria of 1,120 mg/L TDS, 350 mg/L chloride, and 150 mg/L sulfate. Preliminary evaluations done for the DPR Feasibility Study indicated that TPDES limits of 1,314 to 1,324 mg/L TDS and 178 mg/L sulfate may be needed for disposal of residuals from a proposed 2 MGD DPR WTP treatment process through co-discharge with 1.5 MGD of WWTP effluent. TPDES limits did not appear to be required for chloride. These anticipated discharge parameters will be better defined through the 12-month period of effluent water quality sampling planned to be performed during 2016. The required post-treatment for DPR WTP residuals and resulting blended discharge water quality parameters will be estimated based on the effluent water quality data.

The City discharges treated effluent to tributaries of Plum Creek, and by increasing the effluent reuse, will reduce the effluent discharge to natural waterways by up to 2,240 ac-ft/yr.

Refer to Chapter 1, *Appendix 1A*, for the complete list by County of threatened and endangered species in the Lower Colorado Regional Water Planning Area. These species may need to be considered during construction of infrastructure.

Agricultural & Natural Resources Considerations

No impacts to agriculture are expected, as a result of implementing this strategy.

5.4 CONSIDERED, BUT NOT RECOMMENDED OR ALTERNATIVE STRATEGIES

The TWDB rules require the RWPG to evaluate all potentially feasible water management strategies to meet the Region's identified demand deficits. Feasibility is based on evaluation criteria established by the TWDB and the RWPG including project cost, unit cost, yield, reliability, environmental impact, local preference, and institutional constraints. Several water management strategies were identified and evaluated in terms of the potential impact on the Lower Colorado Region as a whole. After initial evaluation, some water management strategies were determined by the RWPG to not be suitable for consideration at this time. These strategies are discussed in the following sections.

In-Channel Dams in Lower Basin

The use of small in-channel inflatable dams on the main stem of the Lower Colorado River has previously been considered as a method to add additional system storage in the Lower Basin and to improve system operations and diversions for water systems in this area. A fairly detailed study of this strategy was conducted by the LCRA in 1997 which evaluated the feasibility of constructing various sized small channel dams using inflatable rubber "bladders" within the Lower Colorado River between Bastrop and Wharton.

The dams which were evaluated consisted of different sizes and designs ranging from approximately 3 to 10 feet in height depending on the channel characteristics at each location considered. Preliminary site locations were evaluated based on criteria designed to minimize impacts to the environment and enhance potential benefits by containing lake elevations inside the existing channel, allowing safe passage of floods by deflating the bladder and folding the dam into the channel during flood events, and providing positive impacts to local communities through enhanced water supply and recreation opportunities. System benefits were estimated in the previous study to potentially range from a combined 10,000-25,000 acre-feet/year through improvements in the flexibility of releases from the Highland Lakes and by allowing for reduced operational losses in the system.

The LCRWPG is interested in conducting future additional studies for this strategy in order to further evaluate the potential dam site locations and their respective water supply and operational benefits, and to quantify the expected environmental impacts of these in-channel dam structures as well as potential impacts to downstream water rights holders. Known environmental issues include the creation of: 1) increased fluctuation of water levels in the river, 2) temporary obstruction to fish migration, 3) potential barriers to sediment transport, and 4) possible eutrophication complications. At the same time, there are potential desirable environmental features created by these potential structures, such as providing: 1) locally increased river pool depths, 2) reduced extreme temperatures during summer and winter seasons,

3) increased habitat variability, and 4) other smaller positive impacts. Further study is needed to determine if some, if not all, of the various issues associated with this future potential water management strategy could be mitigated.

Surface Water Infrastructure Expansion

This water management strategy was scoped to be considered for water user groups or wholesale water providers that needed to expand/improve their infrastructure in order to utilize existing available surface water via current contracts or water rights to increase their water supply.

This strategy was included in the Scope of Work to be used as needed by water user groups, but in the case of the City of Austin, they determined to expand their distribution system rather than expand or provide new transmission capabilities.

Reduced Lake Evaporation by City of Austin

The water management strategy consisted of applying a NSF-approved, biodegradable product to cover the surface of lakes to reduce and/or minimize water losses due evaporation.

The product is made from insoluble fatty acids from coconuts and palm, and comes in a powder form which biodegrades within 72 hours. Literature on the product and process indicates that evaporation could be reduced by 20 to 30%. The product would need to be regularly applied to the surface of lakes, using a spreading process such as application of the stern of a motor boat. It was expected that this strategy would deliver 1,000 acre-feet per year once implemented.

Issues that need to be considered as part of this strategy is the impact on the lake environment by limiting oxygen transfer between air and water, impact on lake temperature, and impact on recreational boaters. Further study would be required.

Move South Austin Regional (SAR) WWTP Discharge above Austin Gauge by City of Austin

This water management strategy consisted of relocating a portion of the SAR WWTP treated effluent discharge to upstream of the Colorado River flow gauge, Austin Gauge. The gauge is currently located near US 183 bridge over the Colorado River, and downstream of the Longhorn Dam.

The goal is to use a portion of the discharge flow to meet environmental flow requirements at the Austin Gauge. LCRA's Water Management Plan (WMP) requires LCRA to maintain a 46 cubic feet per second (cfs) minimum flow at the gauge. The impact of this strategy would be realized when maintaining environmental flow at this gauge is the controlling factor in LCRA releases from upstream reservoirs (Highland Lakes). Currently, the City of Austin has already constructed a reclaimed water line from the SAR WWTP to Roy Guerrero Park and Krieg Fields for irrigation. The Krieg Fields reclaimed water line could be used to discharge flow below Longhorn Dam.

After preliminary review, the City of Austin removed this strategy from consideration.

Construct Goldthwaite Channel Dam in Mills County

This strategy was considered by the Region K planning group, but was removed from the final adopted 2016 Region K Water Plan as a recommended strategy following the public comment period on the Initially Prepared Plan. To meet TWDB Scoping requirements, the details of the original analysis are provided below.

A strategy involving the construction of a new channel dam below the City's existing diversion structure has been included in previous Region K Plans.

For this strategy, a channel dam below the City's existing diversion structure would be constructed on the Colorado River. This dam structure would be located downstream of the City's existing structure. The channel dam would be approximately 10-20 feet in height and the construction of this structure would provide a source of water for the City's diversion pumps, allowing the City to continue providing service for a longer period without flow in the river. The water impounded behind this dam would provide a reasonably consistent source of water from which to pump, as well as an additional 400-1,100 ac-ft/yr when available; TCEQ WAM Run 3 modeling with SB3 environmental flow requirements applied showed that this supply would not be a firm supply during the drought-of-record. The City would consider entering into a partnership with the Fox Crossing Water District, LCRA, or private landowners to construct the channel dam. The actual size and location of this structure should be determined by engineering studies, this report only contains estimated values.

There is no firm yield associated with this strategy, as shown in the following table.

Table 5-127: City of Goldthwaite Channel Dam Project Firm Yield

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Goldthwaite	Mills	Colorado	0	0	0	0	0	0

Capital costs for this strategy were developed based on scaling up the costs from the 2011 Region K Plan to September 2013 dollars, using the Construction Cost Indices in the Texas Water Development Board (TWDB) Cost Estimating Tool. The tool was also used to generate the project cost and annual cost. Since the firm yield is assumed to be zero, there is no unit cost given.

The following table shows the estimated costs associated with this strategy.

Table 5-128: City of Goldthwaite Channel Dam Cost

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$2,056,000	$3,583,000	$285,000	N/A

The following is a summary of the advantages and disadvantages for this alternative:

Advantages

- Operation of the City's water system would remain the same

Disadvantages

- Construction of the dam would require acquisition of land or the rights to inundate land
- Construction of a channel dam would require a water rights permit amendment
- Construction of a channel dam may have environmental impacts
- Future sedimentation of the reservoir may become an issue

Environmental Considerations

No downstream water rights would be affected due to the junior status of the reservoir, and compliance with target bay and estuary inflows would not be reduced, with applied SB3 environmental flow requirements being met. The environmental impacts of this strategy on the Colorado River and Matagorda Bay were re-evaluated in this round of planning.

City of Goldthwaite – San Saba Raw Water Supply Line

This strategy was considered, but not recommended, because construction was completed during the planning process. The yield generated by this project is included in the 2016 Region K Water Plan as an existing supply in Chapter 3. To meet TWDB Scoping requirements, the details of the original analysis are provided below.

This strategy involves diverting raw water from a TCEQ-approved City of San Saba third diversion point on Mill Creek, downstream of Mill Pond. Mill Creek is a spring-fed creek in San Saba County. The water will be conveyed to the City of Goldthwaite's existing raw water transmission infrastructure north of the Colorado River.

The infrastructure required to implement this strategy includes:

- New intake structure.
- 13.4 miles of raw water transmission pipeline.

According to the Water Conservation and Drought Survey response, the estimated firm yield from this strategy is 245 acre-feet per year, as shown in the following table.

Table 5-129: City of Goldthwaite Raw Water Supply Line Yield

WUG Name	County	River Basin	Water Management Strategies (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Goldthwaite	Mills	Colorado	245	245	245	245	245	245

Costs for this strategy were developed based on bid information, and the Texas Water Development Board (TWDB) Cost Estimating Tool. Costs were developed in September 2013 dollars.

The following table shows the estimated costs associated with this strategy.

Table 5-130: City of Goldthwaite Raw Water Supply Line Costs

Total Construction Cost	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft)
$1,837,000	$2,911,000	$262,000	$1,069.00

Environmental Considerations

During construction of this pipeline, the contractor minimized impacts to nests or migratory bird species, in accordance with the Migratory Bird Treaty Act. The contractor also utilized best management practices to minimize impacts to mussel habitat downstream of the new intake location.

City of Wharton – Water Supply Strategy

The current drought and the diminishing reliability of additional groundwater supplies have combined to cause the City of Wharton (City) to proactively develop a water supply strategy that could enable the City to meet the water demands for area growth not otherwise planned for in regional water planning. The City believes that its proximity to the Houston area, the Texas Gulf Coast, and the new I-69 corridor could increase its municipal and industrial water demands during the next fifty years beyond those otherwise anticipated in regional water planning.

Components of the strategy include:

1. Converting an existing large groundwater irrigator to surface water by making up to 20,000 AFY of surface water available through the combination of 10,000 AF of new In-Channel Detention (ICD) in the Colorado River to work in tandem with 10,000 AF of new Off Channel Storage (OCS).

2. Constructing a new municipal well field and pipeline outside of the City's current ETJ to replace its existing wells and meet the City's water needs for the next 50 years.

3. Treatment and reuse of 1,100 AFY of wastewater effluent to develop an Aquifer Storage and Recovery (ASR) project to help mitigate future increases in its use of Gulf Coast Aquifer groundwater.

This strategy proposes to yield the following water supply amounts between 2020 and 2070. The estimated amount of irrigation water may require additional study to determine the actual annual amount, based on availability:

Table 5-131: City of Wharton Water Supply Strategy Yield

WUG Name	County	River Basin	Source	Water Supply Strategy (ac-ft/yr)					
Wharton	Wharton	Colorado	Gulf Coast Aquifer	5,603	5,603	5,603	5,603	5,603	5,603
Irrigation	Wharton	Colorado	Colorado River	20,000	20,000	20,000	20,000	20,000	20,000
Wharton	Wharton	Colorado	Reuse	1,100	1,100	1,100	1,100	1,100	1,100
Total	Wharton	Colorado		26,603	26,603	26,603	26,603	26,603	26,603

Cost implications of Proposed Strategy

Costs for this strategy were developed based on bid information, and the Texas Water Development Board (TWDB) Cost Estimating Tool. Costs were developed in September 2013 dollars.

Table 5-132: City of Wharton Water Supply Strategy Costs

WUG Supply	Total Capital Cost	Largest Annual Cost	Unit Cost ($/ac-ft/yr)
Wharton – Gulf Coast Aquifer	$37,337,000	$4,613,574	$823
Irrigation	$88,867,000	$8,077,294	$404
Wharton – Reuse/ASR	$19,037,000	$3,004,000	$2,731
Total	**$144,941,000**	**$13,101,000**	**$491**

This project was not developed with sufficient detail in time to be considered for inclusion as a recommended strategy in the 2016 Region K Water Plan. It has been included here as a developing strategy in recognition of the ongoing work being accomplished to make it possible for consideration as either a future amendment to the 2016 plan or as a recommended strategy in the 2021 plan. The City recognizes there are numerous studies, assessments and agreements that would be necessary to fully implement all of the components of this strategy. The lack of feasibility of any one or more component may not preclude the development of other components of the strategy.

5.5 ENVIRONMENTAL IMPACTS OF WATER MANAGEMENT STRATEGIES

Sufficient water to meet environmental needs and to maintain a sound ecological environment in the Colorado River and Matagorda Bay is important to the economic and environmental health of Region K. As part of the development of Chapter 5 for the 2016 Region K Plan, new water management strategies or changes to certain water management strategies from the 2011 Region K Plan were recommended. In addition, strategies that would require new or amended water rights were evaluated while incorporating the new TCEQ environmental flow requirements that were determined as part of the Senate Bill 3 (SB3) process.

As part of the SB3 process, the Colorado/Lavaca River and Matagorda Bay Basin Expert Science Team (BBEST) studied available data and developed a set of recommendations for the freshwater inflows that would be needed to maintain a sound ecological environment in Matagorda Bay. *Table 5-133* compares the BBEST recommended freshwater inflow components and the attainment frequencies needed to maintain a sound ecological environment with WAM Run3 attainment frequencies. WAM Run3 provides information on the amount of unappropriated water available for meeting environmental flow needs and other demands assuming full use of water rights in the basin with no return flows. This information shows that with full use of water rights that the attainment frequencies for the 5 flow regimes will not be met under a WAM Run3 regime which represents a worst case scenario in the exercise of existing water rights in the Colorado River Basin.

The members of the Region K water planning group are concerned about meeting environmental needs to maintain a sound ecological environment and we recommend that the planning group take proactive steps during the next round of planning to incorporate strategies to address this shortfall. The planning process is not currently designed to fully address environmental needs.

Table 5-133: Comparison of BBEST recommendations for Matagorda Bay Inflows from Colorado River Basin to WAM Run3 values

Regime Title	BBEST Recommended Value	WAM Run3 Calculated Value
Attainment Frequency for Threshold Regime	100%	65.5%
Attainment Frequency for MBHE1 Regime	90%	35.6%
Attainment Frequency for MBHE2 Regime	75%	16.9%
Attainment Frequency for MBHE3 Regime	60%	11.9%
Attainment Frequency for MBHE4 Regime	35%	8.5%
Coefficient of Variation for Volume	1.4 to 1.5 million acre-feet	877,000 acre-feet
Coefficient of Variation for Long-term Volume	Above 0.8	1.3

5.5.1 **Criteria Used**

The Region K Cutoff strategy model was used for the evaluation of the new or changed condition water management strategies. The assumptions used for the strategy model are listed in Chapter 3, Appendix 3B. For new or changed condition water management strategies in the 2016 Region K Plan, the flow criteria (recommended guidelines) presented in the LSWP Environmental Studies on both the *Lower Colorado River, Texas Instream Flow Guidelines* and the *Matagorda Bay Health Evaluation* was used. The use of these studies for the environmental impact analysis does not mean the LCRWPG endorses the results of the studies. These results meet the TWDB's best available site-specific definition of environmental criteria, which is the reason for their use.

5.5.1.1 Freshwater Inflow Criteria

The following tables are taken from the *Matagorda Bay Health Evaluation* as part of the LSWP Studies to help define the criteria used for environmental impact analysis of the freshwater inflows to Matagorda Bay (Control Point M10000 in the Region K Cutoff model). An exhibit showing control point locations can be found in *Appendix 5D*.

Table 5-134: Inflow Categories and Range of Inflow Criteria

Inflow Category	Inflow Criteria	Description
LONG-TERM	Long-term Average Volume and Variability	provide adequate bay food supply to maintain the essential food supply and existing primary productivity of the bay system
MBHE INFLOW REGIME	MBHE 4	provide inflow variability and support high levels of primarily productivity, and high quality oyster reef health, benthic condition, low estuarine marsh, and shellfish and forage fish habitat.
	MBHE 3	provide inflow variability and support quality oyster reef health, benthic condition, low estuarine marsh, and shellfish and forage fish habitat.
	MBHE 2	provide inflow variability and sustain oyster reef health, benthic condition, low estuarine marsh, and shellfish and forage fish habitat
	MBHE 1	maintain tolerable oyster reef health, benthic character, and habitat conditions
MINIMUM	Threshold	refuge conditions for all species and habitats

Table 5-134 above shows the different levels of criteria and gives a description of what each level of flow can provide to the bay. There are three categories of criteria: long-term, minimum, and the MBHE inflow regime, which consists of four levels of increasing flow volumes.

Table 5-135 shows specific numerical flow volumes for the four levels of the MBHE inflow regime, which are separated into three "seasons." Achievement guidelines for the percentage of time a particular MBHE level should be met are also provided. It should be noted that the achievement guidelines are provided as information, but that the environmental impact analysis that was done for the water management strategies as part of the 2016 Region K Plan did not try to determine whether or not a strategy was reasonable based on whether the strategy caused the freshwater inflows to go above or below a particular value. Again, the main comparison for the study was the flow with and without the strategy implemented.

Table 5-135: Recommended MBHE Inflow Regime Criteria and Proposed Distribution

Onset Month	Flow Distribution (% of annual)	INFLOW CRITERIA (Acre-feet)			
		MBHE 1	MBHE 2	MBHE 3	MBHE 4
Spring January February March April May	38%	114,000 ac-ft 3 consecutive month total	168,700 ac-ft 3 consecutive month total	246,200 ac-ft 3 consecutive month total	433,200 ac-ft 3 consecutive month total
Fall August September October	27%	81,000 ac-ft 3 consecutive month total	119,900 ac-ft 3 consecutive month total	175,000 ac-ft 3 consecutive month total	307,800 ac-ft 3 consecutive month total
Intervening Six months	35%	105,000 ac-ft Total for 6 month period	155,400 ac-ft Total for 6 month period	226,800 ac-ft Total for 6 month period	399,000 ac-ft Total for 6 month period
Achievement Guideline		90%	75%	60%	35%* (See Sec. 5.2)

*modified application as discussed in Section 5.2.

5.5.1.2 Instream Flow Criteria

The following tables show the Colorado River Instream Flow Criteria that was developed as part of the LSWP Studies to help define the criteria used for environmental impact analysis of the water management strategies on the Colorado River instream flows at various control points downstream of the Highland Lakes. An exhibit showing control point locations can be found in *Appendix 5D*.

Table 5-136: Instream Flow Guidelines for the Lower Colorado River Specific to the LSWP (cfs)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
AUSTIN REACH												
Subsistence	50	50	50	50	50	50	50	50	50	50	50	50
BASTROP REACH												
Subsistence	208	274	274	184	275	202	137	123	123	127	180	186
Base-DRY	313	317	274	287	579	418	347	194	236	245	283	311
Base-AVERAGE	433	497	497	635	824	733	610	381	423	433	424	450
COLUMBUS REACH												
Subsistence	340	375	375	299	425	534	342	190	279	190	202	301
Base-DRY	487	590	525	554	966	967	570	310	405	356	480	464
Base-AVERAGE	828	895	1,020	977	1,316	1,440	895	516	610	741	755	737
WHARTON REACH												
Subsistence	315	303	204	270	304	371	212	107	188	147	173	202
Base-DRY	492	597	531	561	985	984	577	314	410	360	486	470
Base-AVERAGE	838	906	1,036	1,011	1,397	1,512	906	522	617	749	764	746

Table 5-136 provides the instream flow guidelines (in cfs) for three different categories of flow conditions and four separate reaches downstream of the Highland Lakes. The Austin Reach begins at Control Point I20000 in Travis County (see exhibit in *Appendix 5D*). The Bastrop Reach begins at Control Point J30000 in Bastrop County. The Columbus Reach begins at Control Point J10000 in Colorado County. The Wharton Reach begins at Control Point K20000 in Wharton County. The three categories of flow are: Subsistence, Base-Dry Conditions, and Base-Average Conditions. The LSWP report also recommends pulse flows, but the modeling used to analyze the environmental impacts is a monthly flow application, which makes it difficult to analyze pulse flows which occur on a daily level rather than monthly. The Austin Reach only has a Subsistence Flow guideline due to the limited locations of return flows downstream of the Longhorn Dam.

Table 5-137 provides the instream flow guidelines in ac-ft/yr.

Table 5-137: Instream Flow Guidelines for the Lower Colorado River (ac-ft/yr))

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
AUSTIN REACH												
Subsistence	3,074	2,777	3,074	2,975	3,074	2,975	3,074	3,074	2,975	3,074	2,975	3,074
BASTROP REACH												
Subsistence	12,789	15,217	16,848	11,127	16,909	12,020	8,424	7,563	7,319	7,809	10,711	11,437
Base-DRY	19,246	17,605	16,848	17,078	35,601	24,873	21,336	11,929	14,043	15,064	16,840	19,123
Base-AVERAGE	26,624	27,602	30,559	37,785	50,666	43,617	37,507	23,427	25,170	26,624	25,230	27,669
COLUMBUS REACH												
Subsistence	20,906	20,826	23,058	17,792	26,132	31,775	21,029	11,683	16,602	11,683	12,020	18,508
Base-DRY	29,944	32,767	32,281	32,965	59,397	57,540	35,048	19,061	24,099	21,890	28,562	28,530
Base-AVERAGE	50,912	49,706	62,717	58,136	80,918	85,686	55,031	31,728	36,298	45,562	44,926	45,316
WHARTON REACH												
Subsistence	19,369	16,828	12,543	16,066	18,692	22,076	13,035	6,579	11,187	9,039	10,294	12,420
Base-DRY	30,252	33,156	32,650	33,382	60,565	58,552	35,478	19,307	24,397	22,136	28,919	28,899
Base-AVERAGE	51,527	50,317	63,701	60,159	85,898	89,970	55,708	32,097	36,714	46,054	45,461	45,870

The instream flow impact analysis was focused on a comparison of the percentage of time the model met these values, both with and without the strategy was implemented. The impact is shown as the difference between the two scenarios, rather than how often either the base model or the model with the strategy met the criteria.

5.5.2 **Strategies Carried Forward from the 2011 Regional Plan**

Many of the strategies presented in the 2016 Region K Plan had a quantitative environmental impact analysis performed as part of the 2011 Region K Plan, and a determination was made that re-evaluating the individual strategy for the 2016 Region K Plan would not provide additional beneficial information. Please refer to *Appendix 5E* for the tabular results of the environmental impact analyses from the 2011 Region K Water Plan.

5.5.3 **Environmental Impact of Strategies Added Since 2011 Regional Water Plan**

Water management strategies added since the 2011 Region K Plan have not had a quantitative environmental impact analysis performed. For the 2016 Region K Plan, the impact of new strategies was generally quantified up to the full amount of the supply available from the strategy. The planning group acknowledges actual impacts will be lower. The actual impact of any individual strategy is subject to a number of mitigating effects which will likely result in lower impacts than reported in the 2016 Regional Water Plan. Actual impacts of a water management strategy must take into account a number of factors, including:

- Current and future Water Management Plans for the Highland Lakes
- Return flows resulting from the recommended strategy
- Current water use by the affected water rights
- Use of a system approach to make diversions from multiple locations
- Environmental requirements placed on the project
- And other project-specific items.

APPENDIX 5A

POTENTIALLY FEASIBLE WATER MANAGEMENT STRATEGIES

Table 5A-1: Region K Water Management Strategies Considered and Evaluated

Table 5A-2: Region K Potentially Feasible WMS Screening

Table 5A-1: Region K Water Management Strategies Considered and Evaluated

Every WUG Entity with an Identified Need		WMSs REQUIRED TO BE CONSIDERED BY STATUTE										Additional									
Water User Group Name	Maximum Need 2020-2070 (af/yr)	Conservation	Drought Management	Reuse	Reallocation/ management of existing supplies	Conjunctive Use	Acquisition of available supplies	Development of new supplies	Development of regional water supply or regional management of water supply facilities	Voluntary transfer of water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)	Emergency transfer of water under Section 11.139	System optimization, subordination, leases, enhancement of yield, improvement of water quality	New SW	New GW	Brush control; precipitation enhancement	Desalination	Aquifer storage and recovery	Amendment of water rights/permits	Rainwater harvesting	other	other
Aqua WSC	*26,269*	PF	PF	nPF	nPF	nPF	PF	PF	nPF	PF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Bastrop	*6,390*	PF	PF	PF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	
Bastrop County WCID #2	*644*	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
County-Other, Bastrop	*1,490*	PF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Creedmoor-Maha WSC	*609*	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Elgin	*4,124*	nPF	PF	nPF	nPF	nPF	PF	PF	nPF	PF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Smithville	*721*	PF	PF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Manufacturing, Bastrop	*199*	nPF	nPF	nPF	nPF	nPF	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Mining, Bastrop	*7,843*	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
County-Other, Blanco	*55*	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	
Johnson City	*175*	PF	PF	PF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Bertram	*358*	PF	PF	nPF	nPF	nPF	PF	PF	PF	PF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
County-Other, Burnet	*460*	PF	PF	nPF	nPF	nPF	nPF	PF	PF	PF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Granite Shoals	*306*	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Horseshoe Bay	*1,098*	PF	PF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Marble Falls	*3,386*	PF	PF	PF	nPF	nPF	nPF	nPF	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Meadowlakes	*896*	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Mining, Burnet	*5,973*	nPF	nPF	nPF	nPF	nPF	PF				nPF	nPF									
Columbus	*163*	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
County-Other, Colorado	*226*	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Irrigation, Colorado	*58,954*	PF	PF	nPF	nPF	nPF	PF	PF	PF	nPF	nPF	PF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	
County-Other, Fayette	*639*	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Schulenburg	*267*	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Manufacturing, Fayette	*391*	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Mining, Fayette	*1,986*	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Steam-Electric, Fayette	*7,414*	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Fredericksburg	*222*	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Manufacturing, Gillespie	*626*	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Austin	*63,194*	PF	PF	PF	nPF	nPF	PF	PF	nPF	PF	nPF	PF		PF	nPF		PF	nPF	PF	nPF	
Buda	*6,088*	PF	PF	PF	nPF	nPF	PF	PF	PF	PF	nPF	nPF	nPF	PF	nPF	PF	PF	nPF	nPF	nPF	
County-Other, Hays	*3,382*	nPF	PF	nPF	nPF	nPF	PF	PF	PF	nPF	nPF	nPF	nPF	PF	nPF	PF	PF	nPF	nPF	nPF	
Dripping Springs	*432*	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Dripping Springs WSC	*126*	PF	PF	nPF	nPF	nPF	nPF	PF	PF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	
Goforth SUD	*48*	nPF	PF	nPF	nPF	nPF					nPF	nPF									
West Travis County PUA	*13,460*	PF	PF	nPF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	
Mining, Hays	*1,579*	nPF	nPF	nPF	nPF	nPF	PF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	
Llano	*488*	PF	PF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	
Irrigation, Matagorda	*166,548*	PF	PF	nPF	nPF	nPF	PF	PF	PF	nPF	nPF	PF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	
Steam-Electric, Matagorda	*25,483*	nPF	nPF	nPF	nPF	nPF	PF	PF	nPF	nPF	nPF	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
County-Other, Mills	*29*	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	
Goldthwaite	*339*	PF	PF	nPF	nPF	nPF	PF	PF	nPF	PF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	

Table 5A-1: Region K Water Management Strategies Considered and Evaluated

Every WUG Entity with an Identified Need		WMSs REQUIRED TO BE CONSIDERED BY STATUTE										Additional									
Water User Group Name	Maximum Need 2020-2070 (af/yr)	Conservation	Drought Management	Reuse	Reallocation/ management of existing supplies	Conjunctive Use	Acquisition of available supplies	Development of new supplies	Development of regional water supply or regional management of water supply facilities	Voluntary transfer of water (incl. regional water banks, sales, leases, options, subordination agreements, and financing agreements)	Emergency transfer of water under Section 11.139	System optimization, subordination, leases, enhancement of yield, improvement of water quality	New SW	New GW	Brush control; precipitation enhancement	Desalination	Aquifer storage and recovery	Amendment of water rights/permits	Rainwater harvesting	other	other
Irrigation, Mills	*605*	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
San Saba	*152*	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Bee Cave Village	*1,518*	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Briarcliff Village	*36*	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Cedar Park	*1,176*	PF	PF	nPF	nPF	nPF					nPF	nPF									
Jonestown	*206*	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Lakeway	*4,503*	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Leander	*4,937*	nPF	nPF	nPF	nPF	nPF					nPF	nPF									
Loop 360 WSC	*157*	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Manor	*2,067*	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Manville WSC	*3,738*	nPF	PF	nPF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Pflugerville	*21,681*	PF	PF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Point Venture	*455*	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Rollingwood	*379*	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Round Rock	*330*	PF	PF	nPF	nPF	nPF				PF	nPF	nPF									
Travis County MUD #4	*710*	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Travis County WCID #10	*3,619*	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Travis County WCID #17	*3,815*	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Travis County WCID #18	*131*	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Volente	*66*	nPF	PF	nPF	nPF	nPF	nPF	PF	nPF	PF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
West Lake Hills	*1,550*	PF	PF	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	nPF	
Steam-Electric, Travis	*21,530*	nPF	nPF	PF	nPF	nPF				PF	nPF	PF			nPF	nPF	nPF	nPF	nPF	nPF	
Irrigation, Wharton	*109,382*	PF	PF	nPF	nPF	nPF	PF	PF	PF	nPF	nPF	PF	PF	nPF	nPF	nPF	PF	nPF	nPF	nPF	
Steam-Electric, Wharton	*200*	nPF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	PF	nPF	nPF	nPF	nPF	nPF	nPF	

nPF = considered but determined 'not potentially feasible' (may include WMSs that were initially identified as potentially feasible)

PF = considered 'potentially feasible' and therefore evaluated

(all WMS evaluations shall be presented in the regional water plan including for WMSs considered potentially feasible but not recommended)

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Table 5A-2: Region K
Potentially Feasible Water Management Strategy Screening (for 2016 Region K Plan)

	Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Addressing a Need?	Total Strategy Cost ($)	Annual Strategy Cost ($)	Cost of Water ($/ac-ft)	Max Yield (ac-ft/yr)	Starting Decade	Basin	Interbasin Transfer (Yes/No)	Screening Matrix Factors (Positive (1), Neutral (0), Negative (-1)) Cost	Yield	Location	Water Quality	Environmental and Natural Resources	Local Preference	Institutional Constraints	Impacts on Water Resources	Impacts on Agricultural Resources	Impacts to Recreation	Impacts on Other Management Strategies	Total of Screening Factors	Quantified Environmental Impacts	Quantified Agriculture Impacts
1	**Drought Management**	Aqua WSC	Mandatory water use reduction by 15%	Yes	$279,400	$279,400	$50	5,588	2020	All	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
2	**Drought Management**	Bastrop	Mandatory water use reduction by 15%	Yes	$62,400	$62,400	$50	1,248	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
3	**Drought Management**	BASTROP COUNTY WCID #2	Mandatory water use reduction by 5%	Yes	$5,100	$5,100	$50	102	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
4	**Drought Management**	COUNTY-OTHER BASTROP COUNTY	Mandatory water use reduction by 15%	Yes	$42,250	$42,250	$50	845	2020	All	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
5	**Drought Management**	COUNTY-OTHER BLANCO COUNTY	Mandatory water use reduction by 15%	Yes	$9,650	$9,650	$50	193	2020	All	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
6	**Drought Management**	COUNTY-OTHER BURNET COUNTY	Mandatory water use reduction by 15%	Yes	$35,550	$35,550	$50	711	2020	All	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
7	**Drought Management**	COUNTY-OTHER COLORADO COUNTY	Mandatory water use reduction by 15%	Yes	$12,250	$12,250	$50	245	2020	All	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
8	**Drought Management**	COUNTY-OTHER FAYETTE COUNTY	Mandatory water use reduction by 15%	Yes	$12,100	$12,100	$50	242	2020	All	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
9	**Drought Management**	COUNTY-OTHER GILLESPIE	Mandatory water use reduction by 15%	No	$17,150	$17,150	$50	343	2020	All	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
10	**Drought Management**	COUNTY-OTHER HAYS	Mandatory water use reduction by 15%	Yes	$56,050	$56,050	$50	1,121	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
11	**Drought Management**	COUNTY-OTHER LLANO	Mandatory water use reduction by 5%	No	$1,550	$1,550	$50	31	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
12	**Drought Management**	COUNTY-OTHER MATAGORDA	Mandatory water use reduction by 5%	No	$4,150	$4,150	$50	83	2020	All	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
13	**Drought Management**	COUNTY-OTHER MILLS	Mandatory water use reduction by 20%	Yes	$4,200	$4,200	$50	84	2020	All	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
14	**Drought Management**	COUNTY-OTHER SAN SABA	Mandatory water use reduction by 15%	No	$12,000	$12,000	$50	240	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
15	**Drought Management**	CREEDMOOR-MAHA WSC	Mandatory water use reduction by 5%	Yes	$2,550	$2,550	$50	51	2020	All	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
16	**Drought Management**	ELGIN	Mandatory water use reduction by 15%	Yes	$42,200	$42,200	$50	844	2020	All	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
17	**Drought Management**	Smithville	Mandatory water use reduction by 15%	Yes	$24,000	$24,000	$50	480	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
18	**Drought Management**	BLANCO	Mandatory water use reduction by 25%	No	$3,700	$3,700	$50	74	2020	Guadalupe	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
19	**Drought Management**	CANYON LAKE WSC	Mandatory water use reduction by 15%	Yes	$1,350	$1,350	$50	27	2020	Guadalupe	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
20	**Drought Management**	JOHNSON CITY	Mandatory water use reduction by 20%	Yes	$4,800	$4,800	$50	96	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
21	**Drought Management**	BERTRAM	Mandatory water use reduction by 15%	Yes	$5,450	$5,450	$50	109	2020	Brazos	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
22	**Drought Management**	BURNET	Mandatory water use reduction by 20%	No	$32,900	$32,900	$50	658	2020	All	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
23	**Drought Management**	CHISHOLM TRAIL SUD	Mandatory water use reduction by 15%	Yes	$950	$950	$50	19	2020	Brazos	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
24	**Drought Management**	COTTONWOOD SHORES	Mandatory water use reduction by 20%	No	$4,000	$4,000	$50	80	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
25	**Drought Management**	GRANITE SHOALS	Mandatory water use reduction by 5%	Yes	$2,850	$2,850	$50	57	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
26	**Drought Management**	HORSESHOE BAY	Mandatory water use reduction by 25%	Yes	$49,700	$49,700	$50	994	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
27	**Drought Management**	KEMPNER WSC	Mandatory water use reduction by 15%	Yes	$1,800	$1,800	$50	36	2020	Brazos	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
28	**Drought Management**	KINGSLAND WSC	Mandatory water use reduction by 5%	No	$200	$200	$50	4	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
29	**Drought Management**	MARBLE FALLS	Mandatory water use reduction by 20%	Yes	#VALUE!	#VALUE!	$50	1277	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
30	**Drought Management**	MEADOWLAKES	Mandatory water use reduction by 20%	Yes	$15,400	$15,400	$50	308	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
31	**Drought Management**	COLUMBUS	Mandatory water use reduction by 15%	Yes	$9,850	$9,850	$50	197	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
32	**Drought Management**	EAGLE LAKE	Mandatory water use reduction by 15%	No	$4,350	$4,350	$50	87	2020	All	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
33	**Drought Management**	WEIMAR	Mandatory water use reduction by 15%	No	$4,550	$4,550	$50	91	2020	All	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
34	**Drought Management**	FAYETTE WSC	Mandatory water use reduction by 15%	No	$7,600	$7,600	$50	152	2020	All	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
35	**Drought Management**	FLATONIA	Mandatory water use reduction by 15%	No	$3,400	$3,400	$50	68	2020	All	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
36	**Drought Management**	LA GRANGE	Mandatory water use reduction by 15%	No	$8,700	$8,700	$50	174	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
37	**Drought Management**	SCHULENBERG	Mandatory water use reduction by 15%	Yes	$7,500	$7,500	$50	150	2020	Lavaca	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
38	**Drought Management**	FREDERICKSBURG	Mandatory water use reduction by 15%	Yes	$30,450	$30,450	$50	609	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
39	**Drought Management**	AUSTIN	Mandatory water use reduction by 10%	Yes	$1,446,850	$1,446,850	$50	28,937	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None

Table 5A-2: Region K
Potentially Feasible Water Management Strategy Screening (for 2016 Region K Plan)

	Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Addressing a Need?	Total Strategy Cost ($)	Annual Strategy Cost ($)	Cost of Water ($/ac-ft)	Max Yield (ac-ft/yr)	Starting Decade	Basin	Interbasin Transfer (Yes/No)	Screening Matrix Factors (Positive (1), Neutral (0), Negative (-1)) Cost	Yield	Location	Water Quality	Environmental and Natural Resources	Local Preference	Institutional Constraints	Impacts on Water Resources	Impacts on Agricultural Resources	Impacts to Recreation	Impacts on Other Management Strategies	Total of Screening Factors	Quantified Environmental Impacts	Quantified Agriculture Impacts
40	**Drought Management**	Buda	Mandatory water use reduction by 10%	Yes	$36,700	$36,700	$50	734	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
41	**Drought Management**	DRIPPING SPRINGS	Mandatory water use reduction by 20%	Yes	$9,400	$9,400	$50	188	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
42	**Drought Management**	DRIPPING SPRINGS WSC	Mandatory water use reduction by 20%	Yes	$16,500	$16,500	$50	330	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
43	**Drought Management**	GOFORTH SUD	Mandatory water use reduction by 25%	Yes	$5,300	$5,300	$50	106	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
44	**Drought Management**	WEST TRAVIS COUNTY PUA	Mandatory water use reduction by 20%	Yes	$206,000	$206,000	$50	4,120	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
45	**Drought Management**	LLANO	Mandatory water use reduction by 15%	Yes	$6,850	$6,850	$50	137	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
46	**Drought Management**	BAY CITY	Mandatory water use reduction by 20%	No	$30,250	$30,250	$50	605	2020	Brazos-Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
47	**Drought Management**	PALACIOS	Mandatory water use reduction by 15%	No	$5,400	$5,400	$50	108	2020	Colorado-Lavaca	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
48	**Drought Management**	GOLDTHWAITE	Mandatory water use reduction by 15%	Yes	$2,950	$2,950	$50	59	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
49	**Drought Management**	RICHLAND SUD	Mandatory water use reduction by 15%	No	$1,300	$1,300	$50	26	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
50	**Drought Management**	SAN SABA	Mandatory water use reduction by 20%	Yes	$12,000	$12,000	$50	240	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
51	**Drought Management**	BARTON CREEK WEST WSC	Mandatory water use reduction by 15%	No	$3,250	$3,250	$50	65	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
52	**Drought Management**	BEE CAVE VILLAGE	Mandatory water use reduction by 20%	Yes	$30,700	$30,700	$50	614	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
53	**Drought Management**	BRIARCLIFF VILLAGE	Mandatory water use reduction by 10%	Yes	$2,200	$2,200	$50	44	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
54	**Drought Management**	CEDAR PARK	Mandatory water use reduction by 20%	No	$27,650	$27,650	$50	553	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
55	**Drought Management**	ROLLINGWOOD	Mandatory water use reduction by 15%	Yes	$2,900	$2,900	$50	58	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
56	**Drought Management**	ROUND ROCK	Mandatory water use reduction by 7%	Yes	$1,550	$1,550	$50	31	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
57	**Drought Management**	SHADY HOLLOW MUD	Mandatory water use reduction by 15%	No	$5,850	$5,850	$50	117	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
58	**Drought Management**	SUNSET VALLEY	Mandatory water use reduction by 30%	No	$14,000	$14,000	$50	280	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
59	**Drought Management**	THE HILLS	Mandatory water use reduction by 15%	No	$10,850	$10,850	$50	217	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
60	**Drought Management**	TRAVIS COUNTY MUD #4	Mandatory water use reduction by 20%	Yes	$45,350	$45,350	$50	907	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
61	**Drought Management**	TRAVIS COUNTY WCID #10	Mandatory water use reduction by 25%	Yes	$45,250	$45,250	$50	905	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
62	**Drought Management**	TRAVIS COUNTY WCID #17	Mandatory water use reduction by 15%	Yes	$88,800	$88,800	$50	1,776	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
63	**Drought Management**	TRAVIS COUNTY WCID #18	Mandatory water use reduction by 15%	Yes	$14,000	$14,000	$50	280	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
64	**Drought Management**	TRAVIS COUNTY WCID #19	Mandatory water use reduction by 20%	No	$5,000	$5,000	$50	100	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
65	**Drought Management**	TRAVIS COUNTY WCID #20	Mandatory water use reduction by 20%	No	$5,900	$5,900	$50	118	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
66	**Drought Management**	VOLENTE	Mandatory water use reduction by 5%	Yes	$350	$350	$50	7	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
67	**Drought Management**	WELLS BRANCH	Mandatory water use reduction by 5%	No	$4,100	$4,100	$50	82	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
68	**Drought Management**	WEST LAKE HILLS	Mandatory water use reduction by 20%	Yes	$15,650	$15,650	$50	313	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
69	**Drought Management**	LAGO VISTA	Mandatory water use reduction by 20%	No	$34,300	$34,300	$50	686	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
70	**Drought Management**	LAKEWAY	Mandatory water use reduction by 20%	Yes	$91,150	$91,150	$50	1,823	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
71	**Drought Management**	LOOP 360 WSC	Mandatory water use reduction by 15%	Yes	$10,550	$10,550	$50	211	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
72	**Drought Management**	LOST CREEK MUD	Mandatory water use reduction by 20%	No	#VALUE!	#VALUE!	$50	218	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
73	**Drought Management**	MANOR	Mandatory water use reduction by 15%	Yes	$23,850	$23,850	$50	477	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
74	**Drought Management**	MANVILLE WSC	Mandatory water use reduction by 15%	Yes	$45,550	$45,550	$50	911	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
75	**Drought Management**	NORTH AUSTIN MUD #1	Mandatory water use reduction by 15%	No	$600	$600	$50	12	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
76	**Drought Management**	NORTHTOWN MUD	Mandatory water use reduction by 15%	No	$9,000	$9,000	$50	180	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
77	**Drought Management**	PFLUGERVILLE	Mandatory water use reduction by 25%	Yes	$423,150	$423,150	$50	8,463	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
78	**Drought Management**	POINT VENTURE	Mandatory water use reduction by 15%	Yes	$6,100	$6,100	$50	122	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None

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Potentially Feasible Water Management Strategy Screening (for 2016 Region K Plan)

	Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Addressing a Need?	Total Strategy Cost ($)	Annual Strategy Cost ($)	Cost of Water ($/ac-ft)	Max Yield (ac-ft/yr)	Starting Decade	Basin	Interbasin Transfer (Yes/No)	Screening Matrix Factors (Positive (1), Neutral (0), Negative (-1)) Cost	Yield	Location	Water Quality	Environmental and Natural Resources	Local Preference	Institutional Constraints	Impacts on Water Resources	Impacts on Agricultural Resources	Impacts to Recreation	Impacts on Other Management Strategies	Total of Screening Factors	Quantified Environmental Impacts	Quantified Agriculture Impacts
79	**Drought Management**	Williamson-Travis County MUD #1	Mandatory water use reduction by 15%	Yes	$1,150	$1,150	$50	23	2020	Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
80	**Drought Management**	EAST BERNARD	Mandatory water use reduction by 15%	No	$3,350	$3,350	$50	67	2020	Brazos-Colorado	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
81	**Drought Management**	WHARTON	Mandatory water use reduction by 15%	No	$14,550	$14,550	$50	291	2020	All	No		0	1	0	0	0	1	1	0	0	0	3	Impact is negligible	None
82	**Drought Management**	IRRIGATION, COLORADO COUNTY	First rice crop only, no second crop.	Yes	$4,815,346	$4,815,346	$163.00	29,542	2020	All	No	1	0	1	0	-1	-1	0	-1	-1	0	0	-2	Reduction of Irrigation return flows of up to 6,500 AFY. Reduction of approximately 17,000 acres of potential feedstock for migratory birds.	Reference cost implications stated in cost section of strategy write-up
83	**Drought Management**	Irrigation, Mills County	Reduce water demands based on lack of available water.	Yes	$15,375	$15,375	$123.00	125	2020	Brazos	No	1	0	1	0	0	-1	0	0	-1	0	0	0	Negligible	Reference cost implications stated in cost section of strategy write-up
84	**Drought Management**	IRRIGATION, MATAGORDA COUNTY	First rice crop only, no second crop.	Yes	$24,171,356	$24,171,356	$649.00	37,244	2020	All	No	0	0	1	0	-1	-1	0	-1	-1	0	0	-3	Reduction of Irrigation return flows of up to 6,300 AFY. Reduction of approximately 15,000 acres of potential feedstock for migratory birds.	Reference cost implications stated in cost section of strategy write-up
85	**Drought Management**	IRRIGATION, WHARTON COUNTY	First rice crop only, no second crop.	Yes	$7,242,300	$7,242,300	$260.00	27,855	2020	All	No	1	0	1	0	-1	-1	0	-1	-1	0	0	-2	Reduction of Irrigation return flows of up to 6,300 AFY. Reduction of approximately 16,000 acres of potential feedstock for migratory birds.	Reference cost implications stated in cost section of strategy write-up
86	**Conservation**	Aqua WSC	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$1,238,268	$221,302	$352.00	2,317	2020	All	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow).
87	**Conservation**	Bastrop	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$224,866	$59,136	$303.00	1,958	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
88	**Conservation**	COUNTY-OTHER BASTROP COUNTY	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$230,000	$34,401	$374.00	677	2020	All	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
89	**Conservation**	Smithville	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$109,412	$16,524	$376.00	155	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
90	**Conservation**	BLANCO	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$47,867	$7,181	$378.00	32	2020	Guadalupe	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
91	**Conservation**	JOHNSON CITY	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$45,790	$6,805	$378.00	30	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
92	**Conservation**	BERTRAM	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$41,421	$11,952	$292.00	204	2020	Brazos	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
93	**Conservation**	BURNET	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$215,000	$53,200	$291.00	917	2020	All	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
94	**Conservation**	COTTONWOOD SHORES	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$30,672	$7,087	$322.00	23	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
95	**Conservation**	HORSESHOE BAY	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$44,289	$19,252	$257.00	1,839	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.

Table 5A-2: Region K
Potentially Feasible Water Management Strategy Screening (for 2016 Region K Plan)

												Screening Matrix Factors (Positive (1), Neutral (0), Negative (-1))													
	Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Addressing a Need?	Total Strategy Cost ($)	Annual Strategy Cost ($)	Cost of Water ($/ac-ft)	Max Yield (ac-ft/yr)	Starting Decade	Basin	Interbasin Transfer (Yes/No)	Cost	Yield	Location	Water Quality	Environmental and Natural Resources	Local Preference	Institutional Constraints	Impacts on Water Resources	Impacts on Agricultural Resources	Impacts to Recreation	Impacts on Other Management Strategies	Total of Screening Factors	Quantified Environmental Impacts	Quantified Agriculture Impacts
96	**Conservation**	MARBLE FALLS	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$221,276	$66,986	$286.00	2,059	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
97	**Conservation**	MEADOWLAKES	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$64,541	$22,755	$271.00	708	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
98	**Conservation**	COLUMBUS	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$100,974	$31,570	$282.00	464	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
99	**Conservation**	WEIMAR	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$56,000	$16,500	$290.00	171	2020	All	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
100	**Conservation**	FLATONIA	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$37,500	$6,000	$356.00	105	2020	All	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
101	**Conservation**	LA GRANGE	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$117,647	$16,612	$396.00	42	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
102	**Conservation**	SCHULENBERG	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$78,947	$12,692	$343.00	232	2020	Lavaca	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
103	**Conservation**	FREDERICKSBURG	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$291,489	$90,113	$284.00	1,301	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
104	**Conservation**	Buda	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$221,686	$32,923	$374.00	888	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
105	**Conservation**	DRIPPING SPRINGS	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$49,510	$14,081	$293.00	262	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
106	**Conservation**	DRIPPING SPRINGS WSC	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$68,043	$16,895	$313.00	283	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
107	**Conservation**	WEST TRAVIS COUNTY PUA	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$292,384	$108,146	$267.00	7,674	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
108	**Conservation**	LLANO	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$87,599	$25,621	$291.00	252	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.

Table 5A-2: Region K
Potentially Feasible Water Management Strategy Screening (for 2016 Region K Plan)

	Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Addressing a Need?	Total Strategy Cost ($)	Annual Strategy Cost ($)	Cost of Water ($/ac-ft)	Max Yield (ac-ft/yr)	Starting Decade	Basin	Interbasin Transfer (Yes/No)	Screening Matrix Factors (Positive (1), Neutral (0), Negative (-1))											Total of Screening Factors	Quantified Environmental Impacts	Quantified Agriculture Impacts
												Cost	Yield	Location	Water Quality	Environmental and Natural Resources	Local Preference	Institutional Constraints	Impacts on Water Resources	Impacts on Agricultural Resources	Impacts to Recreation	Impacts on Other Management Strategies			
109	**Conservation**	BAY CITY	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$405,403	$84,675	$336.00	252	2020	Brazos-Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
110	**Conservation**	GOLDTHWAITE	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$41,809	$4,486	$449.00	58	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
111	**Conservation**	SAN SABA	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$91,823	$31,295	$275.00	510	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
112	**Conservation**	BARTON CREEK WEST WSC	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$38,391	$11,855	$282.00	152	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
113	**Conservation**	BEE CAVE VILLAGE	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$137,097	$47,590	$272.00	1,323	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
114	**Conservation**	CEDAR PARK	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$238,695	$71,011	$289.00	921	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
115	**Conservation**	JONESTOWN	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$46,456	$7,130	$356.00	122	20	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
116	**Conservation**	LAGO VISTA	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$187,406	$54,394	$291.00	972	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
117	**Conservation**	LAKEWAY	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$544,773	$191,119	$272.00	3,921	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
118	**Conservation**	LOOP 360 WSC	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$71,683	$29,963	$258.00	648	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
119	**Conservation**	LOST CREEK MUD	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$108,519	$31,382	$291.00	294	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
120	**Conservation**	PFLUGERVILLE	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$1,701,900	$238,299	$395.00	3,966	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
121	**Conservation**	POINT VENTURE	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$31,028	$9,605	$282.00	301	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.

Table 5A-2: Region K
Potentially Feasible Water Management Strategy Screening (for 2016 Region K Plan)

	Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Addressing a Need?	Total Strategy Cost ($)	Annual Strategy Cost ($)	Cost of Water ($/ac-ft)	Max Yield (ac-ft/yr)	Starting Decade	Basin	Interbasin Transfer (Yes/No)	Screening Matrix Factors (Positive (1), Neutral (0), Negative (-1))											Total of Screening Factors	Quantified Environmental Impacts	Quantified Agriculture Impacts
												Cost	Yield	Location	Water Quality	Environmental and Natural Resources	Local Preference	Institutional Constraints	Impacts on Water Resources	Impacts on Agricultural Resources	Impacts to Recreation	Impacts on Other Management Strategies			
122	**Conservation**	ROLLINGWOOD	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$36,238	$10,881	$286.00	118	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
123	**Conservation**	ROUND ROCK	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$36,147	$5,131	$395.00	13	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
124	**Conservation**	SHADY HOLLOW MUD	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$106,952	$15,088	$397.00	38	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
125	**Conservation**	SUNSET VALLEY	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$31,520	$10,479	$276.00	366	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
126	**Conservation**	THE HILLS	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$97,374	$37,930	$263.00	665	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
127	**Conservation**	TRAVIS COUNTY MUD #4	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$137,248	$65,793	$251.00	2,114	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
128	**Conservation**	TRAVIS COUNTY WCID #10	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$171,890	$58,492	$275.00	1,533	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
129	**Conservation**	TRAVIS COUNTY WCID #17	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$828,248	$246,200	$289.00	4,645	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
130	**Conservation**	TRAVIS COUNTY WCID #18	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$147,665	$22,512	$375.00	104	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
131	**Conservation**	TRAVIS COUNTY WCID #19	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$28,215	$12,726	$255.00	229	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
132	**Conservation**	TRAVIS COUNTY WCID #20	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$38,290	$15,423	$261.00	268	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
133	**Conservation**	WEST LAKE HILLS	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	Yes	$112,784	$41,973	$267.00	700	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
134	**Conservation**	EAST BERNARD	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$52,607	$7,512	$395.00	97	2020	Brazos-Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.

Table 5A-2: Region K
Potentially Feasible Water Management Strategy Screening (for 2016 Region K Plan)

	Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Addressing a Need?	Total Strategy Cost ($)	Annual Strategy Cost ($)	Cost of Water ($/ac-ft)	Max Yield (ac-ft/yr)	Starting Decade	Basin	Interbasin Transfer (Yes/No)	Screening Matrix Factors (Positive (1), Neutral (0), Negative (-1)) Cost	Yield	Location	Water Quality	Environmental and Natural Resources	Local Preference	Institutional Constraints	Impacts on Water Resources	Impacts on Agricultural Resources	Impacts to Recreation	Impacts on Other Management Strategies	Total of Screening Factors	Quantified Environmental Impacts	Quantified Agriculture Impacts
135	**Conservation**	WHARTON	Conservation efforts of 1% per year GPCD reduction for >200 GPCD, and 0.5% GPCD reduction between 140 GPCD and 100 GPCD	No	$211,000	$52,000	$312.00	182	2020	All	No	1	0	1	0	0	0	0	1	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could leave up to 51,000 ac-ft of water in the lakes and aquifers. This additional water would increase storage levels, delay drought triggers, and increase springflows.	Individual WUG implementation has negligible impacts to the region. The overall impact is likely negligible as well. Surface water conservation would increase the amount of water available in lakes and streams, while groundwater conservation would decrease WWTP discharges (streamflow), thus balancing each other out by the time the lower three counties are reached.
136	**Conservation - On farm Conservation**	IRRIGATION, COLORADO COUNTY	On-Farm conservation measures to reduce the amount of water required for rice growing	YES	$547,412	$45,435	$22.89	2,949	2020	Brazos-Colorado	No	1	-1	1	0	-1	0	0	-1	1	0	0	0	Negligible impacts to streamflow and bay	Reference cost implications to implement conservation measures.
137	**Conservation - On farm Conservation**	IRRIGATION, COLORADO COUNTY	On-Farm conservation measures to reduce the amount of water required for rice growing	YES	$129,741	$10,768	$22.89	385	2020	Colorado	No	1	-1	1	0	-1	0	0	-1	1	0	0	0	Negligible impacts to streamflow and bay	Reference cost implications to implement conservation measures.
138	**Conservation - On farm Conservation**	IRRIGATION, COLORADO COUNTY	On-Farm conservation measures to reduce the amount of water required for rice growing	YES	$814,992	$67,644	$22.89	4,034	2020	Lavaca	No	1	-1	1	0	-1	0	0	-1	1	0	0	0	Negligible impacts to streamflow and bay	Reference cost implications to implement conservation measures.
139	**Conservation - On farm Conservation**	IRRIGATION, MATAGORDA COUNTY	On-Farm conservation measures to reduce the amount of water required for rice growing	YES	$1,784,048	$148,076	$22.89	11,269	2020	Brazos-Colorado	No	1	-1	1	0	-1	0	0	-1	1	0	0	0	Negligible impacts to streamflow and bay	Reference cost implications to implement conservation measures.
140	**Conservation - On farm Conservation**	IRRIGATION, MATAGORDA COUNTY	On-Farm conservation measures to reduce the amount of water required for rice growing	YES	$304,331	$25,259	$22.89	1,986	2020	Colorado	No	1	-1	1	0	-1	0	0	-1	1	0	0	0	Negligible impacts to streamflow and bay	Reference cost implications to implement conservation measures.
141	**Conservation - On farm Conservation**	IRRIGATION, MATAGORDA COUNTY	On-Farm conservation measures to reduce the amount of water required for rice growing	YES	$2,127,003	$176,541	$22.89	13,610	2020	Colorado-Lavaca	No	1	-1	1	0	-1	0	0	-1	1	0	0	0	Negligible impacts to streamflow and bay	Reference cost implications to implement conservation measures.
142	**Conservation - On farm Conservation**	IRRIGATION, WHARTON COUNTY	On-Farm conservation measures to reduce the amount of water required for rice growing	YES	$1,759,978	$146,078	$22.89	10,577	2020	Brazos-Colorado	No	1	-1	1	0	-1	0	0	-1	1	0	0	0	Negligible impacts to streamflow and bay	Reference cost implications to implement conservation measures.
143	**Conservation - On farm Conservation**	IRRIGATION, WHARTON COUNTY	On-Farm conservation measures to reduce the amount of water required for rice growing	YES	$488,160	$40,517	$22.89	2,203	2020	Colorado	No	1	-1	1	0	-1	0	0	-1	1	0	0	0	Negligible impacts to streamflow and bay	Reference cost implications to implement conservation measures.
144	**Conservation - On farm Conservation**	IRRIGATION, WHARTON COUNTY	On-Farm conservation measures to reduce the amount of water required for rice growing	YES	$520,355	$43,189	$22.89	3,073	2020	Colorado-Lavaca	No	1	-1	1	0	-1	0	0	-1	1	0	0	0	Negligible impacts to streamflow and bay	Reference cost implications to implement conservation measures.
145	**Conservation - Irrigation Conveyance Improvements**	IRRIGATION, COLORADO COUNTY	Improvements to the methods of water delivery to the rice fields in order to reduce the amount of water needed/lost	YES	$498,876	$41,407	$10.96	3,793	2020	Brazos-Colorado	No	1	-1	1	0	1	0	0	1	1	0	0	4	Reduction of up to 1,897 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications to implement conservation measures.
146	**Conservation - Irrigation Conveyance Improvements**	IRRIGATION, COLORADO COUNTY	Improvements to the methods of water delivery to the rice fields in order to reduce the amount of water needed/lost	YES	$118,237	$9,814	$10.96	431	2020	Colorado	No	1	-1	1	0	1	0	0	1	1	0	0	4	Reduction of up to 216 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications to implement conservation measures.
147	**Conservation - Irrigation Conveyance Improvements**	IRRIGATION, COLORADO COUNTY	Improvements to the methods of water delivery to the rice fields in order to reduce the amount of water needed/lost	YES	$742,732	$61,647	$10.96	5,188	2020	Lavaca	No	1	-1	1	0	1	0	0	1	1	0	0	4	Reduction of up to 2,594 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications to implement conservation measures.
148	**Conservation - Irrigation Conveyance Improvements**	IRRIGATION, MATAGORDA COUNTY	Improvements to the methods of water delivery to the rice fields in order to reduce the amount of water needed/lost	YES	$1,625,868	$134,947	$10.96	14,492	2020	Brazos-Colorado	No	1	-1	1	0	1	0	0	1	1	0	0	4	Reduction of up to 7,246 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications to implement conservation measures.
149	**Conservation - Irrigation Conveyance Improvements**	IRRIGATION, MATAGORDA COUNTY	Improvements to the methods of water delivery to the rice fields in order to reduce the amount of water needed/lost	YES	$277,348	$23,020	$10.96	2,554	2020	Colorado	No	1	-1	1	0	1	0	0	1	1	0	0	4	Reduction of up to 1,277 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications to implement conservation measures.
150	**Conservation - Irrigation Conveyance Improvements**	IRRIGATION, MATAGORDA COUNTY	Improvements to the methods of water delivery to the rice fields in order to reduce the amount of water needed/lost	YES	$1,938,415	$160,888	$10.96	17,502	2020	Colorado-Lavaca	No	1	-1	1	0	1	0	0	1	1	0	0	4	Reduction of up to 8,751 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications to implement conservation measures.
151	**Conservation - Irrigation Conveyance Improvements**	IRRIGATION, WHARTON COUNTY	Improvements to the methods of water delivery to the rice fields in order to reduce the amount of water needed/lost	YES	$1,603,932	$133,126	$10.96	13,602	2020	Brazos-Colorado	No	1	-1	1	0	1	0	0	1	1	0	0	4	Reduction of up to 6,801 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications to implement conservation measures.
152	**Conservation - Irrigation Conveyance Improvements**	IRRIGATION, WHARTON COUNTY	Improvements to the methods of water delivery to the rice fields in order to reduce the amount of water needed/lost	YES	$444,878	$36,925	$10.96	2,834	2020	Colorado	No	1	-1	1	0	1	0	0	1	1	0	0	4	Reduction of up to 1,417 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications to implement conservation measures.
153	**Conservation - Irrigation Conveyance Improvements**	IRRIGATION, WHARTON COUNTY	Improvements to the methods of water delivery to the rice fields in order to reduce the amount of water needed/lost	YES	$474,218	$39,360	$10.96	3,952	2020	Colorado-Lavaca	No	1	-1	1	0	1	0	0	1	1	0	0	4	Reduction of up to 1,976 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications to implement conservation measures.
154	**Conservation - Sprinkler Irrigation**	IRRIGATION, COLORADO COUNTY	Rice farming conversion to sprinkler irrigation (LEPA) versus field flooding	YES	$194,224	$16,121	$36.02	1,099	2020	Brazos-Colorado	No	1	-1	1	0	-1	-1	0	1	0	0	0	0	Reduction of up to 1,099 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications of conversion.
155	**Conservation - Sprinkler Irrigation**	IRRIGATION, COLORADO COUNTY	Rice farming conversion to sprinkler irrigation (LEPA) versus field flooding	YES	$37,168	$3,085	$36.02	181	2020	Colorado	No	1	-1	1	0	-1	-1	0	1	0	0	0	0	Reduction of up to 181 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications of conversion.
156	**Conservation - Sprinkler Irrigation**	IRRIGATION, COLORADO COUNTY	Rice farming conversion to sprinkler irrigation (LEPA) versus field flooding	YES	$281,278	$23,346	$36.02	1,565	2020	Lavaca	No	1	-1	1	0	-1	-1	0	1	0	0	0	0	Reduction of up to 1,565 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications of conversion.
157	**Conservation - Sprinkler Irrigation**	IRRIGATION, MATAGORDA COUNTY	Rice farming conversion to sprinkler irrigation (LEPA) versus field flooding	YES	$669,614	$55,578	$36.02	3,910	2020	Brazos-Colorado	No	1	-1	1	0	-1	-1	0	1	0	0	0	0	Reduction of up to 3,910 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications of conversion.
158	**Conservation - Sprinkler Irrigation**	IRRIGATION, MATAGORDA COUNTY	Rice farming conversion to sprinkler irrigation (LEPA) versus field flooding	YES	$115,635	$9,598	$36.02	680	2020	Colorado	No	1	-1	1	0	-1	-1	0	1	0	0	0	0	Reduction of up to 680 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications of conversion.
159	**Conservation - Sprinkler Irrigation**	IRRIGATION, MATAGORDA COUNTY	Rice farming conversion to sprinkler irrigation (LEPA) versus field flooding	YES	$802,187	$66,582	$36.02	4,696	2020	Colorado-Lavaca	No	1	-1	1	0	-1	-1	0	1	0	0	0	0	Reduction of up to 4,696 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications of conversion.
160	**Conservation - Sprinkler Irrigation**	IRRIGATION, WHARTON COUNTY	Rice farming conversion to sprinkler irrigation (LEPA) versus field flooding	YES	$648,637	$53,837	$36.02	3,750	2020	Brazos-Colorado	No	1	-1	1	0	-1	-1	0	1	0	0	0	0	Reduction of up to 3,750 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications of conversion.
161	**Conservation - Sprinkler Irrigation**	IRRIGATION, WHARTON COUNTY	Rice farming conversion to sprinkler irrigation (LEPA) versus field flooding	YES	$163,772	$13,593	$36.02	895	2020	Colorado	No	1	-1	1	0	-1	-1	0	1	0	0	0	0	Reduction of up to 895 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications of conversion.
162	**Conservation - Sprinkler Irrigation**	IRRIGATION, WHARTON COUNTY	Rice farming conversion to sprinkler irrigation (LEPA) versus field flooding	YES	$190,585	$15,819	$36.02	1,098	2020	Colorado-Lavaca	No	1	-1	1	0	-1	-1	0	1	0	0	0	0	Reduction of up to 1,098 ac-ft/yr of return flows to Colorado River and Matagorda Bay	Reference cost implications of conversion.
163	**Expansion of Groundwater Supply**	Aqua WSC	Expand use of Carrizo-Wilcox aquifer by developing wellfield in Brazos Basin of Bastrop County	Yes	$9,777,000	$1,037,000	$259	4,000	2020	Brazos	No	1	-1	1	0	0	1	1	0	0	0	0	3	Water supply is within the MAG, so dependent on the formation, drawdown in the aquifer could be up to 237 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
164	**New LCRA Contract (with construction)**	Aqua WSC	Purchase SW through contract and construct new SWTP and transmission line from Colorado River	Yes	$127,538,000	$18,940,000	$1,263	15,000	2040	Colorado	No	-1	1	1	0	0	0	-1	0	0	-1	0	-1	Negligible	Could decrease amount of water available for release from the Highland Lakes by up to 15,000 AFY
165	**New LCRA Contract (with construction)**	City of Bastrop	Purchase SW through contract and construct new SWTP and transmission line from Colorado River	Yes	$34,858,000	$5,526,000	$2,210	2,500	2050	Colorado	No	-1	1	1	0	0	0	-1	0	0	-1	0	-1	Negligible	Could decrease amount of water available for release from the Highland Lakes by up to 2,500 AFY
166	**Development of New Groundwater Supply**	City of Bastrop	Develop a new supply of groundwater in the Carrizo-Wilcox aquifer in the Colorado Basin of Bastrop County	Yes	$2,976,000	$281,000	$937	300	2020	Colorado	No	0	-1	1	0	0	1	1	0	0	0	0	2	Water supply is within the MAG, so dependent on the formation, drawdown in the aquifer could be up to 237 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
167	**Reuse (Direct)**	City of Bastrop	Direct reuse of wastewater effluent.	Yes	$4,625,000	$502,000	$448	1,120	2040	Colorado	No		0	1	0	1	0	0	1	-1	-1	1	2	Decrease return flows by 1,120 ac-ft/yr	Decrease return flows by 1,120 ac-ft/yr
168	**Expansion of Groundwater Supply**	BASTROP COUNTY WCID #2	Expand use of Carrizo-Wilcox aquifer in Colorado Basin of Bastrop County	Yes	$2,150,000	$203,000	$369	550	2060	Colorado	No	1	0	1	0	0	0	0	0	0	0	0	2	Water supply is within the MAG, so dependent on the formation, drawdown in the aquifer could be up to 237 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible

Table 5A-2: Region K
Potentially Feasible Water Management Strategy Screening (for 2016 Region K Plan)

												Screening Matrix Factors (Positive (1), Neutral (0), Negative (-1))													
	Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Addressing a Need?	Total Strategy Cost ($)	Annual Strategy Cost ($)	Cost of Water ($/ac-ft)	Max Yield (ac-ft/yr)	Starting Decade	Basin	Interbasin Transfer (Yes/No)	Cost	Yield	Location	Water Quality	Environmental and Natural Resources	Local Preference	Institutional Constraints	Impacts on Water Resources	Impacts on Agricultural Resources	Impacts to Recreation	Impacts on Other Management Strategies	Total of Screening Factors	Quantified Environmental Impacts	Quantified Agriculture Impacts
169	**Expansion of Groundwater Supply**	County-Other, Bastrop County	Expand use of Carrizo-Wilcox aquifer in Colorado Basin of Bastrop County	Yes	$2,150,000	$203,000	$3,383	60	2020	Colorado	No	-1	0	1	0	0	0	1	0	0	0	0	1	Water supply is within the MAG, so dependent on the formation, drawdown in the aquifer could be up to 237 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
170	**Expansion of Groundwater Supply**	Elgin	Expand use of Carrizo-Wilcox aquifer in Colorado Basin of Bastrop County	Yes	$2,150,000	$200,000	$667	300	2020	Colorado	No	0	-1	1	0	0	0	0	0	0	0	0	0	Water supply is within the MAG, so dependent on the formation, drawdown in the aquifer could be up to 237 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
171	**New LCRA Contract (with construction)**	Elgin	Purchase SW through contract and construct new SWTP and transmission line from Colorado River	Yes	$61,623,000	$8,986,000	$2,567	3,500	2030	Colorado	No	-1	1	0	0	0	0	-1	0	0	-1	0	-2	Negligible	Could decrease amount of water available for release from the Highland Lakes by up to 3,500 AFY
172	**Development of New Groundwater Supply**	Smithville	Develop a new supply of groundwater in the Queen City aquifer in the Colorado Basin of Bastrop County	Yes	$2,620,000	$241,000	$1,607	150	2070	Colorado	No	-1	1	1	0	0	-1	0	0	0	0	0	0	Water supply is within the MAG, so drawdown in the aquifer could be up to 13 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
173	**Expansion of Groundwater Supply**	Manufacturing, Bastrop County	Expand use of Carrizo-Wilcox aquifer in Colorado Basin of Bastrop County	Yes	$2,150,000	$198,000	$995	199	2020	Colorado	No	0	0	1	0	0	0	0	0	0	0	0	1	Water supply is within the MAG, so dependent on the formation, drawdown in the aquifer could be up to 237 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
174	**Development of New Groundwater Supply**	Mining, Bastrop County	Develop a new supply of groundwater in the Queen City aquifer in the Guadalupe Basin of Bastrop County	Yes	$2,446,000	$231,000	$755	306	2020	Guadalupe	No	0	0	1	0	0	0	0	0	0	0	0	1	Water supply is within the MAG, so drawdown in the aquifer could be up to 13 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
175	**Development of New Groundwater Supply**	Mining, Bastrop County	Develop a new supply of groundwater in the Carrizo-Wilcox aquifer in the Guadalupe Basin of Bastrop County	Yes	$3,391,000	$321,000	$689	466	2040	Guadalupe	No	0	0	1	0	0	0	0	0	0	0	0	1	Water supply is within the MAG, so dependent on the formation, drawdown in the aquifer could be up to 237 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
176	**Expansion of Groundwater Supply**	County-Other, Blanco County	Expand use of Ellenburger-San Saba aquifer in Colorado Basin of Blanco County	Yes	$490,000	$44,000	$800	55	2050	Colorado	No	0	1	1	0	0	0	1	0	0	0	0	3	Water supply is within the MAG, so drawdown in the aquifer could be up to 2 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
177	**Expansion of Groundwater Supply**	County-Other, Blanco County	Expand use of Hickory aquifer in Colorado Basin of Blanco County	Yes	$1,316,000	$120,000	$2,182	55	2050	Colorado	No	-1	1	1	0	0	0	1	0	0	0	0	2	Water supply is within the MAG, so drawdown in the aquifer could be up to 7 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
178	**Brush Control**	County-Other, Blanco County	Removal of brush to increase recharge and runoff. Firm yield determined from Pedernales River Watershed Feasibility Study.	Yes	$2,137,000	$213,700	$500	425	2020	Colorado	No	0	-1	1	0	1	0	0	0	0	0	0	1	Potential increases to streamflow of up to 425 AFY	Negligible
179	**Expansion of Groundwater Supply**	JOHNSON CITY	Expand use of Ellenburger-San Saba aquifer in Colorado Basin of Blanco County	Yes	$1,505,000	$140,000	$800	175	2020	Colorado	No	0	1	1	0	0	0	0	0	0	0	0	2	Water supply is within the MAG, so drawdown in the aquifer could be up to 2 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Additional drawdown of 175 AFY is likely to have negligible impacts to agriculture
180	**Expansion of Groundwater Supply**	Bertram	Expand use of Ellenburger-San Saba aquifer in Colorado Basin of Burnet County	Yes	$1,374,000	$127,000	$706	180	2020	Brazos	No	0	0	1	0	0	0	0	0	0	0	0	1	Water supply is within the MAG, so aquifer should maintain 100% saturated thickness. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Additional drawdown of 180 AFY is likely to have negligible impacts to agriculture
181	**Buena Vista Regional Project**	Bertram	Contract with LCRA. Expansion of Buchanan WTP and transmission of treated surface water to Buena Vista residents, Bertram, and others	Yes	$4,656,599	$707,707	$801	884	2020	Brazos	Yes	0	1	-1	1	0	0	-1	0	0	-1	0	-1	Project could remove up to 5,000 AFY of water from the Highland Lakes, with no return flows.	Project could remove up to 5,000 AFY of water from the Highland Lakes, with no return flows.
182	**Buena Vista Regional Project**	Burnet	Contract with LCRA. Expansion of Buchanan WTP and transmission of treated surface water to Buena Vista residents, Bertram, and others	No	$10,535,292	$1,601,147	$801	2,000	2020	Colorado	No	0	1	1	1	0	0	-1	0	0	-1	0	1	Project could remove up to 5,000 AFY of water from the Highland Lakes, with no return flows.	Project could remove up to 5,000 AFY of water from the Highland Lakes, with no return flows.
183	**Marble Falls Regional Project**	COTTONWOOD SHORES	Contract with LCRA. Construction of new raw water intake and regional WTP at Max Starcke Dam, and construction of transmission lines to support future development.	No	$8,172,147	$1,296,700	$1,297	1,000	2020	Colorado	No	-1	1	1	0	0	0	-1	0	0	-1	0	-1	Project could remove up to 5,600 AFY of water from the Highland Lakes, with no return flows.	Project could remove up to 5,600 AFY of water from the Highland Lakes, with no return flows.
184	**Marble Falls Regional Project**	County-Other, Burnet County	Contract with LCRA. Construction of new raw water intake and regional WTP at Max Starcke Dam, and construction of transmission lines to	No	$7,175,145	$1,138,502	$1,297	878	2020	Colorado	No	-1	1	1	0	0	0	-1	0	0	-1	0	-1	Project could remove up to 5,600 AFY of water from the Highland Lakes, with no return flows.	Project could remove up to 5,600 AFY of water from the Highland Lakes, with no return flows.
185	**Buena Vista Regional Project**	County-Other, Burnet County	Contract with LCRA. Expansion of Buchanan WTP and transmission of treated surface water to Buena Vista residents, Bertram, and others	Yes	$5,267,646	$800,573	$801	1,000	2040	**Brazos**	No	0	1	1	1	0	0	-1	0	0	-1	0	1	Project could remove up to 5,000 AFY of water from the Highland Lakes, with no return flows.	Project could remove up to 5,000 AFY of water from the Highland Lakes, with no return flows.
186	**Buena Vista Regional Project**	County-Other, Burnet County	Contract with LCRA. Expansion of Buchanan WTP and transmission of treated surface water to Buena Vista residents	No	$5,267,646	$800,573	$801	1,000	2020	**Colorado**	No	0	1	1	1	0	0	-1	0	0	-1	0	1	Project could remove up to 5,000 AFY of water from the Highland Lakes, with no return flows.	Project could remove up to 5,000 AFY of water from the Highland Lakes, with no return flows.
187	**East Lake Buchanan Regional Project**	County-Other, Burnet County	Contract with LCRA. Regional SWTP and deep water intake at Council Creek Village to provide treated water to communities along East Lake	No	$10,477,785	$1,612,000	$1,724	935	2020	Colorado	No	-1	1	1	1	0	0	-1	0	0	-1	0	0	Project could remove up to 935 AFY of water from the Highland Lakes, with no return flows.	Project could remove up to 935 AFY of water from the Highland Lakes, with no return flows.
188	**Brush Control**	County-Other, Burnet County	Removal of brush to increase recharge and runoff. Firm yield determined from Pedernales River Watershed Feasibility Study.	No	$2,137,000	$213,700	$500	425	2020	Colorado	No	0	-1	1	0	1	0	0	0	0	0	0	1	Potential increases to streamflow of up to 425 AFY	Negligible
189	**LCRA Contract Amendment**	GRANITE SHOALS	Amend existing contract with LCRA for additional supply	Yes	$37,750	$37,750	$151	250	2050	Colorado	No	1	1	1	0	0	0	0	0	0	-1	0	2	Individual WUG implementation has negligible impacts to the region, but full regional implementation could remove up to 70,000 AFY from the Highland Lakes or other proposed LCRA reservoirs. Approximately 23,000 AFY would provide additional instream flows from the release point down to Matagorda County.	Increases in firm municipal and industrial contracts over time will eventually reduce the amount of available interruptible water to 0 AFY.
190	**Reuse (Direct)**	HORSESHOE BAY	Direct reuse of wastewater effluent.	Yes	$0	$0	$0	100	2020	Colorado	No	1	0	1	0	1	0	1	1	0	0	0	5	None	None

Table 5A-2: Region K
Potentially Feasible Water Management Strategy Screening (for 2016 Region K Plan)

	Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Addressing a Need?	Total Strategy Cost ($)	Annual Strategy Cost ($)	Cost of Water ($/ac-ft)	Max Yield (ac-ft/yr)	Starting Decade	Basin	Interbasin Transfer (Yes/No)	Screening Matrix Factors (Positive (1), Neutral (0), Negative (-1)): Cost	Yield	Location	Water Quality	Environmental and Natural Resources	Local Preference	Institutional Constraints	Impacts on Water Resources	Impacts on Agricultural Resources	Impacts to Recreation	Impacts on Other Management Strategies	Total of Screening Factors	Quantified Environmental Impacts	Quantified Agriculture Impacts
191	**LCRA Contract Amendment**	HORSESHOE BAY	Amend existing contract with LCRA for additional supply	Yes	$30,200	$30,200	$151	200	2020	Colorado	No	1	1	1	0	0	0	0	0	0	-1	0	2	Individual WUG implementation has negligible impacts to the region, but full regional implementation could remove up to 70,000 AFY from the Highland Lakes or other proposed LCRA reservoirs. Approximately 23,000 AFY would provide additional instream flows from the release point down to Matagorda County.	Increases in firm municipal and industrial contracts over time will eventually reduce the amount of available interruptible water to 0 AFY.
192	**Marble Falls Regional Project**	MARBLE FALLS	Contract with LCRA. Construction of new raw water intake and regional WTP at Max Starcke Dam, and construction of transmission lines to support future development.	Yes	$32,688,587	$5,186,798	$1,297	4,000	2020	Colorado	No	-1	1	1	0	0	0	-1	0	0	-1	0	-1	Project could remove up to 5,600 AFY of water from the Highland Lakes, with no return flows.	Project could remove up to 5,600 AFY of water from the Highland Lakes, with no return flows.
193	**Expansion of Groundwater Supply**	Mining, Burnet County	Expand use of Ellenburger-San Saba aquifer in Colorado Basin of Burnet County	Yes	$10,597,000	$1,034,000	$689	1,500	2020	Colorado	No	0	-1	1	0	0	0	0	0	0	0	0	0	Water supply is within the MAG, so aquifer should maintain 100% saturated thickness. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Maintaing 100% saturated thickness should create negligible impacts to agriculture, but mining demand could drawdown aquifer levels up to 30%, which could impact agriculture well pumping if located nearby. Local GCD can ensure appropriate distance.
194	**Expansion of Groundwater Supply**	Mining, Burnet County	Expand use of Hickory aquifer in Colorado Basin of Burnet County	Yes	$13,437,000	$1,293,000	$718	1,800	2030	Colorado	No	0	-1	1	0	0	0	0	0	0	0	0	0	Water supply is within the MAG, so aquifer should maintain 100% saturated thickness. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible impact to agriculture due to limited use of aquifer for irrigation.
195	**Expansion of Groundwater Supply**	Mining, Burnet County	Expand use of Marble Falls aquifer in Colorado Basin of Burnet County	Yes	$7,257,000	$703,000	$469	1,500	2060	Colorado	No	0	-1	1	0	0	0	0	0	0	0	0	0	Water supply is within the MAG, so aquifer should maintain 100% saturated thickness. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	No impact to agriculture as aquifer is not used for irrigation.
196	**Expansion of Groundwater Supply**	County-Other, Colorado County	Expand use of Gulf Coast aquifer in Colorado Basin of Colorado County	Yes	$1,466,000	$136,000	$602	226	2020	Colorado	No	0	0	1	0	0	0	1	0	0	0	0	2	Water supply is within the MAG, so drawdown in the aquifer could be up to 12 feet, relative to 1999 conditions. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
197	**LCRA WMP - Interruptible Water**	County, Matagorda County, Wharton County	municipal and industrial demands versus fully authorized demands	Yes	$3,894,000	$3,894,000	$50	77,880	2020	All	No	1	1	1	0	1	1	0	0	1	-1	0	5	Environmental flows also have a firm commitment under the LCRA WMP of 33,440 AFY.	Provides a positive impact to agriculture in the volumes shown in Table 5-17.
198	**COA Return Flows**	Irrigation, Colorado County, Matagorda County, Wharton County	Return flows from City of Austin and others	Yes	$0	$0	$0	26,044	2020	All	No	1	0	1	0	1	1	0	1	1	0	0	6	Benefits shown in Table 5-2	Benefits shown in Table 5-2
199	**Expansion of Groundwater Supply**	County-Other, Fayette County	Expand use of Gulf Coast aquifer in Colorado Basin of Fayette County	Yes	$2,279,000	$214,000	$620	345	2020	Colorado	No	0	1	1	0	0	0	1	0	0	0	0	3	Water supply is within the MAG, so drawdown in the aquifer could be up to 12 feet, relative to 1999 conditions. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
200	**Expansion of Groundwater Supply**	County-Other, Fayette County	Expand use of Gulf Coast aquifer in Lavaca Basin of Fayette County	Yes	$2,279,000	$213,000	$724	294	2020	Lavaca	No	0	1	1	0	0	0	1	0	0	0	0	3	Water supply is within the MAG, so drawdown in the aquifer could be up to 12 feet, relative to 1999 conditions. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
201	**Reuse (Direct)**	FLATONIA	Direct reuse of wastewater effluent.	No	$1,226,000	$110,000	$821	182	2020	Lavaca	No	0	-1	1	0	1	0	1	1	0	0	0	3	Reduced demand on aquifer by up to 182 AFY.	None
202	**Expansion of Groundwater Supply**	FLATONIA	Expand use of Gulf Coast aquifer in Lavaca Basin of Fayette County	No	$2,241,000	$206,000	$2,060	100	2020	Lavaca	No	-1	0	1	0	0	0	0	0	0	0	0	0	Water supply is within the MAG, so drawdown in the aquifer could be up to 12 feet, relative to 1999 conditions. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
203	**Expansion of Groundwater Supply**	Manufacturing, Fayette County	Expand use of Gulf Coast aquifer in Lavaca Basin of Fayette County	Yes	$2,279,000	$214,000	$547	391	2020	Lavaca	No	0	1	1	0	0	0	0	0	0	0	0	2	Water supply is within the MAG, so drawdown in the aquifer could be up to 12 feet, relative to 1999 conditions. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
204	**Expansion of Groundwater Supply**	Mining, Fayette County	Expand use of Gulf Coast aquifer in Colorado Basin of Fayette County	Yes	$2,279,000	$214,000	$622	1,576	2020	Colorado	No	0	1	1	0	0	0	0	0	0	0	0	2	Water supply is within the MAG, so drawdown in the aquifer could be up to 12 feet, relative to 1999 conditions. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
205	**Expansion of Groundwater Supply**	Mining, Fayette County	Expand use of Sparta aquifer in Guadalupe Basin of Fayette County	Yes	$753,000	$68,000	$1,030	66	2020	Guadalupe	No		1	1	0	0	0	0	0	0	0	0	2	Water supply is within the MAG, so drawdown in the aquifer could be up to 60 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
206	**Expansion of Groundwater Supply**	Mining, Fayette County	Expand use of Gulf Coast aquifer in Lavaca Basin of Fayette County	Yes	$2,279,000	$214,000	$622	344	2020	Lavaca	No	0	1	1	0	0	0	0	0	0	0	0	2	Water supply is within the MAG, so drawdown in the aquifer could be up to 12 feet, relative to 1999 conditions. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
207	**Long Lake Storage Release**	Steam-Electric, Fayette County	Use stored water from Long Lake released downstream for diversion	Yes	$2,822,000	$374,000	$187	2,000	2020	Colorado	No	1	0	0	0	1	0	0	1	0	0	0	3	Refer to Direct Reuse discussion quantifying return flows	Change "no adverse" to "negligible"
208	**LCRA Contract Amendment**	Steam-Electric, Fayette County	Amend existing contract with LCRA for additional supply.	Yes	$2,265,000	$2,265,000	$151	15,000	2020	Colorado	No	1	1	1	0	0	0	0	0	0	0	0	3	Individual WUG implementation has negligible impacts to the region, but full regional implementation could remove up to 70,000 AFY from the Highland Lakes or other proposed LCRA reservoirs. Approximately 23,000 AFY would provide additional instream flows from the release point down to Matagorda County.	Increases in firm municipal and industrial contracts over time will eventually reduce the amount of available interruptible water to 0 AFY.
209	**Brush Control**	County-Other, Gillespie County	Removal of brush to increase recharge and runoff. No firm yield is associated with this strategy.	No	$2,137,000	$213,700	$500	425	2020	Colorado	No	0	0	1	0	1	0	1	1	0	1	1	6	Potential increases to streamflow of up to 425 AFY	Negligible
210	**Expansion of Groundwater Supply**	Manufacturing, Gillespie County	Expand use of Ellenburger-San Saba aquifer in Colorado Basin of Gillespie County	Yes	$3,880,000	$368,000	$588	626	2020	Colorado	No	0	1	1	0	0	0	0	0	0	0	0	2	Water supply is within the MAG, so drawdown in the aquifer could be up to 5 feet, relative to 2010 conditions. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Additional drawdown of 626 AFY is likely to have negligible impacts to agriculture
211	**Reuse (Direct)**	Buda	Direct reuse of wastewater effluent.	Yes	$5,464,000	$1,180,000	$527	2,240	2020	Colorado	No	1	-1	1	0	1	0	0	1	0	-1	1	3	Reduction of return flows by up to 2,240 AFY.	None
212	**Groundwater Importation (HCPUA Pipeline)**	Buda	Importation of groundwater from the Carrizo-Wilcox aquifer in Gonzales County (Region L) through a pipeline. Buda portion.	Yes	$34,996,869	$4,751,402	$1,926	2,467	2030	Colorado	No	-1	1	-1	0	0	1	0	0	0	0	0	1	See Region L Plan	Negligible

Table 5A-2: Region K
Potentially Feasible Water Management Strategy Screening (for 2016 Region K Plan)

	Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Addressing a Need?	Total Strategy Cost ($)	Annual Strategy Cost ($)	Cost of Water ($/ac-ft)	Max Yield (ac-ft/yr)	Starting Decade	Basin	Interbasin Transfer (Yes/No)	Screening Matrix Factors (Positive (1), Neutral (0), Negative (-1)) Cost	Yield	Location	Water Quality	Environmental and Natural Resources	Local Preference	Institutional Constraints	Impacts on Water Resources	Impacts on Agricultural Resources	Impacts to Recreation	Impacts on Other Management Strategies	Total of Screening Factors	Quantified Environmental Impacts	Quantified Agriculture Impacts
213	**Alternative Groundwater Importation (HCPUA Pipeline)**	Buda	Wilcox aquifer in Gonzales County (Region L) through a pipeline. Buda portion. Alternative version assumes volume available without MAG restriction. Reduces unit cost for Buda.	Yes	$51,128,546	$7,308,685	$1,664	4,426	2030	Colorado	No	-1	1	-1	0	0	1	0	0	0	0	0	1	See Region L Plan	Negligible
214	**Saline Edwards ASR Project**	Buda	Non-drought year available freshwater Edwards BFZ aquifer volume will be stored in the Edwards BFZ (Saline Zone). In times of drought, water will be pumped, treated, and piped to users within the BSEACD district.	Yes	$7,500,000	$1,015,000	$2,031	500	2030	Colorado	No	-1	0	0	1	0	0	0	1	0	0	0	0	Using up to 700 AFY of water from the Saline Zone may allow the same volume to remain in the freshwater zone during drier times. During average rainfall, the strategy may decrease springflow by removing an additional 300 ac-ft/yr	Negligible
215	**Edwards / Middle Trinity ASR Project**	Buda	Non-drought year available freshwater Edwards BFZ aquifer volume will be stored in the Trinity aquifer. In times of drought, water will be pumped, treated, and piped to users within the BSEACD district.	Yes	$6,818,182	$734,266	$801	600	2030	Colorado	No	0	0	1	0	0	0	0	1	0	0	0	2	During average rainfall, the strategy may decrease springflow by removing up to an additional 1,140 ac-ft/yr	Negligible
216	**Groundwater Importation (Hays County Pipeline)**	County-Other, Hays County	Importation of groundwater from the Carrizo-Wilcox aquifer in Gonzales County (Region L) through a pipeline. Region L pipeline runs from delivery point near Kyle to the Wimberley area in Hays County. Region K pipeline will run from a to-be-determined connection point along the pipeline to the Dripping Springs area. Alternative version would use Forestar water (Region G Lee County Carrizo-Wilcox) as the source.	Yes	$12,257,000	$1,507,000	$754	2,000	2030	Colorado	No	0	0	-1	0	0	-1	0	0	0	0	0	-2	Negligible	Negligible
217	**Alternative Groundwater Importation (Hays County Pipeline)**	County-Other, Hays County	Region L pipeline runs from delivery point near Kyle to the Wimberley area in Hays County. Region K pipeline will run from a to-be-determined connection point along the pipeline to the Dripping Springs area. Alternative version would use Forestar water (Region G Lee County Carrizo-	Yes	$12,257,000	$1,507,000	$754	2,000	2030	Colorado	No	0	0	-1	0	0	-1	0	0	0	0	0	-2	Negligible	Negligible
218	**Saline Edwards ASR Project**	County-Other, Hays County	Non-drought year available freshwater Edwards BFZ aquifer volume will be stored in the Edwards BFZ (Saline Zone). In times of drought, water will be pumped, treated, and piped to users within the BSEACD district.	Yes	$3,000,000	$406,000	$2,031	200	2030	Colorado	No	-1	0	0	1	0	0	0	1	0	0	0	0	Using up to 700 AFY of water from the Saline Zone may allow the same volume to remain in the freshwater zone during drier times. During average rainfall, may decrease springflow by removing an additional 300 ac-ft/yr	Negligible
219	**Edwards / Middle Trinity ASR Project**	County-Other, Hays County	Non-drought year available freshwater Edwards BFZ aquifer volume will be stored in the Trinity aquifer. In times of drought, water will be pumped, treated, and piped to users within the BSEACD district.	Yes	$2,272,727	$244,755	$801	200	2030	Colorado	No	0	0	1	0	0	0	0	1	0	0	0	2	During average rainfall, the strategy may decrease springflow by removing up to an additional 1,140 ac-ft/yr	Negligible
220	**Brush Control**	County-Other, Hays County	Removal of brush to increase recharge and runoff. Firm yield determined from Pedernales River Watershed Feasibility Study.	Yes	$2,137,000	$213,700	$500	425	2020	Colorado	No	0	-1	1	0	1	0	0	0	0	0	0	1	Potential increases to streamflow of up to 425 AFY	Negligible
221	**Water Purchase**	Dripping Springs	Water purchase from Dripping Springs WSC	Yes	$0	$0	$0	432	2030	Colorado	No	1	1	1	0	0	1	1	0	0	0	0	5	None	None
222	**Groundwater Importation (Hays County Pipeline)**	Dripping Springs WSC	Wilcox aquifer in Gonzales County (Region L) through a pipeline. Region L pipeline runs from delivery point near Kyle to the Wimberley area in Hays County. Region K pipeline will run from a to-	Yes	$6,128,500	$753,500	$754	1,000	2030	Colorado	No	0	0	-1	0	0	-1	0	0	0	0	0	-2	Negligible	Negligible
223	**Alternative Groundwater Importation (Hays County Pipeline)**	Dripping Springs WSC	Region L pipeline runs from delivery point near Kyle to the Wimberley area in Hays County. Region K pipeline will run from a to-be-determined connection point along the pipeline to the	Yes	$6,128,500	$753,500	$754	1,000	2030	Colorado	No	0	0	-1	0	0	-1	0	0	0	0	0	-2	Negligible	Negligible
224	**Water Purchase**	Goforth SUD	Water purchase from GBRA to meet needs in Hays and Travis counties	Yes	$9,600	$9,600	$200	48	2070	Colorado	No	1	1	1	0	0	1	1	0	0	0	0	5	None	None
225	**Groundwater Importation (Hays County Pipeline)**	West Travis County PUA	Wilcox aquifer in Gonzales County (Region L) through a pipeline. Region L pipeline runs from delivery point near Kyle to the Wimberley area in Hays County. Region K pipeline will run from a to-	Yes	$6,128,500	$753,500	$754	1,000	2030	Colorado	No	0	0	-1	0	0	-1	0	0	0	0	0	-2	Negligible	Negligible
226	**Alternative Groundwater Importation (Hays County Pipeline)**	West Travis County PUA	Region L pipeline runs from delivery point near Kyle to the Wimberley area in Hays County. Region K pipeline will run from a to-be-determined	Yes	$6,128,500	$753,500	$754	1,000	2030	Colorado	No	0	0	-1	0	0	-1	0	0	0	0	0	-2	Negligible	Negligible
227	**LCRA Contract Amendment**	West Travis County PUA	Amend existing contract with LCRA for additional supply for Hays and Travis counties	Yes	$151,000	$151,000	$151	1,000	2030	Colorado	No	1	1	1	0	0	0	0	0	0	-1	0	2	Individual WUG implementation has negligible impacts to the region, but full regional implementation could remove up to 70,000 AFY from the Highland Lakes or other proposed LCRA reservoirs. Approximately 23,000 AFY would provide additional instream flows from the release point down to Matagorda County.	Increases in firm municipal and industrial contracts over time will eventually reduce the amount of available interruptible water to 0 AFY.
228	**Expansion of Groundwater Supply**	Mining, Hays County	Expand use of Trinity aquifer in Colorado Basin of Hays County	Yes	$4,652,000	$457,000	$436	1,047	2020	Colorado	No	1	-1	1	0	0	0	0	0	0	0	0	1	Water supply is within the MAG, so drawdown in the aquifer could be up to 30 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Additional drawdown is likely to have negligible impacts to agriculture in this area.
229	**Edwards / Middle Trinity ASR Project**	Mining, Hays County	Non-drought year available freshwater Edwards BFZ aquifer volume will be stored in the Trinity aquifer. In times of drought, water will be pumped, treated, and piped to users within the BSEACD district.	Yes	$1,136,364	$122,378	$801	100	2030	Colorado	No	0	0	1	0	0	0	0	1	0	0	0	2	During average rainfall, the strategy may decrease springflow by removing up to an additional 1,140 ac-ft/yr	Negligible
230	**Water Purchase**	Mining, Hays County	Water purchase (reuse water) from Buda	Yes	$100,000	$100,000	$200	500	2040	Colorado	No	1	1	1	0	0	0	0	1	0	0	0	4	None	None
231	**Brush Control**	County-Other, Llano County	Removal of brush to increase recharge and runoff. Firm yield determined from Pedernales River Watershed Feasibility Study.	No	$2,137,000	$213,700	$500	425	2020	Colorado	No	0	-1	1	0	1	0	0	0	0	0	0	1	Potential increases to streamflow of up to 425 AFY	Negligible
232	**Reuse (Direct)**	Llano	Direct reuse of wastewater effluent.	Yes	$689,000	$66,000	$660	100	2020	Colorado	No	0	0	1	0	1	0	0	1	0	-1	1	3	Negligible	None
233	**Development of New Groundwater Supply**	Llano	Develop a new supply of groundwater in the Hickory aquifer in the Colorado Basin of Llano County	Yes	$2,743,000	$254,000	$1,270	200	2020	Colorado	No	-1	1	1	0	0	0	1	0	0	0	0	2	Water supply is within the MAG, so drawdown in the aquifer could be up to 7 feet, relative to 2010 conditions. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	None
234	**STPNOC Alternate Canal Delivery**	Steam-Electric, Matagorda County	Divert available Garwood water during winter months through irrigation canal system upstream of Bay City Dam. Pipeline from canal to reservoir.	Yes	$7,669,000	$2,593,000	$204	12,727	2020	Colorado	No	1	1	1	0	0	0	0	0	0	-1	0	2	Negligible	Negligible
235	**LCRA Contract Amendment**	Steam-Electric, Matagorda County		Yes	$1,510,000	$1,510,000	$151	10,000	2020	Colorado	No	1	1	1	0	0	0	0	0	0	-1	0	2	Individual WUG implementation has negligible impacts to the region, but full regional implementation could remove up to 70,000 AFY from the Highland Lakes or other proposed LCRA reservoirs. Approximately 23,000 AFY would provide additional instream flows from the release point down to Matagorda County.	Increases in firm municipal and industrial contracts over time will eventually reduce the amount of available interruptible water to 0 AFY.

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Potentially Feasible Water Management Strategy Screening (for 2016 Region K Plan)

	Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Addressing a Need?	Total Strategy Cost ($)	Annual Strategy Cost ($)	Cost of Water ($/ac-ft)	Max Yield (ac-ft/yr)	Starting Decade	Basin	Interbasin Transfer (Yes/No)	Screening Matrix Factors (Positive (1), Neutral (0), Negative (-1))											Total of Screening Factors	Quantified Environmental Impacts	Quantified Agriculture Impacts
												Cost	Yield	Location	Water Quality	Environmental and Natural Resources	Local Preference	Institutional Constraints	Impacts on Water Resources	Impacts on Agricultural Resources	Impacts to Recreation	Impacts on Other Management Strategies			
236	**STPNOC Brackish Surface Water Blending**	Steam-Electric, Matagorda County	Under emergency conditions, the TCEQ can approve STPNOC to pump brackish surface water to blend with the freshwater in their reservoir	Yes	$0	$0	$0	3,000	2020	Colorado	No	1	1	1	0	0	1	0	0	0	0	0	4	None	None
237	**Brush Control**	County-Other, Mills County	Removal of brush to increase recharge and runoff. Firm yield determined from Pedernales River Watershed Feasibility Study.	No	$2,137,000	$213,700	$500	425	2020	Colorado	No	0	-1	1	0	1	0	0	0	0	0	0	1	Potential increases to streamflow of up to 425 AFY	Negligible
240	**Expansion of Groundwater Supply**	Irrigation, Mills County	Expand use of Trinity aquifer in Colorado Basin of Mills County	Yes	$8,289,000	$777,000	$1,619	480	2020	Brazos	No	-1	1	1	0	0	0	1	0	0	0	0	2	Water supply is within the MAG, so drawdown in the aquifer could be up to 12 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Positive impact of 480 ac-ft/yr of water for irrigation.
241	**Brush Control**	County-Other, San Saba County	Removal of brush to increase recharge and runoff. Firm yield determined from Pedernales River Watershed Feasibility Study.	No	$2,137,000	$213,700	$500	425	2020	Colorado	No	0	-1	1	0	1	0	0	0	0	0	0	1	Potential increases to streamflow of up to 425 AFY	Negligible
242	**Water Purchase**	BEE CAVE VILLAGE	Purchase additional water from West Travis County PUA.	Yes	$0	$0	$0	800	2020	Colorado	No	1	1	1	0	0	0	0	0	0	-1	0	2	None	None
243	**Brush Control**	County-Other, Travis County	Removal of brush to increase recharge and runoff. Firm yield determined from Pedernales River Watershed Feasibility Study.	No	$2,137,000	$213,700	$500	425	2020	Colorado	No	0	-1	1	0	1	0	0	0	0	0	0	1	Potential increases to streamflow of up to 425 AFY	Negligible
244	**Saline Edwards ASR Project**	Creedmoor-Maha WSC	Non-drought year available freshwater Edwards BFZ aquifer volume will be stored in the Edwards BFZ (Saline Zone). In times of drought, water will be pumped, treated, and piped to users within the BSEACD district.	Yes	$4,500,000	$609,000	$2,031	300	2030	Colorado	No	-1	0	0	1	0	0	0	1	0	0	0	0	Using up to 700 AFY of water from the Saline Zone may allow the same volume to remain in the freshwater zone during drier times. During average rainfall, may decrease springflow by removing an additional 300 ac-ft/yr	Negligible
245	**New LCRA Contract**	Creedmoor-Maha WSC	Once contract with City of Austin ends, contract with LCRA for water.	Yes	$60,400	$60,400	$151	400	2030	Colorado	No	1	1	1	0	0	0	0	0	0	-1	0	2	Individual WUG implementation has negligible impacts to the region, but full regional implementation could remove up to 28,000 AFY from the Highland Lakes.	Increases in firm municipal and industrial contracts over time will eventually reduce the amount of available interruptible water to 0 AFY.
246	**LCRA Contract Amendment**	LAKEWAY	Amend existing contract with LCRA for additional supply	Yes	$226,500	$226,500	$151	1,500	2020	Colorado	No	1	1	1	0	0	0	0	0	0	-1	0	2	the region, but full regional implementation could remove up to 70,000 AFY from the Highland Lakes or other proposed LCRA reservoirs. Approximately 23,000 AFY would provide additional instream flows from the release point down to Matagorda County.	Increases in firm municipal and industrial contracts over time will eventually reduce the amount of available interruptible water to 0 AFY.
247	**Water Purchase**	LAKEWAY	Purchase additional water from Travis County WCID #17.	Yes	$0	$0	$0	1,000	2020	Colorado	No	1	1	1	0	0	0	0	0	0	-1	0	2	None	None
248	**Expansion of Groundwater Supply**	LAKEWAY	Expand use of Trinity aquifer in Colorado Basin of Travis County	Yes	$2,985,000	$285,000	$570	500	2020	Colorado	No	0	1	1	0	0	0	1	0	0	0	0	3	Water supply is within the MAG, so drawdown in the aquifer could be up to 124 feet, depending on the formation. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
249	**Expansion of Groundwater Supply**	Manor	Expand use of Trinity aquifer in Colorado Basin of Travis County	Yes	$3,442,000	$327,000	$545	600	2030	Colorado	No	0	1	1	0	0	0	1	0	0	0	0	3	Water supply is within the MAG, so drawdown in the aquifer could be up to 124 feet, depending on the formation. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
250	**Water Purchase**	Manor	Purchase additional water from Manville WSC.	Yes	$900,000	$900,000	$900	1,000	2050	Colorado	No	0	1	1	0	0	0	0	0	0	-1	0	1	None	None
251	**New LCRA Contract**	Manville WSC	Once contract with City of Austin ends, contract with LCRA for water.	Yes	$226,500	$226,500	$151	1,500	2060	Colorado	No	1	1	1	0	0	0	0	0	0	-1	0	2	Individual WUG implementation has negligible impacts to the region, but full regional implementation could remove up to 28,000 AFY from the Highland Lakes.	Increases in firm municipal and industrial contracts over time will eventually reduce the amount of available interruptible water to 0 AFY.
252	**Expansion of Groundwater Supply**	Manville WSC	Expand use of Trinity aquifer in Colorado Basin of Travis County	Yes	$5,431,000	$537,000	$537	1,000	2050	Colorado	No	0	1	1	0	0	0	1	0	0	0	0	3	Water supply is within the MAG, so drawdown in the aquifer could be up to 124 feet, depending on the formation. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
253	**Reuse (Direct)**	Pflugerville	Direct reuse of wastewater effluent.	Yes	$7,959,000	$911,000	$228	4,000	2020	Colorado	No	1	0	1	0	1	0	0	1	0	-1	1	4	Up to 4,000 AFY discharge reduction to Gilleland Creek.	None
254	**LCRA Contract Amendment**	Pflugerville	Amend existing contract with LCRA for additional supply	Yes	$906,000	$906,000	$151	6,000	2050	Colorado	No	1	1	1	0	0	0	0	0	0	-1	0	2	Individual WUG implementation has negligible impacts to the region, but full regional implementation could remove up to 70,000 AFY from the Highland Lakes or other proposed LCRA reservoirs. Approximately 23,000 AFY would provide additional instream flows from the release point down to Matagorda County.	Increases in firm municipal and industrial contracts over time will eventually reduce the amount of available interruptible water to 0 AFY.
255	**Expansion of Groundwater Supply**	Pflugerville	Expand use of Edwards BFZ aquifer in Colorado Basin of Travis County	Yes	$3,729,000	$371,000	$371	1,000	2040	Colorado	No	1	1	1	0	0	0	1	0	0	0	0	4	Water supply is within the MAG, so spring/streamflow should be maintained at least 42 ac-ft/month. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
256	**LCRA Contract Amendment**	POINT VENTURE	Amend existing contract with LCRA for additional supply	Yes	$15,100	$15,100	$151	100	2050	Colorado	No	1	1	1	0	0	0	0	0	0	-1	0	2	Individual WUG implementation has negligible impacts to the region, but full regional implementation could remove up to 70,000 AFY from the Highland Lakes or other proposed LCRA reservoirs. Approximately 23,000 AFY would provide additional instream flows from the release point down to Matagorda County.	Increases in firm municipal and industrial contracts over time will eventually reduce the amount of available interruptible water to 0 AFY.
257	**LCRA Contract Amendment**	ROLLINGWOOD	Amend existing contract with LCRA for additional supply	Yes	$45,300	$45,300	$151	300	2030	Colorado	No	1	1	1	0	0	0	0	0	0	-1	0	2	Individual WUG implementation has negligible impacts to the region, but full regional implementation could remove up to 70,000 AFY from the Highland Lakes or other proposed LCRA reservoirs. Approximately 23,000 AFY would provide additional instream flows from the release point down to Matagorda County.	Increases in firm municipal and industrial contracts over time will eventually reduce the amount of available interruptible water to 0 AFY.
258	**Edwards / Middle Trinity ASR Project**	Sunset Valley	Non-drought year available freshwater Edwards BFZ aquifer volume will be stored in the Trinity aquifer. In times of drought, water will be pumped, treated, and piped to users within the BSEACD district.	Yes	$2,272,727	$244,755	$801	200	2030	Colorado	No	0	0	1	0	0	0	0	1	0	0	0	2	During average rainfall, the strategy may decrease springflow by removing up to an additional 1,140 ac-ft/yr	Negligible
259	**New LCRA Contract**	Sunset Valley	Once contract with City of Austin ends, contract with LCRA for water.	Yes	$75,500	$75,500	$151	500	2030	Colorado	No	1	1	1	0	0	0	0	0	0	-1	0	2	Individual WUG implementation has negligible impacts to the region, but full regional implementation could remove up to 28,000 AFY from the Highland Lakes.	Increases in firm municipal and industrial contracts over time will eventually reduce the amount of available interruptible water to 0 AFY.

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	Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Addressing a Need?	Total Strategy Cost ($)	Annual Strategy Cost ($)	Cost of Water ($/ac-ft)	Max Yield (ac-ft/yr)	Starting Decade	Basin	Interbasin Transfer (Yes/No)	Screening Matrix Factors (Positive (1), Neutral (0), Negative (-1)) Cost	Yield	Location	Water Quality	Environmental and Natural Resources	Local Preference	Institutional Constraints	Impacts on Water Resources	Impacts on Agricultural Resources	Impacts to Recreation	Impacts on Other Management Strategies	Total of Screening Factors	Quantified Environmental Impacts	Quantified Agriculture Impacts
260	**Development of New Groundwater Supply**	Sunset Valley	Develop a new supply of groundwater in the Trinity aquifer in the Colorado Basin of Travis County	Yes	$2,228,000	$207,000	$1,035	200	2040	Colorado	No	-1	1	1	0	0	0	1	0	0	0	0	2	Water supply is within the MAG, so drawdown in the aquifer could be up to 30 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	Negligible
261	**New LCRA Contract**	Travis County WCID #10	Once contract with City of Austin ends, contract with LCRA for water.	Yes	$302,000	$302,000	$151	2,000	2030	Colorado	No	1	1	1	0	0	0	0	0	0	-1	0	2	Individual WUG implementation has negligible impacts to the region, but full regional implementation could remove up to 28,000 AFY from the Highland Lakes.	Increases in firm municipal and industrial contracts over time will eventually reduce the amount of available interruptible water to 0 AFY.
262	**LCRA Contract Amendment**	Travis County WCID #17	Amend existing contract with LCRA for additional supply	Yes	$151,000	$151,000	$151	1,000	2020	Colorado	No	1	1	1	0	0	0	0	0	0	-1	0	2	Individual WUG implementation has negligible impacts to the region, but full regional implementation could remove up to 70,000 AFY from the Highland Lakes or other proposed LCRA reservoirs. Approximately 23,000 AFY would provide additional instream flows from the release point down to Matagorda County.	Increases in firm municipal and industrial contracts over time will eventually reduce the amount of available interruptible water to 0 AFY.
263	**New LCRA Contract (with construction)**	VOLENTE	Construct intake from Lake Travis, transmission line, and treatment plant. Contract with LCRA for surface water.	Yes	$8,263,000	$1,064,000	$7,493	146	2020	Colorado	No	-1	1	1	0	0	0	-1	0	0	-1	0	-1	Individual WUG implementation has negligible impacts to the region, but full regional implementation could remove up to 28,000 AFY from the Highland Lakes.	Increases in firm municipal and industrial contracts over time will eventually reduce the amount of available interruptible water to 0 AFY.
264	**New LCRA Contract**	West Lake Hills	Once contract with City of Austin ends, contract with LCRA for water.	Yes	$196,300	$196,300	$151	1,300	2030	Colorado	No	1	1	1	0	0	0	0	0	0	-1	0	2	Individual WUG implementation has negligible impacts to the region, but full regional implementation could remove up to 28,000 AFY from the Highland Lakes.	Increases in firm municipal and industrial contracts over time will eventually reduce the amount of available interruptible water to 0 AFY.
265	**COA Direct Reuse**	Steam-Electric, Travis County	Direct reuse of wastewater effluent.	Yes	$129,996,000	$12,202,000	$1,162	10,500	2020	Colorado	No	-1	1	1	1	1	0	0	1	-1	0	0	3	Plan discussion provides quantification related to return flows.	Plan discussion provides quantification related to return flows.
266	**Development of New Groundwater Supply**	Steam-Electric, Wharton County	Develop new wellfield in the Gulf Coast Aquifer in the Brazos-Colorado Basin of Wharton County	Yes	$2,237,000	$207,000	$1,035	200	2050	Brazos-Colorado	No	-1	0	1	0	0	0	0	0	0	0	0	0	Negligible	Negligible
267	**LCRA - Off-Channel Reservoir(s)**	LCRA	Lane City off-channel reservoir	Yes	$211,200,000	$19,520,000	$217	90,000	2020	Colorado	No	1	1	1	0	-1	1	0	1	1	1	0	6	Could potentially remove up to 90,000 ac-ft from the Colorado River, but will create additional waterfowl habitat.	Could potentially make available up to 54,000 ac-ft/yr of water for agriculture purposes, dependent on needs of firm customers.
268	**LCRA - Off-Channel Reservoir(s)**	LCRA	Off-Channel reservoir (Prairie Site) using diversions from existing LCRA water rights	Yes	$376,000,000	$27,805,000	$1,545	18,000	2020	Colorado	No	-1	0	1	0	-1	0	0	1	1	1	0	2	Could potentially remove up to 18,000 ac-ft from the Colorado River, but will create additional waterfowl habitat.	Could potentially make available up to 18,000 ac-ft/yr of water for agriculture purposes, dependent on needs of firm customers.
269	**LCRA - Off-Channel Reservoir(s)**	LCRA	Off-Channel reservoir (Mid Basin Site) using diversions from existing LCRA water rights	Yes	$298,000,000	$22,089,000	$1,227	18,000	2020	Colorado	No	-1	0	1	0	-1	0	0	1	1	1	0	2	Could potentially remove up to 18,000 ac-ft from the Colorado River, but will create additional waterfowl habitat.	Could potentially make available up to 18,000 ac-ft/yr of water for agriculture purposes, dependent on needs of firm customers.
270	**LCRA - Off-Channel Reservoir(s)**	LCRA	Off-Channel reservoir receiving diversions from LCRA's Excess Flows permit	Yes	$298,000,000	$22,065,000	$1,446	16,691	2020	Colorado	No	-1	0	1	0	-1	0	0	1	1	1	0	2	Could potentially remove up to 16,691 ac-ft from the Colorado River, but will create additional waterfowl habitat.	Could potentially make available up to 16,691 ac-ft/yr of water for agriculture purposes, dependent on needs of firm customers.
271	**Enhanced Municipal and Industrial Conservation**	LCRA	Condensate Capture strategy by Reducing GPCD and Industrial water use through development of LCRA customer savings by incorporating	Yes	$64,099,000	$5,634,000	$268	20,000	2020	Colorado	No	1	0	1	0	0	1	0	1	0	0	0	4	Negligible, as impacts have already been accounted for in individual WUG strategies.	Negligible
272	**Alternative - Import Return Flows from Williamson County**	LCRA	Return flows from Brazos River basin to Colorado basin through transmission of WWTP effluent	Yes	$64,800,000	$6,200,000	$248	25,000	2020	Colorado	Yes	1	0	1	0	0	0	-1	1	1	1	-1	3	Increase streamflow in Colorado River Basin by up to 25,000 acre-feet/year, while decreasing the streamflow in the Brazos River Basin by the same amount.	Add "by up to 25,000 acre-feet." to discussion
273	**Alternative - Supplement Bay and Estuary Inflows with Brackish Groundwater**	LCRA	Brackish groundwater delivery to the Bay to achieve the same effect as volume of released stored water from Highland Lakes	Yes	$40,500,000	$6,350,000	$529	12,000	2020	Matagorda	No	0	0	0	-1	-1	0	-1	0	0	1	0	-2	Instream flow from Highland Lakes to Matagorda Bay could be decreased by up to 12,000 acre-feet if B&E needs are met through this strategy.	Add "by up to 12,000 acre-feet." to discussion
274	**Alternative - Baylor Creek Reservoir**	LCRA	Reservoir (Baylor Creek) using diversions from existing LCRA water rights	Yes	$179,000,000	$16,200,000	$900	18,000	2040	Colorado	No	0	0	1	0	-1	0	0	1	1	1	0	3	Could potentially remove up to 18,000 ac-ft from the Colorado River, but will create additional waterfowl habitat.	Could potentially make available up to 18,000 ac-ft/yr of water for agriculture purposes, dependent on needs of firm customers.
275	**Development of New Groundwater Supply - FPP Onsite**	LCRA	Develop a new supply of groundwater in the Gulf Coast aquifer in the Colorado Basin of Fayette County	Yes	$2,749,000	$347,000	$496	700	2020	Colorado	No	1	1	1	0	0	0	0	1	0	0	0	4	Water supply is within the MAG, so drawdown in the aquifer could be up to 12 feet, relative to 1999 conditions. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows should be monitored.	None
276	**Development of New Groundwater Supply - FPP Offsite**	LCRA	Develop a new supply of groundwater in the Carrizo-Wilcox aquifer and Yegua-Jackson aquifer in the Colorado Basin of Fayette County	Yes	$20,107,000	$2,782,000	$1,113	2,500	2020	Colorado	No	-1	1	0	0	0	0	0	1	0	0	0	1	aquifer could be up to 75 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but aquifer levels and springflows	None
277	**Expand Use of Groundwater**	LCRA	Expand use of Carrizo-Wilcox aquifer in Colorado Basin of Bastrop County	Yes	$4,564,000	$455,000	$1,517	300	2020	Colorado	No	-1	0	1	0	0	0	0	0	0	0	0	0	formation, drawdown in the aquifer could be up to 237 feet. Assume that using water within the stated available yield should result in negligible impacts to springflows, but	None
278	**Alternative - Brackish Groundwater Desalination**	LCRA	Extracting and treating brackish groundwater from the Gulf Coast aquifer in Matagorda County for use in the Bay City area	Yes	$277,006,000	$43,180,000	$1,035	22,400	2040	Colorado	No	-1	1	0	0	0	0	-1	0	0	0	0	-1	Add discussion of how using local groundwater could reduce the amount of water released from Highland Lakes that provides instream flows, up to 22,400 ac-ft/yr.	Add "of up to 22,400 ac-ft/yr" to discussion
279	**Aquifer Storage and Recovery**	LCRA	Surface water from the Colorado River is diverted to aquifer storage for later recovery	Yes	$39,590,000	$5,430,000	$1,076	5,048	2040	Colorado	No	-1	1	1	0	0	0	0	0	0	0	0	1	Quantified impacts provided in Appendix 5D	Add "of up to 5,048 ac-ft/yr" to discussion
280	**Enhanced Recharge and Conjunctive Use**	LCRA	Surface water from the Colorado River is diverted to recharge basins	Yes	$53,504,000	$8,335,000	$834	10,000	2020	Colorado	No	0	1	1	0	0	0	0	0	1	0	0	3	Could potentially reduce pulse flows in the Colorado River by up to 10,000 ac-ft/yr	Add "of up to 10,000 acre-feet/year" to discussion
281	**Alternative - Groundwater Importation**	LCRA	Import groundwater from outside of region (assume Carrizo-Wilcox aquifer water from Burleson County).	Yes	$614,790,000	$51,445,000	$1,470	35,000	2040	N/A	No	-1	0	-1	0	0	0	0	0	0	0	0	-2	Add "of up to 21,000 ac-ft/yr" to discussion	Add "of up to 35,000 ac-ft/yr" to discussion
282	**Amendments to Water Rights**	LCRA	Amend run-of-river water rights for additional diversion locations and storage rights	Yes	$0	$0	$0	N/A	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Negligible. Impacts are captured under individual reservoir strategies.	No impacts are anticipated based on projected water demands.
283	**Acquire Additional Water Rights**	LCRA	Purchase of water rights owned by others in the basin.	Yes	$125,000	$125,000	$500	250	2020	Colorado	No	1	0	1	0	0	0	0	0	0	0	0	2	Add "by up to 250 acre-feet/year" to discussion	Add "of up to 250 acre-feet/year" to discussion
284	**LCRA Water Management Plan Amendments**	LCRA	See Potential Strategy #197	Yes	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
285	**Downstream Return Flows**	LCRA	Return flows from Pflugerville to Colorado River	Yes	$0	$0	$0	10,453	2020	Colorado	No	1	0	1	0	1	0	0	1	0	0	0	4	Add "of up to 10,453 acre-feet/year" to discussion	Negligible
286	**Return Flows/Indirect Reuse**	LCRA/COA	Return flows from City of Austin to Colorado River	Yes	$0	$0	$0	61,444	2020	Colorado	No	1	0	1	0	1	0	0	1	0	0	0	4	Quantification addressed in text	Quantification addressed in text
287	**COA Conservation**	AUSTIN	Reduction in both per capita consumption and peak day to average day demand ratio	Yes	$41,434,437	$7,855,398	$342.00	36,899	2020	Colorado	No	1	0	1	0	0	0	0	1	0	0	0	3	Could leave up to 37,000 ac-ft of water in the lakes and aquifers.	Negligible

Table 5A-2: Region K
Potentially Feasible Water Management Strategy Screening (for 2016 Region K Plan)

	Water Management Strategy	Water User Group or Wholesale Provider	Strategy Description	Addressing a Need?	Total Strategy Cost ($)	Annual Strategy Cost ($)	Cost of Water ($/ac-ft)	Max Yield (ac-ft/yr)	Starting Decade	Basin	Interbasin Transfer (Yes/No)	Screening Matrix Factors (Positive (1), Neutral (0), Negative (-1))											Total of Screening Factors	Quantified Environmental Impacts	Quantified Agriculture Impacts
												Cost	Yield	Location	Water Quality	Environmental and Natural Resources	Local Preference	Institutional Constraints	Impacts on Water Resources	Impacts on Agricultural Resources	Impacts to Recreation	Impacts on Other Management Strategies			
288	**COA Direct Reuse**	AUSTIN	Direct reuse of wastewater effluent for municipal and manufacturing purposes	Yes	$346,037,000	$32,453,700	$1,162	27,929	2020	Colorado	No	-1	1	1	1	1	0	0	1	-1	0	0	3	Plan discussion provides quantification related to return flows.	Plan discussion provides quantification related to return flows.
289	**COA Other Reuse**	AUSTIN	Decentralized concepts and gray water use.	Yes	$21,772,000	$3,067,000	$1,022	3,000	2020	Colorado	No	-1	1	1	1	1	0	0	1	-1	0	0	3	None	None
290	**Longhorn Dam Operations Improvements**	AUSTIN	Automating knife gates to control flow passing below the gate	Yes	$1,036,000	$87,000	$29	3,000	2020	Colorado	No	1	1	1	0	0	1	0	0	0	0	0	4	None	None
291	**Increased Use of Long Lake Storage**	AUSTIN	Allow more fluctuation in lake level and operate as an off-channel reservoir	Yes	$28,219,000	$3,744,500	$187	20,000	2020	Colorado	No	1	0	0	0	1	0	0	1	0	0	0	3	Refer to Direct Reuse discussion quantifying return flows	Negligible
292	**Capture Local Inflows to Lady Bird Lake**	AUSTIN	Install intake below Tom Miller Dam and pumping excess flows to the water treatment plant	Yes	$2,949,000	$297,000	$297	1,000	2020	Colorado	No	1	1	0	0	0	0	-1	0	0	0	0	1	Negligible	Negligible
293	**Aquifer Storage and Recovery**	AUSTIN	Using treated effluent or surface water from the Colorado River is diverted to aquifer storage for later recovery	Yes	$312,316,000	$30,185,000	$604	50,000	2020	Colorado	No	0	1	0	0	0	0	-1	0	0	0	0	0	Refer to Direct Reuse discussion quantifying return flows	Refer to Direct Reuse discussion quantifying return flows
294	**Indirect Potable Reuse through Lady Bird Lake**	AUSTIN	Conveying WWTP discharge to Lady Bird Lake and withdrawing water to be treated at the WTP	Yes	$41,970,000	$3,593,000	$180	20,000	2020	Colorado	No	1	1	0	-1	-1	0	-1	0	0	0	0	-1	Refer to Direct Reuse discussion quantifying return flows	None
295	**Lake Austin Operations**	AUSTIN	Would allow the lake to operate at a varying level instead of constant in order to capture local flows	Yes	$0	$25,000	$10	2,500	2020	Colorado	No	1	-1	0	0	0	0	0	0	0	-1	0	-1	Negligible	None
296	**Rainwater Harvesting**	AUSTIN	Development of catchment areas (rooftops) to capture rainwater for potable or non-potable use. For potable use, filtration and disinfection considerations would apply.	Yes	$690,167,000	$57,752,712	$3,487	16,564	2020	Colorado	No	-1	0	1	0	0	0	0	0	0	0	0	0	Negligible	Negligible
297	**Alternative - Brackish Groundwater Desalination**	AUSTIN	Extracting brackish groundwater and delivering to Lake Austin	Yes	$54,582,000	$7,613,000	$1,523	5,000	2030	Colorado	No	-1	1	0	0	0	0	-1	0	0	0	0	-1	Negligible	None
298	**Alternative - Reclaimed Water Bank Infiltration to Colorado Alluvium**	AUSTIN	Using an infiltration basin to recharge the local Colorado Alluvium formation	Yes	$151,800,000	$12,700,000	$423	30,000	2030	Colorado	No	0	1	0	0	0	0	-1	0	0	0	0	0	Refer to Direct Reuse discussion quantifying return flows	None
299	**Direct Potable Reuse**	Buda	Directly treat reclaimed water for potable use within the municipality.	Yes	$26,779,000	$2,941,000	$1,313	2,240	2020	Colorado	No	-1	0	1	1	0	1	-1	1	0	0	0	2	Reduction of return flows by up to 2,240 AFY.	Negligible
300	**Municipal Conservation**	Burnet County-Other, Brazos Basin	Conservation efforts to reach 130 gpcd by 2020 and 125 gpcd by 2030.	Yes	$164,771	$23,754	$396	94	2020	Brazos	No	1	0	1	0	1	0	1	0	0	0	0	4	Negligible	Negligible
301	**Reuse (Direct)**	MARBLE FALLS	Expansion to direct reuse program.	Yes	$0	$0	$0	11	2020	Colorado	No	1	0	1	1	0	1	0	0	0	0	0	4	Negligible	Negligible
302	**Water Right Permit Amendment**	Steam-Electric, Matagorda County	Current pending application with TCEQ for amendment to existing water right permit	Yes	$0	$0	$0	0	2020	Colorado	No	1	0	1	0	0	1	0	0	0	0	0	3	None	None
303	**In-Channel Dams in Lower Basin**	LCRA	Small in-channel inflatable dams to extend opportunties for diversions. Strategy was considered but later removed from consideration by LCRA																					N/A	N/A
304	**Surface Water Infrastructure Expansion**		Strategy to expand infrastructure only when contracts/water rights have already been obtained. Strategy considered but determined to not be needed.																					N/A	N/A
305	**HB 1437**		Funding Mechanism Only																					N/A	N/A
306	**Reduced Lake Evaporation**	AUSTIN	Adding a biodegradable product to cover the surface of lakes to reduce water losses due to evaporation. Strategy was evaluated but later removed from consideration by COA.	Yes	N/A	$275,000	$275	1,000	N/A	Colorado	No	1	0	0	0	-1	-1	-1	0	0	-1	0	-3	N/A	N/A
307	**Move SAR WWTP discharge above Austin Gauge**	AUSTIN	Relocating WWTP effluent discharge upstream of river flow gauge to meet environmental flow requirements. Strategy was evaluated but later removed from consideration by COA.	Yes	$5,217,000	$555,000	$555	1,000	N/A	Colorado	No	-1	0	0	-1	0	0	-1	0	0	0	0	-3	N/A	N/A

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APPENDIX 5B

RECOMMENDED AND ALTERNATIVE WATER MANAGEMENT STRATEGY TABLES

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

					Water Management Strategies (ac-ft/yr)					
WUG Name	**County**	**River Basin**	**Water Management Strategy Name**	**Source Name**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
			Surplus/(Shortage)		260	234	200	153	89	2
AQUA WSC	BASTROP	BRAZOS	Conservation		6	9	10	11	15	20
AQUA WSC	BASTROP	BRAZOS	Drought Management	15%	14	17	23	30	39	52
			Remaining Surplus/Shortage after Conservation and/or Drought Management		**280**	**260**	**233**	**194**	**143**	**74**
			Surplus/(Shortage)		(2,534)	(4,656)	(7,145)	(11,210)	(17,667)	(26,269)
AQUA WSC	BASTROP	COLORADO	Conservation		619	895	960	1,128	1,499	1,992
AQUA WSC	BASTROP	COLORADO	Drought Management	15%	1,361	1,746	2,258	2,967	3,935	5,277
			Remaining Surplus/Shortage after Conservation and/or Drought Management		**(554)**	**(2,015)**	**(3,927)**	**(7,115)**	**(12,233)**	**(19,000)**
AQUA WSC	BASTROP	COLORADO	Expansion of Groundwater Supply	Carrizo-Wilcox (Brazos Basin)	2,500	2,500	4,000	4,000	4,000	4,000
AQUA WSC	BASTROP	COLORADO	New LCRA Contract	LCRA System	0	0	5,000	5,000	10,000	15,000
			Remaining Surplus/Shortage		**1,946**	**485**	**5,073**	**1,885**	**1,767**	**0**
			Surplus/(Shortage)		185	167	143	110	64	4
AQUA WSC	BASTROP	GUADALUPE	Conservation		5	7	8	9	12	14
AQUA WSC	BASTROP	GUADALUPE	Drought Management	15%	10	12	16	21	28	37
			Remaining Surplus/Shortage after Conservation and/or Drought Management		**200**	**186**	**167**	**140**	**104**	**55**
			Surplus/(Shortage)		(30)	(671)	(1,519)	(2,685)	(4,274)	(6,390)
BASTROP	BASTROP	COLORADO	Conservation		195	440	688	1,084	1,459	1,958
BASTROP	BASTROP	COLORADO	Drought Management	15%	294	390	517	692	930	1,248
			Remaining Surplus/Shortage after Conservation and/or Drought Management		**459**	**159**	**(314)**	**(909)**	**(1,885)**	**(3,184)**
BASTROP	BASTROP	COLORADO	Reuse				300	600	1,120	1,120
BASTROP	BASTROP	COLORADO	Development of New Groundwater	Carrizo-Wilcox	300	300	300	300	300	
BASTROP	BASTROP	COLORADO	New LCRA Contract	LCRA System				2,500	2,500	2,500
			Remaining Surplus/Shortage		**759**	**459**	**286**	**2,491**	**2,035**	**436**
			Surplus/(Shortage)		753	643	541	320	(93)	(644)
BASTROP COUNTY WCID	BASTROP	COLORADO	Drought Management	5%	19	27	38	53	74	102
			Remaining Surplus/Shortage after Conservation and/or Drought Management		**772**	**670**	**579**	**373**	**(19)**	**(542)**
BASTROP COUNTY WCID	BASTROP	COLORADO	Expansion of Groundwater Supply	Carrizo-Wilcox					550	550
			Remaining Surplus/Shortage		**772**	**670**	**579**	**373**	**531**	**8**
			Surplus/(Shortage)		67	60	51	38	22	0
COUNTY-OTHER	BASTROP	BRAZOS	Conservation		1	2	4	7	8	10
COUNTY-OTHER	BASTROP	BRAZOS	Drought Management	15%	4	5	6	8	10	14
			Remaining Surplus/Shortage after Conservation and/or Drought Management		**72**	**67**	**61**	**53**	**40**	**24**
			Surplus/(Shortage)		(361)	(519)	(739)	(907)	(1,158)	(1,490)
COUNTY-OTHER	BASTROP	COLORADO	Conservation		89	191	337	403	515	663
COUNTY-OTHER	BASTROP	COLORADO	Drought Management	15%	272	328	402	504	643	827
			Remaining Surplus/Shortage after Conservation and/or Drought Management		**0**	**0**	**0**	**0**	**0**	**0**
COUNTY-OTHER	BASTROP	COLORADO	Expansion of Groundwater Supply	Carrizo-Wilcox	60	60	60	60	60	
			Remaining Surplus/Shortage		**60**	**60**	**60**	**60**	**60**	**0**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	Water Management Strategies (ac-ft/yr) 2020	2030	2040	2050	2060	2070
		Surplus/(Shortage)			0	1	3	4	6	8
COUNTY-OTHER	BASTROP	GUADALUPE	Conservation		2	3	3	4	4	4
COUNTY-OTHER	BASTROP	GUADALUPE	Drought Management	15%	5	5	5	5	4	4
		Remaining Surplus/Shortage after Conservation and/or Drought Management			**2**	**4**	**6**	**8**	**10**	**12**
		Surplus/(Shortage)			16	12	5	0	0	0
CREEDMOOR-MAHA WSC	BASTROP	COLORADO	Drought Management	5%	1	1	2	2	3	4
		Remaining Surplus/Shortage after Conservation and/or Drought Management			**17**	**13**	**7**	**2**	**3**	**4**
		Surplus/(Shortage)			(472)	(732)	(1,013)	(1,533)	(2,432)	(3,631)
ELGIN	BASTROP	COLORADO	Drought Management	15%	195	248	319	417	552	732
		Remaining Surplus/Shortage after Conservation and/or Drought Management			**(277)**	**(484)**	**(694)**	**(1,116)**	**(1,880)**	**(2,899)**
ELGIN	BASTROP	COLORADO	Expansion of Groundwater Supply	Carrizo-Wilcox	300	300	**0**	**0**	**0**	**0**
ELGIN	BASTROP	COLORADO	New LCRA Contract	LCRA System		3,500	3,500	3,500	3,500	3,500
ELGIN	BASTROP	COLORADO	Allocate to Travis County portion of Elgin			**(48)**	**(129)**	**(222)**	**(304)**	**(381)**
		Remaining Surplus/Shortage			**23**	**3,268**	**2,677**	**2,162**	**1,316**	**220**
		Surplus/(Shortage)			0	0	0	0	0	0
POLONIA WSC	BASTROP	COLORADO	Refer to Region L Plan							
		Remaining Surplus/Shortage			**0**	**0**	**0**	**0**	**0**	**0**
		Surplus/(Shortage)			1,006	932	953	663	70	(721)
SMITHVILLE	BASTROP	COLORADO	Conservation		44	72	76	88	117	155
SMITHVILLE	BASTROP	COLORADO	Drought Management	15%	126	161	208	273	362	480
		Remaining Surplus/Shortage after Conservation and/or Drought Management			**1,176**	**1,165**	**1,237**	**1,024**	**549**	**(86)**
SMITHVILLE	BASTROP	COLORADO	Development of New Groundwater	Queen City						150
		Remaining Surplus/Shortage			**1,176**	**1,165**	**1,237**	**1,024**	**549**	**64**
		Surplus/(Shortage)			(55)	(87)	(120)	(151)	(174)	(199)
MANUFACTURING	BASTROP	COLORADO	Expansion of Groundwater Supply	Carrizo-Wilcox	55	87	120	151	174	199
		Remaining Surplus/Shortage			**0**	**0**	**0**	**0**	**0**	**0**
		Surplus/(Shortage)			(173)	(409)	(450)	(496)	(545)	(600)
MINING	BASTROP	BRAZOS	**Unmet Needs**	3 Oaks Mine						
		Remaining Surplus/Shortage			**(173)**	**(409)**	**(450)**	**(496)**	**(545)**	**(600)**
		Surplus/(Shortage)			(449)	(3,947)	(4,556)	(5,235)	(5,967)	(6,777)
MINING	BASTROP	COLORADO	**Unmet Needs**	3 Oaks Mine						
		Remaining Surplus/Shortage			**(449)**	**(3,947)**	**(4,556)**	**(5,235)**	**(5,967)**	**(6,777)**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	Water Management Strategies (ac-ft/yr) 2020	2030	2040	2050	2060	2070
Surplus/(Shortage)					(110)	(306)	(341)	(379)	(420)	(466)
MINING	BASTROP	GUADALUPE	Development of New Groundwater	Carrizo-Wilcox (Guadalupe Basin)	0	0	466	466	466	466
MINING	BASTROP	GUADALUPE	Development of New Groundwater	Queen City (Guadalupe Basin)	110	306	0	0	0	0
Remaining Surplus/Shortage					**0**	**0**	**125**	**87**	**46**	**0**
Shortage					831	773	740	723	710	702
BLANCO	BLANCO	GUADALUPE	Conservation		19	32	28	26	27	27
BLANCO	BLANCO	GUADALUPE	Drought Management	25%	55	63	68	71	73	74
Remaining Surplus/Shortage					**850**	**805**	**768**	**749**	**737**	**729**
Shortage					31	(18)	(55)	(79)	(98)	(113)
CANYON LAKE WSC	BLANCO	GUADALUPE	Drought Management	15%	19	23	24	25	26	27
			Check with Region L							
Remaining Surplus/Shortage					**50**	**5**	**(31)**	**(54)**	**(72)**	**(86)**
Shortage					130	49	2	(24)	(42)	(55)
COUNTY-OTHER	BLANCO	COLORADO	Drought Management	15%	86	99	107	111	113	115
COUNTY-OTHER	BLANCO	COLORADO	Expansion of Groundwater Supply	Ellenburger-San Saba				55	55	55
COUNTY-OTHER	BLANCO	COLORADO	Expansion of Groundwater Supply	Hickory				55	55	55
COUNTY-OTHER	BLANCO	COLORADO	Brush Control		0	0	0	0	0	0
Remaining Surplus/Shortage					**216**	**148**	**109**	**197**	**181**	**170**
Shortage					545	486	454	437	423	415
COUNTY-OTHER	BLANCO	GUADALUPE	Drought Management	15%	58	67	72	74	77	78
Remaining Surplus/Shortage					**603**	**553**	**526**	**511**	**500**	**493**
Shortage					(48)	(105)	(138)	(155)	(167)	(175)
JOHNSON CITY	BLANCO	COLORADO	Conservation		18	30	30	28	26	26
JOHNSON CITY	BLANCO	COLORADO	Drought Management	20%	71	82	89	92	95	96
JOHNSON CITY	BLANCO	COLORADO	Expansion of Groundwater Supply	Ellenburger-San Saba	175	175	175	175	175	175
Remaining Surplus/Shortage					**216**	**182**	**156**	**140**	**129**	**122**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	Water Management Strategies (ac-ft/yr) 2020	2030	2040	2050	2060	2070
Shortage/Surplus					(40)	(118)	(184)	(249)	(307)	(358)
BERTRAM	BURNET	BRAZOS	Conservation		41	64	91	126	164	204
BERTRAM	BURNET	BRAZOS	Drought Management	15%	62	73	83	93	102	109
BERTRAM	BURNET	BRAZOS	Expansion of Groundwater Supply	Ellenburger-San Saba (Colorado Basin)	180	180	180	180	180	180
BERTRAM	BURNET	BRAZOS	Buena Vista Regional Project	LCRA System	500	884	884	884	884	884
Remaining Surplus/Shortage					**743**	**1,083**	**1,054**	**1,034**	**1,023**	**1,019**
Shortage/Surplus					6	5	4	2	1	0
BURNET	BURNET	BRAZOS	Conservation		1	1	2	3	4	4
BURNET	BURNET	BRAZOS	Drought Management	20%	2	2	2	2	3	3
Remaining Surplus/Shortage					**7**	**6**	**6**	**5**	**5**	**4**
Shortage/Surplus					2,273	1,920	1,621	1,329	1,066	836
BURNET	BURNET	COLORADO	Conservation		183	281	403	568	736	913
BURNET	BURNET	COLORADO	Drought Management	20%	368	439	498	557	609	655
BURNET	BURNET	COLORADO	Buena Vista Regional Project	LCRA System	1,000	2,000	2,000	2,000	2,000	2,000
Remaining Surplus/Shortage					**3,824**	**4,640**	**4,522**	**4,454**	**4,411**	**4,404**
Shortage/Surplus					268	226	191	156	124	96
COTTONWOOD SHORES	BURNET	COLORADO	Conservation		22	21	20	19	21	23
COTTONWOOD SHORES	BURNET	COLORADO	Drought Management	20%	45	54	61	68	74	80
COTTONWOOD SHORES	BURNET	COLORADO	Marble Falls Regional Project	LCRA System	376	700	700	700	700	700
Remaining Surplus/Shortage					**711**	**1,001**	**972**	**943**	**919**	**899**
Shortage/Surplus					412	198	20	(158)	(318)	(460)
COUNTY-OTHER	BURNET	BRAZOS	Drought Management	15%	175	207	234	260	284	306
COUNTY-OTHER	BURNET	BRAZOS	Buena Vista Regional Project	LCRA System	500	1,000	1,000	1,000	1,000	1,000
COUNTY-OTHER	BURNET	BRAZOS	Conservation		60	93	83	80	87	94
Remaining Surplus/Shortage					**1,147**	**1,498**	**1,337**	**1,182**	**1,053**	**940**
Shortage/Surplus					2,981	2,929	3,215	3,104	2,905	2,623
COUNTY-OTHER	BURNET	COLORADO	Drought Management	15%	351	359	316	333	362	405
COUNTY-OTHER	BURNET	COLORADO	East Lake Buchanan Regional Project	LCRA System	935	935	935	935	935	935
COUNTY-OTHER	BURNET	COLORADO	Buena Vista Regional Project	LCRA System	500	1,000	1,000	1,000	1,000	1,000
COUNTY-OTHER	BURNET	COLORADO	Marble Falls Regional Project	LCRA System	300	878	878	878	878	878
Remaining Surplus/Shortage					**5,067**	**6,101**	**6,344**	**6,250**	**6,080**	**5,841**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	Water Management Strategies (ac-ft/yr) 2020	2030	2040	2050	2060	2070
Shortage/Surplus					177	62	(38)	(137)	(226)	(306)
GRANITE SHOALS	BURNET	COLORADO	Drought Management	5%	33	38	43	48	53	57
GRANITE SHOALS	BURNET	COLORADO	LCRA Contract Amendment	LCRA System				250	250	250
Remaining Surplus/Shortage					**210**	**100**	**5**	**161**	**77**	**1**
Shortage/Surplus					101	(201)	(454)	(697)	(912)	(1,098)
HORSESHOE BAY	BURNET	COLORADO	Conservation		75	194	343	519	710	901
HORSESHOE BAY	BURNET	COLORADO	Drought Management	25%	187	262	326	386	440	487
HORSESHOE BAY	BURNET	COLORADO	Reuse		50	50	50	50	50	50
HORSESHOE BAY	BURNET	COLORADO	LCRA Contract Amendment	LCRA System	0	150	500	500	1,000	1,000
Remaining Surplus/Shortage					**413**	**455**	**765**	**758**	**1,288**	**1,340**
Shortage/Surplus					10	4	5	9	3	0
KINGSLAND WSC	BURNET	COLORADO	Drought Management	5%	2	3	3	3	4	4
Remaining Surplus/Shortage					**12**	**7**	**8**	**12**	**7**	**4**
Shortage/Surplus					1,418	381	(1,089)	(1,859)	(2,377)	(2,636)
MARBLE FALLS	BURNET	COLORADO	Conservation		234	587	1,016	1,397	1,764	2,059
MARBLE FALLS	BURNET	COLORADO	Drought Management	20%	466	674	968	1,122	1,225	1,277
MARBLE FALLS	BURNET	COLORADO	Direct Reuse		11	11	11	11	11	11
MARBLE FALLS	BURNET	COLORADO	Marble Falls Regional Project	LCRA System	500	4,000	4,000	4,000	4,000	4,000
Remaining Surplus/Shortage					**2,629**	**5,653**	**4,906**	**4,671**	**4,623**	**4,711**
Shortage/Surplus					(207)	(379)	(525)	(665)	(788)	(896)
MEADOWLAKES	BURNET	COLORADO	Conservation		84	188	309	443	573	708
MEADOWLAKES	BURNET	COLORADO	Drought Management	20%	170	204	233	261	286	308
Remaining Surplus/Shortage					**47**	**13**	**17**	**39**	**71**	**120**
Shortage/Surplus					(1,011)	(1,703)	(2,428)	(3,085)	(3,841)	(4,703)
MINING	BURNET	COLORADO	Expansion of Groundwater Supply	Ellenburger-San Saba	1,500	1,500	1,500	1,500	1,500	1,500
MINING	BURNET	COLORADO	Expansion of Groundwater Supply	Hickory		500	1,000	1,800	1,800	1,800
MINING	BURNET	COLORADO	Expansion of Groundwater Supply	Marble Falls					1,000	1,500
Remaining Surplus/Shortage					**489**	**297**	**72**	**215**	**459**	**97**
Shortage/Surplus					15	(15)	(36)	(80)	(122)	(163)
COLUMBUS	COLORADO	COLORADO	Conservation		112	206	296	347	404	464
COLUMBUS	COLORADO	COLORADO	Drought Management	15%	170	175	178	185	191	197
Remaining Surplus/Shortage					**297**	**366**	**438**	**452**	**473**	**498**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	2020	2030	2040	2050	2060	2070
					Water Management Strategies (ac-ft/yr)					
Shortage/Surplus					56	55	54	51	45	40
COUNTY-OTHER	COLORADO	BRAZOS-COLORADO	Drought Management	15%	23	23	23	24	25	26
Remaining Surplus/Shortage					**79**	**78**	**77**	**75**	**70**	**66**
Shortage/Surplus					(121)	(127)	(130)	(158)	(191)	(226)
COUNTY-OTHER	COLORADO	COLORADO	Drought Management	15%	150	151	151	155	160	165
COUNTY-OTHER	COLORADO	COLORADO	Expansion of Groundwater Supply	Gulf Coast	226	226	226	226	226	226
Remaining Surplus/Shortage					**255**	**250**	**247**	**223**	**195**	**165**
Shortage/Surplus					615	612	612	602	592	580
COUNTY-OTHER	COLORADO	LAVACA	Drought Management	15%	48	49	49	50	52	54
Remaining Surplus/Shortage					**663**	**661**	**661**	**652**	**644**	**634**
Shortage/Surplus					17	16	16	11	6	0
EAGLE LAKE	COLORADO	BRAZOS-COLORADO	Drought Management	15%	24	24	24	25	26	27
Remaining Surplus/Shortage					**41**	**40**	**40**	**36**	**32**	**27**
Shortage/Surplus					39	36	35	25	12	0
EAGLE LAKE	COLORADO	COLORADO	Drought Management	15%	54	55	55	57	59	60
Remaining Surplus/Shortage					**93**	**91**	**90**	**82**	**71**	**60**
Shortage/Surplus					27	23	20	13	7	0
WEIMAR	COLORADO	COLORADO	Conservation		19	24	30	39	47	57
WEIMAR	COLORADO	COLORADO	Drought Management	15%	27	27	27	27	27	27
Remaining Surplus/Shortage					**73**	**47**	**50**	**52**	**54**	**57**
Shortage/Surplus					56	47	41	27	13	0
WEIMAR	COLORADO	LAVACA	Conservation		37	50	60	78	97	114
WEIMAR	COLORADO	LAVACA	Drought Management	15%	56	57	58	60	62	64
Remaining Surplus/Shortage					**149**	**154**	**159**	**165**	**172**	**178**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	Water Management Strategies (ac-ft/yr) 2020	2030	2040	2050	2060	2070
Shortage/Surplus					(21,628)	(20,296)	(19,000)	(17,738)	(16,511)	(15,316)
IRRIGATION	COLORADO	BRAZOS-COLORADO	Drought Management		8,822	8,584	8,354	8,129	7,910	7,697
IRRIGATION	COLORADO	BRAZOS-COLORADO	Conservation - On farm Conservation		1,292	1,654	2,003	2,336	2,652	2,949
IRRIGATION	COLORADO	BRAZOS-COLORADO	Conservation - Irrigation Conveyance Improvements		336	1,082	1,815	2,521	3,195	3,793
IRRIGATION	COLORADO	BRAZOS-COLORADO	Conservation - Sprinkler Irrigation		92	455	895	1,099	1,099	1,099
IRRIGATION	COLORADO	BRAZOS-COLORADO	COA Return Flows		0	0	243	206	485	0
IRRIGATION	COLORADO	BRAZOS-COLORADO	LCRA WMP - Interruptible Water	LCRA System	11,086	8,521	4,388	2,692	0	0
Remaining Surplus/Shortage					**0**	**0**	**(1,302)**	**(755)**	**(1,170)**	**222**
Shortage/Surplus					(5,126)	(4,371)	(3,636)	(2,921)	(2,225)	(1,548)
IRRIGATION	COLORADO	COLORADO	Drought Management		5,001	4,866	4,735	4,608	4,484	4,363
IRRIGATION	COLORADO	COLORADO	Conservation - On farm Conservation		306	356	383	385	357	298
IRRIGATION	COLORADO	COLORADO	Conservation - Irrigation Conveyance Improvements		80	233	347	415	431	383
IRRIGATION	COLORADO	COLORADO	Conservation - Sprinkler Irrigation		22	98	171	181	181	181
Remaining Surplus/Shortage					**283**	**1,182**	**2,000**	**2,668**	**3,228**	**3,677**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	Water Management Strategies (ac-ft/yr) 2020	2030	2040	2050	2060	2070
Shortage/Surplus					(32,200)	(29,826)	(27,516)	(25,268)	(23,081)	(20,952)
IRRIGATION	COLORADO	LAVACA	Drought Management		15,719	15,296	14,885	14,484	14,095	13,716
IRRIGATION	COLORADO	LAVACA	Conservation - On farm Conservation		1,923	2,431	2,901	3,328	3,708	4,034
IRRIGATION	COLORADO	LAVACA	Conservation - Irrigation Conveyance Improvements		500	1,589	2,629	3,591	4,466	5,188
IRRIGATION	COLORADO	LAVACA	Conservation - Sprinkler Irrigation		137	668	1,296	1,565	1,565	1,565
IRRIGATION	COLORADO	LAVACA	COA Return Flows		0	0	223	130	0	0
IRRIGATION	COLORADO	LAVACA	LCRA WMP - Interruptible Water	LCRA System	13,921	9,842	4,387	1,695	0	0
Remaining Surplus/Shortage					**0**	**0**	**(1,195)**	**(475)**	**753**	**3,551**
Shortage/Surplus					2	1	1	1	0	0
AQUA WSC	FAYETTE	COLORADO	Drought Management	15%	1	1	1	1	1	1
Remaining Surplus/Shortage					**3**	**2**	**2**	**2**	**1**	**1**
Shortage/Surplus					(74)	(157)	(210)	(259)	(306)	(345)
COUNTY-OTHER	FAYETTE	COLORADO	Drought Management	15%	133	145	153	161	168	173
COUNTY-OTHER	FAYETTE	COLORADO	Expansion of Groundwater Supply	Gulf Coast	345	345	345	345	345	345
Remaining Surplus/Shortage					**404**	**333**	**288**	**247**	**207**	**173**
Shortage/Surplus					38	35	33	30	28	26
COUNTY-OTHER	FAYETTE	GUADALUPE	Drought Management	15%	6	6	6	7	7	8
Remaining Surplus/Shortage					**44**	**41**	**39**	**37**	**35**	**34**
Shortage/Surplus					(198)	(228)	(246)	(264)	(281)	(294)
COUNTY-OTHER	FAYETTE	LAVACA	Drought Management	15%	47	51	54	57	59	61
COUNTY-OTHER	FAYETTE	LAVACA	Expansion of Groundwater Supply	Gulf Coast	294	294	294	294	294	294
Remaining Surplus/Shortage					**143**	**117**	**102**	**87**	**72**	**61**
Shortage/Surplus					266	196	150	110	74	45
FAYETTE WSC	FAYETTE	COLORADO	Drought Management	15%	96	106	113	119	125	129
Remaining Surplus/Shortage					**362**	**302**	**263**	**229**	**199**	**174**
Shortage/Surplus					15	11	8	5	3	1
FAYETTE WSC	FAYETTE	GUADALUPE	Drought Management	15%	6	7	7	8	8	8
Remaining Surplus/Shortage					**21**	**18**	**15**	**13**	**11**	**9**
Shortage/Surplus					25	18	12	7	3	0
FAYETTE WSC	FAYETTE	LAVACA	Drought Management	15%	11	12	13	14	15	15
Remaining Surplus/Shortage					**36**	**30**	**25**	**21**	**18**	**15**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	Water Management Strategies (ac-ft/yr) 2020	2030	2040	2050	2060	2070
		Shortage/Surplus			28	21	16	12	7	4
FLATONIA	FAYETTE	GUADALUPE	Conservation		4	6	9	12	16	20
FLATONIA	FAYETTE	GUADALUPE	Drought Management	15%	10	11	11	12	12	13
		Remaining Surplus/Shortage			**42**	**38**	**36**	**36**	**35**	**37**
		Shortage/Surplus			117	86	66	48	33	21
FLATONIA	FAYETTE	LAVACA	Conservation		13	23	34	48	68	85
FLATONIA	FAYETTE	LAVACA	Drought Management	15%	41	45	48	51	53	55
FLATONIA	FAYETTE	LAVACA	Reuse		134	149	159	168	176	182
FLATONIA	FAYETTE	LAVACA	Expansion of Groundwater Supply	Gulf Coast	100	100	100	100	100	100
		Remaining Surplus/Shortage			**405**	**403**	**407**	**415**	**430**	**443**
		Shortage/Surplus			429	335	274	219	171	132
LA GRANGE	FAYETTE	COLORADO	Conservation		42	21	0	0	0	0
LA GRANGE	FAYETTE	COLORADO	Drought Management	15%	130	144	153	161	168	174
		Remaining Surplus/Shortage			**471**	**356**	**274**	**219**	**171**	**132**
		Shortage/Surplus			1	(85)	(142)	(191)	(234)	(267)
SCHULENBERG	FAYETTE	LAVACA	Conservation		37	63	96	141	188	232
SCHULENBERG	FAYETTE	LAVACA	Drought Management	15%	110	123	132	139	146	150
		Remaining Surplus/Shortage			**148**	**101**	**86**	**89**	**100**	**115**
		Shortage/Surplus			(206)	(243)	(279)	(310)	(349)	(391)
MANUFACTURING	FAYETTE	LAVACA	Expansion of Groundwater Supply	Gulf Coast	391	391	391	391	391	391
		Remaining Surplus/Shortage			**185**	**148**	**112**	**81**	**42**	**0**
		Shortage/Surplus			(1,576)	(1,176)	(717)	(274)	179	186
MINING	FAYETTE	COLORADO	Expansion of Groundwater Supply	Gulf Coast	1,576	1,176	717	274	0	0
		Remaining Surplus/Shortage			**0**	**0**	**0**	**0**	**179**	**186**
		Shortage/Surplus			(66)	(42)	(13)	15	42	43
MINING	FAYETTE	GUADALUPE	Expansion of Groundwater Supply	Sparta	66	42	13	0	0	0
		Remaining Surplus/Shortage			**0**	**0**	**0**	**15**	**42**	**43**
		Shortage/Surplus			(344)	(274)	(195)	(119)	(40)	(39)
MINING	FAYETTE	LAVACA	Expansion of Groundwater Supply	Gulf Coast	344	344	344	344	344	344
		Remaining Surplus/Shortage			**0**	**70**	**149**	**225**	**304**	**305**
		Shortage/Surplus			10,286	10,286	8,186	1,886	(2,614)	(7,414)
STEAM ELECTRIC POWER	FAYETTE	COLORADO	Long Lake Storage		2,000	2,000	2,000	2,000	2,000	2,000
STEAM ELECTRIC POWER	FAYETTE	COLORADO	LCRA Contract Amendment	LCRA System	6,000	7,000	9,000	11,000	13,000	15,000
		Remaining Surplus/Shortage			**18,286**	**19,286**	**19,186**	**14,886**	**12,386**	**9,586**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	Water Management Strategies (ac-ft/yr) 2020	2030	2040	2050	2060	2070
Shortage/Surplus					559	486	424	325	217	107
COUNTY-OTHER	GILLESPIE	COLORADO	Drought Management	15%	263	274	284	299	315	331
COUNTY-OTHER	GILLESPIE	COLORADO	Brush Control		0	0	0	0	0	0
Remaining Surplus/Shortage					**822**	**760**	**708**	**624**	**532**	**438**
Shortage/Surplus					28	26	24	20	16	12
COUNTY-OTHER	GILLESPIE	GUADALUPE	Drought Management	15%	10	10	11	11	12	12
Remaining Surplus/Shortage					**38**	**36**	**35**	**31**	**28**	**24**
Shortage/Surplus					690	509	360	164	(30)	(222)
FREDERICKSBURG	GILLESPIE	COLORADO	Conservation		317	599	733	916	1094	1301
FREDERICKSBURG	GILLESPIE	COLORADO	Drought Management	15%	472	499	521	551	580	609
Remaining Surplus/Shortage					**1,007**	**1,108**	**1,093**	**1,080**	**1,064**	**1,079**
Shortage/Surplus					(309)	(362)	(411)	(452)	(536)	(626)
MANUFACTURING	GILLESPIE	COLORADO	Expansion of Groundwater Supply	Ellenburger-San Saba	626	626	626	626	626	626
Remaining Surplus/Shortage					**317**	**264**	**215**	**174**	**90**	**0**
Shortage/Surplus					0	0	0	0	0	0
AUSTIN	HAYS	COLORADO	Drought Management	10%	1	13	25	63	152	275
Remaining Surplus/Shortage					**1**	**13**	**25**	**63**	**152**	**275**
Shortage/Surplus					161	(667)	(1,690)	(2,974)	(4,429)	(6,088)
BUDA	HAYS	COLORADO	Conservation		88	206	434	552	709	888
BUDA	HAYS	COLORADO	Drought Management	10%	177	251	342	456	586	734
BUDA	HAYS	COLORADO	Reuse		2,240	2,240	1,740	1,740	1,740	1,740
BUDA	HAYS	COLORADO	Groundwater Importation - HCPUA Pipeline	Region L Carrizo-Wilcox (HCPUA)	0	667	1,690	2,467	2,467	2,467
BUDA	HAYS	COLORADO	Saline Edwards ASR Project	Saline Edwards ASR	0	500	500	500	500	500
BUDA	HAYS	COLORADO	Edwards/Middle Trinity ASR	Trinity (ASR)	0	600	600	600	600	600
Remaining Surplus/Shortage					**2,666**	**3,797**	**3,616**	**3,341**	**2,173**	**841**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	2020	2030	2040	2050	2060	2070
					Water Management Strategies (ac-ft/yr)					
Shortage/Surplus					983	394	(530)	(1,587)	(2,489)	(3,382)
COUNTY-OTHER	HAYS	COLORADO	Drought Management	15%	466	554	693	852	987	1,121
COUNTY-OTHER	HAYS	COLORADO	Groundwater Importation (Hays County project)	Region L Carrizo-Wilcox	0	2,000	2,000	2,000	2,000	2,000
COUNTY-OTHER	HAYS	COLORADO	Saline Edwards ASR Project	Saline Edwards ASR	0	200	200	200	200	200
COUNTY-OTHER	HAYS	COLORADO	Edwards/Middle Trinity ASR	Trinity (ASR)	0	200	200	200	200	200
Remaining Surplus/Shortage					**1,449**	**3,348**	**2,563**	**1,665**	**898**	**139**
Shortage/Surplus					27	(31)	(104)	(198)	(307)	(432)
DRIPPING SPRINGS	HAYS	COLORADO	Conservation		48	67	98	141	195	262
DRIPPING SPRINGS	HAYS	COLORADO	Drought Management	20%	96	107	122	141	163	188
DRIPPING SPRINGS	HAYS	COLORADO	Water Purchase (from Dripping Springs WSC)		0	31	104	198	307	432
Remaining Surplus/Shortage					**171**	**174**	**220**	**282**	**358**	**450**
Shortage/Surplus					0	0	0	0	0	(126)
DRIPPING SPRINGS WSC	HAYS	COLORADO	Conservation		54	124	152	187	232	283
DRIPPING SPRINGS WSC	HAYS	COLORADO	Drought Management	20%	107	136	172	218	271	330
DRIPPING SPRINGS WSC	HAYS	COLORADO	Groundwater Importation (Hays County project)	Region L Carrizo-Wilcox	0	1,000	1,000	1,000	1,000	1,000
Remaining Surplus/Shortage					**161**	**1,260**	**1,324**	**1,405**	**1,503**	**1,487**
DRIPPING SPRINGS WSC	HAYS	COLORADO	Water Sale (to Dripping Springs)		0	(31)	(104)	(198)	(307)	(432)
Remaining Surplus/Shortage After Sales					**161**	**1,229**	**1,220**	**1,207**	**1,196**	**1,055**
Shortage/Surplus					728	(937)	(2,974)	(5,522)	(8,405)	(11,687)
WEST TRAVIS COUNTY PUA	HAYS	COLORADO	Conservation		405	1,070	2,064	3,501	5,348	7,674
WEST TRAVIS COUNTY PUA	HAYS	COLORADO	Drought Management	20%	819	1,152	1,559	2,069	2,645	3,302
WEST TRAVIS COUNTY PUA	HAYS	COLORADO	Groundwater Importation - Hays County Pipeline Project	Region L Carrizo-Wilcox	0	1,000	1,000	1,000	1,000	1,000
WEST TRAVIS COUNTY PUA	HAYS	COLORADO	Amend LCRA Contract	LCRA System	300	500	2,700	3,000	5,800	5,800
Remaining Surplus/Shortage					**2,252**	**2,785**	**4,349**	**4,048**	**6,388**	**6,089**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	2020	2030	2040	2050	2060	2070
					Water Management Strategies (ac-ft/yr)					
Shortage/Surplus					(531)	(761)	(1,047)	(1,131)	(1,340)	(1,579)
MINING	HAYS	COLORADO	Expansion of Groundwater Supply	Trinity	531	761	1,047	1,047	1,047	1,047
MINING	HAYS	COLORADO	Edwards/Middle Trinity ASR	Trinity (ASR)	0	100	100	100	100	100
MINING	HAYS	COLORADO	Water Purchase from Buda	Reuse	0	0	500	500	500	500
Remaining Surplus/Shortage					**0**	**100**	**600**	**516**	**307**	**68**
Shortage/Surplus					3,646	3,702	3,703	3,689	3,723	3,756
COUNTY-OTHER	LLANO	COLORADO	Drought Management	5%	31	28	28	28	27	25
Remaining Surplus/Shortage					**3,677**	**3,730**	**3,731**	**3,717**	**3,750**	**3,781**
Shortage/Surplus					39	(50)	(41)	(4)	(67)	(133)
HORSESHOE BAY	LLANO	COLORADO	Conservation		189	360	509	638	791	938
HORSESHOE BAY	LLANO	COLORADO	Drought Management	25%	464	486	484	474	490	507
HORSESHOE BAY	LLANO	COLORADO	Reuse		50	50	50	50	50	50
HORSESHOE BAY	LLANO	COLORADO	LCRA Contract Amendment	LCRA System	0	50	50	50	50	50
Remaining Surplus/Shortage					**742**	**896**	**1,052**	**1,208**	**1,314**	**1,412**
Shortage/Surplus					(445)	(475)	(461)	(439)	(467)	(496)
LLANO	LLANO	COLORADO	Conservation		88	118	143	169	209	252
LLANO	LLANO	COLORADO	Drought Management	15%	129	134	132	128	133	137
LLANO	LLANO	COLORADO	Reuse		100	100	100	100	100	100
LLANO	LLANO	COLORADO	Development of New Groundwater	Hickory Aquifer	200	200	200	200	200	200
Remaining Surplus/Shortage					**72**	**77**	**114**	**158**	**175**	**193**
Shortage/Surplus					1,878	1,826	1,811	1,766	1,724	1,689
BAY CITY	MATAGORDA	BRAZOS-COLORADO	Conservation		252	199	114	94	95	96
BAY CITY	MATAGORDA	BRAZOS-COLORADO	Drought Management	20%	567	578	581	590	598	605
Remaining Surplus/Shortage					**2,697**	**2,603**	**2,506**	**2,450**	**2,417**	**2,390**
Shortage/Surplus					146	143	148	145	134	124
COUNTY-OTHER	MATAGORDA	BRAZOS-COLORADO	Drought Management	5%	42	42	42	42	42	43
Remaining Surplus/Shortage					**188**	**185**	**190**	**187**	**176**	**167**
Shortage/Surplus					332	331	332	331	329	327
COUNTY-OTHER	MATAGORDA	COLORADO	Drought Management	5%	9	9	9	9	9	9
Remaining Surplus/Shortage					**341**	**340**	**341**	**340**	**338**	**336**
Shortage/Surplus					85	83	86	84	76	69
COUNTY-OTHER	MATAGORDA	COLORADO-LAVACA	Drought Management	5%	30	30	30	30	30	31
Remaining Surplus/Shortage					**115**	**113**	**116**	**114**	**106**	**100**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	Water Management Strategies (ac-ft/yr) 2020	2030	2040	2050	2060	2070
Shortage/Surplus					385	373	370	364	354	346
PALACIOS	MATAGORDA	COLORADO-LAVACA	Drought Management	15%	102	104	104	105	107	108
Remaining Surplus/Shortage					**487**	**477**	**474**	**469**	**461**	**454**
Shortage/Surplus					(70,487)	(67,962)	(65,505)	(63,114)	(60,787)	(58,523)
IRRIGATION	MATAGORDA	BRAZOS-COLORADO	Drought Management		16,484	16,034	15,596	15,170	14,756	14,353
IRRIGATION	MATAGORDA	BRAZOS-COLORADO	Conservation - On farm Conservation		4,210	5,539	6,905	8,312	9,765	11,269
IRRIGATION	MATAGORDA	BRAZOS-COLORADO	Conservation - Irrigation Conveyance Improvements		1,095	3,622	6,258	8,969	11,762	14,492
IRRIGATION	MATAGORDA	BRAZOS-COLORADO	Conservation - Sprinkler Irrigation		301	1,523	3,086	3,910	3,910	3,910
IRRIGATION	MATAGORDA	BRAZOS-COLORADO	COA Return Flows		3,683	3,872	4,688	5,332	6,032	6,997
IRRIGATION	MATAGORDA	BRAZOS-COLORADO	LCRA WMP - Interruptible Water	LCRA System	15,428	9,595	3,807	1,889	0	0
Remaining Surplus/Shortage					**(29,286)**	**(27,777)**	**(25,165)**	**(19,532)**	**(14,562)**	**(7,502)**
Shortage/Surplus					(12,024)	(11,663)	(11,312)	(10,971)	(10,639)	(10,315)
IRRIGATION	MATAGORDA	COLORADO	Drought Management		2,354	2,290	2,227	2,167	2,108	2,050
IRRIGATION	MATAGORDA	COLORADO	Conservation - On farm Conservation		718	951	1,192	1,445	1,709	1,986
IRRIGATION	MATAGORDA	COLORADO	Conservation - Irrigation Conveyance Improvements		187	622	1,081	1,559	2,059	2,554
IRRIGATION	MATAGORDA	BRAZOS-COLORADO	Conservation - Sprinkler Irrigation		51	261	533	680	680	680
IRRIGATION	MATAGORDA	COLORADO	COA Return Flows		663	708	875	1,020	1,196	1,469
IRRIGATION	MATAGORDA	COLORADO	LCRA WMP - Interruptible Water	LCRA System	2,778	1,754	710	362	0	0
Remaining Surplus/Shortage					**(5,273)**	**(5,077)**	**(4,694)**	**(3,738)**	**(2,887)**	**(1,576)**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	Water Management Strategies (ac-ft/yr) 2020	2030	2040	2050	2060	2070
			Shortage/Surplus		(84,037)	(81,218)	(78,474)	(75,804)	(73,206)	(70,678)
IRRIGATION	MATAGORDA	COLORADO-LAVACA	Drought Management		18,406	17,904	17,415	16,939	16,476	16,026
IRRIGATION	MATAGORDA	COLORADO-LAVACA	Conservation - On farm Conservation		5,019	6,619	8,272	9,984	11,760	13,610
IRRIGATION	MATAGORDA	COLORADO-LAVACA	Conservation - Irrigation Conveyance Improvements		1,305	4,328	7,497	10,772	14,165	17,502
IRRIGATION	MATAGORDA	BRAZOS-COLORADO	Conservation - Sprinkler Irrigation		359	1,820	3,697	4,696	4,696	4,696
IRRIGATION	MATAGORDA	COLORADO-LAVACA	COA Return Flows		4,486	4,746	5,793	6,659	7,648	9,094
IRRIGATION	MATAGORDA	COLORADO-LAVACA	LCRA WMP - Interruptible Water	LCRA System	18,791	11,760	4,704	2,360	0	0
			Remaining Surplus/Shortage		**(35,671)**	**(34,041)**	**(31,096)**	**(24,394)**	**(18,461)**	**(9,750)**
			Shortage/Surplus		(25,363)	(25,377)	(25,401)	(25,431)	(25,461)	(25,483)
STEAM ELECTRIC POWER	MATAGORDA	COLORADO	STPNOC Alternate Canal Delivery	Colorado ROR	12,727	12,727	12,727	12,727	12,727	12,727
STEAM ELECTRIC POWER	MATAGORDA	COLORADO	LCRA Contract Amendment	LCRA System	10,000	10,000	10,000	10,000	10,000	10,000
STEAM ELECTRIC POWER	MATAGORDA	COLORADO	STPNOC Brackish Surface Water Blending	Gulf of Mexico	3,000	3,000	3,000	3,000	3,000	3,000
STEAM ELECTRIC POWER	MATAGORDA	COLORADO	COA Return Flows		770	710	766	763	764	859
			Remaining Surplus/Shortage		**1,134**	**1,060**	**1,092**	**1,059**	**1,030**	**1,103**
			Shortage/Surplus		(16)	(15)	(14)	(18)	(23)	(29)
COUNTY-OTHER	MILLS	BRAZOS	Drought Management	20%	29	29	28	29	30	31
			Remaining Surplus/Shortage		**13**	**14**	**14**	**11**	**7**	**2**
			Shortage/Surplus		90	92	94	87	78	68
COUNTY-OTHER	MILLS	COLORADO	Drought Management	20%	48	48	47	49	51	53
			Remaining Surplus/Shortage		**138**	**140**	**141**	**136**	**129**	**121**
			Shortage/Surplus		(48)	(51)	(53)	(64)	(77)	(94)
GOLDTHWAITE	MILLS	COLORADO	Conservation		10	13	24	38	54	58
GOLDTHWAITE	MILLS	COLORADO	Drought Management	15%	53	53	53	55	57	59
			Remaining Surplus/Shortage		**15**	**15**	**24**	**29**	**34**	**23**
			Shortage/Surplus		(605)	(575)	(545)	(516)	(487)	(460)
IRRIGATION	MILLS	BRAZOS	Expansion of Groundwater Supply	Trinity (Colorado Basin)	480	480	480	480	480	480
IRRIGATION	MILLS	BRAZOS	Drought Management		125	95	65	36	7	0
			Remaining Surplus/Shortage		**0**	**0**	**0**	**0**	**0**	**20**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	2020	2030	2040	2050	2060	2070
					Water Management Strategies (ac-ft/yr)					
Shortage/Surplus					215	211	217	222	216	209
COUNTY-OTHER	SAN SABA	COLORADO	Drought Management	15%	228	236	235	230	235	240
Remaining Surplus/Shortage					**443**	**447**	**452**	**452**	**451**	**449**
Shortage/Surplus					131	129	131	131	131	130
RICHLAND SUD	SAN SABA	COLORADO	Drought Management	15%	25	26	25	25	25	26
Remaining Surplus/Shortage					**156**	**155**	**156**	**156**	**156**	**156**
Shortage/Surplus					(88)	(128)	(124)	(99)	(125)	(152)
SAN SABA	SAN SABA	COLORADO	Conservation		114	211	302	377	463	510
SAN SABA	SAN SABA	COLORADO	Drought Management	20%	228	236	235	230	235	240
Remaining Surplus/Shortage					**254**	**319**	**413**	**508**	**573**	**598**
Shortage/Surplus					721	584	447	286	138	0
AQUA WSC	TRAVIS	COLORADO	Conservation		74	94	87	87	96	103
AQUA WSC	TRAVIS	COLORADO	Drought Management	15%	163	184	204	229	251	272
Remaining Surplus/Shortage					**958**	**862**	**738**	**602**	**485**	**375**
Shortage/Surplus					108,581	74,946	30,447	(1,231)	(29,821)	(63,194)
AUSTIN	TRAVIS	COLORADO	Conservation		22,969	24,559	28,317	31,220	33,822	36,899
AUSTIN	TRAVIS	COLORADO	Drought Management	10%	15,745	18,293	20,997	22,989	24,659	26,641
AUSTIN	TRAVIS	COLORADO	Direct Reuse		10,000	15,000	25,000	27,500	30,000	32,500
AUSTIN	TRAVIS	COLORADO	Reuse - decentralized, gray water		1,000	1,000	1,500	2,000	2,500	3,000
AUSTIN	TRAVIS	COLORADO	Rainwater Harvesting		83	828	4,141	8,282	12,423	16,564
AUSTIN	TRAVIS	COLORADO	Longhorn Dam Operations Improvements		3,000	3,000	3,000	3,000	3,000	3,000
AUSTIN	TRAVIS	COLORADO	Increased use of Long Lake Storage		20,000	20,000	20,000	20,000	20,000	20,000
AUSTIN	TRAVIS	COLORADO	Capture Local Inflows to Lady Bird Lake		1,000	1,000	1,000	1,000	1,000	1,000
AUSTIN	TRAVIS	COLORADO	Aquifer Storage and Recovery		10,000	25,000	25,000	50,000	50,000	50,000
AUSTIN	TRAVIS	COLORADO	Indirect Potable Reuse through Lady Bird Lake		20,000	20,000	20,000	20,000	20,000	20,000
AUSTIN	TRAVIS	COLORADO	Lake Austin Operations		2,500	2,500	2,500	2,500	2,500	2,500
AUSTIN	TRAVIS	COLORADO	COA Return Flows		19,258	17,749	22,990	22,874	26,759	30,312
Remaining Surplus/Shortage					**234,136**	**223,875**	**204,892**	**210,134**	**196,842**	**179,222**
Shortage/Surplus					328	333	336	337	338	338
BARTON CREEK WEST	TRAVIS	COLORADO	Conservation		42	77	108	122	137	152
BARTON CREEK WEST	TRAVIS	COLORADO	Drought Management	15%	65	64	64	63	63	63
Remaining Surplus/Shortage					**370**	**410**	**444**	**459**	**475**	**490**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	Water Management Strategies (ac-ft/yr) 2020	2030	2040	2050	2060	2070
			Shortage/Surplus		(225)	(491)	(745)	(1,030)	(1,282)	(1,518)
BEE CAVE VILLAGE	TRAVIS	COLORADO	Conservation		175	374	608	863	1,136	1,323
BEE CAVE VILLAGE	TRAVIS	COLORADO	Drought Management	20%	355	409	459	516	567	614
BEE CAVE VILLAGE	TRAVIS	COLORADO	Water Purchase (from West Travis County PUA)	LCRA System	300	300	600	600	800	800
			Remaining Surplus/Shortage		**605**	**592**	**922**	**949**	**1,221**	**1,219**
			Shortage/Surplus		140	105	72	32	(3)	(36)
BRIARCLIFF VILLAGE	TRAVIS	COLORADO	Drought Management	10%	26	30	33	37	40	44
			Remaining Surplus/Shortage		**166**	**135**	**105**	**69**	**37**	**8**
			Shortage/Surplus		(505)	(941)	(1,121)	(987)	(1,084)	(1,194)
CEDAR PARK	TRAVIS	COLORADO	Refer to Region G Plan							
			Remaining Surplus/Shortage		**(505)**	**(941)**	**(1,121)**	**(987)**	**(1,084)**	**(1,194)**
			Shortage/Surplus		160	(182)	(284)	(412)	(550)	(686)
CREEDMOOR-MAHA WSC	TRAVIS	COLORADO	Drought Management	5%	28	31	34	38	41	45
CREEDMOOR-MAHA WSC	TRAVIS	COLORADO	Saline Edwards ASR Project	Saline Edwards ASR	0	300	300	300	300	300
CREEDMOOR-MAHA WSC	TRAVIS	COLORADO	New LCRA Contract	LCRA System	0	400	400	400	400	400
			Remaining Surplus/Shortage		**188**	**549**	**450**	**326**	**191**	**59**
			Shortage/Surplus		0	0	0	0	0	0
CREEDMOOR-MAHA WSC	TRAVIS	GUADALUPE	Drought Management	5%	1	2	2	2	2	2
			Remaining Surplus/Shortage		**1**	**2**	**2**	**2**	**2**	**2**
			Shortage/Surplus		0	(101)	(196)	(305)	(402)	(493)
ELGIN	TRAVIS	COLORADO	Drought Management	15%	38	53	67	83	98	112
ELGIN	TRAVIS	COLORADO	See Bastrop County Elgin		0	48	129	222	304	381
			Remaining Surplus/Shortage		**38**	**0**	**0**	**0**	**0**	**0**
			Shortage/Surplus		(93)	(113)	(133)	(158)	(182)	(206)
JONESTOWN	TRAVIS	COLORADO	Conservation		20	36	51	73	96	122
JONESTOWN	TRAVIS	COLORADO	Drought Management	20%	82	86	90	95	99	104
			Remaining Surplus/Shortage		**9**	**9**	**8**	**10**	**13**	**20**
			Shortage/Surplus		2,157	1,840	1,537	1,193	885	597
LAGO VISTA	TRAVIS	COLORADO	Conservation		187	301	426	604	773	972
LAGO VISTA	TRAVIS	COLORADO	Drought Management	20%	374	437	498	566	628	686
			Remaining Surplus/Shortage		**2,344**	**2,141**	**1,963**	**1,797**	**1,658**	**1,569**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	Water Management Strategies (ac-ft/yr) 2020	2030	2040	2050	2060	2070
Shortage/Surplus					(1,469)	(3,607)	(3,585)	(3,573)	(3,568)	(3,567)
LAKEWAY	TRAVIS	COLORADO	Conservation		702	1,652	2,408	3,052	3,640	3,921
LAKEWAY	TRAVIS	COLORADO	Drought Management	20%	1,395	1,823	1,819	1,816	1,815	1,815
LAKEWAY	TRAVIS	COLORADO	Water Purchase from Travis County WCID #17	LCRA System	1,000	1,000	1,000	1,000	1,000	1,000
LAKEWAY	TRAVIS	COLORADO	Expansion of Groundwater Supply	Trinity	500	500	500	500	500	500
Remaining Surplus/Shortage					**2,128**	**1,368**	**2,142**	**2,795**	**3,387**	**3,669**
Shortage/Surplus					0	0	0	(3,336)	(9,347)	(15,976)
LEANDER	TRAVIS	COLORADO	LCRA Contract Amendment	LCRA System	0	0	0	3,336	9,347	15,976
Remaining Surplus/Shortage					**0**	**0**	**0**	**0**	**0**	**0**
Shortage/Surplus					76	30	(14)	(66)	(113)	(157)
LOOP 360 WSC	TRAVIS	COLORADO	Conservation		116	224	333	441	546	648
LOOP 360 WSC	TRAVIS	COLORADO	Drought Management	15%	176	183	190	197	204	211
Remaining Surplus/Shortage					**192**	**254**	**319**	**375**	**433**	**491**
Shortage/Surplus					0	0	0	0	0	0
LOST CREEK MUD	TRAVIS	COLORADO	Conservation		108	137	171	215	254	294
LOST CREEK MUD	TRAVIS	COLORADO	Drought Management	20%	218	214	211	211	211	211
Remaining Surplus/Shortage					**326**	**351**	**382**	**426**	**465**	**505**
Shortage/Surplus					2,316	757	357	(94)	(494)	(867)
MANOR	TRAVIS	COLORADO	Drought Management	15%	171	234	294	362	422	477
MANOR	TRAVIS	COLORADO	Expansion of Groundwater Supply	Trinity	0	600	600	600	600	600
MANOR	TRAVIS	COLORADO	Water Purchase from Manville WSC		0	0	0	1,000	1,000	1,000
Remaining Surplus/Shortage					**2,487**	**1,591**	**1,251**	**1,868**	**1,528**	**1,210**
Shortage/Surplus					1,525	873	182	(568)	(1,286)	(2,346)
MANVILLE WSC	TRAVIS	COLORADO	Drought Management	15%	448	541	630	733	825	911
MANVILLE WSC	TRAVIS	COLORADO	Expansion of Groundwater Supply	Trinity	0	0	0	1,000	1,000	1,000
MANVILLE WSC	TRAVIS	COLORADO	New LCRA Contract	LCRA System	0	0	0	500	2,000	2,000
Remaining Surplus/Shortage					**1,973**	**1,414**	**812**	**1,665**	**2,539**	**1,565**
MANVILLE WSC	TRAVIS	COLORADO	Water Sale to Manor		0	0	0	(1,000)	(1,000)	(1,000)
Remaining Surplus/Shortage After Sales					**1,973**	**1,414**	**812**	**665**	**1,539**	**565**
Shortage/Surplus					0	0	0	0	0	0
NORTH AUSTIN MUD #1	TRAVIS	COLORADO	Drought Management	15%	12	12	12	11	11	11
Remaining Surplus/Shortage					**12**	**12**	**12**	**11**	**11**	**11**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	Water Management Strategies (ac-ft/yr) 2020	2030	2040	2050	2060	2070
		Shortage/Surplus			339	339	339	339	339	339
NORTHTOWN MUD	TRAVIS	COLORADO	Drought Management	15%	104	120	135	152	167	180
		Remaining Surplus/Shortage			**443**	**459**	**474**	**491**	**506**	**519**
		Shortage/Surplus			(605)	(4,935)	(9,073)	(13,727)	(17,872)	(21,741)
PFLUGERVILLE	TRAVIS	COLORADO	Conservation		604	2,105	2,625	3,029	3,514	3,966
PFLUGERVILLE	TRAVIS	COLORADO	Drought Management	25%	3,194	4,276	5,311	6,474	7,503	8,463
PFLUGERVILLE	TRAVIS	COLORADO	Reuse	Reuse	500	1,000	2,000	2,000	4,000	4,000
PFLUGERVILLE	TRAVIS	COLORADO	LCRA Contract Amendment	LCRA System	0	0	0	3,000	3,000	6,000
PFLUGERVILLE	TRAVIS	COLORADO	Expansion of Groundwater Supply	Edwards (BFZ)	0	0	1,000	1,000	1,000	1,000
		Remaining Surplus/Shortage			**3,693**	**2,446**	**1,863**	**1,776**	**1,145**	**1,688**
		Shortage/Surplus			13	(83)	(174)	(278)	(369)	(455)
POINT VENTURE	TRAVIS	COLORADO	Conservation		34	82	139	191	241	301
POINT VENTURE	TRAVIS	COLORADO	Drought Management	15%	52	66	80	96	109	122
POINT VENTURE	TRAVIS	COLORADO	LCRA Contract Amendment	LCRA System	0	100	100	300	300	300
		Remaining Surplus/Shortage			**99**	**165**	**145**	**309**	**281**	**268**
		Shortage/Surplus			0	(379)	(376)	(375)	(376)	(378)
ROLLINGWOOD	TRAVIS	COLORADO	Conservation		38	67	79	91	104	118
ROLLINGWOOD	TRAVIS	COLORADO	Drought Management	15%	58	57	56	56	56	57
ROLLINGWOOD	TRAVIS	COLORADO	New LCRA Contract	LCRA System	0	400	400	400	400	400
		Remaining Surplus/Shortage			**96**	**145**	**159**	**172**	**184**	**197**
		Shortage/Surplus			0	0	0	0	0	0
ROUND ROCK	TRAVIS	COLORADO	Conservation		13	11	10	8	9	10
ROUND ROCK	TRAVIS	COLORADO	Refer to Region G Plan							
		Remaining Surplus/Shortage			**13**	**11**	**10**	**8**	**9**	**10**
		Shortage/Surplus			0	0	0	0	0	0
SHADY HOLLOW MUD	TRAVIS	COLORADO	Conservation		38	16	0	0	0	0
SHADY HOLLOW MUD	TRAVIS	COLORADO	Drought Management	15%	117	114	111	110	110	110
		Remaining Surplus/Shortage			**155**	**130**	**111**	**110**	**110**	**110**
		Shortage/Surplus			27	(472)	(579)	(700)	(807)	(907)
SUNSET VALLEY	TRAVIS	COLORADO	Conservation		38	90	158	241	305	366
SUNSET VALLEY	TRAVIS	COLORADO	Drought Management	30%	116	150	182	218	250	280
SUNSET VALLEY	TRAVIS	COLORADO	Edwards/Trinity ASR		0	200	200	200	200	200
SUNSET VALLEY	TRAVIS	COLORADO	Development of New Groundwater	Trinity	0	0	200	200	200	200
SUNSET VALLEY	TRAVIS	COLORADO	New LCRA Contract	LCRA System	0	715	715	715	715	715
		Remaining Surplus/Shortage			**181**	**683**	**876**	**874**	**863**	**854**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	Water Management Strategies (ac-ft/yr) 2020	2030	2040	2050	2060	2070
Shortage/Surplus					84	89	92	94	95	95
THE HILLS	TRAVIS	COLORADO	Conservation		144	272	386	487	581	665
THE HILLS	TRAVIS	COLORADO	Drought Management	15%	217	217	216	216	216	216
Remaining Surplus/Shortage					**445**	**578**	**694**	**797**	**892**	**976**
Shortage/Surplus					1,207	810	435	13	(361)	(710)
TRAVIS COUNTY MUD #4	TRAVIS	COLORADO	Conservation		262	564	912	1,302	1,705	2,114
TRAVIS COUNTY MUD #4	TRAVIS	COLORADO	Drought Management	20%	522	602	677	762	837	907
Remaining Surplus/Shortage					**1,469**	**1,374**	**1,347**	**1,315**	**1,344**	**1,404**
Shortage/Surplus					0	(2,428)	(2,715)	(3,044)	(3,341)	(3,619)
TRAVIS COUNTY WCID #10	TRAVIS	COLORADO	Conservation		213	445	707	996	1,316	1,533
TRAVIS COUNTY WCID #10	TRAVIS	COLORADO	Drought Management	25%	532	607	679	761	835	905
TRAVIS COUNTY WCID #10	TRAVIS	COLORADO	New LCRA Contract	LCRA System	0	3,000	3,000	3,000	3,000	3,000
Remaining Surplus/Shortage					**745**	**1,624**	**1,671**	**1,713**	**1,810**	**1,819**
Shortage/Surplus					(302)	(1,904)	(2,868)	(3,038)	(3,330)	(3,693)
TRAVIS COUNTY WCID #17	TRAVIS	COLORADO	Conservation		408	890	1,420	1,943	2,404	4,645
TRAVIS COUNTY WCID #17	TRAVIS	COLORADO	Drought Management	15%	1,268	1,508	1,653	1,678	1,722	1,776
TRAVIS COUNTY WCID #17	TRAVIS	COLORADO	LCRA Contract Amendment	LCRA System	2,000	3,000	3,000	3,000	3,000	3,000
Remaining Surplus/Shortage					**3,374**	**3,494**	**3,205**	**3,583**	**3,796**	**5,728**
TRAVIS COUNTY WCID #17	TRAVIS	COLORADO	Water Sale to Lakeway	LCRA System	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)	(1,000)
Remaining Surplus/Shortage After Sales					**2,374**	**2,494**	**2,205**	**2,583**	**2,796**	**4,728**
Shortage/Surplus					613	469	329	163	11	(131)
TRAVIS COUNTY WCID #18	TRAVIS	COLORADO	Conservation		60	95	87	87	96	104
TRAVIS COUNTY WCID #18	TRAVIS	COLORADO	Drought Management	15%	168	190	211	236	259	280
Remaining Surplus/Shortage					**841**	**754**	**627**	**486**	**366**	**253**
Shortage/Surplus					0	0	0	0	0	0
TRAVIS COUNTY WCID #19	TRAVIS	COLORADO	Conservation		50	92	131	166	199	229
TRAVIS COUNTY WCID #19	TRAVIS	COLORADO	Drought Management	20%	100	99	99	99	99	99
Remaining Surplus/Shortage					**150**	**191**	**230**	**265**	**298**	**328**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	Water Management Strategies (ac-ft/yr) 2020	2030	2040	2050	2060	2070
Shortage/Surplus					545	548	551	552	553	553
TRAVIS COUNTY WCID #20	TRAVIS	COLORADO	Conservation		59	110	153	197	234	268
TRAVIS COUNTY WCID #20	TRAVIS	COLORADO	Drought Management	20%	118	117	117	117	116	116
Remaining Surplus/Shortage					**722**	**775**	**821**	**866**	**903**	**937**
Shortage/Surplus					0	(13)	(25)	(40)	(54)	(66)
VOLENTE	TRAVIS	COLORADO	Drought Management	5%	4	4	5	6	7	7
VOLENTE	TRAVIS	COLORADO	New LCRA Contract	LCRA System	142	142	142	142	142	142
Remaining Surplus/Shortage					**146**	**133**	**122**	**108**	**95**	**83**
Shortage/Surplus					0	0	0	0	0	0
WELLS BRANCH MUD	TRAVIS	COLORADO	Drought Management	5%	82	80	79	78	78	78
Remaining Surplus/Shortage					**82**	**80**	**79**	**78**	**78**	**78**
Shortage/Surplus					41	(1,550)	(1,539)	(1,533)	(1,532)	(1,532)
WEST LAKE HILLS	TRAVIS	COLORADO	Conservation		157	286	398	505	609	700
WEST LAKE HILLS	TRAVIS	COLORADO	Drought Management	20%	313	310	308	307	306	306
WEST LAKE HILLS	TRAVIS	COLORADO	New LCRA Contract	LCRA System	0	1,300	1,300	1,300	1,300	1,300
Remaining Surplus/Shortage					**511**	**346**	**467**	**579**	**683**	**774**
Shortage/Surplus					421	68	(269)	(650)	(986)	(1,300)
WEST TRAVIS COUNTY PUA	TRAVIS	COLORADO	Conservation		234	505	809	1,164	1,526	1,900
WEST TRAVIS COUNTY PUA	TRAVIS	COLORADO	Drought Management	20%	473	544	611	688	755	818
WEST TRAVIS COUNTY PUA	TRAVIS	COLORADO	LCRA Contract Amendment	LCRA System	0	500	500	1,000	1,000	1,000
Remaining Surplus/Shortage					**1,128**	**1,617**	**1,651**	**2,202**	**2,295**	**2,418**
WEST TRAVIS COUNTY PUA	TRAVIS	COLORADO	Sale to Bee Cave	LCRA System	(300)	(300)	(600)	(600)	(800)	(800)
Remaining Surplus/Shortage After Sales					**828**	**1,317**	**1,051**	**1,602**	**1,495**	**1,618**
Shortage/Surplus					2,626	(1,374)	(1,374)	(6,543)	(14,043)	(21,530)
STEAM ELECTRIC POWER	TRAVIS	COLORADO	COA Direct Reuse	Reuse	3,500	7,500	7,500	8,500	9,500	10,500
STEAM ELECTRIC POWER	TRAVIS	COLORADO	Increased LCRA System Supply		0	0	0	0	4,543	11,030
Remaining Surplus/Shortage					**6,126**	**6,126**	**6,126**	**1,957**	**0**	**0**
Shortage/Surplus					77	62	51	39	25	12
EAST BERNARD	WHARTON	BRAZOS-COLORADO	Conservation		19	29	42	56	78	97
EAST BERNARD	WHARTON	BRAZOS-COLORADO	Drought Management	15%	57	59	61	63	65	67
Remaining Surplus/Shortage					**153**	**150**	**154**	**158**	**168**	**176**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

					Water Management Strategies (ac-ft/yr)					
WUG Name	**County**	**River Basin**	**Water Management Strategy Name**	**Source Name**	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
					590	553	524	488	447	410
WHARTON	WHARTON	BRAZOS-COLORADO	Conservation		76	88	116	113	116	120
WHARTON	WHARTON	BRAZOS-COLORADO	Drought Management	15%	165	171	175	181	187	192
Remaining Surplus/Shortage					**831**	**812**	**815**	**782**	**750**	**722**
Shortage/Surplus					93	73	58	39	19	0
WHARTON	WHARTON	COLORADO	Conservation		39	46	60	58	60	62
WHARTON	WHARTON	COLORADO	Drought Management	15%	85	88	90	93	96	99
Remaining Surplus/Shortage					**217**	**207**	**208**	**190**	**175**	**161**
Shortage/Surplus					(69,536)	(66,452)	(63,453)	(60,534)	(57,693)	(54,929)
IRRIGATION	WHARTON	BRAZOS-COLORADO	Drought Management		15,042	14,637	14,243	13,860	13,487	13,125
IRRIGATION	WHARTON	BRAZOS-COLORADO	Conservation - On farm Conservation		4,153	5,416	6,689	7,973	9,268	10,577
IRRIGATION	WHARTON	BRAZOS-COLORADO	Conservation - Irrigation Conveyance Improvements		1,080	3,541	6,062	8,602	11,164	13,602
IRRIGATION	WHARTON	BRAZOS-COLORADO	Conservation - Sprinkler Irrigation		297	1,489	2,989	3,750	3,750	3,750
IRRIGATION	WHARTON	BRAZOS-COLORADO	COA Return Flows		4,277	4,458	5,095	5,536	5,865	6,696
IRRIGATION	WHARTON	BRAZOS-COLORADO	LCRA WMP - Interruptible Water	LCRA System	10,674	4,937	1,025	533	0	0
Remaining Surplus/Shortage					**(34,013)**	**(31,974)**	**(27,350)**	**(20,280)**	**(14,159)**	**(7,179)**
Shortage/Surplus					(19,287)	(17,632)	(16,021)	(14,453)	(12,927)	(11,443)
IRRIGATION	WHARTON	COLORADO	Drought Management		8,078	7,861	7,649	7,443	7,243	7,048
IRRIGATION	WHARTON	COLORADO	Conservation - On farm Conservation		1,152	1,437	1,689	1,904	2,077	2,203
IRRIGATION	WHARTON	COLORADO	Conservation - Irrigation Conveyance Improvements		299	940	1,531	2,054	2,501	2,834
IRRIGATION	WHARTON	COLORADO	Conservation - Sprinkler Irrigation		82	395	755	895	895	895
IRRIGATION	WHARTON	COLORADO	COA Return Flows		845	754	669	453	62	0
IRRIGATION	WHARTON	COLORADO	LCRA WMP - Interruptible Water	LCRA System	2,109	835	135	44	0	0
Remaining Surplus/Shortage					**(6,722)**	**(5,410)**	**(3,593)**	**(1,660)**	**(149)**	**1,537**

Table 5B-1: Region K WUG Water Needs and Recommended Water Management Strategies

WUG Name	County	River Basin	Water Management Strategy Name	Source Name	Water Management Strategies (ac-ft/yr) 2020	2030	2040	2050	2060	2070
Shortage/Surplus					(20,559)	(19,589)	(18,644)	(17,725)	(16,831)	(15,960)
IRRIGATION	WHARTON	COLORADO-LAVACA	Drought Management		4,735	4,608	4,484	4,363	4,246	4,132
IRRIGATION	WHARTON	COLORADO-LAVACA	Conservation - On farm Conservation		1,228	1,597	1,965	2,334	2,704	3,073
IRRIGATION	WHARTON	COLORADO-LAVACA	Conservation - Irrigation Conveyance Improvements		319	1,044	1,781	2,519	3,257	3,952
IRRIGATION	WHARTON	COLORADO-LAVACA	Conservation - Sprinkler Irrigation		88	439	878	1,098	1,098	1,098
IRRIGATION	WHARTON	COLORADO-LAVACA	COA Return Flows		1,239	1,282	1,452	1,557	1,619	1,788
IRRIGATION	WHARTON	COLORADO-LAVACA	LCRA WMP - Interruptible Water	LCRA System	3,093	1,420	292	150	0	0
Remaining Surplus/Shortage					**(9,857)**	**(9,199)**	**(7,792)**	**(5,704)**	**(3,907)**	**(1,917)**
Shortage/Surplus					246	184	109	17	(94)	(200)
STEAM-ELECTRIC	WHARTON	BRAZOS-COLORADO	Development of New Groundwater	Gulf Coast	0	0	0	0	200	200
Remaining Surplus/Shortage					**246**	**184**	**109**	**17**	**106**	**0**
Shortage/Surplus					0	150	320	517	567	0
AUSTIN	WILLIAMSON	BRAZOS	Drought Management	10%	770	954	1,184	1,432	1,713	2,021
Remaining Surplus/Shortage					**770**	**1,104**	**1,504**	**1,949**	**2,280**	**2,021**
Shortage/Surplus					0	0	0	0	0	0
NORTH AUSTIN MUD #1	WILLIAMSON	BRAZOS	Drought Management	15%	116	112	109	107	107	107
Remaining Surplus/Shortage					**116**	**112**	**109**	**107**	**107**	**107**
Shortage/Surplus					0	0	0	0	0	0
WELLS BRANCH MUD	TRAVIS	COLORADO	Drought Management	5%	6	6	6	6	6	6
Remaining Surplus/Shortage					**6**	**6**	**6**	**6**	**6**	**6**

APPENDIX 5C

WATER MANAGEMENT STRATEGY COST SUMMARY TABLES

Cost Estimate Summary
Water Supply Project Option
41518 Prices
LCRA - Enhanced Municipal and Industrial Conservation

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$45,875,000
TOTAL COST OF FACILITIES	**$45,875,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$16,056,000
Environmental & Archaeology Studies and Mitigation	$0
Land Acquisition and Surveying (0 acres)	$0
Interest During Construction (4% for 1 years with a 1% ROI)	$2,168,000
TOTAL COST OF PROJECT	**$64,099,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$5,364,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$5,364,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	20,000
Annual Cost of Water ($ per acft)	$268
Annual Cost of Water ($ per 1,000 gallons)	$0.82

Note: One or more cost element has been calculated externally

JB *4/14/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
LCRA - On-site Groundwater to Fayette Power Plant

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$768,000
Transmission Pipeline (0 in dia., 1 miles)	$83,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,103,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$1,954,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$680,000
Environmental & Archaeology Studies and Mitigation	$22,000
Land Acquisition and Surveying (6 acres)	$0
Interest During Construction (4% for 1 years with a 1% ROI)	$93,000
TOTAL COST OF PROJECT	**$2,749,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$230,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$31,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (950861 kW-hr @ 0.09 $/kW-hr)	$86,000
Purchase of Water (700 acft/yr @ 0 $/acft)	$0
TOTAL ANNUAL COST	**$347,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	700
Annual Cost of Water ($ per acft)	$496
Annual Cost of Water ($ per 1,000 gallons)	$1.52

CW *4/22/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
LCRA - Off-site Groundwater to Fayette Power Plant

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$1,380,000
Transmission Pipeline (0 in dia., 24 miles)	$5,164,000
Transmission Pump Station(s) & Storage Tank(s)	$4,891,000
Well Fields (Wells, Pumps, and Piping)	$2,040,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$13,475,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$4,458,000
Environmental & Archaeology Studies and Mitigation	$755,000
Land Acquisition and Surveying (138 acres)	$739,000
Interest During Construction (4% for 1 years with a 1% ROI)	$680,000
TOTAL COST OF PROJECT	**$20,107,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$1,683,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$217,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (9805554 kW-hr @ 0.09 $/kW-hr)	$882,000
Purchase of Water (2500 acft/yr @ 0 $/acft)	$0
TOTAL ANNUAL COST	**$2,782,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	2,500
Annual Cost of Water ($ per acft)	$1,113
Annual Cost of Water ($ per 1,000 gallons)	$3.41

CW *4/22/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
LCRA - Expanded Use of Groundwater in Bastrop County

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$757,000
Transmission Pipeline (0 in dia., 4 miles)	$528,000
Transmission Pump Station(s) & Storage Tank(s)	$936,000
Well Fields (Wells, Pumps, and Piping)	$931,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$3,152,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,077,000
Environmental & Archaeology Studies and Mitigation	$153,000
Land Acquisition and Surveying (8 acres)	$27,000
Interest During Construction (4% for 1 years with a 1% ROI)	$155,000
TOTAL COST OF PROJECT	**$4,564,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$382,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$54,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (206915 kW-hr @ 0.09 $/kW-hr)	$19,000
Purchase of Water (300 acft/yr @ 0 $/acft)	$0
TOTAL ANNUAL COST	**$455,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	300
Annual Cost of Water ($ per acft)	$1,517
Annual Cost of Water ($ per 1,000 gallons)	$4.65

CW *4/22/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
LCRA - Lane City Reservoir

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool 40000 acft, 1125 acres)	$95,100,000
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$6,800,000
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$30,200,000
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$24,700,000
TOTAL COST OF FACILITIES	**$156,800,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$30,400,000
Environmental & Archaeology Studies and Mitigation	$8,900,000
Land Acquisition and Surveying (1130 acres)	$15,100,000
Interest During Construction (4% for 1 years with a 1% ROI)	$7,393,000
TOTAL COST OF PROJECT	**$218,593,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$5,344,000
Reservoir Debt Service (5.5 percent, 40 years)	$9,643,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$925,000
Dam and Reservoir (1.5% of Cost of Facilities)	$1,427,000
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (29869081 kW-hr @ 0.09 $/kW-hr)	$2,688,000
Purchase of Water (90000 acft/yr @ 0 $/acft)	$0
TOTAL ANNUAL COST	**$20,027,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	90,000
Annual Cost of Water ($ per acft)	$223
Annual Cost of Water ($ per 1,000 gallons)	$0.68

Note: One or more cost element has been calculated externally

CW *4/17/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
LCRA - Prairie Reservoir

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool 40000 acft, 1125 acres)	$269,000,000
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 3 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$269,000,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$94,150,000
Environmental & Archaeology Studies and Mitigation	$73,000
Land Acquisition and Surveying (1130 acres)	$56,000
Interest During Construction (4% for 1 years with a 1% ROI)	$12,716,000
TOTAL COST OF PROJECT	**$375,995,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$6,000
Reservoir Debt Service (5.5 percent, 40 years)	$23,427,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$4,035,000
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (3746780 kW-hr @ 0.09 $/kW-hr)	$337,000
Purchase of Water (90000 acft/yr @ 0 $/acft)	$0
TOTAL ANNUAL COST	**$27,805,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	18,000
Annual Cost of Water ($ per acft)	$1,545
Annual Cost of Water ($ per 1,000 gallons)	$4.74

Note: One or more cost element has been calculated externally

NDH *4/17/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
LCRA - Mid-Basin OCR

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool 40000 acft, 1125 acres)	$213,000,000
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 3 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$213,000,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$74,550,000
Environmental & Archaeology Studies and Mitigation	$73,000
Land Acquisition and Surveying (1130 acres)	$56,000
Interest During Construction (4% for 1 years with a 1% ROI)	$10,070,000
TOTAL COST OF PROJECT	**$297,749,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$6,000
Reservoir Debt Service (5.5 percent, 40 years)	$18,551,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$3,195,000
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (3746780 kW-hr @ 0.09 $/kW-hr)	$337,000
Purchase of Water (90000 acft/yr @ 0 $/acft)	$0
TOTAL ANNUAL COST	**$22,089,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	18,000
Annual Cost of Water ($ per acft)	$1,227
Annual Cost of Water ($ per 1,000 gallons)	$3.77

Note: One or more cost element has been calculated externally

NDH *4/17/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
LCRA - Excess Flows OCR

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool 40000 acft, 1125 acres)	$213,000,000
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 3 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$213,000,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$74,550,000
Environmental & Archaeology Studies and Mitigation	$73,000
Land Acquisition and Surveying (1130 acres)	$56,000
Interest During Construction (4% for 1 years with a 1% ROI)	$10,070,000
TOTAL COST OF PROJECT	**$297,749,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$6,000
Reservoir Debt Service (5.5 percent, 40 years)	$18,551,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$3,195,000
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (3472371 kW-hr @ 0.09 $/kW-hr)	$313,000
Purchase of Water (90000 acft/yr @ 0 $/acft)	$0
TOTAL ANNUAL COST	**$22,065,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	15,257
Annual Cost of Water ($ per acft)	$1,446
Annual Cost of Water ($ per 1,000 gallons)	$4.44

Note: One or more cost element has been calculated externally

NDH *4/17/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
City of Austin - Direct Reuse (Municipal, Manufacturing, and Steam-Electric)

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
Intake Pump Stations (0 MGD)	$42,566,000
Transmission Pipeline (0 in dia., 10 miles)	$242,368,000
Storage Tanks (Other Than at Booster Pump Stations)	$52,338,000
Water Treatment Plant	$42,942,000
TOTAL COST OF FACILITIES	**$380,214,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$120,956,000
Environmental & Archaeology Studies and Mitigation	$250,000
Land Acquisition and Surveying (3 acres)	$16,624,000
Interest During Construction (4% for 1 years with a 1% ROI)	$18,132,000
TOTAL COST OF PROJECT	**$536,176,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$44,867,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$4,011,000
Water Treatment Plant (2.5% of Cost of Facilities)	$2,096,000
Pumping Energy Costs (8907397 kW-hr @ 0.09 $/kW-hr)	$802,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$51,776,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	38,429
Annual Cost of Water ($ per acft)	$1,347
Annual Cost of Water ($ per 1,000 gallons)	$4.13

Note: One or more cost element has been calculated externally

JB *10/13/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
COA - ASR

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 5 miles)	$65,000,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$100,000,000
Storage Tanks (Other Than at Booster Pump Stations)	$50,000,000
Water Treatment Plant (2 MGD)	$10,000,000
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$225,000,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$75,500,000
Environmental & Archaeology Studies and Mitigation	$565,000
Land Acquisition and Surveying (29 acres)	$689,000
Interest During Construction (4% for 1 years with a 1% ROI)	$10,562,000
TOTAL COST OF PROJECT	**$312,316,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$26,134,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$2,150,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$1,065,000
Pumping Energy Costs (9288201 kW-hr @ 0.09 $/kW-hr)	$836,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$30,185,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	50,000
Annual Cost of Water ($ per acft)	$604
Annual Cost of Water ($ per 1,000 gallons)	$1.85

Note: One or more cost element has been calculated externally

NDH *3/27/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
COA - Longhorn Dam Automation

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$741,000
TOTAL COST OF FACILITIES	**$741,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$259,000
Environmental & Archaeology Studies and Mitigation	$0
Land Acquisition and Surveying (0 acres)	$0
Interest During Construction (4% for 1 years with a 1% ROI)	$36,000
TOTAL COST OF PROJECT	**$1,036,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$87,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$87,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	3,000
Annual Cost of Water ($ per acft)	$29
Annual Cost of Water ($ per 1,000 gallons)	$0.09

Note: One or more cost element has been calculated externally

KP *4/20/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
COA - Rainwater Harvesting

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$690,167,000
TOTAL COST OF FACILITIES	**$690,167,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$0
Environmental & Archaeology Studies and Mitigation	$0
Land Acquisition and Surveying (0 acres)	$0
Interest During Construction (4% for 0 years with a 1% ROI)	$0
TOTAL COST OF PROJECT	**$690,167,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$57,753,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (0 acft/yr @ 0 $/acft)	$0
TOTAL ANNUAL COST	**$57,753,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	16,564
Annual Cost of Water ($ per acft)	$3,487
Annual Cost of Water ($ per 1,000 gallons)	$10.70

Note: One or more cost element has been calculated externally

NDH *4/15/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
City of Austin - Walter E. Long Enhanced Storage

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$6,735,000
Transmission Pipeline (0 in dia., 7 miles)	$7,293,000
Transmission Pump Station(s) & Storage Tank(s)	$4,792,000
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$3,500,000
TOTAL COST OF FACILITIES	**$22,320,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$7,448,000
Environmental & Archaeology Studies and Mitigation	$195,000
Land Acquisition and Surveying (8 acres)	$28,000
Interest During Construction (4% for 1 years with a 1% ROI)	$1,050,000
TOTAL COST OF PROJECT	**$31,041,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$2,597,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$342,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (13111709 kW-hr @ 0.09 $/kW-hr)	$1,180,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$4,119,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	22,000
Annual Cost of Water ($ per acft)	$187
Annual Cost of Water ($ per 1,000 gallons)	$0.57

Note: One or more cost element has been calculated externally

B. Yeganeh *4/2/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
City of Austin - City of Austin Decentralization of WW/SW

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	Estimated Costs for Facilities
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$1,619,000
Transmission Pipeline (0 in dia., 2 miles)	$510,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$825,000
Two Water Treatment Plants (1.3 MGD and 1.3 MGD)	$11,564,000
Integration, Relocations, & Other	$1,000,000
TOTAL COST OF FACILITIES	**$15,518,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$5,406,000
Environmental & Archaeology Studies and Mitigation	$75,000
Land Acquisition and Surveying (11 acres)	$36,000
Interest During Construction (4% for 1 years with a 1% ROI)	$737,000
TOTAL COST OF PROJECT	**$21,772,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$1,822,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$54,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$1,156,000
Pumping Energy Costs (390580 kW-hr @ 0.09 $/kW-hr)	$35,000
Purchase of Water (1121 acft/yr @ 0 $/acft)	$0
TOTAL ANNUAL COST	**$3,067,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	3,000
Annual Cost of Water ($ per acft)	$1,022
Annual Cost of Water ($ per 1,000 gallons)	$3.14

Note: One or more cost element has been calculated externally

CW *3/27/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
City of Austin - Capturing Local Inflows from LBL

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$1,285,000
Transmission Pipeline (0 in dia., 0 miles)	$73,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$750,000
TOTAL COST OF FACILITIES	**$2,108,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$734,000
Environmental & Archaeology Studies and Mitigation	$7,000
Land Acquisition and Surveying (5 acres)	$0
Interest During Construction (4% for 1 years with a 1% ROI)	$100,000
TOTAL COST OF PROJECT	**$2,949,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$247,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$38,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (135441 kW-hr @ 0.09 $/kW-hr)	$12,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$297,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 3	1,000
Annual Cost of Water ($ per acft)	$297
Annual Cost of Water ($ per 1,000 gallons)	$0.91

Note: One or more cost element has been calculated externally

B.Yeganeh *4/6/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
City of Austin - Indirect Potable Reuse through Lady Bird Lake

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 2 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$30,000,000
TOTAL COST OF FACILITIES	**$30,000,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$10,500,000
Environmental & Archaeology Studies and Mitigation	$50,000
Land Acquisition and Surveying (0 acres)	$0
Interest During Construction (4% for 1 years with a 1% ROI)	$1,420,000
TOTAL COST OF PROJECT	**$41,970,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$3,512,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (898939 kW-hr @ 0.09 $/kW-hr)	$81,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$3,593,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	20,000
Annual Cost of Water ($ per acft)	$180
Annual Cost of Water ($ per 1,000 gallons)	$0.55

Note: One or more cost element has been calculated externally

JB *3/28/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
AQUA WSC - Bastrop - Carrizo-Wilcox - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (7.1 MGD)	$0
Transmission Pipeline (20 in dia., 5 miles)	$2,133,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$4,758,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$6,891,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$2,305,000
Environmental & Archaeology Studies and Mitigation	$237,000
Land Acquisition and Surveying (8 acres)	$13,000
Interest During Construction (4% for 1 years with a 1% ROI)	$331,000
TOTAL COST OF PROJECT	**$9,777,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$818,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$69,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (1668780 kW-hr @ 0.09 $/kW-hr)	$150,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,037,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	4,000
Annual Cost of Water ($ per acft)	$259
Annual Cost of Water ($ per 1,000 gallons)	$0.80

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
BASTROP COUNTY WCID #2 - Carrizo-Wilcox - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,514,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$1,514,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$530,000
Environmental & Archaeology Studies and Mitigation	$29,000
Land Acquisition and Surveying (1 acres)	$4,000
Interest During Construction (4% for 1 years with a 1% ROI)	$73,000
TOTAL COST OF PROJECT	**$2,150,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$180,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$15,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (94022 kW-hr @ 0.09 $/kW-hr)	$8,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$203,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	550
Annual Cost of Water ($ per acft)	$369
Annual Cost of Water ($ per 1,000 gallons)	$1.13

Jeff Dahm *1/29/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
COUNTY-OTHER 1 - Bastrop - Carrizo-Wilcox - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,514,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$1,514,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$530,000
Environmental & Archaeology Studies and Mitigation	$29,000
Land Acquisition and Surveying (1 acres)	$4,000
Interest During Construction (4% for 1 years with a 1% ROI)	$73,000
TOTAL COST OF PROJECT	**$2,150,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$180,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$15,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (10238 kW-hr @ 0.09 $/kW-hr)	$1,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$196,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	60
Annual Cost of Water ($ per acft)	$3,267
Annual Cost of Water ($ per 1,000 gallons)	$10.02

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
ELGIN - Bastrop - Carrizo-Wilcox - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,514,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$1,514,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$530,000
Environmental & Archaeology Studies and Mitigation	$29,000
Land Acquisition and Surveying (1 acres)	$4,000
Interest During Construction (4% for 1 years with a 1% ROI)	$73,000
TOTAL COST OF PROJECT	**$2,150,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$180,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$15,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (51235 kW-hr @ 0.09 $/kW-hr)	$5,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$200,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	300
Annual Cost of Water ($ per acft)	$667
Annual Cost of Water ($ per 1,000 gallons)	$2.05

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Manufacturing 1 - Bastrop - Carrizo-Wilcox - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,514,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$1,514,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$530,000
Environmental & Archaeology Studies and Mitigation	$29,000
Land Acquisition and Surveying (1 acres)	$4,000
Interest During Construction (4% for 1 years with a 1% ROI)	$73,000
TOTAL COST OF PROJECT	**$2,150,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$180,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$15,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (33973 kW-hr @ 0.09 $/kW-hr)	$3,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$198,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	199
Annual Cost of Water ($ per acft)	$995
Annual Cost of Water ($ per 1,000 gallons)	$3.05

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
County-Other 2 - Blanco - Ellenburger-San Saba - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	Estimated Costs for Facilities
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$546,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$546,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$191,000
Environmental & Archaeology Studies and Mitigation	$40,000
Land Acquisition and Surveying (2 acres)	$16,000
Interest During Construction (4% for 1 years with a 1% ROI)	$28,000
TOTAL COST OF PROJECT	**$821,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$69,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$5,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (17529 kW-hr @ 0.09 $/kW-hr)	$2,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$76,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	55
Annual Cost of Water ($ per acft)	$1,382
Annual Cost of Water ($ per 1,000 gallons)	$4.24

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Johnson City - Blanco - Ellenburger-San Saba - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$947,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$947,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$331,000
Environmental & Archaeology Studies and Mitigation	$136,000
Land Acquisition and Surveying (3 acres)	$40,000
Interest During Construction (4% for 1 years with a 1% ROI)	$51,000
TOTAL COST OF PROJECT	**$1,505,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$126,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$9,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (53660 kW-hr @ 0.09 $/kW-hr)	$5,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$140,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	175
Annual Cost of Water ($ per acft)	$800
Annual Cost of Water ($ per 1,000 gallons)	$2.45

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
BERTRAM - Burnet - Ellenburger-San Saba - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,369,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$1,369,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$479,000
Environmental & Archaeology Studies and Mitigation	$100,000
Land Acquisition and Surveying (3 acres)	$14,000
Interest During Construction (4% for 1 years with a 1% ROI)	$69,000
TOTAL COST OF PROJECT	**$2,031,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$170,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$14,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (41721 kW-hr @ 0.09 $/kW-hr)	$4,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$188,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	180
Annual Cost of Water ($ per acft)	$1,044
Annual Cost of Water ($ per 1,000 gallons)	$3.20

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
MINING 3 - Burnet - Ellenburger-San Saba - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$9,048,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$9,048,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$3,167,000
Environmental & Archaeology Studies and Mitigation	$658,000
Land Acquisition and Surveying (16 acres)	$91,000
Interest During Construction (4% for 1 years with a 1% ROI)	$454,000
TOTAL COST OF PROJECT	**$13,418,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$1,123,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$90,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (610804 kW-hr @ 0.09 $/kW-hr)	$55,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,268,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	1,500
Annual Cost of Water ($ per acft)	$845
Annual Cost of Water ($ per 1,000 gallons)	$2.59

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
MANUFACTURING 3 - Gillespie - Ellenburger-San Saba - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	Estimated Costs for Facilities
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$2,535,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$2,535,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$887,000
Environmental & Archaeology Studies and Mitigation	$286,000
Land Acquisition and Surveying (7 acres)	$40,000
Interest During Construction (4% for 1 years with a 1% ROI)	$132,000
TOTAL COST OF PROJECT	**$3,880,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$325,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$25,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (244002 kW-hr @ 0.09 $/kW-hr)	$22,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$372,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	626
Annual Cost of Water ($ per acft)	$594
Annual Cost of Water ($ per 1,000 gallons)	$1.82

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Pflugerville - Travis - Edwards (BFZ) Aquifer - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$2,564,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$2,564,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$897,000
Environmental & Archaeology Studies and Mitigation	$120,000
Land Acquisition and Surveying (3 acres)	$21,000
Interest During Construction (4% for 1 years with a 1% ROI)	$127,000
TOTAL COST OF PROJECT	**$3,729,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$312,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$26,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (361826 kW-hr @ 0.09 $/kW-hr)	$33,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$371,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	1,000
Annual Cost of Water ($ per acft)	$371
Annual Cost of Water ($ per 1,000 gallons)	$1.14

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
COUNTY-OTHER 4 - Colorado - Gulf Coast - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,022,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$1,022,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$358,000
Environmental & Archaeology Studies and Mitigation	$30,000
Land Acquisition and Surveying (1 acres)	$6,000
Interest During Construction (4% for 1 years with a 1% ROI)	$50,000
TOTAL COST OF PROJECT	**$1,466,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$123,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$10,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (36111 kW-hr @ 0.09 $/kW-hr)	$3,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$136,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	226
Annual Cost of Water ($ per acft)	$602
Annual Cost of Water ($ per 1,000 gallons)	$1.85

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
COUNTY-OTHER 5 - Fayette - Gulf Coast - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,581,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$1,581,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$553,000
Environmental & Archaeology Studies and Mitigation	$58,000
Land Acquisition and Surveying (2 acres)	$9,000
Interest During Construction (4% for 1 years with a 1% ROI)	$78,000
TOTAL COST OF PROJECT	**$2,279,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$191,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$16,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (72493 kW-hr @ 0.09 $/kW-hr)	$7,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$214,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	345
Annual Cost of Water ($ per acft)	$620
Annual Cost of Water ($ per 1,000 gallons)	$1.90

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
MINING 4 - Fayette - Gulf Coast - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	Estimated Costs for Facilities
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$3,651,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$3,651,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,278,000
Environmental & Archaeology Studies and Mitigation	$116,000
Land Acquisition and Surveying (4 acres)	$18,000
Interest During Construction (4% for 1 years with a 1% ROI)	$178,000
TOTAL COST OF PROJECT	**$5,241,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$439,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$37,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (618117 kW-hr @ 0.09 $/kW-hr)	$56,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$532,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	1,576
Annual Cost of Water ($ per acft)	$338
Annual Cost of Water ($ per 1,000 gallons)	$1.04

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
COUNTY-OTHER 6 - Fayette - Gulf Coast - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,581,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$1,581,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$553,000
Environmental & Archaeology Studies and Mitigation	$58,000
Land Acquisition and Surveying (2 acres)	$9,000
Interest During Construction (4% for 1 years with a 1% ROI)	$78,000
TOTAL COST OF PROJECT	**$2,279,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$191,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$16,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (61767 kW-hr @ 0.09 $/kW-hr)	$6,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$213,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	294
Annual Cost of Water ($ per acft)	$724
Annual Cost of Water ($ per 1,000 gallons)	$2.22

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Flatonia - Fayette - Gulf Coast - Development of New Groundwater

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0.2 MGD)	$0
Transmission Pipeline (6 in dia., 5 miles)	$480,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,022,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$1,502,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$502,000
Environmental & Archaeology Studies and Mitigation	$155,000
Land Acquisition and Surveying (6 acres)	$6,000
Interest During Construction (4% for 1 years with a 1% ROI)	$76,000
TOTAL COST OF PROJECT	**$2,241,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$188,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$15,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (31311 kW-hr @ 0.09 $/kW-hr)	$3,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$206,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	100
Annual Cost of Water ($ per acft)	$2,060
Annual Cost of Water ($ per 1,000 gallons)	$6.32

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
MANUFACTURING 2 - Fayette - Gulf Coast - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,581,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$1,581,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$553,000
Environmental & Archaeology Studies and Mitigation	$58,000
Land Acquisition and Surveying (2 acres)	$9,000
Interest During Construction (4% for 1 years with a 1% ROI)	$78,000
TOTAL COST OF PROJECT	**$2,279,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$191,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$16,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (82170 kW-hr @ 0.09 $/kW-hr)	$7,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$214,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	391
Annual Cost of Water ($ per acft)	$547
Annual Cost of Water ($ per 1,000 gallons)	$1.68

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
MINING 5 - Fayette - Gulf Coast - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,581,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$1,581,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$553,000
Environmental & Archaeology Studies and Mitigation	$58,000
Land Acquisition and Surveying (2 acres)	$9,000
Interest During Construction (4% for 1 years with a 1% ROI)	$78,000
TOTAL COST OF PROJECT	**$2,279,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$191,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$16,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (72282 kW-hr @ 0.09 $/kW-hr)	$7,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$214,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	344
Annual Cost of Water ($ per acft)	$622
Annual Cost of Water ($ per 1,000 gallons)	$1.91

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
COUNTY-OTHER 3 - Blanco - Hickory - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$912,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$912,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$319,000
Environmental & Archaeology Studies and Mitigation	$32,000
Land Acquisition and Surveying (1 acres)	$8,000
Interest During Construction (4% for 1 years with a 1% ROI)	$45,000
TOTAL COST OF PROJECT	**$1,316,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$110,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$9,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (11843 kW-hr @ 0.09 $/kW-hr)	$1,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$120,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	55
Annual Cost of Water ($ per acft)	$2,182
Annual Cost of Water ($ per 1,000 gallons)	$6.69

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
MINING 6 - Burnet - Hickory Aquifer - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$9,281,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$9,281,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$3,248,000
Environmental & Archaeology Studies and Mitigation	$399,000
Land Acquisition and Surveying (10 acres)	$54,000
Interest During Construction (4% for 1 years with a 1% ROI)	$455,000
TOTAL COST OF PROJECT	**$13,437,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$1,124,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$93,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (845796 kW-hr @ 0.09 $/kW-hr)	$76,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,293,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	1,800
Annual Cost of Water ($ per acft)	$718
Annual Cost of Water ($ per 1,000 gallons)	$2.20

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
MINING 7 - Burnet - Marble Falls Aquifer - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	Estimated Costs for Facilities
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$4,956,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$4,956,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,734,000
Environmental & Archaeology Studies and Mitigation	$284,000
Land Acquisition and Surveying (7 acres)	$37,000
Interest During Construction (4% for 1 years with a 1% ROI)	$246,000
TOTAL COST OF PROJECT	**$7,257,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$607,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$50,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (512039 kW-hr @ 0.09 $/kW-hr)	$46,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$703,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	1,500
Annual Cost of Water ($ per acft)	$469
Annual Cost of Water ($ per 1,000 gallons)	$1.44

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
MINING 8 - Fayette - Sparta Aquifer - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$512,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$512,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$179,000
Environmental & Archaeology Studies and Mitigation	$30,000
Land Acquisition and Surveying (1 acres)	$6,000
Interest During Construction (4% for 1 years with a 1% ROI)	$26,000
TOTAL COST OF PROJECT	**$753,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$63,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$5,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (3301 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$68,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	66
Annual Cost of Water ($ per acft)	$1,030
Annual Cost of Water ($ per 1,000 gallons)	$3.16

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
MINING 9 - Hays - Trinity Aquifer - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$3,265,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$3,265,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,143,000
Environmental & Archaeology Studies and Mitigation	$54,000
Land Acquisition and Surveying (6 acres)	$32,000
Interest During Construction (4% for 1 years with a 1% ROI)	$158,000
TOTAL COST OF PROJECT	**$4,652,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$389,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$33,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (383481 kW-hr @ 0.09 $/kW-hr)	$35,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$457,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	1,047
Annual Cost of Water ($ per acft)	$436
Annual Cost of Water ($ per 1,000 gallons)	$1.34

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Irrigation - Mills - Trinity - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$5,426,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$5,426,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,899,000
Environmental & Archaeology Studies and Mitigation	$574,000
Land Acquisition and Surveying (13 acres)	$109,000
Interest During Construction (4% for 1 years with a 1% ROI)	$281,000
TOTAL COST OF PROJECT	**$8,289,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$694,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$54,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (326338 kW-hr @ 0.09 $/kW-hr)	$29,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$777,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	480
Annual Cost of Water ($ per acft)	$1,619
Annual Cost of Water ($ per 1,000 gallons)	$4.97

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Lakeway - Travis - Trinity - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$2,016,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$2,016,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$706,000
Environmental & Archaeology Studies and Mitigation	$136,000
Land Acquisition and Surveying (3 acres)	$26,000
Interest During Construction (4% for 1 years with a 1% ROI)	$101,000
TOTAL COST OF PROJECT	**$2,985,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$250,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$20,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (163990 kW-hr @ 0.09 $/kW-hr)	$15,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$285,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	500
Annual Cost of Water ($ per acft)	$570
Annual Cost of Water ($ per 1,000 gallons)	$1.75

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Manor - Travis - Trinity - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$2,328,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$2,328,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$815,000
Environmental & Archaeology Studies and Mitigation	$152,000
Land Acquisition and Surveying (4 acres)	$30,000
Interest During Construction (4% for 1 years with a 1% ROI)	$117,000
TOTAL COST OF PROJECT	**$3,442,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$288,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$23,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (178861 kW-hr @ 0.09 $/kW-hr)	$16,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$327,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	600
Annual Cost of Water ($ per acft)	$545
Annual Cost of Water ($ per 1,000 gallons)	$1.67

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Manville WSC - Travis - Trinity - Expansion of Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$3,672,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$3,672,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,285,000
Environmental & Archaeology Studies and Mitigation	$243,000
Land Acquisition and Surveying (6 acres)	$47,000
Interest During Construction (4% for 1 years with a 1% ROI)	$184,000
TOTAL COST OF PROJECT	**$5,431,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$455,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$37,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (497139 kW-hr @ 0.09 $/kW-hr)	$45,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$537,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	1,000
Annual Cost of Water ($ per acft)	$537
Annual Cost of Water ($ per 1,000 gallons)	$1.65

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Bastrop - Carrizo-Wilcox - Development of New Groundwater

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0.5 MGD)	$0
Transmission Pipeline (6 in dia., 5 miles)	$518,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,514,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$2,032,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$685,000
Environmental & Archaeology Studies and Mitigation	$154,000
Land Acquisition and Surveying (6 acres)	$4,000
Interest During Construction (4% for 1 years with a 1% ROI)	$101,000
TOTAL COST OF PROJECT	**$2,976,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$249,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$20,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (134022 kW-hr @ 0.09 $/kW-hr)	$12,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$281,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	300
Annual Cost of Water ($ per acft)	$937
Annual Cost of Water ($ per 1,000 gallons)	$2.87

Jeff Dahm *1/29/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Mining 1 - Bastrop - Carrizo-Wilcox - Development of New Groundwater

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0.8 MGD)	$0
Transmission Pipeline (10 in dia., 5 miles)	$826,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,514,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$2,340,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$778,000
Environmental & Archaeology Studies and Mitigation	$154,000
Land Acquisition and Surveying (6 acres)	$4,000
Interest During Construction (4% for 1 years with a 1% ROI)	$115,000
TOTAL COST OF PROJECT	**$3,391,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$284,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$23,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (154421 kW-hr @ 0.09 $/kW-hr)	$14,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$321,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	466
Annual Cost of Water ($ per acft)	$689
Annual Cost of Water ($ per 1,000 gallons)	$2.11

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Steam-Electric - Wharton - Gulf Coast - Development of New Groundwater

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0.4 MGD)	$0
Transmission Pipeline (6 in dia., 5 miles)	$480,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,022,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$1,502,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$502,000
Environmental & Archaeology Studies and Mitigation	$153,000
Land Acquisition and Surveying (6 acres)	$4,000
Interest During Construction (4% for 1 years with a 1% ROI)	$76,000
TOTAL COST OF PROJECT	**$2,237,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$187,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$15,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (55855 kW-hr @ 0.09 $/kW-hr)	$5,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$207,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	200
Annual Cost of Water ($ per acft)	$1,035
Annual Cost of Water ($ per 1,000 gallons)	$3.18

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Llano - Hickory - Development of New Groundwater Supply

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0.4 MGD)	$0
Transmission Pipeline (6 in dia., 5 miles)	$480,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,368,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$1,848,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$623,000
Environmental & Archaeology Studies and Mitigation	$170,000
Land Acquisition and Surveying (7 acres)	$9,000
Interest During Construction (4% for 1 years with a 1% ROI)	$93,000
TOTAL COST OF PROJECT	**$2,743,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$229,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$18,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (82853 kW-hr @ 0.09 $/kW-hr)	$7,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$254,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	200
Annual Cost of Water ($ per acft)	$1,270
Annual Cost of Water ($ per 1,000 gallons)	$3.90

Note: One or more cost element has been calculated externally

Jeff Dahm *2/20/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Mining 2 - Bastrop - Queen City - Development of New Groundwater

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0.5 MGD)	$0
Transmission Pipeline (6 in dia., 5 miles)	$557,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,097,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$1,654,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$551,000
Environmental & Archaeology Studies and Mitigation	$154,000
Land Acquisition and Surveying (6 acres)	$4,000
Interest During Construction (4% for 1 years with a 1% ROI)	$83,000
TOTAL COST OF PROJECT	**$2,446,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$205,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$17,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (102238 kW-hr @ 0.09 $/kW-hr)	$9,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$231,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	306
Annual Cost of Water ($ per acft)	$755
Annual Cost of Water ($ per 1,000 gallons)	$2.32

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Smithville - Queen City - Development of New Groundwater

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0.3 MGD)	$0
Transmission Pipeline (6 in dia., 5 miles)	$480,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$1,296,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$1,776,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$597,000
Environmental & Archaeology Studies and Mitigation	$154,000
Land Acquisition and Surveying (6 acres)	$4,000
Interest During Construction (4% for 1 years with a 1% ROI)	$89,000
TOTAL COST OF PROJECT	**$2,620,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$219,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$18,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (47682 kW-hr @ 0.09 $/kW-hr)	$4,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$241,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	150
Annual Cost of Water ($ per acft)	$1,607
Annual Cost of Water ($ per 1,000 gallons)	$4.93

Jeff Dahm *1/29/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Sunset Valley - Travis - Trinity - Development of New Groundwater

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0.2 MGD)	$0
Transmission Pipeline (6 in dia., 5 miles)	$480,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$984,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$1,464,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$488,000
Environmental & Archaeology Studies and Mitigation	$187,000
Land Acquisition and Surveying (7 acres)	$13,000
Interest During Construction (4% for 1 years with a 1% ROI)	$76,000
TOTAL COST OF PROJECT	**$2,228,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$186,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$15,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (71816 kW-hr @ 0.09 $/kW-hr)	$6,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$207,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	200
Annual Cost of Water ($ per acft)	$1,035
Annual Cost of Water ($ per 1,000 gallons)	$3.18

Note: One or more cost element has been calculated externally

Jeff Dahm *4/24/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
BSEACD - Edwards-Middle Trinity ASR

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	Estimated Costs for Facilities
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$1,878,000
Transmission Pipeline (0 in dia., 1 miles)	$309,000
Transmission Pump Station(s) & Storage Tank(s)	$1,603,000
Well Fields (Wells, Pumps, and Piping)	$5,301,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Two Water Treatment Plants (1 MGD and 1 MGD)	$140,000
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$9,231,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$3,215,000
Environmental & Archaeology Studies and Mitigation	$59,000
Land Acquisition and Surveying (12 acres)	$37,000
Interest During Construction (4% for 1 years with a 1% ROI)	$439,000
TOTAL COST OF PROJECT	**$12,981,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$1,086,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$139,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$84,000
Pumping Energy Costs (958233 kW-hr @ 0.09 $/kW-hr)	$86,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$1,395,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	1,144
Annual Cost of Water ($ per acft)	$1,219
Annual Cost of Water ($ per 1,000 gallons)	$3.74

NDH *4/17/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
BSEACD - Saline Edwards ASR

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$1,533,000
Transmission Pipeline (0 in dia., 6 miles)	$1,855,000
Transmission Pump Station(s) & Storage Tank(s)	$1,077,000
Well Fields (Wells, Pumps, and Piping)	$2,844,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Two Water Treatment Plants (0.3 MGD and 0.9 MGD)	$3,357,000
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$10,666,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$3,640,000
Environmental & Archaeology Studies and Mitigation	$182,000
Land Acquisition and Surveying (12 acres)	$35,000
Interest During Construction (4% for 1 years with a 1% ROI)	$509,000
TOTAL COST OF PROJECT	**$15,032,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$1,258,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$109,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$622,000
Pumping Energy Costs (464130 kW-hr @ 0.09 $/kW-hr)	$42,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$2,031,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	1,000
Annual Cost of Water ($ per acft)	$2,031
Annual Cost of Water ($ per 1,000 gallons)	$6.23

NDH *4/17/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Burnet County-Other, City of Burnet, City of Bertram - Buena Vista Project

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (8.7 MGD)	$980,000
Transmission Pipeline (18 in dia., 12 miles)	$249,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (8.7 MGD)	$16,323,000
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$17,552,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$6,131,000
Environmental & Archaeology Studies and Mitigation	$379,000
Land Acquisition and Surveying (14 acres)	$82,000
Interest During Construction (4% for 1 years with a 1% ROI)	$846,000
TOTAL COST OF PROJECT	**$24,990,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$2,091,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$27,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$1,660,000
Pumping Energy Costs (1463225 kW-hr @ 0.09 $/kW-hr)	$132,000
Purchase of Water (4884 acft/yr @ 151 $/acft)	$737,000
TOTAL ANNUAL COST	**$4,647,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	4,884
Annual Cost of Water ($ per acft)	$951
Annual Cost of Water ($ per 1,000 gallons)	$2.92

Note: One or more cost element has been calculated externally

Jeff Dahm *4/17/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Burnet County-Other - East Lake Buchanan Project

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (1.7 MGD)	$334,000
Transmission Pipeline (10 in dia., 12 miles)	$535,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (1.7 MGD)	$6,235,000
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$7,104,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$2,460,000
Environmental & Archaeology Studies and Mitigation	$361,000
Land Acquisition and Surveying (11 acres)	$62,000
Interest During Construction (4% for 1 years with a 1% ROI)	$350,000
TOTAL COST OF PROJECT	**$10,337,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$865,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$14,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$694,000
Pumping Energy Costs (432057 kW-hr @ 0.09 $/kW-hr)	$39,000
Purchase of Water (935 acft/yr @ 151 $/acft)	$141,000
TOTAL ANNUAL COST	**$1,753,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	935
Annual Cost of Water ($ per acft)	$1,875
Annual Cost of Water ($ per 1,000 gallons)	$5.75

Note: One or more cost element has been calculated externally

Jeff Dahm *4/17/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
County Other - Burnet - Marble Falls RWS

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (6.5 MGD)	$1,992,000
Transmission Pipeline (18 in dia., 19 miles)	$1,638,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (10 MGD)	$30,738,000
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$34,368,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$11,947,000
Environmental & Archaeology Studies and Mitigation	$557,000
Land Acquisition and Surveying (15 acres)	$85,000
Interest During Construction (4% for 1 years with a 1% ROI)	$1,644,000
TOTAL COST OF PROJECT	**$48,601,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$4,067,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$66,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$3,286,000
Pumping Energy Costs (2258294 kW-hr @ 0.09 $/kW-hr)	$203,000
Purchase of Water (5878 acft/yr @ 151 $/acft)	$888,000
TOTAL ANNUAL COST	**$8,510,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	5,578
Annual Cost of Water ($ per acft)	$1,526
Annual Cost of Water ($ per 1,000 gallons)	$4.68

Note: One or more cost element has been calculated externally

Jeff Dahm *4/17/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Volente - Volente Water Contract with LCRA

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0.3 MGD)	$772,000
Transmission Pipeline (12 in dia., 5 miles)	$1,235,000
Transmission Pump Station(s) & Storage Tank(s)	$889,000
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0.5 MGD)	$2,916,000
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$5,812,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,973,000
Environmental & Archaeology Studies and Mitigation	$141,000
Land Acquisition and Surveying (17 acres)	$57,000
Interest During Construction (4% for 1 years with a 1% ROI)	$280,000
TOTAL COST OF PROJECT	**$8,263,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$691,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$51,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$292,000
Pumping Energy Costs (94767 kW-hr @ 0.09 $/kW-hr)	$9,000
Purchase of Water (142 acft/yr @ 151 $/acft)	$21,000
TOTAL ANNUAL COST	**$1,064,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2.5	142
Annual Cost of Water ($ per acft)	$7,493
Annual Cost of Water ($ per 1,000 gallons)	$22.99

CW *1/12/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
City of Bastrop - Water Supply for Bastrop County

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (5.6 MGD)	$2,358,000
Transmission Pipeline (20 in dia., 2 miles)	$1,444,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (6.2 MGD)	$21,101,000
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$24,903,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$8,644,000
Environmental & Archaeology Studies and Mitigation	$74,000
Land Acquisition and Surveying (18 acres)	$58,000
Interest During Construction (4% for 1 years with a 1% ROI)	$1,179,000
TOTAL COST OF PROJECT	**$34,858,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$2,917,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$73,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$2,110,000
Pumping Energy Costs (531589 kW-hr @ 0.09 $/kW-hr)	$48,000
Purchase of Water (2500 acft/yr @ 151 $/acft)	$378,000
TOTAL ANNUAL COST	**$5,526,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2.8	2,500
Annual Cost of Water ($ per acft)	$2,210
Annual Cost of Water ($ per 1,000 gallons)	$6.78

CW *1/12/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
City of Elgin - Water Supply for Bastrop County

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (8.7 MGD)	$4,105,000
Transmission Pipeline (24 in dia., 13 miles)	$7,779,000
Transmission Pump Station(s) & Storage Tank(s)	$3,155,000
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (8.7 MGD)	$28,916,000
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$43,955,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$14,995,000
Environmental & Archaeology Studies and Mitigation	$353,000
Land Acquisition and Surveying (72 acres)	$236,000
Interest During Construction (4% for 1 years with a 1% ROI)	$2,084,000
TOTAL COST OF PROJECT	**$61,623,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$5,157,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$250,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$2,892,000
Pumping Energy Costs (1760330 kW-hr @ 0.09 $/kW-hr)	$158,000
Purchase of Water (3500 acft/yr @ 151 $/acft)	$529,000
TOTAL ANNUAL COST	**$8,986,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2.8	3,500
Annual Cost of Water ($ per acft)	$2,567
Annual Cost of Water ($ per 1,000 gallons)	$7.88

CW *1/9/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Aqua WSC - Water Supply for Bastrop County

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (18.7 MGD)	$18,339,000
Transmission Pipeline (36 in dia., 25 miles)	$27,824,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Two Water Treatment Plants (6.7 MGD and 6.7 MGD)	$45,328,000
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$91,491,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$30,630,000
Environmental & Archaeology Studies and Mitigation	$665,000
Land Acquisition and Surveying (138 acres)	$439,000
Interest During Construction (4% for 1 years with a 1% ROI)	$4,313,000
TOTAL COST OF PROJECT	**$127,538,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$10,672,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$737,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$4,533,000
Pumping Energy Costs (8140246 kW-hr @ 0.09 $/kW-hr)	$733,000
Purchase of Water (15000 acft/yr @ 151 $/acft)	$2,265,000
TOTAL ANNUAL COST	**$18,940,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2.8	15,000
Annual Cost of Water ($ per acft)	$1,263
Annual Cost of Water ($ per 1,000 gallons)	$3.87

CW *1/9/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Region K - Bastrop Water Reuse

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$1,083,000
Transmission Pipeline (0 in dia., 5 miles)	$1,175,000
Transmission Pump Station(s) & Storage Tank(s)	$997,000
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$3,255,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,080,000
Environmental & Archaeology Studies and Mitigation	$125,000
Land Acquisition and Surveying (7 acres)	$8,000
Interest During Construction (4% for 1 years with a 1% ROI)	$157,000
TOTAL COST OF PROJECT	**$4,625,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$387,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$61,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (596317 kW-hr @ 0.09 $/kW-hr)	$54,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$502,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	1,120
Annual Cost of Water ($ per acft)	$448
Annual Cost of Water ($ per 1,000 gallons)	$1.38

B. Yeganeh *3/9/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Buda - Water Reuse

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$800,000
Transmission Pipeline (0 in dia., 4 miles)	$3,598,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$4,398,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,359,000
Environmental & Archaeology Studies and Mitigation	$105,000
Land Acquisition and Surveying (7 acres)	$7,000
Interest During Construction (4% for 1 years with a 1% ROI)	$206,000
TOTAL COST OF PROJECT	**$6,075,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$508,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$56,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (310484 kW-hr @ 0.09 $/kW-hr)	$28,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$592,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	2,240
Annual Cost of Water ($ per acft)	$264
Annual Cost of Water ($ per 1,000 gallons)	$0.81

J. Balcolm *3/9/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
City of Flatonia - City of Flatonia Reuse Water System

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	**_Estimated Costs for Facilities_**
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$100,000
Transmission Pipeline (6 in dia., 2 miles)	$306,000
Transmission Pump Station(s) & Storage Tank(s)	$325,000
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$122,000
TOTAL COST OF FACILITIES	**$853,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$283,000
Environmental & Archaeology Studies and Mitigation	$48,000
Land Acquisition and Surveying (0 acres)	$0
Interest During Construction (4% for 1 years with a 1% ROI)	$42,000
TOTAL COST OF PROJECT	**$1,226,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$103,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$7,000
Dam and Reservoir (1% of Cost of Facilities)	$0
Water Treatment Plant (1% of Cost of Facilities)	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$110,000**
Available Project Yield (acft/yr), based on a Peaking Factor of	134
Annual Cost of Water ($ per acft)	$821
Annual Cost of Water ($ per 1,000 gallons)	$2.52

Note: One or more cost element has been calculated externally

Joan Portillo *2/9/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
Region K - City of Llano Reuse

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$153,000
Transmission Pipeline (0 in dia., 2 miles)	$320,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$473,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$149,000
Environmental & Archaeology Studies and Mitigation	$40,000
Land Acquisition and Surveying (6 acres)	$3,000
Interest During Construction (4% for 1 years with a 1% ROI)	$24,000
TOTAL COST OF PROJECT	**$689,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$58,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$7,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (6727 kW-hr @ 0.09 $/kW-hr)	$1,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$66,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	100
Annual Cost of Water ($ per acft)	$660
Annual Cost of Water ($ per 1,000 gallons)	$2.03

B. Yeganeh *4/23/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
City of Pflugerville - City of Pflugerville Reuse

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$1,935,000
Transmission Pipeline (0 in dia., 6 miles)	$1,995,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$1,667,000
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$5,597,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,859,000
Environmental & Archaeology Studies and Mitigation	$138,000
Land Acquisition and Surveying (34 acres)	$95,000
Interest During Construction (4% for 1 years with a 1% ROI)	$270,000
TOTAL COST OF PROJECT	**$7,959,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$666,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$85,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (1775065 kW-hr @ 0.09 $/kW-hr)	$160,000
Purchase of Water (4000 acft/yr @ 0 $/acft)	$0
TOTAL ANNUAL COST	**$911,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	4,000
Annual Cost of Water ($ per acft)	$228
Annual Cost of Water ($ per 1,000 gallons)	$0.70

CW *2/27/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
STP - Alternate Canal Delivery

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$5,017,000
Transmission Pipeline (0 in dia., 0 miles)	$458,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$5,475,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$1,893,000
Environmental & Archaeology Studies and Mitigation	$21,000
Land Acquisition and Surveying (5 acres)	$20,000
Interest During Construction (4% for 1 years with a 1% ROI)	$260,000
TOTAL COST OF PROJECT	**$7,669,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$642,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$130,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (1148478 kW-hr @ 0.09 $/kW-hr)	$103,000
Purchase of Water (12727 acft/yr @ 135 $/acft)	$1,718,000
TOTAL ANNUAL COST	**$2,593,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 4	12,727
Annual Cost of Water ($ per acft)	$204
Annual Cost of Water ($ per 1,000 gallons)	$0.63

NDH *4/17/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
LCRA - Carrizo-Wilcox GW Importation

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$440,000,000
TOTAL COST OF FACILITIES	**$440,000,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$154,000,000
Environmental & Archaeology Studies and Mitigation	$0
Land Acquisition and Surveying (0 acres)	$0
Interest During Construction (4% for 1 years with a 1% ROI)	$20,790,000
TOTAL COST OF PROJECT	**$614,790,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$51,445,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (90000 acft/yr @ 0 $/acft)	$0
TOTAL ANNUAL COST	**$51,445,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	35,000
Annual Cost of Water ($ per acft)	$1,470
Annual Cost of Water ($ per 1,000 gallons)	$4.51

Note: One or more cost element has been calculated externally

NDH *4/22/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
LCRA - Import Return Flows from Williamson County

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	Estimated Costs for Facilities
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$4,322,000
Transmission Pipeline (0 in dia., 0 miles)	$26,350,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0.1 MGD)	$7,400,000
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$38,072,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$12,008,000
Environmental & Archaeology Studies and Mitigation	$728,000
Land Acquisition and Surveying (5 acres)	$1,552,000
Interest During Construction (4% for 1 years with a 1% ROI)	$1,833,000
TOTAL COST OF PROJECT	**$54,193,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$4,535,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$372,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$185,000
Pumping Energy Costs (4270413 kW-hr @ 0.09 $/kW-hr)	$384,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$5,476,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	25,000
Annual Cost of Water ($ per acft)	$219
Annual Cost of Water ($ per 1,000 gallons)	$0.67

Note: One or more cost element has been calculated externally

NDH *4/27/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
LCRA - Supplement B&E Inflows with Brackish Groundwater

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$22,871,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$22,871,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$10,377,000
Environmental & Archaeology Studies and Mitigation	$500,000
Land Acquisition and Surveying (5 acres)	$35,000
Interest During Construction (4% for 1 years with a 1% ROI)	$1,183,000
TOTAL COST OF PROJECT	**$34,966,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$2,926,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (5.2555638144375% of Cost of Facilities)	$1,202,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (7500000 kW-hr @ 0.09 $/kW-hr)	$675,000
Purchase of Water (12000 acft/yr @ 100 $/acft)	$1,200,000
TOTAL ANNUAL COST	**$6,003,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	12,000
Annual Cost of Water ($ per acft)	$500
Annual Cost of Water ($ per 1,000 gallons)	$1.53

Note: One or more cost element has been calculated externally

NDH *4/27/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
LCRA - Brackish GW Desalination from Gulf Coast Aquifer

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	Estimated Costs for Facilities
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$198,250,000
TOTAL COST OF FACILITIES	**$198,250,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$69,388,000
Environmental & Archaeology Studies and Mitigation	$0
Land Acquisition and Surveying (0 acres)	$0
Interest During Construction (4% for 1 years with a 1% ROI)	$9,368,000
TOTAL COST OF PROJECT	**$277,006,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$23,180,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (90000 acft/yr @ 0 $/acft)	$0
TOTAL ANNUAL COST	**$23,180,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	22,400
Annual Cost of Water ($ per acft)	$1,035
Annual Cost of Water ($ per 1,000 gallons)	$3.18

Note: One or more cost element has been calculated externally

NDH *4/22/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
LCRA - Baylor Creek Reservoir

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool 48390 acft, 1125 acres)	$42,180,000
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$33,752,000
Transmission Pipeline (0 in dia., 8 miles)	$54,145,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$130,077,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$42,820,000
Environmental & Archaeology Studies and Mitigation	$195,000
Land Acquisition and Surveying (1130 acres)	$56,000
Interest During Construction (4% for 1 years with a 1% ROI)	$6,061,000
TOTAL COST OF PROJECT	**$179,209,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$10,059,000
Reservoir Debt Service (5.5 percent, 40 years)	$3,677,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$1,385,000
Dam and Reservoir (1.5% of Cost of Facilities)	$633,000
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (5041899 kW-hr @ 0.09 $/kW-hr)	$454,000
Purchase of Water (90000 acft/yr @ 0 $/acft)	$0
TOTAL ANNUAL COST	**$16,208,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	18,000
Annual Cost of Water ($ per acft)	$900
Annual Cost of Water ($ per 1,000 gallons)	$2.76

Note: One or more cost element has been calculated externally

NDH *4/17/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
LCRA - Aquifer Storage, Recharge and Recovery

Cost based on ENR CCI 9552 for 41518 and a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (9 MGD)	$4,280,000
Transmission Pipeline (24 in dia., 5 miles)	$2,589,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$5,486,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (4.5 MGD)	$15,807,000
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$28,162,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$9,727,000
Environmental & Archaeology Studies and Mitigation	$316,000
Land Acquisition and Surveying (14 acres)	$46,000
Interest During Construction (4% for 1 years with a 1% ROI)	$1,339,000
TOTAL COST OF PROJECT	**$39,590,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$3,313,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$188,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$1,581,000
Pumping Energy Costs (3861420 kW-hr @ 0.09 $/kW-hr)	$348,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$5,430,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	5,048
Annual Cost of Water ($ per acft)	$1,076
Annual Cost of Water ($ per 1,000 gallons)	$3.30

B.Yeganeh *4/15/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
LCRA - Enhanced Recharge

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, 20.66 acres)	$11,057,000
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$605,000
Transmission Pipeline (0 in dia., 0 miles)	$328,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$22,569,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$2,793,000
TOTAL COST OF FACILITIES	**$37,352,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$13,057,000
Environmental & Archaeology Studies and Mitigation	$703,000
Land Acquisition and Surveying (115 acres)	$582,000
Interest During Construction (4% for 1 years with a 1% ROI)	$1,810,000
TOTAL COST OF PROJECT	**$53,504,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$3,114,000
Reservoir Debt Service (5.5 percent, 40 years)	$1,015,000
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$244,000
Dam and Reservoir (1.5% of Cost of Facilities)	$166,000
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (5879819 kW-hr @ 0.09 $/kW-hr)	$529,000
Well Leases	$3,267,000
TOTAL ANNUAL COST	**$8,335,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	10,000
Annual Cost of Water ($ per acft)	$834
Annual Cost of Water ($ per 1,000 gallons)	$2.56

Note: One or more cost element has been calculated externally

CW *4/22/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
City of Austin - Brackish Groundwater Desalination

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$3,398,000
Transmission Pipeline (0 in dia., 13 miles)	$7,069,000
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$15,987,000
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (4.5 MGD)	$12,218,000
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$38,672,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$13,182,000
Environmental & Archaeology Studies and Mitigation	$790,000
Land Acquisition and Surveying (28 acres)	$92,000
Interest During Construction (4% for 1 years with a 1% ROI)	$1,846,000
TOTAL COST OF PROJECT	**$54,582,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$4,567,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$316,000
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$2,358,000
Pumping Energy Costs (4128292 kW-hr @ 0.09 $/kW-hr)	$372,000
Purchase of Water (acft/yr @ $/acft)	$0
TOTAL ANNUAL COST	**$7,613,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	5,000
Annual Cost of Water ($ per acft)	$1,523
Annual Cost of Water ($ per 1,000 gallons)	$4.67

B.Yeganeh *4/20/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
COA - Reclaim Water in Colorado Alluvium

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (0 MGD)	$0
Integration, Relocations, & Other	$108,675,000
TOTAL COST OF FACILITIES	**$108,675,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 35% for all other facilities)	$38,036,000
Environmental & Archaeology Studies and Mitigation	$0
Land Acquisition and Surveying (0 acres)	$0
Interest During Construction (4% for 1 years with a 1% ROI)	$5,135,000
TOTAL COST OF PROJECT	**$151,846,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$12,706,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$0
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (90000 acft/yr @ 0 $/acft)	$0
TOTAL ANNUAL COST	**$12,706,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 1	30,000
Annual Cost of Water ($ per acft)	$424
Annual Cost of Water ($ per 1,000 gallons)	$1.30

Note: One or more cost element has been calculated externally

KP *4/23/2015*

Cost Estimate Summary
Water Supply Project Option
41518 Prices
City of Buda - City of Buda Direct Potable Reuse

Cost based on ENR CCI 9552 for 41518 and
a PPI of 187 for 41518

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Dam and Reservoir (Conservation Pool acft, acres)	$0
Off-Channel Storage/Ring Dike (Conservation Pool acft, acres)	$0
Terminal Storage (Conservation Pool acft, acres)	$0
Intake Pump Stations (0 MGD)	$0
Transmission Pipeline (0 in dia., 0 miles)	$0
Transmission Pump Station(s) & Storage Tank(s)	$0
Well Fields (Wells, Pumps, and Piping)	$0
Storage Tanks (Other Than at Booster Pump Stations)	$0
Water Treatment Plant (2 MGD)	$21,561,000
Integration, Relocations, & Other	$0
TOTAL COST OF FACILITIES	**$21,561,000**
Engineering and Feasibility Studies, Legal Assistance, Financing, Bond Counsel, and Contingencies (30% for pipes & 20% for all other facilities)	$4,312,000
Environmental & Archaeology Studies and Mitigation	$0
Land Acquisition and Surveying (1 acres)	$0
Interest During Construction (4% for 1 years with a 1% ROI)	$906,000
TOTAL COST OF PROJECT	**$26,779,000**
ANNUAL COST	
Debt Service (5.5 percent, 20 years)	$2,241,000
Reservoir Debt Service (5.5 percent, 40 years)	$0
Operation and Maintenance	
Intake, Pipeline, Pump Station (1% of Cost of Facilities)	$0
Dam and Reservoir (1.5% of Cost of Facilities)	$0
Water Treatment Plant (2.5% of Cost of Facilities)	$700,000
Pumping Energy Costs (0 kW-hr @ 0.09 $/kW-hr)	$0
Purchase of Water (1 acft/yr @ 633000 $/acft)	$0
TOTAL ANNUAL COST	**$2,941,000**
Available Project Yield (acft/yr), based on a Peaking Factor of 2	2,240
Annual Cost of Water ($ per acft)	$1,313
Annual Cost of Water ($ per 1,000 gallons)	$4.03

Note: One or more cost element has been calculated externally

Jaime Burke *11/2/2015*

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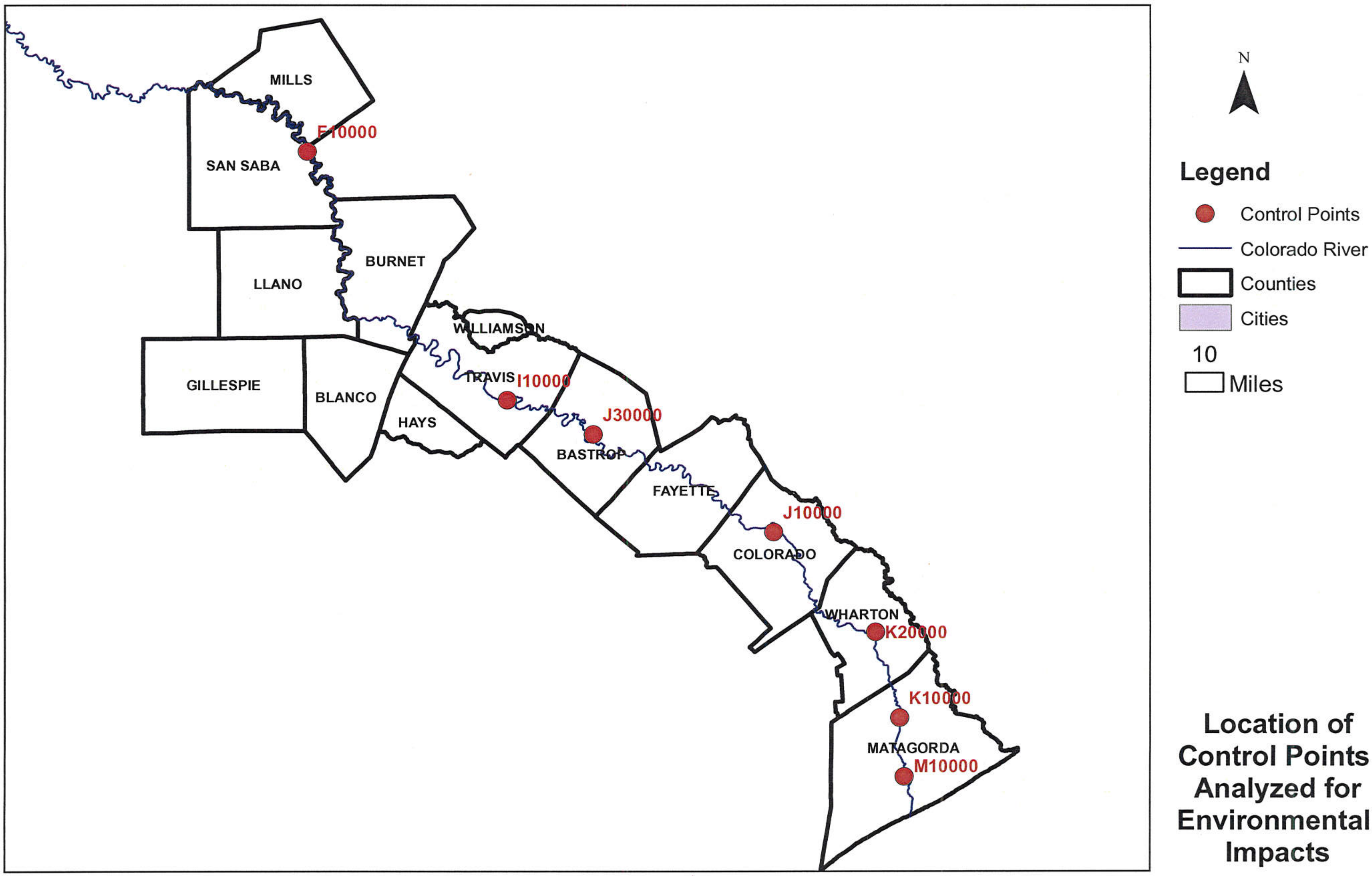
APPENDIX 5D

ENVIRONMENTAL IMPACTS OF NEW STRATEGIES IN THE 2016 REGION K PLAN


N
Legend
Control Points
Colorado River
Counties
Cities
10
Miles
MILLS
SAN SABA
LLANO
BURNET
GILLESPIE
BLANCO
HAYS
WILLIAMSON
TRAVIS
BASTROP
FAYETTE
COLORADO
WHARTON
MATAGORDA
F10000
I10000
J30000
J10000
K20000
K10000
M10000
Location of Control Points Analyzed for Environmental Impacts

2020 Colorado River Instream Flow Analysis

2020
CP K10000
Matagorda Co.

MONTH	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
	FLOW	STR2020	ASR	DIFFERENCE	FLOW	STR2020	ASR	DIFFERENCE	FLOW	STR2020	ASR	DIFFERENCE
	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%
Jan	19,369	79.7%	79.7%	0.0%	30,252	63.5%	63.5%	0.0%	51,527	50.0%	50.0%	0.0%
Feb	16,828	85.1%	85.1%	0.0%	33,156	54.1%	54.1%	0.0%	50,317	43.2%	43.2%	0.0%
Mar	12,543	82.4%	82.4%	0.0%	32,650	45.9%	45.9%	0.0%	63,701	35.1%	35.1%	0.0%
Apr	16,066	64.9%	64.9%	0.0%	33,382	40.5%	40.5%	0.0%	60,159	35.1%	35.1%	0.0%
May	18,692	67.6%	67.6%	0.0%	60,565	33.8%	33.8%	0.0%	85,898	27.0%	27.0%	0.0%
Jun	22,076	48.6%	48.6%	0.0%	58,552	28.4%	28.4%	0.0%	89,970	25.7%	27.0%	1.4%
Jul	13,035	35.1%	35.1%	0.0%	35,478	13.5%	13.5%	0.0%	55,708	12.2%	12.2%	0.0%
Aug	6,579	31.1%	31.1%	0.0%	19,307	16.2%	16.2%	0.0%	32,097	2.7%	2.7%	0.0%
Sep	11,187	59.5%	59.5%	0.0%	24,397	37.8%	37.8%	0.0%	36,714	18.9%	18.9%	0.0%
Oct	9,039	75.7%	75.7%	0.0%	22,136	58.1%	58.1%	0.0%	46,054	28.4%	28.4%	0.0%
Nov	10,294	87.8%	87.8%	0.0%	28,919	56.8%	56.8%	0.0%	45,461	39.2%	39.2%	0.0%
Dec	12,420	83.8%	83.8%	0.0%	28,899	54.1%	54.1%	0.0%	45,870	41.9%	41.9%	0.0%

2020
CP K20000
Wharton Co.

MONTH	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
	FLOW	STR2020	ASR	DIFFERENCE	FLOW	STR2020	ASR	DIFFERENCE	FLOW	STR2020	ASR	DIFFERENCE
	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%
Jan	19,369	81.1%	81.1%	0.0%	30,252	62.2%	62.2%	0.0%	51,527	44.6%	44.6%	0.0%
Feb	16,828	83.8%	83.8%	0.0%	33,156	55.4%	55.4%	0.0%	50,317	39.2%	39.2%	0.0%
Mar	12,543	97.3%	97.3%	0.0%	32,650	60.8%	60.8%	0.0%	63,701	36.5%	36.5%	0.0%
Apr	16,066	94.6%	94.6%	0.0%	33,382	58.1%	58.1%	0.0%	60,159	36.5%	36.5%	0.0%
May	18,692	95.9%	95.9%	0.0%	60,565	40.5%	40.5%	0.0%	85,898	32.4%	32.4%	0.0%
Jun	22,076	91.9%	91.9%	0.0%	58,552	47.3%	47.3%	0.0%	89,970	27.0%	27.0%	0.0%
Jul	13,035	90.5%	90.5%	0.0%	35,478	66.2%	66.2%	0.0%	55,708	23.0%	23.0%	0.0%
Aug	6,579	94.6%	94.6%	0.0%	19,307	81.1%	81.1%	0.0%	32,097	68.9%	68.9%	0.0%
Sep	11,187	93.2%	93.2%	0.0%	24,397	81.1%	81.1%	0.0%	36,714	45.9%	45.9%	0.0%
Oct	9,039	91.9%	91.9%	0.0%	22,136	67.6%	67.6%	0.0%	46,054	32.4%	32.4%	0.0%
Nov	10,294	87.8%	87.8%	0.0%	28,919	52.7%	52.7%	0.0%	45,461	39.2%	39.2%	0.0%
Dec	12,420	86.5%	86.5%	0.0%	28,899	54.1%	54.1%	0.0%	45,870	33.8%	33.8%	0.0%

2020 Colorado River Instream Flow Analysis

2020
CP J10000
Colorado Co.

MONTH	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
	FLOW (AC-FT/MO)	BASE % TIME MET	ASR % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	ASR % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	ASR % TIME MET	DIFFERENCE %
Jan	20,906	77.0%	77.0%	0.0%	29,944	62.2%	62.2%	0.0%	50,912	40.5%	40.5%	0.0%
Feb	20,826	77.0%	77.0%	0.0%	32,767	59.5%	59.5%	0.0%	49,706	39.2%	39.2%	0.0%
Mar	23,058	93.2%	93.2%	0.0%	32,281	77.0%	77.0%	0.0%	62,717	40.5%	40.5%	0.0%
Apr	17,792	100.0%	100.0%	0.0%	32,965	89.2%	89.2%	0.0%	58,136	45.9%	45.9%	0.0%
May	26,132	100.0%	100.0%	0.0%	59,397	90.5%	90.5%	0.0%	80,918	70.3%	70.3%	0.0%
Jun	31,775	97.3%	97.3%	0.0%	57,540	90.5%	90.5%	0.0%	85,686	77.0%	77.0%	0.0%
Jul	21,029	100.0%	100.0%	0.0%	35,048	94.6%	94.6%	0.0%	55,031	79.7%	79.7%	0.0%
Aug	11,683	100.0%	100.0%	0.0%	19,061	100.0%	100.0%	0.0%	31,728	89.2%	89.2%	0.0%
Sep	16,602	100.0%	100.0%	0.0%	24,099	97.3%	97.3%	0.0%	36,298	87.8%	87.8%	0.0%
Oct	11,683	100.0%	100.0%	0.0%	21,890	90.5%	90.5%	0.0%	45,562	52.7%	52.7%	0.0%
Nov	12,020	87.8%	87.8%	0.0%	28,562	50.0%	50.0%	0.0%	44,926	32.4%	33.8%	1.4%
Dec	18,508	82.4%	82.4%	0.0%	28,530	47.3%	47.3%	0.0%	45,316	31.1%	31.1%	0.0%

2020
CP J30000
Bastrop Co.

MONTH	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
	FLOW (AC-FT/MO)	BASE % TIME MET	ASR % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	ASR % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	ASR % TIME MET	DIFFERENCE %
Jan	12,789	79.7%	79.7%	0.0%	19,246	58.1%	58.1%	0.0%	26,624	41.9%	41.9%	0.0%
Feb	15,217	67.6%	67.6%	0.0%	17,605	64.9%	64.9%	0.0%	27,602	44.6%	44.6%	0.0%
Mar	16,848	93.2%	93.2%	0.0%	16,848	93.2%	93.2%	0.0%	30,559	66.2%	66.2%	0.0%
Apr	11,127	98.6%	98.6%	0.0%	17,078	95.9%	95.9%	0.0%	37,785	68.9%	68.9%	0.0%
May	16,909	95.9%	95.9%	0.0%	35,601	91.9%	91.9%	0.0%	50,666	82.4%	82.4%	0.0%
Jun	12,020	100.0%	100.0%	0.0%	24,873	100.0%	100.0%	0.0%	43,617	85.1%	85.1%	0.0%
Jul	8,424	100.0%	100.0%	0.0%	21,336	97.3%	97.3%	0.0%	37,507	91.9%	91.9%	0.0%
Aug	7,563	100.0%	100.0%	0.0%	11,929	100.0%	100.0%	0.0%	23,427	98.6%	98.6%	0.0%
Sep	7,319	100.0%	100.0%	0.0%	14,043	97.3%	97.3%	0.0%	25,170	89.2%	89.2%	0.0%
Oct	7,809	100.0%	100.0%	0.0%	15,064	86.5%	86.5%	0.0%	26,624	66.2%	66.2%	0.0%
Nov	10,711	79.7%	79.7%	0.0%	16,840	60.8%	60.8%	0.0%	25,230	40.5%	40.5%	0.0%
Dec	11,437	75.7%	75.7%	0.0%	19,123	51.4%	51.4%	0.0%	27,669	33.8%	33.8%	0.0%

2020 Freshwater Inflows to Matagorda Bay

SPRINGTIME ONSET FLOW CRITERIA MET (3 CONSECUTIVE MONTHS DURING JAN-MAY)						
CRITERIA	TARGET	STR2020		ASR		DIFFERENCE
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	114,000	45	60.8%	45	60.8%	0.0%
MBHE 2	168,700	43	58.1%	43	58.1%	0.0%
MBHE 3	246,200	40	54.1%	40	54.1%	0.0%
MBHE 4	433,200	25	33.8%	25	33.8%	0.0%

FALL ONSET FLOW CRITERIA MET (3 CONSECUTIVE MONTHS DURING AUG-OCT)						
CRITERIA	TARGET	STR2020		ASR		DIFFERENCE
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	81,000	50	67.6%	50	67.6%	0.0%
MBHE 2	119,900	45	60.8%	45	60.8%	0.0%
MBHE 3	175,000	43	58.1%	43	58.1%	0.0%
MBHE 4	307,800	35	47.3%	35	47.3%	0.0%

INTERVENING SIX MONTHS FLOW CRITERIA MET						
CRITERIA	TARGET	STR2020		ASR		DIFFERENCE
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	105,000	47	63.5%	47	63.5%	0.0%
MBHE 2	155,400	43	58.1%	43	58.1%	0.0%
MBHE 3	226,800	41	55.4%	41	55.4%	0.0%
MBHE 4	399,000	28	37.8%	27	36.5%	-1.4%

Note: Intervening six months includes June, July, November, December, and the remaining Springtime Onset months that are not used for the 3 consecutive month calculation.

NUMBER OF MONTHS THAT THRESHOLD LEVEL IS MET						
CRITERIA	TARGET	STR2020		ASR		DIFFERENCE
	(AC-FT/mo)	# OF MONTHS	%	# OF MONTHS	%	%
THRESHOLD	15,000	561	63.2%	561	63.2%	0.0%

APPENDIX 5E

ENVIRONMENTAL IMPACTS OF STRATEGIES FROM THE 2011 REGION K PLAN

2010 Freshwater Inflows to Matagorda Bay

SPRINGTIME ONSET FLOW CRITERIA MET						
CRITERIA	TARGET	BASE		STRATEGY		DIFFERENCE
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	114,000	43	72.9%	43	72.9%	0.0%
MBHE 2	168,700	41	69.5%	41	69.5%	0.0%
MBHE 3	246,200	38	64.4%	38	64.4%	0.0%
MBHE 4	433,200	28	47.5%	28	47.5%	0.0%

FALL ONSET FLOW CRITERIA MET						
CRITERIA	TARGET	BASE		STRATEGY		DIFFERENCE
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	81,000	34	57.6%	34	57.6%	0.0%
MBHE 2	119,900	29	49.2%	29	49.2%	0.0%
MBHE 3	175,000	20	33.9%	20	33.9%	0.0%
MBHE 4	307,800	13	22.0%	13	22.0%	0.0%

INTERVENING SIX MONTHS FLOW CRITERIA MET						
CRITERIA	TARGET	BASE		STRATEGY		DIFFERENCE
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	105,000	52	88.1%	52	88.1%	0.0%
MBHE 2	155,400	45	76.3%	45	76.3%	0.0%
MBHE 3	226,800	40	67.8%	40	67.8%	0.0%
MBHE 4	399,000	31	52.5%	31	52.5%	0.0%

Note: Intervening six months includes June, July, November, December, and the remaining Springtime Onset months that are not used for the 3 consecutive month calculation.

NUMBER OF MONTHS THAT THRESHOLD LEVEL IS MET						
CRITERIA	TARGET	BASE		STRATEGY		DIFFERENCE
	(AC-FT/mo)	# OF MONTHS	%	# OF MONTHS	%	%
THRESHOLD	15,000	546	77.1%	546	77.1%	0.0%

2060 Freshwater Inflows to Matagorda Bay

SPRINGTIME ONSET FLOW CRITERIA MET						
CRITERIA	TARGET	BASE		STRATEGY		DIFFERENCE
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	114,000	48	81.4%	46	78.0%	-3.4%
MBHE 2	168,700	39	66.1%	39	66.1%	0.0%
MBHE 3	246,200	35	59.3%	37	62.7%	3.4%
MBHE 4	433,200	22	37.3%	22	37.3%	0.0%

FALL ONSET FLOW CRITERIA MET						
CRITERIA	TARGET	BASE		STRATEGY		DIFFERENCE
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	81,000	38	64.4%	38	64.4%	0.0%
MBHE 2	119,900	31	52.5%	30	50.8%	-1.7%
MBHE 3	175,000	19	32.2%	17	28.8%	-3.4%
MBHE 4	307,800	11	18.6%	11	18.6%	0.0%

INTERVENING SIX MONTHS FLOW CRITERIA MET						
CRITERIA	TARGET	BASE		STRATEGY		DIFFERENCE
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	105,000	53	89.8%	54	91.5%	1.7%
MBHE 2	155,400	46	78.0%	45	76.3%	-1.7%
MBHE 3	226,800	39	66.1%	39	66.1%	0.0%
MBHE 4	399,000	32	54.2%	32	54.2%	0.0%

Note: Intervening six months includes June, July, November, December, and the remaining Springtime Onset months that are not used for the 3 consecutive month calculation.

NUMBER OF MONTHS THAT THRESHOLD LEVEL IS MET						
CRITERIA	TARGET	BASE		STRATEGY		DIFFERENCE
	(AC-FT/mo)	# OF MONTHS	%	# OF MONTHS	%	%
THRESHOLD	15,000	540	76.3%	530	74.9%	-1.4%

2010 Colorado River Instream Flow Analysis

2010 CP K10000 Matagorda Co.	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
MONTH	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %
JAN	19,369	91.5%	91.5%	0.0%	30,252	74.6%	74.6%	0.0%	51,527	57.6%	57.6%	0.0%
FEB	16,828	93.2%	93.2%	0.0%	33,156	76.3%	76.3%	0.0%	50,317	61.0%	61.0%	0.0%
MAR	12,543	100.0%	100.0%	0.0%	32,650	79.7%	79.7%	0.0%	63,701	50.8%	50.8%	0.0%
APR	16,066	79.7%	79.7%	0.0%	33,382	57.6%	57.6%	0.0%	60,159	52.5%	52.5%	0.0%
MAY	18,692	83.1%	83.1%	0.0%	60,565	61.0%	61.0%	0.0%	85,898	59.3%	59.3%	0.0%
JUN	22,076	62.7%	62.7%	0.0%	58,552	47.5%	47.5%	0.0%	89,970	42.4%	42.4%	0.0%
JUL	13,035	42.4%	42.4%	0.0%	35,478	32.2%	32.2%	0.0%	55,708	32.2%	32.2%	0.0%
AUG	6,579	74.6%	74.6%	0.0%	19,307	35.6%	35.6%	0.0%	32,097	25.4%	25.4%	0.0%
SEP	11,187	66.1%	66.1%	0.0%	24,397	50.8%	50.8%	0.0%	36,714	44.1%	44.1%	0.0%
OCT	9,039	88.1%	88.1%	0.0%	22,136	74.6%	74.6%	0.0%	46,054	55.9%	55.9%	0.0%
NOV	10,294	100.0%	100.0%	0.0%	28,919	74.6%	74.6%	0.0%	45,461	49.2%	49.2%	0.0%
DEC	12,420	98.3%	98.3%	0.0%	28,899	78.0%	78.0%	0.0%	45,870	64.4%	64.4%	0.0%

2010 CP K20000 Wharton Co.	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
MONTH	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %
JAN	19,369	91.5%	91.5%	0.0%	30,252	74.6%	74.6%	0.0%	51,527	52.5%	52.5%	0.0%
FEB	16,828	91.5%	91.5%	0.0%	33,156	72.9%	72.9%	0.0%	50,317	57.6%	57.6%	0.0%
MAR	12,543	100.0%	100.0%	0.0%	32,650	86.4%	86.4%	0.0%	63,701	49.2%	49.2%	0.0%
APR	16,066	91.5%	91.5%	0.0%	33,382	64.4%	64.4%	0.0%	60,159	54.2%	54.2%	0.0%
MAY	18,692	100.0%	100.0%	0.0%	60,565	62.7%	62.7%	0.0%	85,898	61.0%	61.0%	0.0%
JUN	22,076	93.2%	93.2%	0.0%	58,552	50.8%	50.8%	0.0%	89,970	45.8%	45.8%	0.0%
JUL	13,035	98.3%	98.3%	0.0%	35,478	40.7%	40.7%	0.0%	55,708	30.5%	30.5%	0.0%
AUG	6,579	98.3%	98.3%	0.0%	19,307	84.7%	84.7%	0.0%	32,097	49.2%	49.2%	0.0%
SEP	11,187	93.2%	93.2%	0.0%	24,397	61.0%	61.0%	0.0%	36,714	49.2%	49.2%	0.0%
OCT	9,039	91.5%	91.5%	0.0%	22,136	74.6%	74.6%	0.0%	46,054	50.8%	50.8%	0.0%
NOV	10,294	100.0%	100.0%	0.0%	28,919	74.6%	74.6%	0.0%	45,461	44.1%	44.1%	0.0%
DEC	12,420	98.3%	98.3%	0.0%	28,899	79.7%	79.7%	0.0%	45,870	54.2%	54.2%	0.0%

2010 Colorado River Instream Flow Analysis

2010 CP J10000 Colorado Co.	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
MONTH	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %
JAN	20,906	86.4%	86.4%	0.0%	29,944	69.5%	69.5%	0.0%	50,912	44.1%	44.1%	0.0%
FEB	20,826	81.4%	81.4%	0.0%	32,767	64.4%	64.4%	0.0%	49,706	50.8%	50.8%	0.0%
MAR	23,058	100.0%	100.0%	0.0%	32,281	81.4%	81.4%	0.0%	62,717	47.5%	47.5%	0.0%
APR	17,792	100.0%	100.0%	0.0%	32,965	86.4%	86.4%	0.0%	58,136	50.8%	50.8%	0.0%
MAY	26,132	100.0%	100.0%	0.0%	59,397	89.8%	89.8%	0.0%	80,918	72.9%	72.9%	0.0%
JUN	31,775	100.0%	100.0%	0.0%	57,540	96.6%	96.6%	0.0%	85,686	67.8%	67.8%	0.0%
JUL	21,029	100.0%	100.0%	0.0%	35,048	98.3%	98.3%	0.0%	55,031	86.4%	86.4%	0.0%
AUG	11,683	100.0%	100.0%	0.0%	19,061	100.0%	100.0%	0.0%	31,728	96.6%	96.6%	0.0%
SEP	16,602	100.0%	100.0%	0.0%	24,099	98.3%	98.3%	0.0%	36,298	91.5%	91.5%	0.0%
OCT	11,683	100.0%	100.0%	0.0%	21,890	89.8%	89.8%	0.0%	45,562	55.9%	55.9%	0.0%
NOV	12,020	94.9%	94.9%	0.0%	28,562	62.7%	62.7%	0.0%	44,926	42.4%	42.4%	0.0%
DEC	18,508	88.1%	88.1%	0.0%	28,530	74.6%	74.6%	0.0%	45,316	44.1%	44.1%	0.0%

2010 CP J30000 Bastrop Co.	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
MONTH	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %
JAN	12,789	86.4%	86.4%	0.0%	19,246	69.5%	69.5%	0.0%	26,624	47.5%	47.5%	0.0%
FEB	15,217	83.1%	83.1%	0.0%	17,605	83.1%	83.1%	0.0%	27,602	57.6%	57.6%	0.0%
MAR	16,848	100.0%	100.0%	0.0%	16,848	100.0%	100.0%	0.0%	30,559	81.4%	81.4%	0.0%
APR	11,127	100.0%	100.0%	0.0%	17,078	100.0%	100.0%	0.0%	37,785	66.1%	66.1%	0.0%
MAY	16,909	100.0%	100.0%	0.0%	35,601	91.5%	91.5%	0.0%	50,666	88.1%	88.1%	0.0%
JUN	12,020	100.0%	100.0%	0.0%	24,873	100.0%	100.0%	0.0%	43,617	96.6%	96.6%	0.0%
JUL	8,424	100.0%	100.0%	0.0%	21,336	98.3%	98.3%	0.0%	37,507	94.9%	94.9%	0.0%
AUG	7,563	100.0%	100.0%	0.0%	11,929	100.0%	100.0%	0.0%	23,427	100.0%	100.0%	0.0%
SEP	7,319	100.0%	100.0%	0.0%	14,043	98.3%	98.3%	0.0%	25,170	83.1%	83.1%	0.0%
OCT	7,809	100.0%	100.0%	0.0%	15,064	96.6%	96.6%	0.0%	26,624	74.6%	74.6%	0.0%
NOV	10,711	94.9%	94.9%	0.0%	16,840	81.4%	81.4%	0.0%	25,230	52.5%	52.5%	0.0%
DEC	11,437	89.8%	89.8%	0.0%	19,123	78.0%	78.0%	0.0%	27,669	54.2%	54.2%	0.0%

2060 Colorado River Instream Flow Analysis

2060 CP K10000 Matagorda Co.	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
MONTH	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %
JAN	19,369	86.4%	89.8%	3.4%	30,252	78.0%	78.0%	0.0%	51,527	64.4%	64.4%	0.0%
FEB	16,828	91.5%	91.5%	0.0%	33,156	81.4%	81.4%	0.0%	50,317	67.8%	67.8%	0.0%
MAR	12,543	98.3%	98.3%	0.0%	32,650	89.8%	89.8%	0.0%	63,701	44.1%	44.1%	0.0%
APR	16,066	86.4%	84.7%	-1.7%	33,382	66.1%	67.8%	1.7%	60,159	44.1%	47.5%	3.4%
MAY	18,692	81.4%	79.7%	-1.7%	60,565	54.2%	55.9%	1.7%	85,898	47.5%	45.8%	-1.7%
JUN	22,076	71.2%	71.2%	0.0%	58,552	47.5%	47.5%	0.0%	89,970	39.0%	39.0%	0.0%
JUL	13,035	52.5%	69.5%	16.9%	35,478	39.0%	39.0%	0.0%	55,708	28.8%	32.2%	3.4%
AUG	6,579	72.9%	98.3%	25.4%	19,307	39.0%	44.1%	5.1%	32,097	27.1%	30.5%	3.4%
SEP	11,187	71.2%	76.3%	5.1%	24,397	61.0%	59.3%	-1.7%	36,714	59.3%	59.3%	0.0%
OCT	9,039	89.8%	91.5%	1.7%	22,136	76.3%	74.6%	-1.7%	46,054	55.9%	55.9%	0.0%
NOV	10,294	96.6%	96.6%	0.0%	28,919	78.0%	79.7%	1.7%	45,461	64.4%	64.4%	0.0%
DEC	12,420	100.0%	100.0%	0.0%	28,899	83.1%	83.1%	0.0%	45,870	62.7%	66.1%	3.4%

2060 CP K20000 Wharton Co.	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
MONTH	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %
JAN	19,369	84.7%	86.4%	1.7%	30,252	78.0%	78.0%	0.0%	51,527	54.2%	57.6%	3.4%
FEB	16,828	89.8%	89.8%	0.0%	33,156	76.3%	76.3%	0.0%	50,317	59.3%	61.0%	1.7%
MAR	12,543	98.3%	98.3%	0.0%	32,650	93.2%	91.5%	-1.7%	63,701	44.1%	44.1%	0.0%
APR	16,066	96.6%	91.5%	-5.1%	33,382	71.2%	72.9%	1.7%	60,159	47.5%	49.2%	1.7%
MAY	18,692	93.2%	94.9%	1.7%	60,565	59.3%	59.3%	0.0%	85,898	49.2%	49.2%	0.0%
JUN	22,076	88.1%	93.2%	5.1%	58,552	57.6%	57.6%	0.0%	89,970	40.7%	40.7%	0.0%
JUL	13,035	94.9%	98.3%	3.4%	35,478	40.7%	44.1%	3.4%	55,708	30.5%	28.8%	-1.7%
AUG	6,579	96.6%	98.3%	1.7%	19,307	64.4%	81.4%	16.9%	32,097	32.2%	44.1%	11.9%
SEP	11,187	91.5%	94.9%	3.4%	24,397	62.7%	64.4%	1.7%	36,714	57.6%	57.6%	0.0%
OCT	9,039	91.5%	93.2%	1.7%	22,136	76.3%	74.6%	-1.7%	46,054	54.2%	54.2%	0.0%
NOV	10,294	96.6%	96.6%	0.0%	28,919	76.3%	78.0%	1.7%	45,461	54.2%	54.2%	0.0%
DEC	12,420	96.6%	96.6%	0.0%	28,899	81.4%	81.4%	0.0%	45,870	59.3%	59.3%	0.0%

2060 Colorado River Instream Flow Analysis

2060 CP J10000 Colorado Co.	MONTH	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
		FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE
		(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%
	JAN	20,906	81.4%	81.4%	0.0%	29,944	72.9%	72.9%	0.0%	50,912	44.1%	45.8%	1.7%
	FEB	20,826	83.1%	84.7%	1.7%	32,767	74.6%	74.6%	0.0%	49,706	54.2%	54.2%	0.0%
	MAR	23,058	98.3%	98.3%	0.0%	32,281	88.1%	86.4%	-1.7%	62,717	42.4%	42.4%	0.0%
	APR	17,792	100.0%	100.0%	0.0%	32,965	76.3%	74.6%	-1.7%	58,136	49.2%	49.2%	0.0%
	MAY	26,132	100.0%	100.0%	0.0%	59,397	78.0%	81.4%	3.4%	80,918	57.6%	57.6%	0.0%
	JUN	31,775	98.3%	98.3%	0.0%	57,540	83.1%	89.8%	6.8%	85,686	57.6%	59.3%	1.7%
	JUL	21,029	98.3%	98.3%	0.0%	35,048	91.5%	96.6%	5.1%	55,031	50.8%	64.4%	13.6%
	AUG	11,683	98.3%	98.3%	0.0%	19,061	98.3%	98.3%	0.0%	31,728	83.1%	91.5%	8.5%
	SEP	16,602	98.3%	100.0%	1.7%	24,099	94.9%	98.3%	3.4%	36,298	74.6%	81.4%	6.8%
	OCT	11,683	98.3%	100.0%	1.7%	21,890	76.3%	78.0%	1.7%	45,562	61.0%	61.0%	0.0%
	NOV	12,020	89.8%	89.8%	0.0%	28,562	61.0%	66.1%	5.1%	44,926	47.5%	49.2%	1.7%
	DEC	18,508	84.7%	84.7%	0.0%	28,530	76.3%	78.0%	1.7%	45,316	49.2%	49.2%	0.0%

2060 CP J30000 Bastrop Co.	MONTH	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
		FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE
		(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%
	JAN	12,789	84.7%	88.1%	3.4%	19,246	69.5%	72.9%	3.4%	26,624	52.5%	55.9%	3.4%
	FEB	15,217	84.7%	83.1%	-1.7%	17,605	78.0%	79.7%	1.7%	27,602	62.7%	64.4%	1.7%
	MAR	16,848	98.3%	98.3%	0.0%	16,848	98.3%	98.3%	0.0%	30,559	81.4%	84.7%	3.4%
	APR	11,127	100.0%	100.0%	0.0%	17,078	100.0%	100.0%	0.0%	37,785	57.6%	59.3%	1.7%
	MAY	16,909	100.0%	100.0%	0.0%	35,601	91.5%	91.5%	0.0%	50,666	81.4%	81.4%	0.0%
	JUN	12,020	100.0%	100.0%	0.0%	24,873	100.0%	100.0%	0.0%	43,617	89.8%	93.2%	3.4%
	JUL	8,424	100.0%	100.0%	0.0%	21,336	94.9%	94.9%	0.0%	37,507	79.7%	83.1%	3.4%
	AUG	7,563	100.0%	100.0%	0.0%	11,929	98.3%	98.3%	0.0%	23,427	98.3%	98.3%	0.0%
	SEP	7,319	100.0%	100.0%	0.0%	14,043	96.6%	98.3%	1.7%	25,170	81.4%	84.7%	3.4%
	OCT	7,809	100.0%	100.0%	0.0%	15,064	89.8%	93.2%	3.4%	26,624	66.1%	67.8%	1.7%
	NOV	10,711	89.8%	91.5%	1.7%	16,840	69.5%	71.2%	1.7%	25,230	50.8%	50.8%	0.0%
	DEC	11,437	91.5%	89.8%	-1.7%	19,123	74.6%	74.6%	0.0%	27,669	52.5%	55.9%	3.4%

Environmental Impacts of City of Austin Return Flows and Reuse (Settlement Agreement with LCRA)

2010 Freshwater Inflows to Matagorda Bay

SPRINGTIME ONSET FLOW CRITERIA MET						
CRITERIA	TARGET	BASE		STRATEGY		DIFFERENCE
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	114,000	43	72.9%	45	76.3%	3.4%
MBHE 2	168,700	41	69.5%	42	71.2%	1.7%
MBHE 3	246,200	38	64.4%	39	66.1%	1.7%
MBHE 4	433,200	28	47.5%	31	52.5%	5.0%

FALL ONSET FLOW CRITERIA MET						
CRITERIA	TARGET	BASE		STRATEGY		DIFFERENCE
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	81,000	34	57.6%	37	62.7%	5.1%
MBHE 2	119,900	29	49.2%	31	52.5%	3.3%
MBHE 3	175,000	20	33.9%	22	37.3%	3.4%
MBHE 4	307,800	13	22.0%	13	22.0%	0.0%

INTERVENING SIX MONTHS FLOW CRITERIA MET						
CRITERIA	TARGET	BASE		STRATEGY		DIFFERENCE
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	105,000	52	88.1%	54	91.5%	3.4%
MBHE 2	155,400	45	76.3%	50	84.7%	8.4%
MBHE 3	226,800	40	67.8%	41	69.5%	1.7%
MBHE 4	399,000	31	52.5%	32	54.2%	1.7%

Note: Intervening six months includes June, July, November, December, and the remaining Springtime Onset months that are not used for the 3 consecutive month calculation.

NUMBER OF MONTHS THAT THRESHOLD LEVEL IS MET						
CRITERIA	TARGET	BASE		STRATEGY		DIFFERENCE
	(AC-FT/mo)	# OF MONTHS	%	# OF MONTHS	%	%
THRESHOLD	15,000	546	77.1%	595	84.0%	6.9%

2060 Freshwater Inflows to Matagorda Bay

SPRINGTIME ONSET FLOW CRITERIA MET						
CRITERIA	TARGET	BASE		STRATEGY		DIFFERENCE
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	114,000	48	81.4%	50	84.7%	3.3%
MBHE 2	168,700	39	66.1%	44	74.6%	8.5%
MBHE 3	246,200	35	59.3%	37	62.7%	3.4%
MBHE 4	433,200	22	37.3%	25	42.4%	5.1%

FALL ONSET FLOW CRITERIA MET						
CRITERIA	TARGET	BASE		STRATEGY		DIFFERENCE
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	81,000	38	64.4%	42	71.2%	6.8%
MBHE 2	119,900	31	52.5%	33	55.9%	3.4%
MBHE 3	175,000	19	32.2%	23	39.0%	6.8%
MBHE 4	307,800	11	18.6%	13	22.0%	3.4%

INTERVENING SIX MONTHS FLOW CRITERIA MET						
CRITERIA	TARGET	BASE		STRATEGY		DIFFERENCE
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	105,000	53	89.8%	59	100.0%	10.2%
MBHE 2	155,400	46	78.0%	54	91.5%	13.6%
MBHE 3	226,800	39	66.1%	44	74.6%	8.5%
MBHE 4	399,000	32	54.2%	32	54.2%	0.0%

Note: Intervening six months includes June, July, November, December, and the remaining Springtime Onset months that are not used for the 3 consecutive month calculation.

NUMBER OF MONTHS THAT THRESHOLD LEVEL IS MET						
CRITERIA	TARGET	BASE		STRATEGY		DIFFERENCE
	(AC-FT/mo)	# OF MONTHS	%	# OF MONTHS	%	%
THRESHOLD	15,000	540	76.3%	594	83.9%	7.6%

Environmental Impacts of City of Austin Return Flows and Reuse (Settlement Agreement with LCRA)

2010 Colorado River Instream Flow Analysis

2010
CP K10000
Matagorda Co.

MONTH	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
	FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE
	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%
JAN	19,369	84.7%	93.2%	8.5%	30,252	76.3%	83.1%	6.8%	51,527	62.7%	64.4%	1.7%
FEB	16,828	89.8%	98.3%	8.5%	33,156	79.7%	79.7%	0.0%	50,317	66.1%	62.7%	-3.4%
MAR	12,543	96.6%	100.0%	3.4%	32,650	88.1%	81.4%	-6.7%	63,701	42.4%	54.2%	11.8%
APR	16,066	84.7%	86.4%	1.7%	33,382	64.4%	61.0%	-3.4%	60,159	42.4%	52.5%	10.1%
MAY	18,692	81.4%	88.1%	6.7%	60,565	54.2%	62.7%	8.5%	85,898	47.5%	62.7%	15.2%
JUN	22,076	71.2%	67.8%	-3.4%	58,552	47.5%	52.5%	5.0%	89,970	39.0%	44.1%	5.1%
JUL	13,035	52.5%	91.5%	39.0%	35,478	39.0%	32.2%	-6.8%	55,708	28.8%	32.2%	3.4%
AUG	6,579	71.2%	100.0%	28.8%	19,307	37.3%	39.0%	1.7%	32,097	25.4%	30.5%	5.1%
SEP	11,187	69.5%	78.0%	8.5%	24,397	59.3%	57.6%	-1.7%	36,714	57.6%	45.8%	-11.8%
OCT	9,039	88.1%	100.0%	11.9%	22,136	74.6%	79.7%	5.1%	46,054	54.2%	55.9%	1.7%
NOV	10,294	94.9%	100.0%	5.1%	28,919	76.3%	83.1%	6.8%	45,461	62.7%	54.2%	-8.5%
DEC	12,420	98.3%	100.0%	1.7%	28,899	81.4%	84.7%	3.3%	45,870	61.0%	72.9%	11.9%

2010
CP K20000
Wharton Co.

MONTH	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
	FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE
	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%
JAN	19,369	84.7%	91.5%	6.8%	30,252	78.0%	83.1%	5.1%	51,527	54.2%	59.3%	5.1%
FEB	16,828	89.8%	98.3%	8.5%	33,156	76.3%	83.1%	6.8%	50,317	59.3%	61.0%	1.7%
MAR	12,543	98.3%	100.0%	1.7%	32,650	93.2%	84.7%	-8.5%	63,701	44.1%	54.2%	10.2%
APR	16,066	96.6%	100.0%	3.4%	33,382	71.2%	71.2%	0.0%	60,159	47.5%	54.2%	6.8%
MAY	18,692	93.2%	100.0%	6.8%	60,565	59.3%	66.1%	6.8%	85,898	49.2%	62.7%	13.6%
JUN	22,076	88.1%	98.3%	10.2%	58,552	57.6%	54.2%	-3.4%	89,970	40.7%	47.5%	6.8%
JUL	13,035	94.9%	98.3%	3.4%	35,478	40.7%	72.9%	32.2%	55,708	30.5%	32.2%	1.7%
AUG	6,579	96.6%	100.0%	3.4%	19,307	64.4%	94.9%	30.5%	32,097	32.2%	66.1%	33.9%
SEP	11,187	91.5%	100.0%	8.5%	24,397	62.7%	83.1%	20.3%	36,714	57.6%	52.5%	-5.1%
OCT	9,039	91.5%	100.0%	8.5%	22,136	76.3%	84.7%	8.5%	46,054	54.2%	52.5%	-1.7%
NOV	10,294	96.6%	100.0%	3.4%	28,919	76.3%	83.1%	6.8%	45,461	54.2%	49.2%	-5.1%
DEC	12,420	96.6%	100.0%	3.4%	28,899	81.4%	84.7%	3.4%	45,870	59.3%	64.4%	5.1%

2010 Colorado River Instream Flow Analysis

2010 CP J10000 Colorado Co.		SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
	MONTH	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %
	JAN	20,906	81.4%	89.8%	8.5%	29,944	72.9%	81.4%	8.5%	50,912	44.1%	50.8%	6.8%
	FEB	20,826	83.1%	89.8%	6.8%	32,767	74.6%	74.6%	0.0%	49,706	54.2%	57.6%	3.4%
	MAR	23,058	98.3%	100.0%	1.7%	32,281	88.1%	78.0%	-10.2%	62,717	42.4%	47.5%	5.1%
	APR	17,792	100.0%	100.0%	0.0%	32,965	76.3%	98.3%	22.0%	58,136	49.2%	52.5%	3.4%
	MAY	26,132	100.0%	100.0%	0.0%	59,397	78.0%	94.9%	16.9%	80,918	57.6%	79.7%	22.0%
	JUN	31,775	98.3%	100.0%	1.7%	57,540	83.1%	98.3%	15.3%	85,686	57.6%	78.0%	20.3%
	JUL	21,029	98.3%	100.0%	1.7%	35,048	91.5%	100.0%	8.5%	55,031	50.8%	94.9%	44.1%
	AUG	11,683	98.3%	100.0%	1.7%	19,061	98.3%	100.0%	1.7%	31,728	83.1%	98.3%	15.3%
	SEP	16,602	98.3%	100.0%	1.7%	24,099	94.9%	100.0%	5.1%	36,298	74.6%	94.9%	20.3%
	OCT	11,683	98.3%	100.0%	1.7%	21,890	76.3%	100.0%	23.7%	45,562	61.0%	57.6%	-3.4%
	NOV	12,020	89.8%	100.0%	10.2%	28,562	61.0%	74.6%	13.6%	44,926	47.5%	45.8%	-1.7%
	DEC	18,508	84.7%	96.6%	11.9%	28,530	76.3%	81.4%	5.1%	45,316	49.2%	50.8%	1.7%

2010 CP J30000 Bastrop Co.		SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
	MONTH	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %
	JAN	12,789	83.1%	100.0%	16.9%	19,246	67.8%	89.8%	22.0%	26,624	50.8%	64.4%	13.6%
	FEB	15,217	83.1%	94.9%	11.8%	17,605	76.3%	89.8%	13.5%	27,602	61.0%	72.9%	11.9%
	MAR	16,848	96.6%	100.0%	3.4%	16,848	96.6%	100.0%	3.4%	30,559	79.7%	86.4%	6.7%
	APR	11,127	98.3%	100.0%	1.7%	17,078	98.3%	100.0%	1.7%	37,785	55.9%	84.7%	28.8%
	MAY	16,909	98.3%	100.0%	1.7%	35,601	89.8%	91.5%	1.7%	50,666	81.4%	91.5%	10.1%
	JUN	12,020	98.3%	100.0%	1.7%	24,873	98.3%	100.0%	1.7%	43,617	88.1%	98.3%	10.2%
	JUL	8,424	98.3%	100.0%	1.7%	21,336	93.2%	100.0%	6.8%	37,507	78.0%	96.6%	18.6%
	AUG	7,563	98.3%	100.0%	1.7%	11,929	96.6%	100.0%	3.4%	23,427	96.6%	100.0%	3.4%
	SEP	7,319	98.3%	100.0%	1.7%	14,043	94.9%	100.0%	5.1%	25,170	81.4%	96.6%	15.2%
	OCT	7,809	98.3%	100.0%	1.7%	15,064	88.1%	100.0%	11.9%	26,624	64.4%	91.5%	27.1%
	NOV	10,711	88.1%	100.0%	11.9%	16,840	67.8%	98.3%	30.5%	25,230	49.2%	69.5%	20.3%
	DEC	11,437	89.8%	100.0%	10.2%	19,123	72.9%	88.1%	15.2%	27,669	50.8%	66.1%	15.3%

Environmental Impacts of City of Austin Return Flows and Reuse (Settlement Agreement with LCRA)

2060 Colorado River Instream Flow Analysis

2060 CP K10000 Matagorda Co.	MONTH	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
		FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE
		(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%
	JAN	19,369	86.4%	100.0%	13.6%	30,252	78.0%	91.5%	13.5%	51,527	64.4%	72.9%	8.5%
	FEB	16,828	91.5%	100.0%	8.5%	33,156	81.4%	91.5%	10.1%	50,317	67.8%	74.6%	6.8%
	MAR	12,543	98.3%	100.0%	1.7%	32,650	89.8%	88.1%	-1.7%	63,701	44.1%	49.2%	5.1%
	APR	16,066	86.4%	96.6%	10.2%	33,382	66.1%	72.9%	6.8%	60,159	44.1%	49.2%	5.1%
	MAY	18,692	81.4%	91.5%	10.1%	60,565	54.2%	59.3%	5.1%	85,898	47.5%	50.8%	3.3%
	JUN	22,076	71.2%	78.0%	6.8%	58,552	47.5%	52.5%	5.0%	89,970	39.0%	42.4%	3.4%
	JUL	13,035	52.5%	76.3%	23.8%	35,478	39.0%	39.0%	0.0%	55,708	28.8%	32.2%	3.4%
	AUG	6,579	72.9%	100.0%	27.1%	19,307	39.0%	47.5%	8.5%	32,097	27.1%	37.3%	10.2%
	SEP	11,187	71.2%	93.2%	22.0%	24,397	61.0%	66.1%	5.1%	36,714	59.3%	59.3%	0.0%
	OCT	9,039	89.8%	100.0%	10.2%	22,136	76.3%	88.1%	11.8%	46,054	55.9%	62.7%	6.8%
	NOV	10,294	96.6%	100.0%	3.4%	28,919	78.0%	88.1%	10.1%	45,461	64.4%	71.2%	6.8%
	DEC	12,420	100.0%	100.0%	0.0%	28,899	83.1%	93.2%	10.1%	45,870	62.7%	78.0%	15.3%

2060 CP K20000 Wharton Co.	MONTH	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
		FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE
		(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%
	JAN	19,369	84.7%	100.0%	15.3%	30,252	78.0%	91.5%	13.6%	51,527	54.2%	67.8%	13.6%
	FEB	16,828	89.8%	100.0%	10.2%	33,156	76.3%	86.4%	10.2%	50,317	59.3%	67.8%	8.5%
	MAR	12,543	98.3%	100.0%	1.7%	32,650	93.2%	91.5%	-1.7%	63,701	44.1%	50.8%	6.8%
	APR	16,066	96.6%	100.0%	3.4%	33,382	71.2%	78.0%	6.8%	60,159	47.5%	49.2%	1.7%
	MAY	18,692	93.2%	100.0%	6.8%	60,565	59.3%	64.4%	5.1%	85,898	49.2%	52.5%	3.4%
	JUN	22,076	88.1%	96.6%	8.5%	58,552	57.6%	57.6%	0.0%	89,970	40.7%	45.8%	5.1%
	JUL	13,035	94.9%	98.3%	3.4%	35,478	40.7%	49.2%	8.5%	55,708	30.5%	32.2%	1.7%
	AUG	6,579	96.6%	100.0%	3.4%	19,307	64.4%	84.7%	20.3%	32,097	32.2%	44.1%	11.9%
	SEP	11,187	91.5%	100.0%	8.5%	24,397	62.7%	79.7%	16.9%	36,714	57.6%	62.7%	5.1%
	OCT	9,039	91.5%	100.0%	8.5%	22,136	76.3%	88.1%	11.9%	46,054	54.2%	61.0%	6.8%
	NOV	10,294	96.6%	100.0%	3.4%	28,919	76.3%	88.1%	11.9%	45,461	54.2%	66.1%	11.9%
	DEC	12,420	96.6%	100.0%	3.4%	28,899	81.4%	93.2%	11.9%	45,870	59.3%	76.3%	16.9%

Environmental Impacts of City of Austin Return Flows and Reuse (Settlement Agreement with LCRA)

2060
CP J10000
Colorado Co.

MONTH	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
	FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE
	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%
JAN	20,906	81.4%	100.0%	18.6%	29,944	72.9%	86.4%	13.6%	50,912	44.1%	62.7%	18.6%
FEB	20,826	83.1%	98.3%	15.3%	32,767	74.6%	84.7%	10.2%	49,706	54.2%	69.5%	15.3%
MAR	23,058	98.3%	100.0%	1.7%	32,281	88.1%	86.4%	-1.7%	62,717	42.4%	44.1%	1.7%
APR	17,792	100.0%	100.0%	0.0%	32,965	76.3%	93.2%	16.9%	58,136	49.2%	49.2%	0.0%
MAY	26,132	100.0%	100.0%	0.0%	59,397	78.0%	93.2%	15.3%	80,918	57.6%	66.1%	8.5%
JUN	31,775	98.3%	100.0%	1.7%	57,540	83.1%	94.9%	11.9%	85,686	57.6%	66.1%	8.5%
JUL	21,029	98.3%	100.0%	1.7%	35,048	91.5%	96.6%	5.1%	55,031	50.8%	71.2%	20.3%
AUG	11,683	98.3%	100.0%	1.7%	19,061	98.3%	98.3%	0.0%	31,728	83.1%	91.5%	8.5%
SEP	16,602	98.3%	100.0%	1.7%	24,099	94.9%	100.0%	5.1%	36,298	74.6%	91.5%	16.9%
OCT	11,683	98.3%	100.0%	1.7%	21,890	76.3%	98.3%	22.0%	45,562	61.0%	64.4%	3.4%
NOV	12,020	89.8%	100.0%	10.2%	28,562	61.0%	84.7%	23.7%	44,926	47.5%	57.6%	10.2%
DEC	18,508	84.7%	98.3%	13.6%	28,530	76.3%	91.5%	15.3%	45,316	49.2%	64.4%	15.3%

2060
CP J30000
Bastrop Co.

MONTH	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
	FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE
	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%
JAN	12,789	84.7%	100.0%	15.3%	19,246	69.5%	98.3%	28.8%	26,624	52.5%	86.4%	33.9%
FEB	15,217	84.7%	100.0%	15.3%	17,605	78.0%	100.0%	22.0%	27,602	62.7%	83.1%	20.4%
MAR	16,848	98.3%	100.0%	1.7%	16,848	98.3%	100.0%	1.7%	30,559	81.4%	88.1%	6.7%
APR	11,127	100.0%	100.0%	0.0%	17,078	100.0%	100.0%	0.0%	37,785	57.6%	84.7%	27.1%
MAY	16,909	100.0%	100.0%	0.0%	35,601	91.5%	93.2%	1.7%	50,666	81.4%	88.1%	6.7%
JUN	12,020	100.0%	100.0%	0.0%	24,873	100.0%	100.0%	0.0%	43,617	89.8%	94.9%	5.1%
JUL	8,424	100.0%	100.0%	0.0%	21,336	94.9%	100.0%	5.1%	37,507	79.7%	86.4%	6.7%
AUG	7,563	100.0%	100.0%	0.0%	11,929	98.3%	100.0%	1.7%	23,427	98.3%	100.0%	1.7%
SEP	7,319	100.0%	100.0%	0.0%	14,043	96.6%	100.0%	3.4%	25,170	81.4%	94.9%	13.5%
OCT	7,809	100.0%	100.0%	0.0%	15,064	89.8%	100.0%	10.2%	26,624	66.1%	88.1%	22.0%
NOV	10,711	89.8%	100.0%	10.2%	16,840	69.5%	100.0%	30.5%	25,230	50.8%	79.7%	28.9%
DEC	11,437	91.5%	100.0%	8.5%	19,123	74.6%	96.6%	22.0%	27,669	52.5%	81.4%	28.9%

2060 Freshwater Inflows to Matagorda Bay

SPRINGTIME ONSET FLOW CRITERIA MET						
CRITERIA	**TARGET**	**BASE**		**STRATEGY**		**DIFFERENCE**
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	114,000	48	81.4%	48	81.4%	0.0%
MBHE 2	168,700	39	66.1%	39	66.1%	0.0%
MBHE 3	246,200	35	59.3%	35	59.3%	0.0%
MBHE 4	433,200	22	37.3%	20	33.9%	-3.4%

FALL ONSET FLOW CRITERIA MET						
CRITERIA	**TARGET**	**BASE**		**STRATEGY**		**DIFFERENCE**
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	81,000	38	64.4%	38	64.4%	0.0%
MBHE 2	119,900	31	52.5%	31	52.5%	0.0%
MBHE 3	175,000	19	32.2%	17	28.8%	-3.4%
MBHE 4	307,800	11	18.6%	11	18.6%	0.0%

INTERVENING SIX MONTHS FLOW CRITERIA MET						
CRITERIA	**TARGET**	**BASE**		**STRATEGY**		**DIFFERENCE**
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	105,000	53	89.8%	53	89.8%	0.0%
MBHE 2	155,400	46	78.0%	46	78.0%	0.0%
MBHE 3	226,800	39	66.1%	39	66.1%	0.0%
MBHE 4	399,000	32	54.2%	32	54.2%	0.0%

Note: Intervening six months includes June, July, November, December, and the remaining Springtime Onset months that are not used for the 3 consecutive month calculation.

NUMBER OF MONTHS THAT THRESHOLD LEVEL IS MET						
CRITERIA	**TARGET**	**BASE**		**STRATEGY**		**DIFFERENCE**
	(AC-FT/mo)	# OF MONTHS	%	# OF MONTHS	%	%
THRESHOLD	15,000	540	76.3%	540	76.3%	0.0%

2060 Colorado River Instream Flow Analysis

2060 CP K10000 Matagorda Co.	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
MONTH	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %
JAN	19,369	86.4%	86.4%	0.0%	30,252	78.0%	78.0%	0.0%	51,527	64.4%	64.4%	0.0%
FEB	16,828	91.5%	91.5%	0.0%	33,156	81.4%	81.4%	0.0%	50,317	67.8%	67.8%	0.0%
MAR	12,543	98.3%	98.3%	0.0%	32,650	89.8%	89.8%	0.0%	63,701	44.1%	44.1%	0.0%
APR	16,066	86.4%	86.4%	0.0%	33,382	66.1%	66.1%	0.0%	60,159	44.1%	44.1%	0.0%
MAY	18,692	81.4%	81.4%	0.0%	60,565	54.2%	54.2%	0.0%	85,898	47.5%	47.5%	0.0%
JUN	22,076	71.2%	71.2%	0.0%	58,552	47.5%	47.5%	0.0%	89,970	39.0%	39.0%	0.0%
JUL	13,035	52.5%	52.5%	0.0%	35,478	39.0%	39.0%	0.0%	55,708	28.8%	28.8%	0.0%
AUG	6,579	72.9%	72.9%	0.0%	19,307	39.0%	39.0%	0.0%	32,097	27.1%	27.1%	0.0%
SEP	11,187	71.2%	71.2%	0.0%	24,397	61.0%	61.0%	0.0%	36,714	59.3%	59.3%	0.0%
OCT	9,039	89.8%	89.8%	0.0%	22,136	76.3%	76.3%	0.0%	46,054	55.9%	55.9%	0.0%
NOV	10,294	96.6%	96.6%	0.0%	28,919	78.0%	78.0%	0.0%	45,461	64.4%	64.4%	0.0%
DEC	12,420	100.0%	100.0%	0.0%	28,899	83.1%	83.1%	0.0%	45,870	62.7%	62.7%	0.0%

2060 CP K20000 Wharton Co.	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
MONTH	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %
JAN	19,369	84.7%	84.7%	0.0%	30,252	78.0%	78.0%	0.0%	51,527	54.2%	54.2%	0.0%
FEB	16,828	89.8%	89.8%	0.0%	33,156	76.3%	76.3%	0.0%	50,317	59.3%	59.3%	0.0%
MAR	12,543	98.3%	98.3%	0.0%	32,650	93.2%	93.2%	0.0%	63,701	44.1%	44.1%	0.0%
APR	16,066	96.6%	96.6%	0.0%	33,382	71.2%	71.2%	0.0%	60,159	47.5%	47.5%	0.0%
MAY	18,692	93.2%	93.2%	0.0%	60,565	59.3%	59.3%	0.0%	85,898	49.2%	49.2%	0.0%
JUN	22,076	88.1%	88.1%	0.0%	58,552	57.6%	57.6%	0.0%	89,970	40.7%	40.7%	0.0%
JUL	13,035	94.9%	94.9%	0.0%	35,478	40.7%	40.7%	0.0%	55,708	30.5%	30.5%	0.0%
AUG	6,579	96.6%	96.6%	0.0%	19,307	64.4%	64.4%	0.0%	32,097	32.2%	32.2%	0.0%
SEP	11,187	91.5%	91.5%	0.0%	24,397	62.7%	62.7%	0.0%	36,714	57.6%	57.6%	0.0%
OCT	9,039	91.5%	91.5%	0.0%	22,136	76.3%	76.3%	0.0%	46,054	54.2%	54.2%	0.0%
NOV	10,294	96.6%	96.6%	0.0%	28,919	76.3%	76.3%	0.0%	45,461	54.2%	54.2%	0.0%
DEC	12,420	96.6%	96.6%	0.0%	28,899	81.4%	81.4%	0.0%	45,870	59.3%	59.3%	0.0%

2060 Colorado River Instream Flow Analysis

2060 CP J10000 Colorado Co.	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
MONTH	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %
JAN	20,906	81.4%	81.4%	0.0%	29,944	72.9%	72.9%	0.0%	50,912	44.1%	44.1%	0.0%
FEB	20,826	83.1%	83.1%	0.0%	32,767	74.6%	74.6%	0.0%	49,706	54.2%	54.2%	0.0%
MAR	23,058	98.3%	98.3%	0.0%	32,281	88.1%	88.1%	0.0%	62,717	42.4%	42.4%	0.0%
APR	17,792	100.0%	100.0%	0.0%	32,965	76.3%	76.3%	0.0%	58,136	49.2%	49.2%	0.0%
MAY	26,132	100.0%	100.0%	0.0%	59,397	78.0%	78.0%	0.0%	80,918	57.6%	57.6%	0.0%
JUN	31,775	98.3%	98.3%	0.0%	57,540	83.1%	83.1%	0.0%	85,686	57.6%	57.6%	0.0%
JUL	21,029	98.3%	98.3%	0.0%	35,048	91.5%	91.5%	0.0%	55,031	50.8%	50.8%	0.0%
AUG	11,683	98.3%	98.3%	0.0%	19,061	98.3%	98.3%	0.0%	31,728	83.1%	83.1%	0.0%
SEP	16,602	98.3%	98.3%	0.0%	24,099	94.9%	94.9%	0.0%	36,298	74.6%	74.6%	0.0%
OCT	11,683	98.3%	98.3%	0.0%	21,890	76.3%	76.3%	0.0%	45,562	61.0%	61.0%	0.0%
NOV	12,020	89.8%	89.8%	0.0%	28,562	61.0%	61.0%	0.0%	44,926	47.5%	47.5%	0.0%
DEC	18,508	84.7%	84.7%	0.0%	28,530	76.3%	76.3%	0.0%	45,316	49.2%	49.2%	0.0%

2060 CP J30000 Bastrop Co.	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
MONTH	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %
JAN	12,789	84.7%	84.7%	0.0%	19,246	69.5%	69.5%	0.0%	26,624	52.5%	52.5%	0.0%
FEB	15,217	84.7%	84.7%	0.0%	17,605	78.0%	78.0%	0.0%	27,602	62.7%	62.7%	0.0%
MAR	16,848	98.3%	98.3%	0.0%	16,848	98.3%	98.3%	0.0%	30,559	81.4%	81.4%	0.0%
APR	11,127	100.0%	100.0%	0.0%	17,078	100.0%	100.0%	0.0%	37,785	57.6%	57.6%	0.0%
MAY	16,909	100.0%	100.0%	0.0%	35,601	91.5%	91.5%	0.0%	50,666	81.4%	81.4%	0.0%
JUN	12,020	100.0%	100.0%	0.0%	24,873	100.0%	100.0%	0.0%	43,617	89.8%	89.8%	0.0%
JUL	8,424	100.0%	100.0%	0.0%	21,336	94.9%	94.9%	0.0%	37,507	79.7%	79.7%	0.0%
AUG	7,563	100.0%	100.0%	0.0%	11,929	98.3%	98.3%	0.0%	23,427	98.3%	98.3%	0.0%
SEP	7,319	100.0%	100.0%	0.0%	14,043	96.6%	96.6%	0.0%	25,170	81.4%	81.4%	0.0%
OCT	7,809	100.0%	100.0%	0.0%	15,064	89.8%	89.8%	0.0%	26,624	66.1%	66.1%	0.0%
NOV	10,711	89.8%	89.8%	0.0%	16,840	69.5%	69.5%	0.0%	25,230	50.8%	50.8%	0.0%
DEC	11,437	91.5%	91.5%	0.0%	19,123	74.6%	74.6%	0.0%	27,669	52.5%	52.5%	0.0%

2060 Freshwater Inflows to Matagorda Bay

SPRINGTIME ONSET FLOW CRITERIA MET						
CRITERIA	**TARGET**	**BASE**		**STRATEGY**		**DIFFERENCE**
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	114,000	48	81.4%	48	81.4%	0.0%
MBHE 2	168,700	39	66.1%	39	66.1%	0.0%
MBHE 3	246,200	35	59.3%	35	59.3%	0.0%
MBHE 4	433,200	22	37.3%	22	37.3%	0.0%

FALL ONSET FLOW CRITERIA MET						
CRITERIA	**TARGET**	**BASE**		**STRATEGY**		**DIFFERENCE**
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	81,000	38	64.4%	38	64.4%	0.0%
MBHE 2	119,900	31	52.5%	31	52.5%	0.0%
MBHE 3	175,000	19	32.2%	19	32.2%	0.0%
MBHE 4	307,800	11	18.6%	11	18.6%	0.0%

INTERVENING SIX MONTHS FLOW CRITERIA MET						
CRITERIA	**TARGET**	**BASE**		**STRATEGY**		**DIFFERENCE**
	(AC-FT)	# OF YEARS	%	# OF YEARS	%	%
MBHE 1	105,000	53	89.8%	53	89.8%	0.0%
MBHE 2	155,400	46	78.0%	46	78.0%	0.0%
MBHE 3	226,800	39	66.1%	39	66.1%	0.0%
MBHE 4	399,000	32	54.2%	32	54.2%	0.0%

Note: Intervening six months includes June, July, November, December, and the remaining Springtime Onset months that are not used for the 3 consecutive month calculation.

NUMBER OF MONTHS THAT THRESHOLD LEVEL IS MET						
CRITERIA	**TARGET**	**BASE**		**STRATEGY**		**DIFFERENCE**
	(AC-FT/mo)	# OF MONTHS	%	# OF MONTHS	%	%
THRESHOLD	15,000	540	76.3%	545	77.0%	0.7%

2060 Colorado River Instream Flow Analysis

2060 CP K10000 Matagorda Co.		SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
	MONTH	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %
	JAN	19,369	86.4%	89.8%	3.4%	30,252	78.0%	81.4%	3.4%	51,527	64.4%	64.4%	0.0%
	FEB	16,828	91.5%	91.5%	0.0%	33,156	81.4%	81.4%	0.0%	50,317	67.8%	67.8%	0.0%
	MAR	12,543	98.3%	98.3%	0.0%	32,650	89.8%	89.8%	0.0%	63,701	44.1%	44.1%	0.0%
	APR	16,066	86.4%	86.4%	0.0%	33,382	66.1%	67.8%	1.7%	60,159	44.1%	45.8%	1.7%
	MAY	18,692	81.4%	81.4%	0.0%	60,565	54.2%	55.9%	1.7%	85,898	47.5%	47.5%	0.0%
	JUN	22,076	71.2%	71.2%	0.0%	58,552	47.5%	47.5%	0.0%	89,970	39.0%	39.0%	0.0%
	JUL	13,035	52.5%	54.2%	1.7%	35,478	39.0%	39.0%	0.0%	55,708	28.8%	28.8%	0.0%
	AUG	6,579	72.9%	67.8%	-5.1%	19,307	39.0%	39.0%	0.0%	32,097	27.1%	32.2%	5.1%
	SEP	11,187	71.2%	72.9%	1.7%	24,397	61.0%	61.0%	0.0%	36,714	59.3%	59.3%	0.0%
	OCT	9,039	89.8%	89.8%	0.0%	22,136	76.3%	76.3%	0.0%	46,054	55.9%	57.6%	1.7%
	NOV	10,294	96.6%	96.6%	0.0%	28,919	78.0%	83.1%	5.1%	45,461	64.4%	64.4%	0.0%
	DEC	12,420	100.0%	98.3%	-1.7%	28,899	83.1%	83.1%	0.0%	45,870	62.7%	66.1%	3.4%

2060 CP K20000 Wharton Co.		SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
	MONTH	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %	FLOW (AC-FT/MO)	BASE % TIME MET	STRATEGY % TIME MET	DIFFERENCE %
	JAN	19,369	84.7%	88.1%	3.4%	30,252	78.0%	81.4%	3.4%	51,527	54.2%	57.6%	3.4%
	FEB	16,828	89.8%	91.5%	1.7%	33,156	76.3%	76.3%	0.0%	50,317	59.3%	61.0%	1.7%
	MAR	12,543	98.3%	98.3%	0.0%	32,650	93.2%	89.8%	-3.4%	63,701	44.1%	44.1%	0.0%
	APR	16,066	96.6%	94.9%	-1.7%	33,382	71.2%	72.9%	1.7%	60,159	47.5%	47.5%	0.0%
	MAY	18,692	93.2%	94.9%	1.7%	60,565	59.3%	59.3%	0.0%	85,898	49.2%	49.2%	0.0%
	JUN	22,076	88.1%	88.1%	0.0%	58,552	57.6%	57.6%	0.0%	89,970	40.7%	42.4%	1.7%
	JUL	13,035	94.9%	96.6%	1.7%	35,478	40.7%	40.7%	0.0%	55,708	30.5%	30.5%	0.0%
	AUG	6,579	96.6%	96.6%	0.0%	19,307	64.4%	66.1%	1.7%	32,097	32.2%	37.3%	5.1%
	SEP	11,187	91.5%	91.5%	0.0%	24,397	62.7%	62.7%	0.0%	36,714	57.6%	57.6%	0.0%
	OCT	9,039	91.5%	91.5%	0.0%	22,136	76.3%	74.6%	-1.7%	46,054	54.2%	55.9%	1.7%
	NOV	10,294	96.6%	96.6%	0.0%	28,919	76.3%	78.0%	1.7%	45,461	54.2%	54.2%	0.0%
	DEC	12,420	96.6%	98.3%	1.7%	28,899	81.4%	81.4%	0.0%	45,870	59.3%	61.0%	1.7%

Environmental Impacts of Alternative Strategy Groundwater Importation

2060 Colorado River Instream Flow Analysis

2060 CP J10000 Colorado Co.	MONTH	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
		FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE
		(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%
	JAN	20,906	81.4%	81.4%	0.0%	29,944	72.9%	76.3%	3.4%	50,912	44.1%	45.8%	1.7%
	FEB	20,826	83.1%	84.7%	1.7%	32,767	74.6%	74.6%	0.0%	49,706	54.2%	55.9%	1.7%
	MAR	23,058	98.3%	98.3%	0.0%	32,281	88.1%	84.7%	-3.4%	62,717	42.4%	42.4%	0.0%
	APR	17,792	100.0%	100.0%	0.0%	32,965	76.3%	79.7%	3.4%	58,136	49.2%	49.2%	0.0%
	MAY	26,132	100.0%	100.0%	0.0%	59,397	78.0%	79.7%	1.7%	80,918	57.6%	59.3%	1.7%
	JUN	31,775	98.3%	98.3%	0.0%	57,540	83.1%	83.1%	0.0%	85,686	57.6%	59.3%	1.7%
	JUL	21,029	98.3%	98.3%	0.0%	35,048	91.5%	93.2%	1.7%	55,031	50.8%	52.5%	1.7%
	AUG	11,683	98.3%	100.0%	1.7%	19,061	98.3%	98.3%	0.0%	31,728	83.1%	84.7%	1.7%
	SEP	16,602	98.3%	100.0%	1.7%	24,099	94.9%	94.9%	0.0%	36,298	74.6%	78.0%	3.4%
	OCT	11,683	98.3%	98.3%	0.0%	21,890	76.3%	78.0%	1.7%	45,562	61.0%	62.7%	1.7%
	NOV	12,020	89.8%	91.5%	1.7%	28,562	61.0%	69.5%	8.5%	44,926	47.5%	49.2%	1.7%
	DEC	18,508	84.7%	84.7%	0.0%	28,530	76.3%	79.7%	3.4%	45,316	49.2%	49.2%	0.0%

2060 CP J30000 Bastrop Co.	MONTH	SUBSISTENCE FLOWS				BASE FLOWS - DRY CONDITIONS				BASE FLOWS - AVERAGE CONDITIONS			
		FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE	FLOW	BASE	STRATEGY	DIFFERENCE
		(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%	(AC-FT/MO)	% TIME MET	% TIME MET	%
	JAN	12,789	84.7%	88.1%	3.4%	19,246	69.5%	74.6%	5.1%	26,624	52.5%	55.9%	3.4%
	FEB	15,217	84.7%	84.7%	0.0%	17,605	78.0%	81.4%	3.4%	27,602	62.7%	66.1%	3.4%
	MAR	16,848	98.3%	98.3%	0.0%	16,848	98.3%	98.3%	0.0%	30,559	81.4%	84.7%	3.4%
	APR	11,127	100.0%	100.0%	0.0%	17,078	100.0%	100.0%	0.0%	37,785	57.6%	61.0%	3.4%
	MAY	16,909	100.0%	100.0%	0.0%	35,601	91.5%	91.5%	0.0%	50,666	81.4%	81.4%	0.0%
	JUN	12,020	100.0%	100.0%	0.0%	24,873	100.0%	100.0%	0.0%	43,617	89.8%	89.8%	0.0%
	JUL	8,424	100.0%	100.0%	0.0%	21,336	94.9%	94.9%	0.0%	37,507	79.7%	83.1%	3.4%
	AUG	7,563	100.0%	100.0%	0.0%	11,929	98.3%	100.0%	1.7%	23,427	98.3%	98.3%	0.0%
	SEP	7,319	100.0%	100.0%	0.0%	14,043	96.6%	98.3%	1.7%	25,170	81.4%	83.1%	1.7%
	OCT	7,809	100.0%	100.0%	0.0%	15,064	89.8%	89.8%	0.0%	26,624	66.1%	69.5%	3.4%
	NOV	10,711	89.8%	91.5%	1.7%	16,840	69.5%	72.9%	3.4%	25,230	50.8%	52.5%	1.7%
	DEC	11,437	91.5%	88.1%	-3.4%	19,123	74.6%	78.0%	3.4%	27,669	52.5%	55.9%	3.4%

APPENDIX 5F

TWDB DB17 REPORTS

WUG Second Tier Needs Summary

WUG Second Tier Needs

WUG Unmet Needs Summary

WUG Unmet Needs

WUG Recommended Water Management Strategies

Recommended Projects Associated with Water Management Strategies

WUG Alternative Water Management Strategies

Alternative Projects Associated with Water Management Strategies

WUG Management Supply Factors

Water User Group (WUG) Second-Tier Identified Water Need Summary

REGION K

	2020	2030	2040	2050	2060	2070
MUNICIPAL	959	6,211	9,922	17,295	26,925	42,579
COUNTY-OTHER	151	189	249	1,043	1,893	2,787
MANUFACTURING	570	692	810	913	1,059	1,216
MINING	4,260	8,618	9,247	10,219	11,653	13,664
STEAM ELECTRIC POWER	25,363	25,377	25,401	25,431	32,712	44,127
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	214,375	178,442	141,153	107,636	78,682	54,428

*Second-tier needs are WUG split needs adjusted to include the implementation of recommended demand reduction and direct reuse water management strategies.

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Water User Group (WUG) Second-Tier Identified Water Need

REGION K	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
BASTROP COUNTY						
BRAZOS BASIN						
AQUA WSC	0	0	0	0	0	0
LEE COUNTY WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	173	409	450	496	545	600
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
COLORADO BASIN						
AQUA WSC	554	2,015	3,927	7,115	12,233	19,000
BASTROP	0	0	14	309	765	2,064
BASTROP COUNTY WCID #2	0	0	0	0	19	542
CREEDMOOR-MAHA WSC	0	0	0	0	0	0
ELGIN	277	484	694	1,116	1,880	2,899
LEE COUNTY WSC	0	0	0	0	0	0
POLONIA WSC	0	0	0	0	0	0
SMITHVILLE	0	0	0	0	0	86
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	55	87	120	151	174	199
MINING	449	3,947	4,556	5,235	5,967	6,777
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
GUADALUPE BASIN						
AQUA WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	110	306	341	379	420	466
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
BLANCO COUNTY						
COLORADO BASIN						
JOHNSON CITY	0	0	19	35	46	53
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
GUADALUPE BASIN						
BLANCO	0	0	0	0	0	0
CANYON LAKE WATER SERVICE COMPANY	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
BURNET COUNTY						
BRAZOS BASIN						
BERTRAM	0	0	10	30	41	45
BURNET	0	0	0	0	0	0
CHISHOLM TRAIL SUD	0	0	0	0	0	0

Water User Group (WUG) Second-Tier Identified Water Need

REGION K	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
BURNET COUNTY						
BRAZOS BASIN						
KEMPNER WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	60
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
COLORADO BASIN						
BURNET	0	0	0	0	0	0
COTTONWOOD SHORES	0	0	0	0	0	0
GRANITE SHOALS	0	0	0	89	173	249
HORSESHOE BAY	0	0	0	0	0	0
KINGSLAND WSC	0	0	0	0	0	0
MARBLE FALLS	0	0	0	0	0	0
MEADOWLAKES	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	1,011	1,703	2,428	3,085	3,841	4,703
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
COLORADO COUNTY						
BRAZOS-COLORADO BASIN						
EAGLE LAKE	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	11,086	8,521	5,933	3,653	1,655	0
COLORADO BASIN						
COLUMBUS	0	0	0	0	0	0
EAGLE LAKE	0	0	0	0	0	0
WEIMAR	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	3	31	61
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
LAVACA BASIN						
WEIMAR	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	13,921	9,842	5,805	2,300	0	0
FAYETTE COUNTY						
COLORADO BASIN						
AQUA WSC	0	0	0	0	0	0
FAYETTE WSC	0	0	0	0	0	0
LA GRANGE	0	0	0	0	0	0
LEE COUNTY WSC	0	0	0	0	0	0

Water User Group (WUG) Second-Tier Identified Water Need

REGION K	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
FAYETTE COUNTY						
COLORADO BASIN						
COUNTY-OTHER	0	12	57	98	138	172
MINING	1,576	1,176	717	274	0	0
STEAM ELECTRIC POWER	0	0	0	0	2,614	7,414
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
GUADALUPE BASIN						
FAYETTE WSC	0	0	0	0	0	0
FLATONIA	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	66	42	13	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
LAVACA BASIN						
FAYETTE WSC	0	0	0	0	0	0
FLATONIA	0	0	0	0	0	0
SCHULENBURG	0	0	0	0	0	0
COUNTY-OTHER	151	177	192	207	222	233
MANUFACTURING	206	243	279	310	349	391
MINING	344	274	195	119	40	39
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
GILLESPIE COUNTY						
COLORADO BASIN						
FREDERICKSBURG	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	309	362	411	452	536	626
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
GUADALUPE BASIN						
COUNTY-OTHER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
HAYS COUNTY						
COLORADO BASIN						
AUSTIN	0	0	0	0	0	0
BUDA	0	0	0	226	1,394	2,726
CIMARRON PARK WATER COMPANY	0	0	0	0	0	0
DRIPPING SPRINGS	0	0	0	0	0	0
DRIPPING SPRINGS WSC	0	0	0	0	0	0
GOFORTH SUD	0	0	0	0	0	0
MOUNTAIN CITY	0	0	0	0	0	0
PLUM CREEK WATER COMPANY	0	0	0	0	0	0
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	0	0	0	0	412	711
COUNTY-OTHER	0	0	0	735	1,502	2,261
MANUFACTURING	0	0	0	0	0	0
MINING	531	761	547	631	840	1,079
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0

Water User Group (WUG) Second-Tier Identified Water Need

REGION K	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
LLANO COUNTY						
COLORADO BASIN						
HORSESHOE BAY	0	0	0	0	0	0
KINGSLAND WSC	0	0	0	0	0	0
LLANO	128	123	86	42	25	7
SUNRISE BEACH VILLAGE	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
MATAGORDA COUNTY						
BRAZOS-COLORADO BASIN						
BAY CITY	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	48,397	41,244	33,660	26,753	20,594	14,499
COLORADO BASIN						
BAY CITY	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	25,363	25,377	25,401	25,431	25,461	25,483
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	8,714	7,539	6,279	5,120	4,083	3,045
COLORADO-LAVACA BASIN						
PALACIOS	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	58,948	50,547	41,593	33,413	26,109	18,844
MILLS COUNTY						
BRAZOS BASIN						
GOLDTHWAITE	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	480	480	480	480	480	460
COLORADO BASIN						
BROOKESMITH SUD	0	0	0	0	0	0
GOLDTHWAITE	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0

Water User Group (WUG) Second-Tier Identified Water Need

REGION K	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
SAN SABA COUNTY						
COLORADO BASIN						
RICHLAND SUD	0	0	0	0	0	0
SAN SABA	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
TRAVIS COUNTY						
COLORADO BASIN						
AQUA WSC	0	0	0	0	0	0
AUSTIN	0	0	0	0	0	0
BARTON CREEK WEST WSC	0	0	0	0	0	0
BEE CAVE	0	0	0	0	0	0
BRIARCLIFF	0	0	0	0	0	0
CEDAR PARK	0	0	0	0	0	0
CREEDMOOR-MAHA WSC	0	0	9	133	268	400
ELGIN	0	48	129	222	304	381
JONESTOWN	0	0	0	0	0	0
LAGO VISTA	0	0	0	0	0	0
LAKEWAY	0	132	0	0	0	0
LEANDER	0	788	2,529	3,340	3,701	4,055
LOOP 360 WSC	0	0	0	0	0	0
LOST CREEK MUD	0	0	0	0	0	0
MANOR	0	0	0	0	72	390
MANVILLE WSC	0	0	0	0	461	1,435
MUSTANG RIDGE	0	0	0	0	0	0
NORTH AUSTIN MUD #1	0	0	0	0	0	0
NORTHTOWN MUD	0	0	0	0	0	0
PFLUGERVILLE	0	0	0	2,224	2,855	5,312
POINT VENTURE	0	0	0	0	19	32
ROLLINGWOOD	0	255	241	228	216	203
ROUND ROCK	0	27	82	144	187	223
SHADY HOLLOW MUD	0	0	0	0	0	0
SUNSET VALLEY	0	0	0	0	0	0
THE HILLS	0	0	0	0	0	0
TRAVIS COUNTY MUD #4	0	0	0	0	0	0
TRAVIS COUNTY WCID #10	0	1,376	1,329	1,287	1,190	1,181
TRAVIS COUNTY WCID #17	0	0	0	0	0	0
TRAVIS COUNTY WCID #18	0	0	0	0	0	0
TRAVIS COUNTY WCID #19	0	0	0	0	0	0
TRAVIS COUNTY WCID #20	0	0	0	0	0	0
VOLENTE	0	9	20	34	47	59
WELLS BRANCH MUD	0	0	0	0	0	0
WEST LAKE HILLS	0	954	833	721	617	526
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	0	0	0	0	0	0
WILLIAMSON-TRAVIS COUNTY MUD #1	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0

Water User Group (WUG) Second-Tier Identified Water Need

REGION K	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
TRAVIS COUNTY						
COLORADO BASIN						
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	0	0	0	0	4,543	11,030
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
GUADALUPE BASIN						
CREEDMOOR-MAHA WSC	0	0	0	0	0	0
GOFORTH SUD	0	0	0	0	0	0
MUSTANG RIDGE	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
WHARTON COUNTY						
BRAZOS-COLORADO BASIN						
EAST BERNARD	0	0	0	0	0	0
WHARTON	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	0	0	0	0	94	200
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	48,964	41,369	33,470	26,349	20,024	13,875
COLORADO BASIN						
EL CAMPO	0	0	0	0	0	0
WHARTON	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	9,676	6,999	4,397	2,157	211	0
COLORADO-LAVACA BASIN						
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	14,189	11,901	9,536	7,411	5,526	3,705
LAVACA BASIN						
COUNTY-OTHER	0	0	0	0	0	0
WILLIAMSON COUNTY						
BRAZOS BASIN						
AUSTIN	0	0	0	0	0	0
NORTH AUSTIN MUD #1	0	0	0	0	0	0
WELLS BRANCH MUD	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0

Water User Group (WUG) Second-Tier Identified Water Need

***Second-tier needs are WUG split needs adjusted to include the implementation of recommended demand reduction and direct reuse water management strategies.**

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Water User Group (WUG) Unmet Needs Summary

REGION K

	2020	2030	2040	2050	2060	2070
MUNICIPAL	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	622	4,356	5,006	5,731	6,512	7,377
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	120,822	113,478	102,187	76,539	55,295	27,924

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The unmet needs shown in the WUG Unmet Needs Summary report are calculated by first deducting the WUG split's projected demand from the sum of its total existing water supply volume and all associated recommended water management strategy water volumes. If the WUG split has a greater future supply volume than projected demand in any given decade, this amount is considered a surplus volume. Before aggregating the difference between supplies and demands to the WUG category level, calculated surpluses are updated to zero so that only the WUGs with unmet needs in the decade are included with the Needs totals. Unmet needs water volumes are shown as absolute values.

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Water User Group (WUG) Unmet Needs

REGION K	WUG UNMET NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
BASTROP COUNTY						
BRAZOS BASIN						
MINING	173	409	450	496	545	600
COLORADO BASIN						
MINING	449	3,947	4,556	5,235	5,967	6,777
COLORADO COUNTY						
BRAZOS-COLORADO BASIN						
IRRIGATION	0	0	1,302	755	1,170	0
LAVACA BASIN						
IRRIGATION	0	0	1,195	475	0	0
MATAGORDA COUNTY						
BRAZOS-COLORADO BASIN						
IRRIGATION	29,286	27,777	25,165	19,532	14,562	7,502
COLORADO BASIN						
IRRIGATION	5,273	5,077	4,694	3,738	2,887	1,576
COLORADO-LAVACA BASIN						
IRRIGATION	35,671	34,041	31,096	24,394	18,461	9,750
WHARTON COUNTY						
BRAZOS-COLORADO BASIN						
IRRIGATION	34,013	31,974	27,350	20,281	14,159	7,179
COLORADO BASIN						
IRRIGATION	6,722	5,410	3,593	1,660	149	0
COLORADO-LAVACA BASIN						
IRRIGATION	9,857	9,199	7,792	5,704	3,907	1,917

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The unmet needs shown in the WUG Unmet Needs report are calculated by first deducting the WUG split's projected demand from the sum of its total existing water supply volume and all associated recommended water management strategy water volumes. If the WUG split has a greater future supply volume than projected demand in any given decade, this amount is considered a surplus volume. In order to display only unmet needs associated with the WUG split, these surplus volumes are updated to a zero and the unmet needs water volumes are shown as absolute values.

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Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Primary Region: K

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
AQUA WSC	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	1,549	1,960	2,502	3,248	4,254	5,639	$50	$50
AQUA WSC	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - CARRIZO-WILCOX AQUIFER	K | CARRIZO-WILCOX AQUIFER | BASTROP COUNTY	2,500	2,500	4,000	4,000	4,000	4,000	$259	$259
AQUA WSC	K	LCRA - PRAIRIE SITE RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIR (2030 DECADE)	0	0	5,000	5,000	10,000	15,000	N/A	$1414
AQUA WSC	K	MUNICIPAL CONSERVATION - AQUA WSC	DEMAND REDUCTION	704	1,006	1,066	1,235	1,623	2,130	$352	$352
AUSTIN	K	CITY OF AUSTIN - AQUIFER STORAGE AND RECOVERY	K | TRINITY AQUIFER ASR | TRAVIS COUNTY	10,000	25,000	25,000	50,000	50,000	50,000	$604	$604
AUSTIN	K	CITY OF AUSTIN - CAPTURE LOCAL INFLOWS TO LADY BIRD LAKE	K | COLORADO RUN-OF-RIVER	1,000	1,000	1,000	1,000	1,000	1,000	$297	$297
AUSTIN	K	CITY OF AUSTIN - CONSERVATION	DEMAND REDUCTION	22,969	24,559	28,317	31,220	33,822	36,899	$342	$342
AUSTIN	K	CITY OF AUSTIN - DIRECT REUSE	K | DIRECT REUSE	5,429	10,429	20,429	22,929	25,429	27,929	$1347	$1347
AUSTIN	K	CITY OF AUSTIN - INDIRECT POTABLE REUSE THROUGH LADY BIRD LAKE	K | COLORADO INDIRECT REUSE	20,000	20,000	20,000	20,000	20,000	20,000	$180	$180
AUSTIN	K	CITY OF AUSTIN - LAKE AUSTIN OPERATIONS	K | COLORADO RUN-OF-RIVER	2,500	2,500	2,500	2,500	2,500	2,500	$10	$10
AUSTIN	K	CITY OF AUSTIN - LAKE LONG ENHANCED STORAGE	K | LAKE LONG/RESERVOIR	20,000	20,000	20,000	20,000	20,000	20,000	$187	$187
AUSTIN	K	CITY OF AUSTIN - LONGHORN DAM OPERATION IMPROVEMENTS	K | COLORADO RUN-OF-RIVER	3,000	3,000	3,000	3,000	3,000	3,000	$29	$29
AUSTIN	K	CITY OF AUSTIN - OTHER REUSE	K | DIRECT REUSE	1,000	1,000	1,500	2,000	2,500	3,000	$1022	$1022
AUSTIN	K	CITY OF AUSTIN - RAINWATER HARVESTING	K | RAINWATER HARVESTING	83	828	4,141	8,282	12,423	16,564	$3487	$3487
AUSTIN	K	CITY OF AUSTIN RETURN FLOWS	K | COLORADO INDIRECT REUSE - CITY OF AUSTIN RETURN FLOWS	19,258	17,749	22,990	22,874	26,759	30,312	$0	$0
AUSTIN	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	16,516	19,260	22,206	24,484	26,524	28,937	$50	$50
BARTON CREEK WEST WSC	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	65	64	64	63	63	63	$50	$50
BARTON CREEK WEST WSC	K	MUNICIPAL CONSERVATION - BARTON CREEK WEST WSC	DEMAND REDUCTION	42	77	108	122	137	152	$282	$282
BASTROP	K	DEVELOPMENT OF NEW GROUNDWATER SUPPLIES - CARRIZO-WILCOX AQUIFER	K | CARRIZO-WILCOX AQUIFER | BASTROP COUNTY	300	300	300	300	300	0	$937	N/A
BASTROP	K	DIRECT REUSE - BASTROP	K | DIRECT REUSE	0	0	300	600	1,120	1,120	N/A	$448
BASTROP	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	294	390	517	692	930	1,248	$50	$50
BASTROP	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	0	0	0	2,500	2,500	2,500	N/A	$2361
BASTROP	K	MUNICIPAL CONSERVATION - BASTROP	DEMAND REDUCTION	195	440	688	1,084	1,459	1,958	$303	$303
BASTROP COUNTY WCID #2	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	19	27	38	53	74	102	$50	$50
BASTROP COUNTY WCID #2	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - CARRIZO-WILCOX AQUIFER	K | CARRIZO-WILCOX AQUIFER | BASTROP COUNTY	0	0	0	0	550	550	N/A	$369
BAY CITY	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	568	579	582	591	599	606	$50	$50
BAY CITY	K	MUNICIPAL CONSERVATION - BAY CITY	DEMAND REDUCTION	252	199	114	94	95	96	$336	$336
BEE CAVE	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	355	409	459	516	567	614	$50	$50

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
BEE CAVE	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	300	300	600	600	800	800	$0	$0
BEE CAVE	K	MUNICIPAL CONSERVATION - BEE CAVE VILLAGE	DEMAND REDUCTION	175	374	608	863	1,136	1,323	$272	$272
BERTRAM	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	62	73	83	93	102	109	$50	$50
BERTRAM	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - ELLENBURGER-SAN SABA AQUIFER	K | ELLENBURGER-SAN SABA AQUIFER | BURNET COUNTY	180	180	180	180	180	180	$1044	$1044
BERTRAM	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	500	884	884	884	884	884	$952	$952
BERTRAM	K	MUNICIPAL CONSERVATION - BERTRAM	DEMAND REDUCTION	41	64	91	126	164	204	$292	$292
BLANCO	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	55	63	68	71	73	74	$50	$50
BLANCO	K	MUNICIPAL CONSERVATION - BLANCO	DEMAND REDUCTION	19	32	28	26	27	27	$378	$378
BRIARCLIFF	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	26	30	33	37	40	44	$50	$50
BUDA	K	DIRECT REUSE - BUDA	K | DIRECT REUSE	2,240	2,240	1,740	1,740	1,740	1,740	$264	$264
BUDA	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	177	251	342	456	586	734	$50	$50
BUDA	K	EDWARDS / MIDDLE TRINITY ASR	K | TRINITY AQUIFER ASR | HAYS COUNTY	0	600	600	600	600	600	N/A	$1291
BUDA	K	HCPUA PIPELINE - REGION K RECOMMENDED	L | CARRIZO-WILCOX AQUIFER | GONZALES COUNTY	0	667	1,690	2,467	2,467	2,467	N/A	$1926
BUDA	K	MUNICIPAL CONSERVATION - BUDA	DEMAND REDUCTION	88	206	434	552	709	888	$374	$374
BUDA	K	SALINE EDWARDS ASR	K | EDWARDS AQUIFER ASR FRESH/BRACKISH | TRAVIS COUNTY	0	100	100	100	100	100	N/A	$2031
BUDA	K	SALINE EDWARDS ASR (SALINE)	K | EDWARDS-BFZ AQUIFER SALINE | TRAVIS COUNTY	0	400	400	400	400	400	N/A	$2031
BURNET	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	370	441	500	559	612	658	$50	$50
BURNET	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	1,000	2,000	2,000	2,000	2,000	2,000	$952	$952
BURNET	K	MUNICIPAL CONSERVATION - BURNET	DEMAND REDUCTION	184	282	405	571	740	917	$291	$291
COLUMBUS	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	170	175	178	185	191	197	$50	$50
COLUMBUS	K	MUNICIPAL CONSERVATION - COLUMBUS	DEMAND REDUCTION	112	206	296	347	404	464	$282	$282
COTTONWOOD SHORES	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	45	54	61	68	74	80	$50	$50
COTTONWOOD SHORES	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	376	700	700	700	700	700	$1517	$1517
COTTONWOOD SHORES	K	MUNICIPAL CONSERVATION - COTTONWOOD SHORES	DEMAND REDUCTION	22	21	20	19	21	23	$322	$322
COUNTY-OTHER, BASTROP	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	281	338	413	517	657	845	$50	$50
COUNTY-OTHER, BASTROP	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - CARRIZO-WILCOX AQUIFER	K | CARRIZO-WILCOX AQUIFER | BASTROP COUNTY	60	60	60	60	60	0	$3267	N/A
COUNTY-OTHER, BASTROP	K	MUNICIPAL CONSERVATION - BASTROP COUNTY-OTHER	DEMAND REDUCTION	92	196	344	414	527	677	$374	$374
COUNTY-OTHER, BLANCO	K	BRUSH CONTROL	K | COLORADO RUN-OF-RIVER	425	425	425	425	425	425	$500	$500
COUNTY-OTHER, BLANCO	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	144	166	179	185	190	193	$50	$50

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
COUNTY-OTHER, BLANCO	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - ELLENBURGER-SAN SABA AQUIFER	K | ELLENBURGER-SAN SABA AQUIFER | BLANCO COUNTY	0	0	0	55	55	55	N/A	$1382
COUNTY-OTHER, BLANCO	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - HICKORY AQUIFER	K | HICKORY AQUIFER | BLANCO COUNTY	0	0	0	55	55	55	N/A	$2182
COUNTY-OTHER, BURNET	K	BRUSH CONTROL	K | COLORADO RUN-OF-RIVER	425	425	425	425	425	425	$500	$500
COUNTY-OTHER, BURNET	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	526	566	550	593	646	711	$50	$50
COUNTY-OTHER, BURNET	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	2,235	3,813	3,813	3,813	3,813	3,813	$1308	$1308
COUNTY-OTHER, BURNET	K	MUNICIPAL CONSERVATION - BURNET COUNTY-OTHER	DEMAND REDUCTION	60	93	83	80	87	94	$0	$0
COUNTY-OTHER, COLORADO	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	221	223	223	229	237	245	$50	$50
COUNTY-OTHER, COLORADO	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - GULF COAST AQUIFER	K | GULF COAST AQUIFER | COLORADO COUNTY	226	226	226	226	226	226	$602	$602
COUNTY-OTHER, FAYETTE	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	186	202	213	225	234	242	$50	$50
COUNTY-OTHER, FAYETTE	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - GULF COAST AQUIFER	K | GULF COAST AQUIFER | FAYETTE COUNTY	639	639	639	639	639	639	$667	$667
COUNTY-OTHER, GILLESPIE	K	BRUSH CONTROL	K | COLORADO RUN-OF-RIVER	425	425	425	425	425	425	$500	$500
COUNTY-OTHER, GILLESPIE	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	273	284	295	310	327	343	$50	$50
COUNTY-OTHER, HAYS	K	BRUSH CONTROL	K | COLORADO RUN-OF-RIVER	425	425	425	425	425	425	$500	$500
COUNTY-OTHER, HAYS	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	466	554	693	852	987	1,121	$50	$50
COUNTY-OTHER, HAYS	K	EDWARDS / MIDDLE TRINITY ASR	K | TRINITY AQUIFER ASR | HAYS COUNTY	0	200	200	200	200	200	N/A	$1291
COUNTY-OTHER, HAYS	K	HAYS COUNTY PIPELINE - REGION K RECOMMENDED	L | CARRIZO-WILCOX AQUIFER | GONZALES COUNTY	0	2,000	2,000	2,000	2,000	2,000	N/A	$708
COUNTY-OTHER, HAYS	K	SALINE EDWARDS ASR	K | EDWARDS AQUIFER ASR FRESH/BRACKISH | TRAVIS COUNTY	0	100	100	100	100	100	N/A	$2031
COUNTY-OTHER, HAYS	K	SALINE EDWARDS ASR (SALINE)	K | EDWARDS-BFZ AQUIFER SALINE | TRAVIS COUNTY	0	100	100	100	100	100	N/A	$2031
COUNTY-OTHER, HAYS	L	GBRA - MBWSP - SURFACE WATER W/ ASR (OPTION 3C)	L | GUADALUPE RUN-OF-RIVER	0	0	0	0	2,029	7,220	N/A	$596
COUNTY-OTHER, HAYS	L	TWA REGIONAL CARRIZO AQUIFER DEVELOPMENT	L | CARRIZO-WILCOX AQUIFER | GONZALES COUNTY	0	0	0	1,169	4,685	4,388	N/A	$2490
COUNTY-OTHER, HAYS	L	TWA TRINITY AQUIFER DEVELOPMENT	L | TRINITY AQUIFER | COMAL COUNTY	0	0	0	0	0	1,263	N/A	$704
COUNTY-OTHER, HAYS	L	VISTA RIDGE PROJECT	G | CARRIZO-WILCOX AQUIFER | BURLESON COUNTY	3,781	5,000	5,000	5,000	5,000	5,000	$680	$611
COUNTY-OTHER, LLANO	K	BRUSH CONTROL	K | COLORADO RUN-OF-RIVER	425	425	425	425	425	425	$500	$500
COUNTY-OTHER, LLANO	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	31	28	28	28	27	25	$50	$50
COUNTY-OTHER, MATAGORDA	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	81	81	81	81	81	83	$50	$50
COUNTY-OTHER, MILLS	K	BRUSH CONTROL	K | COLORADO RUN-OF-RIVER	425	425	425	425	425	425	$500	$500
COUNTY-OTHER, MILLS	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	77	77	75	78	81	84	$50	$50
COUNTY-OTHER, SAN SABA	K	BRUSH CONTROL	K | COLORADO RUN-OF-RIVER	425	425	425	425	425	425	$500	$500

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
COUNTY-OTHER, SAN SABA	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	47	48	47	46	47	48	$50	$50
COUNTY-OTHER, TRAVIS	K	BRUSH CONTROL	K | COLORADO RUN-OF-RIVER	425	425	425	425	425	425	$500	$500
COUNTY-OTHER, WHARTON	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	299	306	310	322	333	343	$50	$50
CREEDMOOR-MAHA WSC	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	30	34	38	42	46	51	$50	$50
CREEDMOOR-MAHA WSC	K	LCRA - MID BASIN RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	0	400	400	400	400	400	N/A	$151
CREEDMOOR-MAHA WSC	K	SALINE EDWARDS ASR	K | EDWARDS AQUIFER ASR FRESH/BRACKISH | TRAVIS COUNTY	0	101	101	101	101	101	N/A	$2031
CREEDMOOR-MAHA WSC	K	SALINE EDWARDS ASR (SALINE)	K | EDWARDS-BFZ AQUIFER SALINE | TRAVIS COUNTY	0	199	199	199	199	199	N/A	$2031
DRIPPING SPRINGS	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	96	107	122	141	163	188	$50	$50
DRIPPING SPRINGS	K	HAYS COUNTY PIPELINE - REGION K RECOMMENDED	L | CARRIZO-WILCOX AQUIFER | GONZALES COUNTY	0	0	0	0	134	407	N/A	$0
DRIPPING SPRINGS	K	MUNICIPAL CONSERVATION - DRIPPING SPRINGS	DEMAND REDUCTION	48	67	98	141	195	262	$293	$293
DRIPPING SPRINGS	K	WATER PURCHASE	K | HIGHLAND LAKES LAKE/RESERVOIR SYSTEM	0	31	104	198	173	0	N/A	N/A
DRIPPING SPRINGS WSC	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	107	136	172	218	271	330	$50	$50
DRIPPING SPRINGS WSC	K	HAYS COUNTY PIPELINE - REGION K RECOMMENDED	L | CARRIZO-WILCOX AQUIFER | GONZALES COUNTY	0	1,000	1,000	1,000	866	593	N/A	$708
DRIPPING SPRINGS WSC	K	MUNICIPAL CONSERVATION - DRIPPING SPRINGS WSC	DEMAND REDUCTION	54	124	152	187	232	283	$313	$313
EAGLE LAKE	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	78	79	79	82	85	87	$50	$50
EAST BERNARD	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	57	59	61	63	65	67	$50	$50
EAST BERNARD	K	MUNICIPAL CONSERVATION - EAST BERNARD	DEMAND REDUCTION	19	29	42	56	78	97	$395	$395
ELGIN	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	233	301	386	500	650	844	$50	$50
ELGIN	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - CARRIZO-WILCOX AQUIFER	K | CARRIZO-WILCOX AQUIFER | BASTROP COUNTY	300	300	0	0	0	0	$667	N/A
ELGIN	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	0	3,500	3,500	3,500	3,500	3,500	N/A	$2718
FAYETTE WSC	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	113	125	133	141	148	152	$50	$50
FLATONIA	K	DIRECT REUSE - FLATONIA	K | DIRECT REUSE	134	149	159	168	176	182	$821	$821
FLATONIA	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	51	56	59	63	65	68	$50	$50
FLATONIA	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - GULF COAST AQUIFER	K | GULF COAST AQUIFER | FAYETTE COUNTY	100	100	100	100	100	100	$2060	$2060
FLATONIA	K	MUNICIPAL CONSERVATION - FLATONIA	DEMAND REDUCTION	17	29	43	60	84	105	$356	$356
FREDERICKSBURG	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	472	499	521	551	580	609	$50	$50
FREDERICKSBURG	K	MUNICIPAL CONSERVATION - FREDERICKSBURG	DEMAND REDUCTION	317	599	733	916	1,094	1,301	$284	$284
GOLDTHWAITE	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	53	53	53	55	57	59	$50	$50
GOLDTHWAITE	K	MUNICIPAL CONSERVATION - GOLDTHWAITE	DEMAND REDUCTION	10	13	24	38	54	58	$449	$449
GRANITE SHOALS	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	33	38	43	48	53	57	$50	$50

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
GRANITE SHOALS	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	0	0	0	250	250	250	N/A	$151
HORSESHOE BAY	K	DIRECT REUSE - HORSESHOE BAY	K | DIRECT REUSE	100	100	100	100	100	100	$0	$0
HORSESHOE BAY	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	651	748	810	860	930	994	$50	$50
HORSESHOE BAY	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	0	200	550	550	1,050	1,050	N/A	$151
HORSESHOE BAY	K	MUNICIPAL CONSERVATION - HORSESHOE BAY	DEMAND REDUCTION	264	554	852	1,157	1,501	1,839	$257	$257
IRRIGATION, COLORADO	K	CITY OF AUSTIN RETURN FLOWS	K | COLORADO INDIRECT REUSE - CITY OF AUSTIN RETURN FLOWS	0	0	466	336	485	0	N/A	N/A
IRRIGATION, COLORADO	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	29,542	28,746	27,974	27,221	26,489	25,776	$163	$163
IRRIGATION, COLORADO	K	IRRIGATION CONSERVATION - ON FARM	DEMAND REDUCTION	3,521	4,441	5,287	6,049	6,717	7,281	$162	$162
IRRIGATION, COLORADO	K	IRRIGATION CONSERVATION - OPERATION CONVEYANCE IMPROVEMENTS	DEMAND REDUCTION	916	2,904	4,791	6,527	8,092	9,364	$200	$200
IRRIGATION, COLORADO	K	IRRIGATION CONSERVATION - SPRINKLER	DEMAND REDUCTION	251	1,221	2,362	2,845	2,845	2,845	$36	$36
IRRIGATION, COLORADO	K	LCRA - INTERRUPTIBLE WATER FOR AGRICULTURE (LCRA WMP AMENDMENTS)	K | HIGHLAND LAKES LAKE/RESERVOIR SYSTEM	25,007	18,363	8,775	4,387	0	0	$50	N/A
IRRIGATION, MATAGORDA	K	CITY OF AUSTIN RETURN FLOWS	K | COLORADO INDIRECT REUSE - CITY OF AUSTIN RETURN FLOWS	8,832	9,326	11,356	13,011	14,876	17,560	$0	$0
IRRIGATION, MATAGORDA	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	37,244	36,228	35,238	34,276	33,340	32,429	$649	$649
IRRIGATION, MATAGORDA	K	IRRIGATION CONSERVATION - ON FARM	DEMAND REDUCTION	9,947	13,109	16,369	19,741	23,234	26,865	$162	$162
IRRIGATION, MATAGORDA	K	IRRIGATION CONSERVATION - OPERATION CONVEYANCE IMPROVEMENTS	DEMAND REDUCTION	2,587	8,572	14,836	21,300	27,986	34,548	$200	$200
IRRIGATION, MATAGORDA	K	IRRIGATION CONSERVATION - SPRINKLER	DEMAND REDUCTION	711	3,604	7,316	9,286	9,286	9,286	$36	$36
IRRIGATION, MATAGORDA	K	LCRA - INTERRUPTIBLE WATER FOR AGRICULTURE (LCRA WMP AMENDMENTS)	K | HIGHLAND LAKES LAKE/RESERVOIR SYSTEM	36,997	23,109	9,221	4,611	0	0	$50	N/A
IRRIGATION, MILLS	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	125	95	65	36	7	0	$123	N/A
IRRIGATION, MILLS	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - TRINITY AQUIFER	K | TRINITY AQUIFER | MILLS COUNTY	480	480	480	480	480	480	$1619	$1619
IRRIGATION, WHARTON	K	CITY OF AUSTIN RETURN FLOWS	K | COLORADO INDIRECT REUSE - CITY OF AUSTIN RETURN FLOWS	6,361	6,494	7,216	7,546	7,546	8,484	$0	$0
IRRIGATION, WHARTON	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	27,855	27,106	26,376	25,666	24,976	24,305	$260	$260
IRRIGATION, WHARTON	K	IRRIGATION CONSERVATION - ON FARM	DEMAND REDUCTION	6,533	8,450	10,343	12,211	14,049	15,853	$162	$162
IRRIGATION, WHARTON	K	IRRIGATION CONSERVATION - OPERATION CONVEYANCE IMPROVEMENTS	DEMAND REDUCTION	1,698	5,525	9,374	13,175	16,922	20,388	$200	$200
IRRIGATION, WHARTON	K	IRRIGATION CONSERVATION - SPRINKLER	DEMAND REDUCTION	467	2,323	4,622	5,743	5,743	5,743	$36	$36
IRRIGATION, WHARTON	K	LCRA - INTERRUPTIBLE WATER FOR AGRICULTURE (LCRA WMP AMENDMENTS)	K | HIGHLAND LAKES LAKE/RESERVOIR SYSTEM	15,876	7,192	1,452	726	0	0	$50	N/A
IRRIGATION, WHARTON	P	IRRIGATION CONSERVATION - ON FARM	DEMAND REDUCTION	41,338	41,338	41,338	41,338	41,338	41,338	$76	$76
IRRIGATION, WHARTON	P	IRRIGATION CONSERVATION - TAILWATER RECOVERY	DEMAND REDUCTION	8,429	8,429	8,429	8,429	8,429	8,429	$423	$423

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
IRRIGATION, WHARTON	P	LOCAL OFF-CHANNEL RESERVOIR - WHARTON COUNTY (LANE CITY)	K | COLORADO RUN-OF-RIVER	12,000	12,000	12,000	12,000	12,000	12,000	$33	$33
JOHNSON CITY	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	71	82	89	92	95	96	$50	$50
JOHNSON CITY	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - ELLENBURGER-SAN SABA AQUIFER	K | ELLENBURGER-SAN SABA AQUIFER | BLANCO COUNTY	175	175	175	175	175	175	$800	$800
JOHNSON CITY	K	MUNICIPAL CONSERVATION - JOHNSON CITY	DEMAND REDUCTION	18	30	30	28	26	26	$378	$378
JONESTOWN	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	82	86	90	95	99	104	$50	$50
JONESTOWN	K	MUNICIPAL CONSERVATION - JONESTOWN	DEMAND REDUCTION	20	36	51	73	96	122	$356	$356
KINGSLAND WSC	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	47	54	53	50	56	60	$50	$50
LA GRANGE	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	130	144	153	161	168	174	$50	$50
LA GRANGE	K	MUNICIPAL CONSERVATION - LA GRANGE	DEMAND REDUCTION	42	21	0	0	0	0	$396	N/A
LAGO VISTA	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	374	437	498	566	628	686	$50	$50
LAGO VISTA	K	MUNICIPAL CONSERVATION - LAGO VISTA	DEMAND REDUCTION	187	301	426	604	773	972	$291	$291
LAKEWAY	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	1,395	1,823	1,819	1,816	1,815	1,815	$50	$50
LAKEWAY	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - TRINITY AQUIFER	K | TRINITY AQUIFER | TRAVIS COUNTY	500	500	500	500	500	500	$570	$570
LAKEWAY	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	1,000	1,000	1,000	1,000	1,000	1,000	$0	$0
LAKEWAY	K	MUNICIPAL CONSERVATION - LAKEWAY	DEMAND REDUCTION	702	1,652	2,408	3,052	3,640	3,921	$272	$272
LLANO	K	DEVELOPMENT OF NEW GROUNDWATER SUPPLIES - HICKORY AQUIFER	K | HICKORY AQUIFER | LLANO COUNTY	200	200	200	200	200	200	$1270	$1270
LLANO	K	DIRECT REUSE - LLANO	K | DIRECT REUSE	100	100	100	100	100	100	$660	$660
LLANO	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	129	134	132	128	133	137	$50	$50
LLANO	K	MUNICIPAL CONSERVATION - LLANO	DEMAND REDUCTION	88	118	143	169	209	252	$291	$291
LOOP 360 WSC	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	176	183	190	197	204	211	$50	$50
LOOP 360 WSC	K	MUNICIPAL CONSERVATION - LOOP 360 WSC	DEMAND REDUCTION	116	224	333	441	546	648	$258	$258
LOST CREEK MUD	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	218	214	211	211	211	211	$50	$50
LOST CREEK MUD	K	MUNICIPAL CONSERVATION - LOST CREEK MUD	DEMAND REDUCTION	108	137	171	215	254	294	$291	$291
LOWER COLORADO RIVER AUTHORITY - UNASSIGNED WATER VOLUMES	K	CITY OF AUSTIN RETURN FLOWS	K | COLORADO INDIRECT REUSE - CITY OF AUSTIN RETURN FLOWS	20,594	18,530	19,919	19,519	19,999	22,526	$0	$0
LOWER COLORADO RIVER AUTHORITY - UNASSIGNED WATER VOLUMES	K	CITY OF PFLUGERVILLE - DOWNSTREAM RETURN FLOWS	K | COLORADO INDIRECT REUSE - DOWNSTREAM RETURN FLOWS	5,086	5,834	6,784	8,636	8,997	10,453	$0	$0
LOWER COLORADO RIVER AUTHORITY - UNASSIGNED WATER VOLUMES	K	LCRA - ACQUIRE ADDITIONAL WATER RIGHTS	K | COLORADO RUN-OF-RIVER	250	250	250	250	250	250	$500	$0
LOWER COLORADO RIVER AUTHORITY - UNASSIGNED WATER VOLUMES	K	LCRA - EXCESS FLOWS RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	15,257	15,543	15,830	16,117	16,404	16,691	$1446	$1446
MANOR	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	171	234	294	362	422	477	$50	$50
MANOR	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - TRINITY AQUIFER	K | TRINITY AQUIFER | TRAVIS COUNTY	0	600	600	600	600	600	N/A	$545

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
MANUFACTURING, BASTROP	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - CARRIZO-WILCOX AQUIFER	K | CARRIZO-WILCOX AQUIFER | BASTROP COUNTY	55	87	120	151	174	199	$995	$995
MANUFACTURING, FAYETTE	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - GULF COAST AQUIFER	K | GULF COAST AQUIFER | FAYETTE COUNTY	391	391	391	391	391	391	$547	$547
MANUFACTURING, GILLESPIE	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - ELLENBURGER-SAN SABA AQUIFER	K | ELLENBURGER-SAN SABA AQUIFER | GILLESPIE COUNTY	626	626	626	626	626	626	$594	$594
MANVILLE WSC	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	448	541	630	733	825	911	$50	$50
MANVILLE WSC	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - TRINITY AQUIFER	K | TRINITY AQUIFER | TRAVIS COUNTY	0	0	0	1,000	1,000	1,000	N/A	$537
MANVILLE WSC	K	LCRA - MID BASIN RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	0	0	0	500	2,000	2,000	N/A	$151
MARBLE FALLS	K	DIRECT REUSE - MARBLE FALLS	K | DIRECT REUSE	11	11	11	11	11	11	$0	$0
MARBLE FALLS	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	466	674	968	1,122	1,225	1,277	$50	$50
MARBLE FALLS	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	500	4,000	4,000	4,000	4,000	4,000	$1517	$1517
MARBLE FALLS	K	MUNICIPAL CONSERVATION - MARBLE FALLS	DEMAND REDUCTION	234	587	1,016	1,397	1,764	2,059	$286	$286
MEADOWLAKES	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	170	204	233	261	286	308	$50	$50
MEADOWLAKES	K	MUNICIPAL CONSERVATION - MEADOWLAKES	DEMAND REDUCTION	84	188	309	443	573	708	$271	$271
MINING, BASTROP	K	DEVELOPMENT OF NEW GROUNDWATER SUPPLIES - CARRIZO-WILCOX AQUIFER	K | CARRIZO-WILCOX AQUIFER | BASTROP COUNTY	0	0	466	466	466	466	N/A	$689
MINING, BASTROP	K	DEVELOPMENT OF NEW GROUNDWATER SUPPLIES - QUEEN CITY AQUIFER	K | QUEEN CITY AQUIFER | BASTROP COUNTY	110	306	0	0	0	0	$755	N/A
MINING, BURNET	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - ELLENBURGER-SAN SABA AQUIFER	K | ELLENBURGER-SAN SABA AQUIFER | BURNET COUNTY	1,500	1,500	1,500	1,500	1,500	1,500	$950	$950
MINING, BURNET	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - HICKORY AQUIFER	K | HICKORY AQUIFER | BURNET COUNTY	0	500	1,000	1,800	1,800	1,800	N/A	$718
MINING, BURNET	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - MARBLE FALLS AQUIFER	K | MARBLE FALLS AQUIFER | BURNET COUNTY	0	0	0	0	1,000	1,500	N/A	$469
MINING, FAYETTE	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - GULF COAST AQUIFER	K | GULF COAST AQUIFER | FAYETTE COUNTY	1,920	1,520	1,061	618	344	344	$388	$622
MINING, FAYETTE	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - SPARTA AQUIFER	K | SPARTA AQUIFER | FAYETTE COUNTY	66	42	13	0	0	0	$1030	N/A
MINING, HAYS	K	DIRECT REUSE - BUDA	K | DIRECT REUSE	0	0	500	500	500	500	N/A	$0
MINING, HAYS	K	EDWARDS / MIDDLE TRINITY ASR	K | TRINITY AQUIFER ASR | HAYS COUNTY	0	100	100	100	100	100	N/A	$1291
MINING, HAYS	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - TRINITY AQUIFER	K | TRINITY AQUIFER | HAYS COUNTY	531	761	1,047	1,047	1,047	1,047	$436	$436
MOUNTAIN CITY	K	EDWARDS / MIDDLE TRINITY ASR	K | TRINITY AQUIFER ASR | HAYS COUNTY	0	44	44	44	44	44	N/A	$1291
MOUNTAIN CITY	L	DROUGHT MANAGEMENT - MOUNTAIN CITY	DEMAND REDUCTION	1	0	0	0	0	0	$14	N/A
MOUNTAIN CITY	L	LOCAL TRINITY AQUIFER DEVELOPMENT	K | TRINITY AQUIFER | HAYS COUNTY	60	60	60	60	60	60	$1300	$1300
MOUNTAIN CITY	L	MUNICIPAL WATER CONSERVATION (RURAL)	DEMAND REDUCTION	0	0	0	0	0	1	N/A	$770
NORTH AUSTIN MUD #1	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	128	124	121	118	118	118	$50	$50
NORTHTOWN MUD	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	104	120	135	152	167	180	$50	$50

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
PALACIOS	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	102	104	104	105	107	108	$50	$50
PFLUGERVILLE	K	DIRECT REUSE - PFLUGERVILLE	K | DIRECT REUSE	500	1,000	2,000	2,000	4,000	4,000	$228	$228
PFLUGERVILLE	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	3,194	4,276	5,311	6,474	7,503	8,463	$50	$50
PFLUGERVILLE	K	EXPANSION OF CURRENT GROUNDWATER SUPPLIES - EDWARDS-BFZ AQUIFER	K | EDWARDS-BFZ AQUIFER | TRAVIS COUNTY	0	0	1,000	1,000	1,000	1,000	N/A	$371
PFLUGERVILLE	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	0	0	0	3,000	3,000	4,000	N/A	$151
PFLUGERVILLE	K	LCRA - MID BASIN RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	0	0	0	0	0	2,000	N/A	$151
PFLUGERVILLE	K	MUNICIPAL CONSERVATION - PFLUGERVILLE	DEMAND REDUCTION	604	2,105	2,625	3,029	3,514	3,966	$295	$295
POINT VENTURE	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	52	66	80	96	109	122	$50	$50
POINT VENTURE	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	0	100	100	300	300	300	N/A	$151
POINT VENTURE	K	MUNICIPAL CONSERVATION - POINT VENTURE	DEMAND REDUCTION	34	82	139	191	241	301	$282	$282
ROLLINGWOOD	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	58	57	56	56	56	57	$50	$50
ROLLINGWOOD	K	LCRA - MID BASIN RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	0	400	400	400	400	400	N/A	$151
ROLLINGWOOD	K	MUNICIPAL CONSERVATION - ROLLINGWOOD	DEMAND REDUCTION	38	67	79	91	104	118	$286	$286
SAN SABA	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	228	236	235	230	235	240	$50	$50
SAN SABA	K	MUNICIPAL CONSERVATION - SAN SABA	DEMAND REDUCTION	114	211	302	377	463	510	$275	$275
SCHULENBURG	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	110	123	132	139	146	150	$50	$50
SCHULENBURG	K	MUNICIPAL CONSERVATION - SCHULENBURG	DEMAND REDUCTION	37	63	96	141	188	232	$343	$343
SHADY HOLLOW MUD	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	117	114	111	110	110	110	$50	$50
SHADY HOLLOW MUD	K	MUNICIPAL CONSERVATION - SHADY HOLLOW MUD	DEMAND REDUCTION	38	16	0	0	0	0	$397	N/A
SMITHVILLE	K	DEVELOPMENT OF NEW GROUNDWATER SUPPLIES - QUEEN CITY AQUIFER	K | QUEEN CITY AQUIFER | BASTROP COUNTY	0	0	0	0	0	150	N/A	$1607
SMITHVILLE	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	126	161	208	273	362	480	$50	$50
SMITHVILLE	K	MUNICIPAL CONSERVATION - SMITHVILLE	DEMAND REDUCTION	44	72	76	88	117	155	$376	$376
STEAM ELECTRIC POWER, BASTROP	K	LCRA - EXPAND USE OF GROUNDWATER (CARRIZO-WILCOX AQUIFER)	K | CARRIZO-WILCOX AQUIFER | BASTROP COUNTY	300	300	300	300	300	300	$1517	$1517
STEAM ELECTRIC POWER, FAYETTE	K	CITY OF AUSTIN - LAKE LONG ENHANCED STORAGE	K | LAKE LONG/RESERVOIR	2,000	2,000	2,000	2,000	2,000	2,000	$187	$187
STEAM ELECTRIC POWER, FAYETTE	K	LCRA - GROUNDWATER SUPPLY FOR FPP (OFF-SITE)	K | CARRIZO-WILCOX AQUIFER | FAYETTE COUNTY	500	500	500	500	500	500	$1113	$1113
STEAM ELECTRIC POWER, FAYETTE	K	LCRA - GROUNDWATER SUPPLY FOR FPP (OFF-SITE)	K | YEGUA-JACKSON AQUIFER | FAYETTE COUNTY	2,000	2,000	2,000	2,000	2,000	2,000	$1113	$1113
STEAM ELECTRIC POWER, FAYETTE	K	LCRA - GROUNDWATER SUPPLY FOR FPP (ON-SITE)	K | GULF COAST AQUIFER | FAYETTE COUNTY	700	700	700	700	700	700	$496	$496
STEAM ELECTRIC POWER, FAYETTE	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	6,000	7,000	9,000	11,000	13,000	15,000	$151	$151
STEAM ELECTRIC POWER, MATAGORDA	K	BLEND BRACKISH SURFACE WATER IN STPNOC RESERVOIR	K | GULF OF MEXICO SALINE	3,000	3,000	3,000	3,000	3,000	3,000	$0	$0

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
STEAM ELECTRIC POWER, MATAGORDA	K	CITY OF AUSTIN RETURN FLOWS	K | COLORADO INDIRECT REUSE - CITY OF AUSTIN RETURN FLOWS	770	710	766	763	764	859	$0	$0
STEAM ELECTRIC POWER, MATAGORDA	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	22,727	22,727	22,727	22,727	22,727	22,727	$151	$151
STEAM ELECTRIC POWER, TRAVIS	K	CITY OF AUSTIN - DIRECT REUSE	K | DIRECT REUSE	3,500	7,500	7,500	8,500	9,500	10,500	$1347	$1347
STEAM ELECTRIC POWER, TRAVIS	K	LCRA - MID BASIN RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	0	0	0	0	4,543	11,030	N/A	$151
STEAM ELECTRIC POWER, WHARTON	K	DEVELOPMENT OF NEW GROUNDWATER SUPPLIES - GULF COAST AQUIFER	K | GULF COAST AQUIFER | WHARTON COUNTY	0	0	0	0	200	200	N/A	$1035
SUNRISE BEACH VILLAGE	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	4	4	4	3	3	3	$50	$50
SUNSET VALLEY	K	DEVELOPMENT OF NEW GROUNDWATER SUPPLIES - TRINITY AQUIFER	K | TRINITY AQUIFER | TRAVIS COUNTY	0	0	200	200	200	200	N/A	$1035
SUNSET VALLEY	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	116	150	182	218	250	280	$50	$50
SUNSET VALLEY	K	EDWARDS / MIDDLE TRINITY ASR	K | TRINITY AQUIFER ASR | HAYS COUNTY	0	200	200	200	200	200	N/A	$1291
SUNSET VALLEY	K	LCRA - MID BASIN RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	0	715	715	715	715	715	N/A	$151
SUNSET VALLEY	K	MUNICIPAL CONSERVATION - SUNSET VALLEY	DEMAND REDUCTION	38	90	158	241	305	366	$276	$276
THE HILLS	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	217	217	216	216	216	216	$50	$50
THE HILLS	K	MUNICIPAL CONSERVATION - THE HILLS	DEMAND REDUCTION	144	272	386	487	581	665	$263	$263
TRAVIS COUNTY MUD #4	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	522	602	677	762	837	907	$50	$50
TRAVIS COUNTY MUD #4	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY MUD #4	DEMAND REDUCTION	262	564	912	1,302	1,705	2,114	$251	$251
TRAVIS COUNTY WCID #10	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	532	607	679	761	835	905	$50	$50
TRAVIS COUNTY WCID #10	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	0	3,000	3,000	3,000	3,000	3,000	N/A	$151
TRAVIS COUNTY WCID #10	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #10	DEMAND REDUCTION	213	445	707	996	1,316	1,533	$275	$275
TRAVIS COUNTY WCID #17	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	1,268	1,508	1,653	1,678	1,722	1,776	$50	$50
TRAVIS COUNTY WCID #17	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	1,000	2,000	2,000	2,000	2,000	2,000	$151	$151
TRAVIS COUNTY WCID #17	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #17	DEMAND REDUCTION	853	1,825	2,399	2,889	3,325	4,645	$289	$289
TRAVIS COUNTY WCID #18	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	168	190	211	236	259	280	$50	$50
TRAVIS COUNTY WCID #18	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #18	DEMAND REDUCTION	60	95	87	87	96	104	$375	$375
TRAVIS COUNTY WCID #19	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	100	99	99	99	99	99	$50	$50
TRAVIS COUNTY WCID #19	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #19	DEMAND REDUCTION	50	92	131	166	199	229	$255	$255
TRAVIS COUNTY WCID #20	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	118	117	117	117	116	116	$50	$50
TRAVIS COUNTY WCID #20	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #20	DEMAND REDUCTION	59	110	153	197	234	268	$261	$261
VOLENTE	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	4	4	5	6	7	7	$50	$50
VOLENTE	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	142	142	142	142	142	142	$7644	$7644
WEIMAR	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	83	85	87	90	92	96	$50	$50

Recommended Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
WEIMAR	K	MUNICIPAL CONSERVATION - WEIMAR	DEMAND REDUCTION	56	74	90	117	144	171	$290	$290
WELLS BRANCH MUD	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	88	86	85	84	84	84	$50	$50
WEST LAKE HILLS	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	313	310	308	307	306	306	$50	$50
WEST LAKE HILLS	K	LCRA - MID BASIN RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	0	1,300	1,300	1,300	1,300	1,300	N/A	$151
WEST LAKE HILLS	K	MUNICIPAL CONSERVATION - WEST LAKE HILLS	DEMAND REDUCTION	157	286	398	505	609	700	$267	$267
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	1,292	1,696	2,170	2,757	3,400	4,120	$50	$50
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	K	HAYS COUNTY PIPELINE - REGION K RECOMMENDED	L | CARRIZO-WILCOX AQUIFER | GONZALES COUNTY	0	1,000	1,000	1,000	1,000	1,000	N/A	$708
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	K	LCRA - LANE CITY RESERVOIR	K | LCRA NEW OFF-CHANNEL RESERVOIRS (2020 DECADE)	0	700	2,900	3,400	6,200	6,200	N/A	$151
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	K	MUNICIPAL CONSERVATION - WEST TRAVIS COUNTY PUA	DEMAND REDUCTION	639	1,575	2,873	4,665	6,874	9,574	$267	$267
WHARTON	K	DROUGHT MANAGEMENT	DEMAND REDUCTION	250	259	265	274	283	291	$50	$50
WHARTON	K	MUNICIPAL CONSERVATION - WHARTON	DEMAND REDUCTION	168	134	176	171	176	182	$312	$312
			Region K Total RecommendedWMS Supplies	538,369	598,375	649,286	725,008	789,681	866,675		

Recommended Projects Associated with Water Management Strategies

Project Sponosr Region: K

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
AQUA WSC	N	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - AQUA WSC	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$9,777,000	2020
AQUA WSC	N	MUNICIPAL CONSERVATION - AQUA WSC	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$1,384,870	2020
AQUA WSC	N	NEW SURFACE WATER INFRASTRUCTURE - AQUA WSC	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; NEW WATER TREATMENT PLANT; PUMP STATION; STORAGE TANK	$127,538,000	2040
AUSTIN	Y	CITY OF AUSTIN - AQUIFER STORAGE AND RECOVERY	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; MULTIPLE WELLS/WELL FIELD; PUMP STATION; WATER TREATMENT PLANT EXPANSION	$312,316,000	2020
AUSTIN	Y	CITY OF AUSTIN - CAPTURE LOCAL INFLOWS TO LADY BIRD LAKE	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; PUMP STATION	$2,949,000	2020
AUSTIN	Y	CITY OF AUSTIN - DIRECT REUSE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; WATER TREATMENT PLANT EXPANSION	$536,176,000	2020
AUSTIN	Y	CITY OF AUSTIN - INDIRECT POTABLE REUSE THROUGH LADY BIRD LAKE	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; PUMP STATION	$41,970,000	2020
AUSTIN	Y	CITY OF AUSTIN - LAKE LONG ENHANCED STORAGE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$31,041,000	2020
AUSTIN	Y	CITY OF AUSTIN - LONGHORN DAM OPERATIONS IMPROVEMENTS	WATER LOSS CONTROL	$1,036,000	2020
AUSTIN	Y	CITY OF AUSTIN - OTHER REUSE	CONVEYANCE/TRANSMISSION PIPELINE; NEW WATER TREATMENT PLANT; PUMP STATION; STORAGE TANK	$21,772,000	2020
AUSTIN	Y	CITY OF AUSTIN - RAINWATER HARVESTING	MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); STORAGE TANK	$690,167,000	2020
AUSTIN	Y	CITY OF AUSTIN CONSERVATION	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$41,434,437	2020
BARTON CREEK WEST WSC	N	MUNICIPAL CONSERVATION - BARTON CREEK WEST WSC	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$38,391	2020
BASTROP	N	DEVELOPMENT OF NEW CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$2,976,000	2020
BASTROP	N	DIRECT REUSE - BASTROP	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$4,625,000	2040
BASTROP	N	MUNICIPAL CONSERVATION - BASTROP	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$224,866	2020
BASTROP	N	NEW SURFACE WATER INFRASTRUCTURE - BASTROP	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; NEW WATER TREATMENT PLANT; PUMP STATION	$34,858,000	2050
BASTROP COUNTY WCID #2	N	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP COUNTY WCID #2	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$2,150,000	2060
BAY CITY	N	MUNICIPAL CONSERVATION - BAY CITY	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$405,403	2020
BEE CAVE	N	MUNICIPAL CONSERVATION - BEE CAVE VILLAGE	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$137,097	2020
BERTRAM	N	BUENA VISTA REGIONAL PROJECT	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION	$4,523,170	2020
BERTRAM	N	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - BERTRAM	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$2,031,000	2020

Recommended Projects Associated with Water Management Strategies

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
BERTRAM	N	MUNICIPAL CONSERVATION - BERTRAM	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$41,421	2020
BLANCO	N	MUNICIPAL CONSERVATION - BLANCO	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$47,867	2020
BUDA	N	BS/EACD EDWARDS / MIDDLE TRINITY ASR	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; PUMP STATION	$6,818,182	2030
BUDA	N	BS/EACD SALINE EDWARDS ASR	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; PUMP STATION	$7,500,000	2030
BUDA	N	DIRECT REUSE - BUDA	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$6,075,000	2020
BUDA	N	MUNICIPAL CONSERVATION - BUDA	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$221,686	2020
BURNET	N	BUENA VISTA REGIONAL PROJECT	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION	$10,233,415	2020
BURNET	N	MUNICIPAL CONSERVATION - BURNET	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$184,386	2020
CEDAR PARK	Y	MUNICIPAL CONSERVATION - CEDAR PARK	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$238,695	2020
COLUMBUS	N	MUNICIPAL CONSERVATION - COLUMBUS	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$100,974	2020
COTTONWOOD SHORES	N	MARBLE FALLS REGIONAL PROJECT	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; NEW WATER TREATMENT PLANT; PUMP STATION; STORAGE TANK	$6,099,086	2020
COTTONWOOD SHORES	N	MUNICIPAL CONSERVATION - COTTONWOOD SHORES	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$30,672	2020
COUNTY-OTHER, BASTROP	N	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP COUNTY-OTHER	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$2,150,000	2020
COUNTY-OTHER, BASTROP	N	MUNICIPAL CONSERVATION - BASTROP COUNTY OTHER	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$232,736	2020
COUNTY-OTHER, BLANCO	N	BRUSH CONTROL	BRUSH CONTROL CAPITAL COST	$2,137,000	2020
COUNTY-OTHER, BLANCO	N	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - BLANCO COUNTY-OTHER	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$821,000	2050
COUNTY-OTHER, BLANCO	N	EXPANSION OF HICKORY AQUIFER SUPPLIES - BLANCO COUNTY-OTHER	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$1,316,000	2050
COUNTY-OTHER, BURNET	N	BRUSH CONTROL	BRUSH CONTROL CAPITAL COST	$2,137,000	2020
COUNTY-OTHER, BURNET	N	BUENA VISTA REGIONAL PROJECT	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION	$10,233,415	2020
COUNTY-OTHER, BURNET	N	EAST LAKE BUCHANAN REGIONAL PROJECT	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; NEW WATER TREATMENT PLANT; PUMP STATION; STORAGE TANK	$10,337,000	2020
COUNTY-OTHER, BURNET	N	MARBLE FALLS REGIONAL PROJECT	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; NEW WATER TREATMENT PLANT; PUMP STATION; STORAGE TANK	$7,649,996	2020

Recommended Projects Associated with Water Management Strategies

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COUNTY-OTHER, BURNET	N	MUNICIPAL CONSERVATION - BURNET COUNTY-OTHER	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$164,771	2020
COUNTY-OTHER, COLORADO	N	EXPANSION OF GULF COAST AQUIFER SUPPLIES - COLORADO COUNTY-OTHER	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$1,466,000	2020
COUNTY-OTHER, FAYETTE	N	EXPANSION OF GULF COAST AQUIFER SUPPLIES - FAYETTE COUNTY-OTHER	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$4,558,000	2020
COUNTY-OTHER, GILLESPIE	N	BRUSH CONTROL	BRUSH CONTROL CAPITAL COST	$2,137,000	2020
COUNTY-OTHER, HAYS	N	BRUSH CONTROL	BRUSH CONTROL CAPITAL COST	$2,137,000	2020
COUNTY-OTHER, HAYS	N	BS/EACD EDWARDS / MIDDLE TRINITY ASR	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; PUMP STATION	$2,272,727	2030
COUNTY-OTHER, HAYS	N	BS/EACD SALINE EDWARDS ASR	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; PUMP STATION	$3,000,000	2030
COUNTY-OTHER, HAYS	N	HAYS COUNTY PIPELINE - REGION K PORTION	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$11,739,500	2030
COUNTY-OTHER, LLANO	N	BRUSH CONTROL	BRUSH CONTROL CAPITAL COST	$2,137,000	2020
COUNTY-OTHER, MILLS	N	BRUSH CONTROL	BRUSH CONTROL CAPITAL COST	$2,137,000	2020
COUNTY-OTHER, SAN SABA	N	BRUSH CONTROL	BRUSH CONTROL CAPITAL COST	$2,137,000	2020
COUNTY-OTHER, TRAVIS	N	BRUSH CONTROL	BRUSH CONTROL CAPITAL COST	$2,137,000	2020
CREEDMOOR-MAHA WSC	N	BS/EACD SALINE EDWARDS ASR	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; PUMP STATION	$4,500,000	2030
DRIPPING SPRINGS	N	MUNICIPAL CONSERVATION - DRIPPING SPRINGS	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$49,510	2020
DRIPPING SPRINGS WSC	N	HAYS COUNTY PIPELINE - REGION K PORTION	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$5,869,750	2030
DRIPPING SPRINGS WSC	N	MUNICIPAL CONSERVATION - DRIPPING SPRINGS WSC	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$68,043	2020
EAST BERNARD	N	MUNICIPAL CONSERVATION - EAST BERNARD	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$52,607	2020
ELGIN	N	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - ELGIN	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$2,150,000	2020
ELGIN	N	NEW SURFACE WATER INFRASTRUCTURE - ELGIN	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; NEW WATER TREATMENT PLANT; PUMP STATION; STORAGE TANK	$61,623,000	2030
FLATONIA	N	DIRECT REUSE - FLATONIA	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$1,226,000	2020
FLATONIA	N	EXPANSION OF GULF COAST AQUIFER SUPPLIES - FLATONIA	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$2,241,000	2020
FLATONIA	N	MUNICIPAL CONSERVATION - FLATONIA	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$37,553	2020
FREDERICKSBURG	N	MUNICIPAL CONSERVATION - FREDERICKSBURG	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$291,489	2020
GOLDTHWAITE	N	MUNICIPAL CONSERVATION - GOLDTHWAITE	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$41,809	2020

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Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
HORSESHOE BAY	N	MUNICIPAL CONSERVATION - HORSESHOE BAY	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$154,204	2020
IRRIGATION, COLORADO	N	IRRIGATION CONSERVATION - ON FARM	ON FARM IRRIGATION CONSERVATION	$14,210,709	2020
IRRIGATION, COLORADO	N	IRRIGATION CONSERVATION - SPRINKLER	ON FARM IRRIGATION CONSERVATION	$1,234,855	2020
IRRIGATION, COLORADO	N	IRRIGATION OPERATIONS CONVEYANCE IMPROVEMENTS	CANAL LINING; ON FARM IRRIGATION CONSERVATION	$22,581,627	2020
IRRIGATION, MATAGORDA	N	IRRIGATION CONSERVATION - ON FARM	ON FARM IRRIGATION CONSERVATION	$52,428,108	2020
IRRIGATION, MATAGORDA	N	IRRIGATION CONSERVATION - SPRINKLER	ON FARM IRRIGATION CONSERVATION	$4,030,116	2020
IRRIGATION, MATAGORDA	N	IRRIGATION OPERATIONS CONVEYANCE IMPROVEMENTS	CANAL LINING; ON FARM IRRIGATION CONSERVATION	$83,311,250	2020
IRRIGATION, MILLS	N	EXPANSION OF TRINITY AQUIFER SUPPLIES - MILLS COUNTY IRRIGATION	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$8,289,000	2020
IRRIGATION, WHARTON	N	IRRIGATION CONSERVATION - ON FARM	ON FARM IRRIGATION CONSERVATION	$30,939,183	2020
IRRIGATION, WHARTON	N	IRRIGATION CONSERVATION - SPRINKLER	ON FARM IRRIGATION CONSERVATION	$2,492,779	2020
IRRIGATION, WHARTON	N	IRRIGATION OPERATIONS CONVEYANCE IMPROVEMENTS	CANAL LINING; ON FARM IRRIGATION CONSERVATION	$49,164,123	2020
JOHNSON CITY	N	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - JOHNSON CITY	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$1,505,000	2020
JOHNSON CITY	N	MUNICIPAL CONSERVATION - JOHNSON CITY	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$45,790	2020
JONESTOWN	N	MUNICIPAL CONSERVATION - JONESTOWN	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$46,456	2020
LA GRANGE	N	MUNICIPAL CONSERVATION - LA GRANGE	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$117,647	2020
LAGO VISTA	N	MUNICIPAL CONSERVATION - LAGO VISTA	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$187,406	2020
LAKEWAY	N	EXPANSION OF TRINITY AQUIFER SUPPLIES - LAKEWAY	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$2,985,000	2020
LAKEWAY	N	MUNICIPAL CONSERVATION - LAKEWAY	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$544,773	2020
LLANO	N	DEVELOPMENT OF NEW HICKORY AQUIFER SUPPLIES - LLANO	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$2,743,000	2020
LLANO	N	DIRECT REUSE - LLANO	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$689,000	2020
LLANO	N	MUNICIPAL CONSERVATION - LLANO	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$87,599	2020
LOOP 360 WSC	N	MUNICIPAL CONSERVATION - LOOP 360	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$71,683	2020
LOST CREEK MUD	N	MUNICIPAL CONSERVATION - LOST CREEK MUD	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$108,519	2020
LOWER COLORADO RIVER AUTHORITY	Y	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - LCRA	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION; STORAGE TANK	$4,564,000	2020
LOWER COLORADO RIVER AUTHORITY	Y	LCRA - ACQUIRE ADDITIONAL WATER RIGHTS	WATER RIGHT/PERMIT LEASE OR PURCHASE	$125,000	2020

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LOWER COLORADO RIVER AUTHORITY	Y	LCRA - ENHANCED MUNICIPAL AND INDUSTRIAL CONSERVATION	MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$64,099,000	2020
LOWER COLORADO RIVER AUTHORITY	Y	LCRA - EXCESS FLOWS PERMIT OFF-CHANNEL RESERVOIR	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; PUMP STATION; RESERVOIR CONSTRUCTION	$298,000,000	2020
LOWER COLORADO RIVER AUTHORITY	Y	LCRA - GROUNDWATER SUPPLY FOR FPP (OFF-SITE)	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION; STORAGE TANK	$20,107,000	2020
LOWER COLORADO RIVER AUTHORITY	Y	LCRA - GROUNDWATER SUPPLY FOR FPP (ON-SITE)	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION	$2,749,000	2020
LOWER COLORADO RIVER AUTHORITY	Y	LCRA - LANE CITY OFF-CHANNEL RESERVOIR	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; PUMP STATION; RESERVOIR CONSTRUCTION	$218,593,000	2017
LOWER COLORADO RIVER AUTHORITY	Y	LCRA - MID-BASIN OFF-CHANNEL RESERVOIR	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; PUMP STATION; RESERVOIR CONSTRUCTION	$298,000,000	2020
LOWER COLORADO RIVER AUTHORITY	Y	LCRA - PRAIRIE SITE OFF-CHANNEL RESERVOIR	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; PUMP STATION; RESERVOIR CONSTRUCTION	$376,000,000	2030
MANOR	N	EXPANSION OF TRINITY AQUIFER SUPPLIES - MANOR	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$3,442,000	2030
MANUFACTURING, BASTROP	N	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP COUNTY MANUFACTURING	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$2,150,000	2020
MANUFACTURING, FAYETTE	N	EXPANSION OF GULF COAST AQUIFER SUPPLIES - FAYETTE COUNTY MANUFACTURING	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$2,279,000	2020
MANUFACTURING, GILLESPIE	N	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - GILLESPIE COUNTY MANUFACTURING	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$3,880,000	2020
MANVILLE WSC	N	EXPANSION OF TRINITY AQUIFER SUPPLIES - MANVILLE WSC	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$5,431,000	2050
MARBLE FALLS	N	MARBLE FALLS REGIONAL PROJECT	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; NEW WATER TREATMENT PLANT; PUMP STATION; STORAGE TANK	$34,851,918	2020
MARBLE FALLS	N	MUNICIPAL CONSERVATION - MARBLE FALLS	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$221,276	2020
MEADOWLAKES	N	MUNICIPAL CONSERVATION - MEADOWLAKES	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$64,541	2020
MINING, BASTROP	N	DEVELOPMENT OF NEW CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP COUNTY MINING	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$3,391,000	2040
MINING, BASTROP	N	DEVELOPMENT OF NEW QUEEN CITY AQUIFER SUPPLIES - BASTROP COUNTY MINING	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$2,446,000	2020
MINING, BURNET	N	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - BURNET COUNTY MINING	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$13,418,000	2020
MINING, BURNET	N	EXPANSION OF HICKORY AQUIFER SUPPLIES - BURNET COUNTY MINING	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$13,437,000	2030
MINING, BURNET	N	EXPANSION OF MARBLE FALLS AQUIFER SUPPLIES - BURNET COUNTY MINING	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$7,257,000	2060
MINING, FAYETTE	N	EXPANSION OF GULF COAST AQUIFER SUPPLIES - FAYETTE COUNTY MINING	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$7,520,000	2020
MINING, FAYETTE	N	EXPANSION OF SPARTA AQUIFER SUPPLIES - FAYETTE COUNTY MINING	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$753,000	2020
MINING, HAYS	N	BS/EACD EDWARDS / MIDDLE TRINITY ASR	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; PUMP STATION	$1,136,364	2030
MINING, HAYS	N	EXPANSION OF TRINITY AQUIFER SUPPLIES - HAYS COUNTY MINING	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$4,652,000	2020
MOUNTAIN CITY	N	BS/EACD EDWARDS / MIDDLE TRINITY ASR	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; PUMP STATION	$500,000	2030
PFLUGERVILLE	N	DIRECT REUSE - PFLUGERVILLE	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION; STORAGE TANK	$7,959,000	2020

Recommended Projects Associated with Water Management Strategies

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
PFLUGERVILLE	N	EXPANSION OF EDWARDS (BFZ) AQUIFER SUPPLIES - PFLUGERVILLE	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$3,729,000	2040
PFLUGERVILLE	N	MUNICIPAL CONSERVATION - PFLUGERVILLE	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$1,701,900	2020
POINT VENTURE	N	MUNICIPAL CONSERVATION - POINT VENTURE	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$31,028	2020
ROLLINGWOOD	N	MUNICIPAL CONSERVATION - ROLLINGWOOD	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$36,238	2020
ROUND ROCK	Y	MUNICIPAL CONSERVATION - ROUND ROCK	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$36,147	2020
SAN SABA	N	MUNICIPAL CONSERVATION - SAN SABA	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$91,823	2020
SCHULENBURG	N	MUNICIPAL CONSERVATION - SCHULENBURG	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$78,947	2020
SHADY HOLLOW MUD	N	MUNICIPAL CONSERVATION - SHADY HOLLOW MUD	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$106,952	2020
SMITHVILLE	N	DEVELOPMENT OF NEW QUEEN CITY AQUIFER SUPPLIES - SMITHVILLE	CONVEYANCE/TRANSMISSION PIPELINE; SINGLE WELL	$2,620,000	2070
SMITHVILLE	N	MUNICIPAL CONSERVATION - SMITHVILLE	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$109,412	2020
STEAM ELECTRIC POWER, MATAGORDA	N	ALTERNATE CANAL DELIVERY - STPNOC	CONVEYANCE/TRANSMISSION PIPELINE	$7,669,000	2020
STEAM ELECTRIC POWER, WHARTON	N	DEVELOPMENT OF NEW GULF COAST AQUIFER SUPPLIES - WHARTON COUNTY STEAM-ELECTRIC	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$2,237,000	2060
SUNSET VALLEY	N	BS/EACD EDWARDS / MIDDLE TRINITY ASR	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; PUMP STATION	$2,272,727	2030
SUNSET VALLEY	N	DEVELOPMENT OF NEW TRINITY AQUIFER SUPPLIES - SUNSET VALLEY	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD	$2,228,000	2040
SUNSET VALLEY	N	MUNICIPAL CONSERVATION - SUNSET VALLEY	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$31,520	2020
THE HILLS	N	MUNICIPAL CONSERVATION - THE HILLS	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$97,374	2020
TRAVIS COUNTY MUD #4	N	MUNICIPAL CONSERVATION - TRAVIS COUNTY MUD #4	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$137,248	2020
TRAVIS COUNTY WCID #10	N	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #10	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$171,890	2020
TRAVIS COUNTY WCID #17	N	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #17	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$828,248	2020
TRAVIS COUNTY WCID #18	N	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #18	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$147,665	2020

Recommended Projects Associated with Water Management Strategies

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
TRAVIS COUNTY WCID #19	N	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #19	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$28,215	2020
TRAVIS COUNTY WCID #20	N	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #20	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$38,290	2020
VOLENTE	N	NEW SURFACE WATER INFRASTRUCTURE - VOLENTE	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; NEW WATER TREATMENT PLANT; PUMP STATION; STORAGE TANK	$8,263,000	2020
WEIMAR	N	MUNICIPAL CONSERVATION - WEIMAR	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$55,778	2020
WEST LAKE HILLS	N	MUNICIPAL CONSERVATION - WEST LAKE HILLS	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$112,784	2020
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	N	HAYS COUNTY PIPELINE - REGION K PORTION	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION	$5,869,750	2030
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	N	MUNICIPAL CONSERVATION - WEST TRAVIS COUNTY PUA	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$461,454	2020
WHARTON	N	MUNICIPAL CONSERVATION - WHARTON	METER REPLACEMENT; MUNICIPAL CONSERVATION CAPITAL COST (DOES NOT INCLUDE METER REPLACEMENT OR WATER LOSS); WATER LOSS CONTROL	$210,832	2020

Region K Total Recommended Capital Cost	**$3,772,705,672**

***Projects with a capital cost of zero are excluded from the report list.**

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Alternative Water User Group (WUG) Water Management Strategies (WMS)

WUG Entity Primary Region: K

WUG Entity Name	WMS Sponsor Region	WMS Name	Source Name	Water Management Strategy Supplies 2020	2030	2040	2050	2060	2070	Unit Cost 2020	Unit Cost 2070
AUSTIN	K	CITY OF AUSTIN - BRACKISH GROUNDWATER DESALINATION	K | EDWARDS-BFZ AQUIFER | TRAVIS COUNTY	0	5,000	5,000	5,000	5,000	5,000	N/A	$1523
AUSTIN	K	CITY OF AUSTIN - RECLAIMED WATER BANK INFILTRATION TO COLORADO ALLUVIUM	K | OTHER AQUIFER | TRAVIS COUNTY	0	15,000	20,000	25,000	30,000	30,000	N/A	$424
BUDA	K	DIRECT POTABLE REUSE	K | DIRECT REUSE (POTABLE)	2,240	2,240	2,240	2,240	2,240	2,240	$1440	$1440
BUDA	K	HCPUA PIPELINE - REGION K ALTERNATIVE	L | CARRIZO-WILCOX AQUIFER | GONZALES COUNTY	0	667	1,690	2,974	4,033	4,426	N/A	$1664
IRRIGATION, WHARTON	P	EXPAND USE OF GROUNDWATER	P | GULF COAST AQUIFER | WHARTON COUNTY	50,285	50,285	50,285	50,285	50,285	50,285	$44	$44
LOWER COLORADO RIVER AUTHORITY - UNASSIGNED WATER VOLUMES	K	LCRA - AQUIFER STORAGE AND RECOVERY	K | CARRIZO-WILCOX AQUIFER ASR | BASTROP COUNTY	0	0	5,048	5,048	5,048	5,048	N/A	$1076
LOWER COLORADO RIVER AUTHORITY - UNASSIGNED WATER VOLUMES	K	LCRA - BAYLOR CREEK RESERVOIR	K | BAYLOR CREEK RESERVOIR	0	0	18,000	18,000	18,000	18,000	N/A	$900
LOWER COLORADO RIVER AUTHORITY - UNASSIGNED WATER VOLUMES	K	LCRA - BRACKISH GROUNDWATER DESALINATION	K | GULF COAST AQUIFER | MATAGORDA COUNTY	0	0	22,400	22,400	22,400	22,400	N/A	$1035
LOWER COLORADO RIVER AUTHORITY - UNASSIGNED WATER VOLUMES	K	LCRA - ENHANCED RECHARGE AND CONJUNCTIVE USE	K | GULF COAST AQUIFER | WHARTON COUNTY	10,000	10,000	10,000	10,000	10,000	10,000	$834	$834
LOWER COLORADO RIVER AUTHORITY - UNASSIGNED WATER VOLUMES	K	LCRA - GROUNDWATER IMPORTATION	G | CARRIZO-WILCOX AQUIFER | BURLESON COUNTY	0	0	35,000	35,000	35,000	35,000	N/A	$1470
LOWER COLORADO RIVER AUTHORITY - UNASSIGNED WATER VOLUMES	K	LCRA - IMPORT RETURN FLOWS FROM WILLIAMSON COUNTY	G | BRAZOS RUN-OF-RIVER	25,000	25,000	25,000	25,000	25,000	25,000	$219	$219
LOWER COLORADO RIVER AUTHORITY - UNASSIGNED WATER VOLUMES	K	LCRA - SUPPLEMENT BAY AND ESTUARY INFLOWS WITH BRACKISH GROUNDWATER	K | GULF COAST AQUIFER | MATAGORDA COUNTY	12,000	12,000	12,000	12,000	12,000	12,000	$500	$500
			Region K Total Alternative WMS Supplies	99,525	120,192	206,663	212,947	219,006	219,399		

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Alternative Projects Associated with Water Management Strategies

Project Sponsor Region: K

Sponsor Name	Is Sponsor a WWP?	Project Name	Project Description	Capital Cost	Online Decade
AUSTIN	Y	CITY OF AUSTIN - BRACKISH GROUNDWATER DESALINATION	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; STORAGE TANK	$54,582,000	2030
AUSTIN	Y	CITY OF AUSTIN - RECLAIMED WATER BANK INFILTRATION TO COLORADO ALLUVIUM	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION; RESERVOIR CONSTRUCTION	$151,846,000	2030
BUDA	N	DIRECT POTABLE REUSE	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; NEW WATER TREATMENT PLANT; PUMP STATION; STORAGE TANK	$26,779,000	2020
HAYS CALDWELL PUA	Y	HAYS/CALDWELL PUA PROJECT - ALTERNATIVE	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; PUMP STATION; STORAGE TANK	$51,128,546	2030
LOWER COLORADO RIVER AUTHORITY	Y	LCRA - AQUIFER STORAGE AND RECOVERY	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; PUMP STATION; STORAGE TANK	$39,590,000	2040
LOWER COLORADO RIVER AUTHORITY	Y	LCRA - BAYLOR CREEK RESERVOIR	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; PUMP STATION; RESERVOIR CONSTRUCTION	$179,000,000	2040
LOWER COLORADO RIVER AUTHORITY	Y	LCRA - BRACKISH GROUNDWATER DESALINATION	CONVEYANCE/TRANSMISSION PIPELINE; INJECTION WELL; MULTIPLE WELLS/WELL FIELD; NEW WATER TREATMENT PLANT; PUMP STATION; STORAGE TANK	$277,006,000	2040
LOWER COLORADO RIVER AUTHORITY	Y	LCRA - ENHANCED RECHARGE AND CONJUNCTIVE USE	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; NEW SURFACE WATER INTAKE; PUMP STATION; RESERVOIR CONSTRUCTION	$53,504,000	2020
LOWER COLORADO RIVER AUTHORITY	Y	LCRA - GROUNDWATER IMPORTATION	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; PUMP STATION	$614,790,000	2040
LOWER COLORADO RIVER AUTHORITY	Y	LCRA - IMPORT RETURN FLOWS FROM WILLIAMSON COUNTY	CONVEYANCE/TRANSMISSION PIPELINE; NEW WATER RIGHT/PERMIT; PUMP STATION; STORAGE TANK; WATER TREATMENT PLANT EXPANSION	$54,193,000	2020
LOWER COLORADO RIVER AUTHORITY	Y	LCRA - SUPPLEMENT BAY AND ESTUARY INFLOWS WITH BRACKISH GROUNDWATER	CONVEYANCE/TRANSMISSION PIPELINE; DIVERSION AND CONTROL STRUCTURE	$34,966,000	2020

Region K Total Alternative Capital Cost	**$1,537,384,546**

***Projects with a capital cost of zero are excluded from the report list.**

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Water User Group (WUG) Management Supply Factor

REGION K	WUG MANAGEMENT SUPPLY FACTOR					
	2020	2030	2040	2050	2060	2070
AQUA WSC	1.3	1.1	1.4	1.1	1.1	1.0
AUSTIN	2.4	2.1	1.9	1.8	1.7	1.6
BARTON CREEK WEST WSC	2.0	2.1	2.2	2.2	2.3	2.3
BASTROP	1.4	1.2	1.1	1.5	1.3	1.1
BASTROP COUNTY WCID #2	3.0	2.2	1.8	1.3	1.4	1.0
BAY CITY	2.0	1.9	1.9	1.8	1.8	1.8
BEE CAVE	1.3	1.3	1.4	1.4	1.4	1.4
BERTRAM	2.8	3.2	2.9	2.7	2.5	2.4
BLANCO	3.5	3.1	2.8	2.7	2.7	2.6
BRIARCLIFF	1.6	1.5	1.3	1.2	1.1	1.0
BUDA	2.3	2.3	1.9	1.6	1.3	1.1
BURNET	3.4	3.3	3.0	2.8	2.6	2.5
CIMARRON PARK WATER COMPANY	1.0	1.0	1.1	1.1	1.1	1.1
COLUMBUS	1.3	1.3	1.4	1.4	1.4	1.4
COTTONWOOD SHORES	4.1	4.7	4.2	3.8	3.5	3.3
COUNTY-OTHER, BASTROP	1.1	1.1	1.0	1.0	1.0	1.0
COUNTY-OTHER, BLANCO	2.3	2.0	1.9	1.9	1.9	1.8
COUNTY-OTHER, BURNET	2.9	3.1	3.2	3.0	2.8	2.5
COUNTY-OTHER, COLORADO	1.7	1.7	1.7	1.6	1.6	1.5
COUNTY-OTHER, FAYETTE	1.5	1.4	1.3	1.2	1.2	1.2
COUNTY-OTHER, GILLESPIE	1.7	1.6	1.6	1.5	1.5	1.4
COUNTY-OTHER, HAYS	2.7	2.9	1.9	1.6	1.3	1.2
COUNTY-OTHER, LLANO	7.7	8.5	8.5	8.3	8.8	9.4
COUNTY-OTHER, MATAGORDA	1.4	1.4	1.4	1.4	1.4	1.4
COUNTY-OTHER, MILLS	2.5	2.5	2.5	2.5	2.4	2.3
COUNTY-OTHER, SAN SABA	3.2	3.1	3.2	3.2	3.2	3.1
COUNTY-OTHER, TRAVIS	2.3	2.5	2.7	3.1	4.0	5.7
COUNTY-OTHER, WHARTON	1.7	1.6	1.6	1.5	1.5	1.4
CREEDMOOR-MAHA WSC	1.3	1.9	1.7	1.5	1.4	1.2
DRIPPING SPRINGS	1.4	1.3	1.4	1.4	1.4	1.5
DRIPPING SPRINGS WSC	1.3	2.9	2.5	2.3	2.0	1.7
EAGLE LAKE	1.3	1.2	1.2	1.2	1.2	1.2
EAST BERNARD	1.4	1.4	1.4	1.4	1.4	1.4
ELGIN	1.0	2.6	2.0	1.6	1.3	1.0
FAYETTE WSC	1.6	1.4	1.3	1.3	1.2	1.2
FLATONIA	2.3	2.2	2.1	2.1	2.1	2.1
FREDERICKSBURG	1.5	1.5	1.5	1.4	1.4	1.4
GOLDTHWAITE	1.0	1.0	1.1	1.1	1.1	1.1
GRANITE SHOALS	1.3	1.1	1.0	1.2	1.1	1.0
HORSESHOE BAY	1.4	1.5	1.6	1.6	1.7	1.7
IRRIGATION, BASTROP	1.5	1.6	1.7	1.8	1.9	2.0
IRRIGATION, BLANCO	1.3	1.4	1.4	1.5	1.5	1.6
IRRIGATION, BURNET	1.4	1.4	1.4	1.4	1.4	1.4
IRRIGATION, COLORADO	1.0	1.0	1.0	1.0	1.0	1.1
IRRIGATION, FAYETTE	1.9	2.0	2.2	2.3	2.5	2.6
IRRIGATION, GILLESPIE	1.2	1.2	1.2	1.3	1.3	1.3
IRRIGATION, LLANO	1.2	1.2	1.3	1.3	1.3	1.3
IRRIGATION, MATAGORDA	0.7	0.7	0.7	0.8	0.8	0.9
IRRIGATION, MILLS	1.3	1.3	1.3	1.3	1.3	1.4
IRRIGATION, SAN SABA	1.1	1.1	1.2	1.2	1.2	1.3

Water User Group (WUG) Management Supply Factor

REGION K	WUG MANAGEMENT SUPPLY FACTOR					
	2020	2030	2040	2050	2060	2070
IRRIGATION, TRAVIS	1.2	1.3	1.4	1.5	1.7	1.8
IRRIGATION, WHARTON	0.9	0.9	0.9	1.0	1.0	1.0
JOHNSON CITY	1.6	1.4	1.4	1.3	1.3	1.3
JONESTOWN	1.0	1.0	1.0	1.0	1.0	1.0
KINGSLAND WSC	1.3	1.2	1.2	1.2	1.1	1.1
LA GRANGE	1.7	1.5	1.4	1.4	1.3	1.3
LAGO VISTA	2.5	2.2	2.0	1.8	1.7	1.7
LAKEWAY	1.3	1.2	1.2	1.3	1.4	1.4
LIVESTOCK, BASTROP	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, BLANCO	1.1	1.1	1.1	1.1	1.1	1.1
LIVESTOCK, BURNET	1.4	1.4	1.4	1.4	1.4	1.4
LIVESTOCK, COLORADO	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, FAYETTE	1.4	1.4	1.4	1.4	1.4	1.4
LIVESTOCK, GILLESPIE	1.5	1.5	1.5	1.5	1.5	1.5
LIVESTOCK, LLANO	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, MATAGORDA	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, MILLS	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, SAN SABA	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, TRAVIS	1.0	1.0	1.0	1.0	1.0	1.0
LLANO	1.1	1.1	1.1	1.2	1.2	1.2
LOOP 360 WSC	1.3	1.4	1.4	1.4	1.5	1.5
LOST CREEK MUD	1.3	1.3	1.4	1.4	1.4	1.5
MANOR	3.2	2.0	1.6	1.4	1.2	1.1
MANUFACTURING, BASTROP	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, BLANCO	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, BURNET	1.8	1.6	1.5	1.3	1.2	1.1
MANUFACTURING, COLORADO	2.2	2.1	1.9	1.9	1.7	1.6
MANUFACTURING, FAYETTE	1.5	1.4	1.3	1.2	1.1	1.0
MANUFACTURING, GILLESPIE	1.3	1.2	1.2	1.1	1.1	1.0
MANUFACTURING, HAYS	2.8	2.4	2.2	2.0	1.8	1.7
MANUFACTURING, LLANO	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, MATAGORDA	1.3	1.2	1.2	1.1	1.1	1.0
MANUFACTURING, MILLS	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, SAN SABA	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, TRAVIS	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, WHARTON	1.4	1.4	1.3	1.2	1.1	1.0
MANVILLE WSC	2.3	1.5	1.3	1.3	1.3	1.2
MARBLE FALLS	2.1	2.7	2.0	1.8	1.8	1.7
MEADOWLAKES	1.1	1.0	1.0	1.0	1.0	1.1
MINING, BASTROP	0.8	0.4	0.3	0.3	0.3	0.3
MINING, BLANCO	1.0	1.0	1.0	1.0	1.0	1.0
MINING, BURNET	1.1	1.1	1.0	1.0	1.1	1.0
MINING, COLORADO	1.1	1.1	1.0	1.0	1.0	1.0
MINING, FAYETTE	1.0	1.0	1.1	1.3	2.5	2.5
MINING, GILLESPIE	13.8	13.8	13.8	13.8	13.8	13.8
MINING, HAYS	1.0	1.1	1.4	1.4	1.2	1.0
MINING, LLANO	1.0	1.0	1.0	1.0	1.0	1.0
MINING, MATAGORDA	1.0	1.0	1.3	1.8	2.9	4.5
MINING, MILLS	1.0	1.0	1.0	1.0	1.0	1.0
MINING, SAN SABA	1.4	1.4	1.6	1.7	1.8	1.8

Water User Group (WUG) Management Supply Factor

REGION K	WUG MANAGEMENT SUPPLY FACTOR					
	2020	2030	2040	2050	2060	2070
MINING, TRAVIS	1.0	1.0	1.0	1.0	1.0	1.0
MINING, WHARTON	1.0	1.0	1.3	1.8	2.8	4.4
MOUNTAIN CITY	1.8	2.2	2.1	1.9	1.7	1.5
NORTH AUSTIN MUD #1	1.1	1.1	1.2	1.1	1.2	1.2
NORTHTOWN MUD	1.6	1.6	1.5	1.5	1.5	1.4
PALACIOS	1.7	1.7	1.7	1.7	1.6	1.6
PFLUGERVILLE	1.3	1.1	1.1	1.1	1.0	1.0
POINT VENTURE	1.3	1.4	1.3	1.5	1.4	1.3
ROLLINGWOOD	1.3	1.4	1.4	1.5	1.5	1.5
SAN SABA	1.2	1.3	1.4	1.4	1.5	1.5
SCHULENBURG	1.2	1.1	1.1	1.1	1.1	1.1
SHADY HOLLOW MUD	1.2	1.2	1.1	1.2	1.2	1.2
SMITHVILLE	2.4	2.1	1.9	1.6	1.2	1.0
STEAM ELECTRIC POWER, BASTROP	1.2	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, FAYETTE	1.6	1.6	1.6	1.4	1.3	1.2
STEAM ELECTRIC POWER, LLANO	1.0	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, MATAGORDA	1.0	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, TRAVIS	1.3	1.3	1.3	1.1	1.0	1.0
STEAM ELECTRIC POWER, WHARTON	1.1	1.1	1.0	1.0	1.0	1.0
SUNRISE BEACH VILLAGE	3.7	3.8	3.9	4.0	4.0	4.0
SUNSET VALLEY	1.5	3.4	3.4	3.2	3.0	2.9
THE HILLS	1.3	1.4	1.5	1.6	1.6	1.7
TRAVIS COUNTY MUD #4	1.8	1.7	1.6	1.5	1.5	1.5
TRAVIS COUNTY WCID #10	1.4	1.7	1.6	1.6	1.5	1.5
TRAVIS COUNTY WCID #17	1.3	1.3	1.3	1.3	1.3	1.4
TRAVIS COUNTY WCID #18	1.7	1.6	1.4	1.3	1.2	1.1
TRAVIS COUNTY WCID #19	1.3	1.4	1.5	1.5	1.6	1.7
TRAVIS COUNTY WCID #20	2.2	2.3	2.4	2.5	2.6	2.6
VOLENTE	2.9	2.5	2.2	1.9	1.7	1.6
WEIMAR	1.4	1.4	1.4	1.4	1.4	1.4
WELLS BRANCH MUD	1.1	1.1	1.1	1.1	1.1	1.1
WEST LAKE HILLS	1.3	1.2	1.3	1.4	1.4	1.5
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	1.5	1.5	1.5	1.4	1.5	1.4
WHARTON	1.7	1.6	1.6	1.5	1.5	1.5

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. To calculate the Management Supply Factor for each WUG as a whole, not split by region-county-basin the combined total of existing and future supply is divided by the total projected demand.

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CHAPTER 6.0: IMPACTS OF REGIONAL WATER PLAN

6.1 SCOPE OF WORK

A major goal of the regional water planning process is the protection of the State's water, agricultural, and natural resources. This Chapter presents the results of Task 6 of the Project Scope, which addresses:

- Evaluation of the estimated cumulative impacts of the Regional Water Plan (RWP), for example on groundwater levels, spring discharges, bay and estuary inflows, and instream flows.
- Description of the impacts of the RWP regarding:
  - Agricultural Resources;
  - Other Water Resources of the State including other Water Management Strategies and groundwater and surface water interrelationships;
  - Threats to Agricultural and Natural Resources;
  - Third-party social and economic impacts resulting from voluntary redistributions of water including analysis of third-party impacts of moving water from rural and agricultural areas;
  - Major impacts of recommended Water Management Strategies on key parameters of water quality, and;
  - Effects on Navigation.
- Summarization of the identified water needs that remain unmet by the RWP and the socioeconomic impacts of not meeting the identified water needs.

6.2 CUMULATIVE IMPACTS OF THE REGIONAL WATER PLAN

The impacts of individual water management strategies on Colorado River instream flows and bay and estuary freshwater inflows were discussed in Chapter 5. The TWDB also requires an analysis of what the cumulative impacts of the recommended water management strategies would be to the Colorado River and Matagorda Bay.

For the 2016 Region K Plan, many of the recommended water management strategies utilize water under existing water rights, which includes full use of wastewater effluent at 100 percent, consistent with the required surface water availability modeling guidelines. The baseline water availability analyses are conducted using full use of existing water rights; therefore the water for the strategies in the Colorado River basin is generally accounted for in the baseline model simulation.

In general, off-channel reservoirs that utilize existing water rights should not create additional impacts to the system, although variations to instream flows could be expected to occur. Additional groundwater that is used and then discharged to a local stream can create additional flow downstream, but the additional pumping can also potentially lower the water table and reduce spring flows in the area. Reuse of wastewater effluent reduces return flows, but it also reduces the need to divert additional surface water to meet demands. Aquifer Storage and Recovery (ASR) has the potential to reduce higher levels of surface water or groundwater by storing it when it's available, but then also has the potential to keep stream and aquifer levels higher during times of drought by providing an additional source of water.

Conservation and drought management are strategies that encourage efficient and responsible use of the region's water resources.

When return flows are present, they contribute to instream flows and bay and estuary inflows. They provide a consistent source of flow in the river, even when a portion of the return flows are reused. Return flows are a source of flow that is not included in the surface water availability modeling, and show a positive impact to the system as a water management strategy.

Groundwater strategies recommended by the Lower Colorado Regional Water Planning Group (LCRWPG) had yields within the identified Modeled Available Groundwater (MAG) volumes, which are determined based on the Desired Future Condition (DFC) of each aquifer. Groundwater Conservation Districts will continue to monitor aquifer levels to determine if future changes to the DFC and MAG are needed.

The recommendation by the LCRWPG of strategies such as conservation, reuse, and drought management will reduce demands, which will help to maintain the spring discharges in the region, especially during times of drought. In addition, recommended strategies such as off-channel reservoirs and aquifer storage and recovery may aid in balancing peak demands for surface water and groundwater, which could also help maintain spring flows in the region.

6.3 IMPACTS OF WATER MANAGEMENT STRATEGIES ON WATER RESOURCES

A major goal of the regional water planning process is the protection of the State's water, agricultural, and natural resources. This focus has been considered throughout the planning process by the Lower Colorado Regional Water Planning Group (LCRWPG) when selecting water management strategies to meet water needs for the future. Conservation and drought management were considered as initial strategies for meeting water needs. Impacts on the State's resources have been considered before recommending other strategies. The effects of the recommended water management strategies on specific resources are discussed in further detail within this Section.

6.3.1 Agricultural Resources

Rice production in the lower three counties of the Lower Colorado Regional Water Planning Area (LCRWPA) is the agricultural resource most dependent upon a reliable, extensive water supply. LCRA's water rights in these counties used for rice farming are some of the most senior rights within the entire Colorado River Basin. However, the irrigators using these water rights do not have a sufficiently reliable supply of water under drought-of-record (DOR) conditions.

The management strategies introduced in Chapter 5 of this regional water plan were created to meet the needs of all WUGs including agricultural needs. Primarily, the unmet agricultural needs in the LCRWPA are related to rice irrigation in the lower counties of Colorado, Wharton, and Matagorda. These needs have been partially met with recommended water management strategies to help reduce the projected shortages. The use of interruptible water supplies, return flows from the City of Austin, on-farm conservation, conveyance improvements, and conversion to sprinkler irrigation will help to reduce the water needs, but will not eliminate them completely.

6.3.2 Other Water Resources of the State including Groundwater and Surface Water Interrelationships

Water resources available by basin within the LCRWPA are discussed in further detail below.

6.3.2.1 Brazos River Basin

Portions of Bastrop, Burnet, Mills, Travis, and Williamson Counties are within the Brazos River Basin. Local supplies are the only surface water sources originating from the Brazos River Basin in the LCRWPA. The portion of Williamson County within the LCRWPA is within the service area of the City of Austin (COA) and the Lower Colorado River Authority (LCRA) and is served by their respective water supplies from the Colorado River Basin.

Groundwater supplies in the Brazos River Basin are obtained primarily from the Carrizo-Wilcox, Hickory, and Trinity aquifers. Groundwater is also available in lesser quantities from the Edwards-Balcones Fault Zone (BFZ), Ellenburger-San Saba, Gulf Coast, Marble Falls, Queen City, Sparta, Yegua-Jackson, and other unnamed aquifers.

Areas that are supplied from groundwater in the Brazos River Basin would be expected to discharge less water from treatment plants after implementing conservation measures. As wastewater effluent is often an important portion of instream flows, especially during dry periods, conservation measures may result in reduced stream flows.

Expanding the use of groundwater will generally increase the amount of return flows to streams, though the possibility of introducing low quality groundwater, particularly from the Hickory aquifer, to surface systems may have an unfavorable effect on surface water quality.

6.3.2.2 Brazos-Colorado Coastal River Basin

The Brazos-Colorado Coastal River Basin includes portions of Colorado, Matagorda, and Wharton Counties. The only surface water source for this basin in the LCRWPA that is not a local supply is a run-of-river (ROR) right from the San Bernard River. However, surface water originating in the Colorado River Basin is transferred to the Brazos-Colorado Coastal River Basin for agricultural use and is subsequently released to streams in the process of rice production. The entirety of the Brazos-Colorado River Basin within the LCRWPA is served by the Gulf Coast aquifer.

As in the other basins of the LCRWPA, increased groundwater usage may have potential impacts on water quantity in stream channels but possible adverse effects on water quality in some cases. Conservation programs implemented through the LCRA or local farmers may decrease return flows within the Brazos-Colorado Coastal Basin during dry periods and introduce less water from the Colorado River Basin for irrigation use, due to reduced demands. While not a recommended strategy, conjunctive use of groundwater and surface water supplies will decrease aquifer levels during dry times when surface water is not available, but could allow the aquifer to recover when surface water is available.

6.3.2.3 Colorado River Basin

Since the LCRWPA is centered on the Colorado River Basin, nearly every recommended management strategy has the potential to impact water quantity and quality in the basin.

The Colorado River Basin constitutes the largest portion of the LCRWPA as well as the single largest source of water for the region. The Highland Lakes System, operated by the Lower Colorado River Authority (LCRA), provides firm surface water supplies throughout the lower part of the basin. A large amount of water is also available from run-of-river (ROR) supplies in the basin. Other reservoirs in the system provide small yields or receive their water from the Highland Lakes System or a ROR right. The largest amounts of groundwater in the Colorado River Basin are available from the Gulf Coast, Carrizo-Wilcox, Hickory, and Ellenburger-San Saba aquifers. These four (4) aquifers represent approximately 60 percent of the available groundwater supply with various other aquifers providing the remaining 40 percent.

Currently, the use of City of Austin (COA) effluent discharges downstream to increase the reliability of existing diversion rights maintains flow rates from Austin to the downstream point of diversion. There are several recommended City of Austin strategies that incorporate a portion of the effluent as the strategy's source of water. It is possible that COA reuse will become comprehensive enough to reduce these total flows considerably in later decades, though that is not currently projected to occur within the planning horizon for this planning cycle. While the amount of reuse is projected to increase, the amount of Austin's municipal return flows above the reuse strategy amounts are also projected to increase over the planning period. These projected amounts of return flows for the planning period are updated as part of the planning process each cycle.

New contracts and contract amendments may also decrease total flow due to decreased availability to agricultural irrigation and may result in higher concentrations of effluent in the river below wastewater discharges in certain areas during low flow periods.

Operation of the Highland Lakes System with one or more new downstream off-channel reservoirs will create additional available firm water and may be beneficial to instream flows during some periods. In addition, it will reduce the amount of water in the Highland Lakes that has to be released to meet downstream demands.

Conservation practices for irrigation will reduce the demand for stored surface water and thereby result in reduced streamflow, although sediment and nutrient loads from irrigation tail water would be reduced, as well.

Portions of Matagorda and Wharton Counties are within the Colorado-Lavaca Coastal River Basin. All surface water sources in these areas are associated with local supplies or stored water from the Highland Lakes. However, as in the Brazos-Colorado Coastal River Basin, water from the Colorado River Basin is discharged into streams following its use in rice production, and all groundwater supplies are obtained from the Gulf Coast aquifer.

As in the other basins of the LCRWPA, increased groundwater usage may have potential positive impacts on water quantity in stream channels but possible adverse effects on water quality in some cases. Again, conservation programs for irrigation may decrease stream flows during dry periods and introduce less water from the Colorado River Basin for irrigation use.

6.3.2.4 Lavaca River Basin

The western portions of Colorado and Fayette Counties are located in the Lavaca River Basin. There are no firm surface water rights available from the Lavaca River Basin within these two (2) counties. Additionally, the only reservoir in this basin, Lake Texana, is not located in the LCRWPA, and no surface water contracts serve water user groups (WUGs) in the region from Lavaca River Basin supplies. All surface water supplies in the basin are obtained from local supplies. The primary source of groundwater for the Lavaca River Basin in the LCRWPA is the Gulf Coast aquifer.

As in the Brazos and Colorado River Basins, municipal conservation could possibly impair water quality. However, areas served by groundwater would experience some benefit from increased stream flows from additional pumpage, although groundwater quality issues may introduce additional problems to stream water quality in certain instances.

As in the other basins, conservation programs for irrigation may decrease stream flows during dry periods and introduce less water from the Colorado River Basin for irrigation use.

6.3.2.5 Guadalupe River Basin

The Guadalupe River Basin includes portions of Bastrop, Blanco, Fayette, Hays, and Travis counties within the LCRWPA. No major reservoirs exist within the LCRWPA section of the Guadalupe River Basin, and the only firm surface water source is provided by two (2) minor reservoirs operated by the City of Blanco. Other surface water sources are obtained from local supplies.

The Carrizo-Wilcox and Ellenburger-San Saba aquifers are the major groundwater sources for the Guadalupe River Basin. Other smaller groundwater sources include the Edwards-BFZ, Edwards-Trinity, Gulf Coast, Queen City, Sparta, Trinity, and Yegua-Jackson aquifers.

As in the other basins, expanded groundwater usage is expected to increase stream flows with a possibility of negatively impacting water quality from additional discharges and groundwater quality issues.

6.3.3 Threats to Agricultural and Natural Resources

The water management strategies recommended for the LCRWPA in this RWP are intended to protect natural resources while still meeting the projected water needs of the region. The impacts of recommended strategies on specific resources are discussed below.

6.3.3.1 Threatened and Endangered Species

The LCRWPA contains an array of habitats for a variety of wildlife species. A number of these species are listed as threatened or endangered by federal or state authorities, proposed as candidates to be listed, or are otherwise rare but unlisted species. A comprehensive list of these species can be found in *Appendix 1A* of Chapter 1 in this RWP.

The potential impacts to threatened and endangered species are expected to be limited. The construction of infrastructure related to these strategies may potentially impact one or more of the species identified in *Appendix 1A.*

6.3.3.2 Parks and Public Lands

As described in Chapter 1, over 28,000 acres of state parks are within the boundaries of the LCRWPA. These 14 state facilities host a variety of outdoor recreational opportunities for visitors from around the state of Texas. None of the recommended water management strategies are expected to have impacts on public lands. In addition, there are no foreseen impacts to stream segments traversing public lands. Additional information concerning impacts from each strategy can be found in Chapter 5.

6.3.3.3 Matagorda Bay System

The Matagorda Bay system represents a significant ecological resource to the LCRWPA and provides habitat for a number of species while supporting recreation and industry. As the second largest estuary system in Texas, it represents a major priority in protecting the state's natural resources.

Matagorda Bay receives inflows from the Colorado and Lavaca Rivers as well as a coastal contributing area. The target and critical freshwater inflow needs were estimated in a study conducted in 1997 by the LCRA, TNRCC, TWDB, and TPWD. The target inflow is described as the necessary long-term inflows that produce 98 percent of the maximum normalized population biomass for nine (9) key estuarine species while maintaining certain criteria for salinity, population density, and nutrient inflow. The minimum inflow for critical needs represents the amount of water required for bay and estuary inflows to keep salinity at the mouth of the Colorado River to a level of 25 parts per thousand or less. This condition is expected to provide for fish habitat during extreme drought conditions without impacting the long-term ecology of Matagorda Bay.

While a revision of the Freshwater Inflow Needs Study (FINS) was completed in 2006, the 1997 FINS critical and target flows were incorporated into the 2010 LCRA Water Management Plan. The 2010 LCRA Water Management Plan was used in this round of planning when determining the quantitative environmental impacts of the water management strategies. *Table 6-1* shows the monthly freshwater inflow criteria from the Colorado River determined in the 1997 Freshwater Inflow Needs Study.

Table 6-1: Target and Critical Freshwater Inflow Needs for the Matagorda Bay System from the Colorado River

Month	1997 FINS Freshwater Inflows (1,000 ac-ft)[1]	
	Critical	Target
January	14.26	44.1
February	14.26	45.3
March	14.26	129.1
April	14.26	150.7
May	14.26	162.2
June	14.26	159.3
July	14.26	107.0
August	14.26	59.4
September	14.26	38.8
October	14.26	47.4
November	14.26	44.4
December	14.26	45.2
Annual Totals	171	1,033

[1] Schedule of flows is designed to optimize biodiversity/productivity under normal rainfall. Under drought conditions, target flows should be curtailed in accordance to the severity of the drought and flows should be maintained at or above critical levels based on water quality considerations.

The freshwater inflow values presented in *Table 6-1* were developed following the methodology presented in "Characteristics of an Ecologically Sound Environment for the Guadalupe Estuary" by Boyd and Green, presented in *Freshwater Inflows to Texas Bays and Estuaries: Ecological Relationships and Methods for Determination of Needs* by TPWD, dated 1994. The process of determining freshwater inflow needs was carried out in three (3) distinct phases:

Phase 1: Develop statistical relationships between freshwater inflows and key indicators such as salinity species productivity, and nutrient inflows.

Phase 2: Use the developed statistical functions to compute optimal monthly and seasonal freshwater needs using the Texas Estuarine Mathematical Programming (TXEMP) Model developed by TWDB.

Phase 3: Simulate salinity conditions throughout the estuary using the TxBLEND model developed by TWDB and LCRA.

Phases 2 and 3 were carried out in an iterative process that compared simulated and desired salinity levels throughout the estuary. If the modeled salinity levels were outside of the ranges desired, the TXEMP model was adjusted accordingly. Additional information concerning the development of the target and critical freshwater inflows to the Matagorda Bay system can be found in Freshwater Inflow Needs of the Matagorda Bay System (LCRA 1997).

Additional studies were performed as part of the LSWP analysis. The Matagorda Bay Health Evaluation Study was completed in 2008, and recommended inflow criteria from the Colorado River that covered a wide range of inflow conditions to Matagorda Bay. Low-flow (threshold), long-term average, and four (4) additional volumes of flow with associated percentages of time they should be met were part of the recommendations. The criteria from this study were used by the LCRWPG as a benchmark for evaluating the environmental impacts of the new water management strategies in this round of planning. The use of the criteria as a benchmark does not imply that the LCRWPG endorses the results of the study at this time, but rather it is the most up-to-date scientific data available.

The Matagorda Bay Health Evaluation (MBHE) used the latest data and science to assess the relationship between various factors and bay conditions.[1] Several measures of bay health were investigated, including salinity, habitat condition, species abundance, nutrient supply and benthic condition. The computer models and data analysis in the study were used to develop inflow criteria for the Colorado River. Salinity, habitat and benthic modeling were used to develop criteria for most levels, but additional measures of bay health were used wherever possible.

The recommended Colorado River inflows from the MBHE study were designed to cover the full range of inflow conditions into Matagorda Bay, with a regime that incorporates five levels of inflow, each with an associated desired achievement guideline. The lowest level, "Threshold," is a fixed monthly value to provide refuge conditions that would ideally be achieved 100% of the time. The remaining levels, MBHE-1 through MBHE-4, represent different inflow targets that were recommended to be achieved with the following frequencies: MBHE-1, 90%; MBHE-2, 75%; MBHE-3, 60%; and MBHE-4, 35%. The levels all include seasonal variability and incorporate influxes of fresh water into the Bay in the spring and fall that reflect the natural pattern of inflows into the bay. The MBHE freshwater inflow categories and descriptions are summarized in *Table 6-2*. The inflow values associated with these inflow levels are presented in *Table 6-3*.

Table 6-2: Summary of Matagorda Bay Health Evaluation Inflow Levels

Inflow Level	Descriptions
Threshold	Refuge conditions for all species and habitat
MBHE-1	Maintain tolerable oyster reef health, benthic character, and habitat conditions
MBHE-2	Provide inflow variability and sustain oyster reef health, benthic condition, low estuarine marsh, and shellfish and forage fish habitat
MBHE-3	Provide inflow variability and support quality oyster reef health, benthic condition, low estuarine marsh, and shellfish and forage fish habitat
MBHE-4	Provide inflow variability and support high levels of primary productivity, and high quality oyster reef health, benthic condition, low estuarine marsh, and shellfish and forage fish habitat

[1] FINAL REPORT: MATAGORDA BAY INFLOW CRITERIA (COLORADO RIVER), MATAGORDA BAY HEALTH EVALUATION, Prepared for LCRA and SAWS (Dec. 2008).

Table 6-3: Matagorda Bay Health Inflow Values (acre-feet)

Inflow Category	Spring (3 month total)	Fall (3 month total)	Intervening (6 month total)	Monthly
Threshold	-	-	-	15,000
MBHE-1	114,000	81,000	105,000	-
MBHE-2	168,700	119,900	155,400	-
MBHE-3	246,200	175,000	226,800	-
MBHE-4	433,200	307,800	399,000	-

6.3.4 Third-party Social and Economic Impacts resulting from Voluntary Redistributions of Water

While the LCRWPG has not specifically recommended a "voluntary redistribution of water" strategy, the term essentially means one entity providing surplus water to another entity in need of water. Recommended strategies in the 2016 Region K Plan that would fall under this category include the Water Purchase strategy, as well as the New LCRA Contracts and LCRA Contract Amendment strategies.

Because the redistribution of water is voluntary, it is assumed that the existing water supplies would not be redistributed if doing so caused negative social and economic impacts to the entity selling the water. In most cases, it can be anticipated that there would be a positive economic impact to the entity selling the water, and a positive social impact to the entity purchasing the water.

6.3.5 Moving Water from Rural and Agricultural Areas

It is estimated that in Year 2020, the water used in rural (livestock) and agricultural areas will represent 52 percent of the total water used in Region K. It is estimated that this will be reduced to 37 percent of the Region's 1,461,800 acre-feet (ac-ft) demand projected in Year 2070 as a result of growth in municipal and industrial demands and a decrease in agricultural production. The projected decrease in irrigation demand is anticipated to be approximately 13 percent between 2020 and 2070. Livestock demand is constant over the planning period.

Water management strategies, along with current sources of water supply, are available to agricultural users throughout the planning period; therefore, the impacts on agricultural users are not directly related to moving water from these areas. The potential impacts of moving water from rural and agricultural areas are mainly associated with socio-economic impacts to third parties. The potential impetus for moving water is expected to occur from two (2) sources: (1) the cost of raw water may become too great for the local irrigator to afford, and they may elect to voluntarily leave the industry for economic reasons; or (2) the value of the water for municipal or industrial purposes may create a market for the wholesale owner to redirect the sale of the water making it unavailable to the irrigator. Several management strategies are outlined in the RWP to provide water to irrigators, especially in the lower basin counties of Colorado, Wharton, and Matagorda, but do not meet all of the projected water needs.

It may be feasible for a third party to pay for conservation measures and then utilize the saved water for their own needs (through re-contracting or other agreements) and allow the irrigator to remain in business; however, there are few contractual and institutional measures in effect to allow this trade-off to occur at this time.

6.4 IMPACTS OF WATER MANAGEMENT STRATEGIES ON KEY PARAMETERS OF WATER QUALITY

The potential impacts that water management strategies (WMS) may have on water quality are discussed in this section, including the identified water quality parameters which are deemed important to the use of the water resources within the Region.

Under the Clean Water Act, the State of Texas must define designated uses for all major water bodies and, consequently, the water quality standards that are appropriate for that designated water use. The water quality parameters which are listed for the Lower Colorado Regional Water Planning Area (LCRWPA) below were selected based on the *Texas Commission on Environmental Quality (TCEQ) Water Quality Inventory for Designated Water Body Uses* as well as the water quality parameters identified in the TCEQ 303d List of Impaired Water Bodies.

6.4.1 Surface Water

Key surface water parameters identified within the LCRWPA fall into two (2) broad categories:

1. **Nutrients and Non-Conservative Substances**

- Bacteria
- pH
- Dissolved Oxygen
- Total Suspended Solids (TSS)
- Temperature
- Nutrients (nitrogen, phosphorus)
- Minerals and Conservative Substances
- Total Dissolved Solids (TDS)
- Chlorides
- Mercury
- Salinity
- Sediment Contaminants

Non-conservative substances are those parameters that undergo rapid degradation or change as the substance flows downstream, such as nutrients which are consumed by plant life. Nutrients and non-conservative loadings to surface water originate from a variety of natural and man-made sources. One (1) significant source of these loads is wastewater treatment facilities. As population increases, the number and size of these wastewater discharges will likely increase. Stormwater runoff from certain land use types constitutes another significant source of nutrient loading to the Region's watercourses, including such land use types as agricultural areas, golf courses, residential development, or other landscaped areas where fertilizers are applied. Nutrient loads in the LCRWPA are typically within the limits deemed acceptable for conventional water treatment facilities and are, therefore, not considered a major concern as related to source of supply.

2. Conservative Substances

Conservative substances are those that do not undergo rapid degradation or do not significantly change in the water as the substance flows downstream, such as metals. Minerals and other conservative substances contributing to surface water generally originate from three (3) sources: (1) non-point source runoff or groundwater seepage from mineralized areas, either natural or man-made, (2) wastewater discharges, and (3) sea water migration above estuaries. Wastewater discharges and industrial discharges have improved over the past 30 years due to the requirements of the Clean Water Act. If local concentrations of conservative contaminants are identified, they are remediated by the appropriate agency. Natural features such as elevation tend to limit salinity migration above estuaries.

6.4.2 Groundwater

Groundwater in the LCRWPA is generally of good quality with no usage limitations. Water quality parameters of interest include TDS, metals, and hardness.

Groundwater in the Gulf Coast aquifer containing less than 500 mg/L dissolved solids is located at various depths throughout the lower three (3) Counties, but at no depths greater than 3,200 feet. The Carrizo-Wilcox aquifer has localized areas of water quality problems which include hydrogen sulfide, methane, increased salinity levels, and dissolved solids. The Edwards aquifer is typically fresh, although hard, with dissolved solids concentrations typically less than 500 mg/L.

Water quality from the Trinity aquifer is acceptable for most municipal and industrial purposes; however, excess concentrations of certain constituents in many places exceed drinking water standards. Heavy pumpage and water level declines in this Region have contributed to deteriorating water quality in the aquifer.

Wells completed in the Middle Trinity aquifer (especially the Hensell Sand) may exhibit levels of sodium, sulfate, and chloride, which are believed to be the result of leakage from the overlying Glen Rose Formation. This is less likely to be true for wells completed in the Lower Trinity aquifer. The Hammett Shale acts as an aquitard and effectively prevents leakage from the overlying formations. In some areas, poor quality water occurs in and near wells that have not been properly cased. These wells may have deteriorated casings, insufficient casing or cement, or the casing may have been perforated at multiple depths in an effort to maximize the well yield. These wells serve as a conduit for poor quality water originating in the evaporite beds near the contact of the Upper and Lower Glen Rose Formations. Water quality declines in the down-dip direction of all of the Trinity aquifer water-bearing units.

Natural chemical quality of Edwards-Trinity (Plateau) water ranges from fresh to slightly saline. The water is typically hard and may vary widely in concentrations of dissolved solids, composed mostly of calcium and bicarbonate. The salinity of the groundwater tends to increase toward the west. Water quality of springs issuing from the aquifer in the southern and eastern border areas is typically excellent.

In general, the quality of water from the Hickory aquifer could be described as moderate to low quality. The TDS concentrations vary from 300 to 500 mg/L. In some areas the groundwater may have dissolved solids concentrations as high as 3,000 mg/L. The water may contain alpha particle and total radium concentrations that may exceed the safe drinking water levels of the U.S. Environmental Protection Agency (EPA) and TCEQ. Radon gas may also be entrained, although no limits have been established for radon. Most of the radioactive groundwater is thought to be produced from the middle Hickory unit, while the upper Hickory unit produces water that exceeds secondary limits for concentration of iron. High nitrate levels may be found in the shallower portions of the aquifer where there may be interaction with surface activities such as fertilizer applications and septic systems.

Throughout most of the LCRWPA, the chemical quality of the Queen City aquifer water is excellent, but water quality may deteriorate fairly rapidly down-dip. The water may be fairly acidic (low pH), have high iron concentrations, or contain hydrogen sulfide gas. All of these conditions are relatively easy to remedy with standard water treatment methods.

Usable quality water is commonly found within the Sparta aquifer outcrop and for a few miles down-dip. The water quality in most of this aquifer is excellent, but the quality does decrease in the down-dip direction. In some areas, the water can contain iron concentrations exceeding the secondary drinking water standards.

Water produced from the Ellenburger-San Saba aquifer may have dissolved concentrations that range from 200 mg/L to as high as 3,000 mg/L, but in most cases is usually less than 1,000 mg/L. The quality of water declines rapidly in the down-dip direction.

The water produced from the Marble Falls aquifer is suitable for most purposes, but some wells in Blanco County have produced water with high nitrate concentrations. The down-dip portion of the aquifer is not extensive, but in these areas, the water becomes highly mineralized. Since the limestone formation comprising this aquifer is relatively shallow, it is susceptible to pollution by surface uses and activities.

Water quality in the Yegua-Jackson aquifer varies greatly. Water produced from the Yegua-Jackson aquifer may have dissolved concentrations as high as 3,000 mg/L. Chlorides and sulfates are also a concern for this aquifer, as well as some areas of high concentrations of dissolved manganese. In general, small amounts of usable water can be found at less than 300 feet deep throughout most of the aquifer.

6.4.3 Brackish Groundwater

Total dissolved solids (TDS) is the most commonly used parameter to describe overall groundwater quality because it is a measure of all of the dissolved constituents in water. In this section of the RWP, TDS will be used as the general description of groundwater quality. The term “brackish”, as used in this section of the RWP, describes slightly-saline or moderately-saline groundwater and thus includes water between 1,000 and 10,000 mg/L TDS.

Many water-bearing formations in Texas contain a large volume of brackish groundwater. Discussions on brackish groundwater in Region K are based on information found in “*Brackish Groundwater Manual for Texas Regional Planning Groups*”, prepared for the Texas Water Development Board (TWDB) in February 2003.

Historically, the TWDB has defined aquifer water quality in terms of TDS concentrations expressed in milligrams per liter (mg/L) and has classified water into four (4) broad categories; fresh (less than 1,000 mg/L), slightly-saline (1,000 - 3,000 mg/L), moderately-saline (3,000 - 10,000 mg/L), and very-saline (10,000 - 35,000 mg/L).

Official TWDB delineations of the down-dip boundaries of aquifers such as the Edwards (BFZ), Trinity, Queen City, Sparta, and Carrizo-Wilcox have historically been based on water quality, specifically the

TDS concentrations that meet the needs of the aquifers' primary uses. The down-dip extent of most aquifers in the state is defined by the 3,000 mg/L dissolved solids level, as groundwater with less than 3,000 mg/L TDS meets most agricultural and industrial needs. However, a few aquifers have different TDS criteria defining the aquifer extent, including: Edwards (BFZ) (1,000 mg/L TDS).

The availability of brackish groundwater is a general measure of the amount of brackish groundwater in a water-bearing unit. All of the major and minor aquifers in the Region K water planning area contain brackish groundwater, which are listed below:

Major Aquifers

- Carrizo-Wilcox
- Edwards (BFZ)
- Edwards-Trinity (Plateau)
- Trinity
- Gulf Coast

Minor Aquifers

- Ellenburger-San Saba
- Hickory
- Marble Falls
- Queen City
- Sparta
- Yegua-Jackson

6.4.3.1 Carrizo-Wilcox Aquifer

The Carrizo-Wilcox aquifer is one of the most continuous and permeable water-bearing formations in Texas. In the LCRWPA, it extends into Bastrop and Fayette Counties. Throughout the extent of the aquifer, it provides groundwater acceptable for most irrigation, public supply and industrial purposes. It also has significant brackish water resources in down-dip portions of the aquifer that may be used as additional water supplies.

In Central Texas groundwater from the Carrizo is principally sodium chloride and sodium sulfate types. The availability of brackish groundwater from the Carrizo-Wilcox aquifer in Region K is considered high.[2]

6.4.3.2 Edwards (BFZ) Aquifer

The Edwards (Balcones Fault Zone-BFZ) aquifer extends in Travis and Hays Counties in Region K. The boundary between the fresh-water and brackish sections of the Edwards aquifer is commonly referred to as the "Bad Water Line", which is the 1,000 mg/L TDS line.

[2] "*Brackish Groundwater Manual for Texas Regional Planning Groups*", prepared for TWDB by LBG-Guyton Associates in association with NRS Consulting Engineers, February, 2003.

Groundwater in the fresh portion of the Edwards is a hard, calcium-bicarbonate water. As the salinity of the water increases in the saline portion of the aquifer, the concentrations of sulfate and chloride increase, as does the concentration of sodium, and the water becomes a sodium-mixed anion type water. The quality of the saline water in the Edwards aquifer does not appear to vary significantly areally. In general, poorer quality water in the aquifer is found in the down-dip portions of the aquifer, and may also correlate with low permeability sections of the formations. Similarly, there are no consistent vertical trends in water quality. In places, wells produce fresh water at shallow depths, brackish to saline water at greater depths, and fresh water again at even greater depths. Hydrogen sulfide is often found in the Saline Zone.

Availability of brackish groundwater from Edwards (BFZ) aquifer in Region K is low to moderate.[2]

6.4.3.3 Edwards-Trinity (Plateau) Aquifer

Much of the groundwater found in the Edwards-Trinity (Plateau) aquifer is fresh to slightly-saline. The chemical quality of the Edwards and associated limestones is generally better than that in the underlying Trinity aquifer in the Plateau region. Groundwater is fairly uniform in quality, with water from the Edwards and associated limestones being a very hard, calcium bicarbonate type, usually containing less than 500 mg/L TDS, although in some areas the TDS can exceed 1,000 mg/L. The water quality in the Trinity tends to be poorer than in the Edwards.

There is no availability of brackish groundwater from Edwards Trinity (Plateau) aquifer in Region K.[2]

6.4.3.4 Trinity Aquifer

Trinity Group deposits include sands, limestones, shales and clays. The stratigraphy of the Trinity Group is complicated, in part because of the large area that it covers.

In Central Texas, the Hensell and Hosston Sands are the most productive units in the Trinity aquifer. The Hensell is fairly prolific in many areas, and is known to yield small to large amounts of water to wells. It is also referred to as the “First” or “Upper” Trinity Sand by drillers and locals in Central Texas.

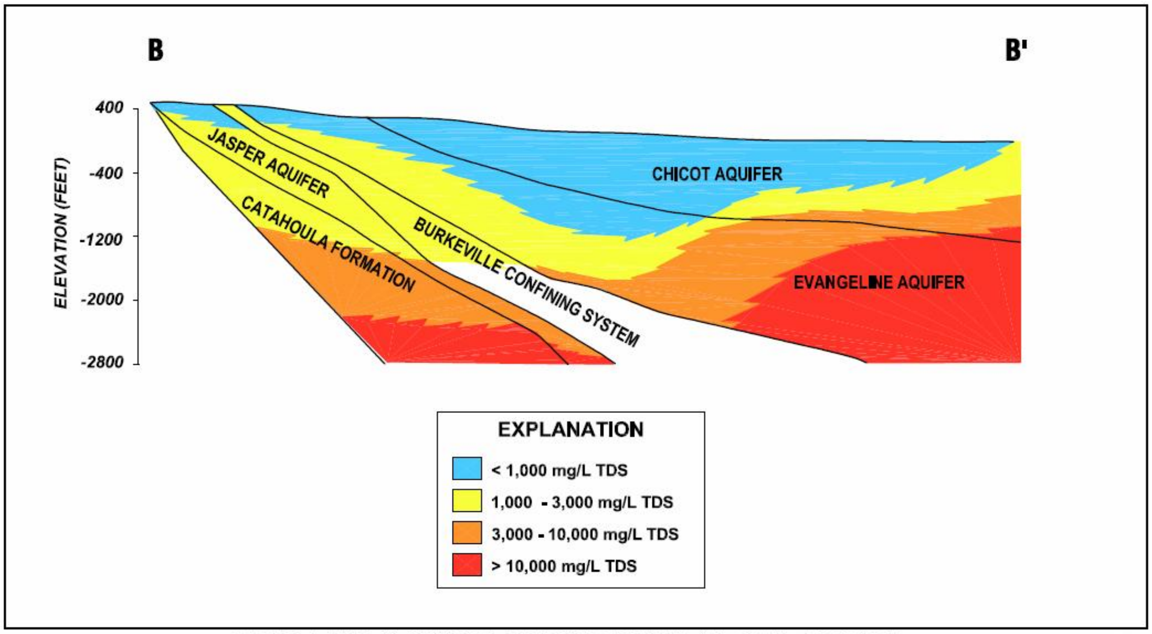
A significant source of brackish water may be found in the down-dip areas of the Trinity aquifer. The availability of brackish groundwater from the Trinity aquifer in most of Region K is considered moderate.[2]

6.4.3.5 Gulf Coast Aquifer

The Gulf Coast aquifer extends through a large area of Region K in Fayette, Colorado, Wharton and Matagorda counties.

Water quality varies with depth and locality in the Gulf Coast aquifer. The water quality is generally fresh in the northeastern half of the aquifer, from the Coastal Bend region to Louisiana. Some areas in this half do produce slightly-saline water, in particular near the coast between the City of Houston and Louisiana. The groundwater quality in the southwestern half of the aquifer (generally south of the San Antonio River) is generally more brackish than in the northern section, with most areas containing slightly- to moderately-saline groundwater, and very few areas containing fresh water. The depths that fresh, slightly-saline, moderately-saline, and saline groundwater is found varies from individual aquifer to aquifer throughout the extent of the aquifer system. *Figure 6-1* shows concentrations of total dissolved solids in the Gulf Coast aquifer in a cross-section running through Lavaca, Wharton, and Matagorda Counties.[2]

Figure 6-1: Simplified Cross-Section of the Gulf Coast Aquifer System running through Lavaca, Wharton, and Matagorda Counties



SIMPLIFIED CROSS SECTION B-B' OF THE GULF COAST AQUIFER SYSTEM WITH GENERALIZED WATER QUALITY RANGES
(Modified from Baker, 1979)

The availability of brackish groundwater from the Gulf Coast aquifer in most of Region K is considered moderate to high.[2]

6.4.4 Other Aquifer Water Quality Information

While the Groundwater Availability Model (GAM) reports may contain information pertaining to water quality of aquifer formations, the models do not provide any outcomes concerning water quality issues.

TWDB's water well database tracks concentration of several water quality constituents including Sodium, Potassium, Strontium, Bicarbonates, Sulfate, Chloride, Fluorides, Nitrates, Alkalinity, and Hardness.

6.4.5 Potential Water Quality Impacts Resulting from Increased Drawdown of Aquifers

The potential water quality impacts resulting from increased drawdown in the LCRWPA are currently not well understood. The following is a discussion of potential water quality issues:

The wells close to the coast have greater risk to be impacted. As they are drawn down, there is a greater potential for salt water intrusion which begins to increase the total dissolved solids in the water. Overall, water quality has been good throughout the lower counties, and they have experienced higher demands and lower water tables in the past than what is currently projected under this RWP.

Concerns for most of the Central Texas aquifers are largely based on limiting or ceasing spring flows rather than quality reasons. With the lack of current knowledge on the locations of the potential salt deposits, it can be stated that increased drawdown could, in some cases, result in deteriorated water quality associated with total dissolved solids and radiation in some areas.

6.4.6 Management Strategies

The Lower Colorado River Authority (LCRA) has implemented regulatory programs within their jurisdiction to aid in pollution prevention. LCRA regulations include both land-based activities and surface water usage. Land-based activities include on-site sewage facilities, septic systems, construction, and nonpoint source pollution. In addition, LCRA has supported the “no discharge” designation by TCEQ for the Highland Lakes. The water quality parameters and water management strategies selected by the LCRWPG were evaluated to determine the impacts on water quality as a result of these recommended strategies. The recommended management strategies, as described in Chapter 5 of this RWP and used in this evaluation, are:

- Water Conservation (Municipal, Industrial, and Agricultural)
- Expansion of Current Groundwater Supplies
- Development of New Groundwater Supplies
- Groundwater Importation
- Aquifer Storage and Recovery (ASR)
- Return Flows / Reuse and Reuse-sourced Projects
- Water Purchase/New or Amended Water Contracts
- Desalination of Brackish Groundwater
- LCRA Water Management Plan for Interruptible Supplies
- LCRA Off-Channel Reservoirs
- Blending tidally-influenced water in the STPNOC reservoir
- Alternate Canal Delivery

The following paragraphs discuss the impacts of each management strategy on the chosen water quality parameters.

<u>Water Conservation</u>, including municipal and industrial, can have both positive and negative impacts on water quality. Water that is being processed through a wastewater treatment plant typically has acquired additional dissolved solids prior to discharge to the waters of the state. Conventional wastewater treatment reduces suspended solids, but does not reduce dissolved solids in the effluent. Water conservation measures will reduce the volume of water passing through the wastewater plants without reducing the mass loading rates (a 1.6-gallon flush carries the same waste mass to the wastewater plant that a 6-gallon flush once carried). This may result in increased constituent loads to the wastewater treatment plants. In the event that, over time, water conservation causes changes to wastewater concentrations, treatment processes may need to be adjusted to maintain permitted discharge parameters. It should be noted that during low flow conditions, the wastewater effluent in a stream may represent water that helps to augment and maintain the minimum stream flows.

Conservation of irrigation water (through on-farm water conservation measures, irrigation district conveyance improvements, and conversion to sprinkler irrigation), pump limited amounts of groundwater during drought conditions, and primarily capture the remaining permitted portion of Colorado River flows. Return flows generated by runoff from rice irrigation are returned via tail water runoff in the Colorado River Basin or the coastal basin. Tail water is the term used to describe that water returned to the stream after application to irrigated cropland. Tail water may carry nutrients, sediments, salts, and other pollutants from the farmland. This return flow can have a negative impact on water quality, and by implementing conservation measures which reduce tail water losses, the nutrient and sediment loading can be reduced. However, this return flow tends to be introduced into the receiving stream during normally dry periods so it may have a net beneficial effect in terms of maintaining minimum streamflow conditions.

The impacts on water quality of the Expansion of Current Groundwater Supplies, Development of New Groundwater Supplies, and Groundwater Importation strategies are uncertain. However, they are not expected to have adverse impacts to the water quality in the aquifer. In some particular situations, these strategies may negatively influence water quality. As previously stated, water quality in the Hickory aquifer could be described as moderate to low quality. The use of this aquifer by municipal users may require additional treatment compared to a standard groundwater treatment plant, especially in areas of high concentrations of TDS, areas that may contain alpha particle and total radium concentrations that may exceed the safe drinking water levels of the EPA and TCEQ, and areas with high nutrient levels. The use of this aquifer by irrigators could potentially release the above constituents into surface water sources, thus causing increased levels of the above described water quality parameters.

The recommended Aquifer Storage and Recovery (ASR) projects in this plan utilize a variety of water sources for storage. Fresh groundwater, brackish or saline groundwater, wastewater effluent, and surface water are all sources that are identified for the various recommended strategies. The groundwater sources should have limited impacts on water quality, although storing fresh water in the Saline Zone for a long period of time can increase the TDS and decrease the quality of the stored water. Utilizing wastewater effluent and surface water that is diverted from the Colorado River could reduce instream flows downstream, which in turn, could negatively impact water quality during certain months of the year when instream flows are already lower.

Reuse and Reuse-sourced Projects are part of the City of Austin's (COA) management strategy to respond to droughts and meet future growth and subsequent water supply shortages. The COA plans to use a portion of their wastewater effluent as a source for a number of recommended strategies to extend current supplies and help alleviate future shortages. The COA plans to use indirect reuse, if authorized by TCEQ, or direct reuse with infrastructure for a variety of projects. While the amount of reuse is projected to increase, municipal return flows are also projected to increase over the planning period. When available on an interruptible basis, downstream water rights can continue to divert, in seniority order, these return flows. In any event, the quality of water produced by City of Austin wastewater facilities is such that no adverse impacts on water quality are anticipated. In other parts of the region, reuse provides a purposeful use for treated wastewater effluent that cannot otherwise be discharged to the Highland Lakes, due to TCEQ restrictions. This effluent is currently being used to irrigate areas that do not normally require irrigation. In a sense, this strategy would simply relocate the treated effluent to more useful locations that are currently irrigated with potable water. Due to the treatment standards of the effluent, there should be no water quality issues from this strategy. Since the effluent is currently not allowed to be discharged to the Highland Lakes, there is also no issue of reduced return flows downstream.

Water Purchase and Additional Contracts as management strategies can decrease instream and bay and estuary freshwater inflows as a result of the full utilization of water supplies, although the Water Management Plan provides for environmental flows in the river below Austin and Matagorda Bay. Fully utilizing existing water supply projects may amplify some existing concerns, particularly contaminant concentrations due to reduced opportunities for instream dilution. The continued return of flows via wastewater treatment facility discharges will provide some mitigation of that effect. Typical municipal return flows are approximately 60 percent of the total quantity diverted for use, although that percentage may be expected to decrease as reuse and reuse-sourced projects develop.

LCRA Off-Channel Reservoirs potentially will have a positive impact on water quality since one or more will operate partially or wholly as a "scalping reservoir" such that diversions are made to the reservoir only when flows in the river are sufficient to meet higher priority need. The water that is diverted and stored in reservoirs would allow some sediments to settle out, so that water released from the reservoir would be of higher quality. However, the water would be stored for consumptive use, and instream flows along with bay and estuary freshwater inflows would slightly decrease. In general, increased return flows are expected to occur in this region as demand increases, and this increase in return flows will continue to occur during low flow events, thus, potentially increasing instream flows during DOR conditions.

LCRA Water Management Plan allows LCRA to supply rice irrigators in the Lower Colorado River Basin with interruptible supplies of water from the Highland Lakes, when available. Releases from storage provide streamflow in the river on the way to the diversion point, with impacts to water quality that are similar to return flows.

Desalination of Brackish Groundwater, such as the Edwards-BFZ Saline Zone, will provide a usable water supply with a level of dissolved solids low enough to be used for municipal purposes. A significant side effect of this strategy is the disposal of wastes generated from the desalination process. If deep well injection is used for brine disposal, minimal impacts to water quality should occur.

Blending tidally-influenced water in the STPNOC reservoir will increase the TDS levels in the reservoir. As long as there is sufficient freshwater in the reservoir, the TDS levels should remain low enough to be used for steam-electric power generation. No desalination process should be necessary.

Alternate Canal Delivery by STPNOC will decrease the TDS levels in the STPNOC reservoir by allowing for water diversions with lower TDS to dilute the TDS of the water in the STPNOC cooling pond

6.5 IMPACTS OF WATER MANAGEMENT STRATEGIES ON NAVIGATION

Due to the nature of the strategies recommended in the 2016 Region K Plan, there are no anticipated impacts to navigation.

6.6 SUMMARY OF UNMET IDENTIFIED WATER NEEDS

While the goal of the LCRWPG has been to recommend water management strategies to meet all water needs in the region, the 2016 Region K Plan does have some remaining unmet needs.

Irrigation water needs in Colorado County, Matagorda County, and Wharton County were not able to be fully met by recommended strategies. *Table 6-4* provides a summary of the recommended strategies and the remaining unmet water needs as a total for the region. Remaining unmet needs range from approximately 120,500 ac-ft in 2020 to approximately 19,000 ac-ft in 2070. The current drought conditions and the surface water availability modeling that was performed with the inclusion of those conditions created much larger water needs than previous Region K plans. In addition, the main strategy to meet Irrigation water needs in previous Region K plans (the LCRA-SAWS Water Project) is no longer a strategy in the 2016 Region K Plan. The limiting factors for new water management strategies that can be recommended for Irrigation are water availability and cost of new infrastructure.

Table 6-4: Recommended Strategies for Irrigation and Remaining Unmet Irrigation Needs

WMS	2020 Needs	2030 Needs	2040 Needs	2050 Needs	2060 Needs	2070 Needs
	(334,884)	**(319,009)**	**(303,561)**	**(288,528)**	**(273,900)**	**(259,664)**
	Strategy Yields (AFY)					
Drought Management	94,641	92,080	89,588	87,163	84,805	82,510
On-Farm Conservation	20,000	26,000	32,000	38,000	44,000	50,000
Irrigation Conveyance Improvements	5,200	17,000	29,000	41,000	53,000	64,300
Sprinkler Irrigation	1,430	7,150	14,300	17,875	17,875	17,875
Return Flows	15,193	15,820	19,038	20,893	22,907	26,044
LCRA WMP Interruptible Water (2010 WMP)	77,880	48,664	19,448	9,724	0	0
(Future LCRA WMP, including OCR supplies)	*	*	*	*	*	*
Remaining Unmet Needs	(120,540)	(112,295)	(100,187)	(73,873)	(51,313)	(18,935)

* Availability of interruptible water will be increased using the Lane City OCR and other recommended OCRs; the estimated quantity is subject to WMP amendments through TCEQ and the hydrologic outcome of the current drought.

There is also identified unmet Mining needs in the 2016 Region K Plan. These needs were identified in Bastrop County in coordination with Region G. The mining industry in that area pumps groundwater to lower the water table in order to allow access to mining activities. It was determined that the Mining demands were not true demands, and therefore did not need to have recommended water management strategies. The unmet Mining WUG needs are as follows:

Table 6-5: Unmet Mining Needs in Region K

WUG Name	County	River Basin	Unmet Needs (ac-ft/yr)					
			2020	2030	2040	2050	2060	2070
Mining	Bastrop	Brazos	(173)	(409)	(450)	(496)	(545)	(600)
Mining	Bastrop	Colorado	(449)	(3,947)	(4,556)	(5,235)	(5,967)	(6,777)

6.6.1 Socioeconomic Impacts of Not Meeting Water Needs

The following excerpts are taken directly from the Introduction to the TWDB report entitled *Socioeconomic Impacts of Projected Water Shortages for the Region K Regional Water Planning Area*, dated September 2015. The full report, which includes the information below as well as additional sociological impacts, such as reduction in population, school enrollment, and consumer surplus loss, is provided as *Appendix 6A* to this chapter:

"Administrative rules (31 Texas Administrative Code §357.33 (c)) require that regional water planning groups evaluate the social and economic impacts of not meeting water needs as part of the regional water planning process, and rules direct the TWDB staff to provide technical assistance upon request. Staff of the TWDB's Water Use, Projections, & Planning Division designed and conducted this analysis in support of the Region K Regional Water Planning Group."

"Water shortages during a repeat of the drought of record would likely curtail or eliminate certain economic activity in businesses and industries that rely heavily on water. Insufficient water supplies could not only have an immediate and real impact on existing businesses and industry, but they could also adversely and chronically affect economic development in Texas. From a social perspective, water supply reliability is critical as well. Shortages could disrupt activity in homes, schools and government and could adversely affect public health and safety. For these reasons, it is important to evaluate and understand how water supply shortages during drought could impact communities throughout the state."

Table 6-6 summarizes estimated economic impacts. Variables shown include:[3]

- **Regional income** – total payroll costs (wages and salaries plus benefits) paid by industries, corporate income, rental income, and interest payments for the region
- **Jobs** – number of full and part-time jobs required by a given industry including self-employment
- **Business taxes** – sales, excise, fees, licenses, and other taxes paid during normal operation of an industry (does not include any type of income tax)

If drought of record conditions occur and water supplies are not developed, study results indicate that the Region K Water Planning Area would suffer significant losses. If such conditions occurred in 2020, lost income to residents in the region could total $1.56 billion with associated job losses as high as 9,877. State and local governments could lose nearly $234 million in tax receipts. If such conditions occurred in 2070, income losses could run $3.57 billion, and job losses could total 45,282. Approximately $257 million worth of State and local taxes would be lost. Reported figures are probably conservative because they are based on estimated costs for a single year; however, in much of Texas, the drought of record lasted several years. For example, in 2040, models indicate that shortages would cost residents and businesses in the region $1.09 billion in lost income. Thus, if shortages lasted for three years, total losses related to unmet needs could easily approach $3.3 billion.

[3] Regional income plus business taxes are a suitable measure of economic prosperity because they are a better measure of net economic returns.

Table 6-6: Single Year Economic Impacts of Unmet Water Needs for Region K

Year	Income ($ millions)[1]	Jobs	State and Local Taxes ($ millions)[1]
2020	$1,560	9,877	$234
2030	$1,557	11,880	$216
2040	$1,233	10,414	$160
2050	$1,093	11,894	$114
2060	$1,975	24,184	$150
2070	$3,568	45,282	$257

Source: TWDB, Water Use, Projections, & Planning Division
[1] In year 2013 dollars

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APPENDIX 6A

TWDB SOCIOECONOMIC IMPACT ANALYSIS OF PROJECTED WATER SHORTAGES

Socioeconomic Impacts of Projected Water Shortages for the Region K Regional Water Planning Area

Prepared in Support of the 2016 Region K Regional Water Plan

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Executive Summary

Evaluating the social and economic impacts of not meeting identified water needs is a required part of the regional water planning process. The Texas Water Development Board (TWDB) estimates those impacts for regional water planning groups, and summarizes the impacts in the state water plan. The analysis presented is for the Region K Regional Water Planning Group.

Based on projected water demands and existing water supplies, the Region K planning group identified water needs (potential shortages) that would occur within its region under a repeat of the drought of record for six water use categories. The TWDB then estimated the socioeconomic impacts of those needs—if they are not met—for each water use category and as an aggregate for the region.

The analysis was performed using an economic modeling software package, IMPLAN (Impact for Planning Analysis), as well as other economic analysis techniques, and represents a snapshot of socioeconomic impacts that may occur during a single year during a drought of record within each of the planning decades. For each water use category, the evaluation focused on estimating income losses and job losses. The income losses represent an approximation of gross domestic product (GDP) that would be foregone if water needs are not met.

The analysis also provides estimates of financial transfer impacts, which include tax losses (state, local, and utility tax collections); water trucking costs; and utility revenue losses. In addition, social impacts were estimated, encompassing lost consumer surplus (a welfare economics measure of consumer wellbeing); as well as population and school enrollment losses.

It is estimated that not meeting the identified water needs in Region K would result in an annually combined lost income impact of approximately $1.6 billion in 2020, increasing to $3.6 billion in 2070 (Table ES-1). In 2020, the region would lose approximately 9,900 jobs, and by 2070 job losses would increase to approximately 45,000.

All impact estimates are in year 2013 dollars and were calculated using a variety of data sources and tools including the use of a region-specific IMPLAN model, data from the TWDB annual water use estimates, the U.S. Census Bureau, Texas Agricultural Statistics Service, and Texas Municipal League.

Table ES-1: Region K Socioeconomic Impact Summary

Regional Economic Impacts	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$1,560	$1,557	$1,233	$1,093	$1,975	$3,568
Job losses	9,877	11,880	10,414	11,894	24,187	45,282
Financial Transfer Impacts	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Tax losses on production and imports ($ millions)*	$236	$217	$160	$113	$145	$248
Water trucking costs ($ millions)*	-	$3	$4	$4	$2	$6
Utility revenue losses ($ millions)*	$23	$84	$138	$205	$339	$592
Utility tax revenue losses ($ millions)*	$0	$1	$2	$3	$6	$10
Social Impacts	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Consumer surplus losses ($ millions)*	$1	$29	$51	$105	$194	$347
Population losses	1,813	2,181	1,912	2,184	4,441	8,314
School enrollment losses	335	403	354	404	822	1,538

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

1 Introduction

Water shortages during a repeat of the drought of record would likely curtail or eliminate certain economic activity in businesses and industries that rely heavily on water. Insufficient water supplies could not only have an immediate and real impact on existing businesses and industry, but they could also adversely and chronically affect economic development in Texas. From a social perspective, water supply reliability is critical as well. Shortages could disrupt activity in homes, schools and government and could adversely affect public health and safety. For these reasons, it is important to evaluate and understand how water supply shortages during drought could impact communities throughout the state.

Administrative rules (31 Texas Administrative Code §357.33 (c)) require that regional water planning groups evaluate the social and economic impacts of not meeting water needs as part of the regional water planning process, and rules direct the TWDB staff to provide technical assistance upon request. Staff of the TWDB's Water Use, Projections, & Planning Division designed and conducted this analysis in support of the Region K Regional Water Planning Group.

This document summarizes the results of the analysis and discusses the methodology used to generate the results. Section 1 summarizes the water needs calculation performed by the TWDB based on the regional water planning group's data. Section 2 describes the methodology for the impact assessment and discusses approaches and assumptions specific to each water use category (i.e., irrigation, livestock, mining, steam-electric, municipal and manufacturing). Section 3 presents the results for each water use category with results summarized for the region as a whole. Appendix A presents details on the socioeconomic impacts by county.

1.1 Identified Regional Water Needs (Potential Shortages)

As part of the regional water planning process, the TWDB adopted water demand projections for each water user group (WUG) with input from the planning groups. WUGs are composed of cities, utilities, combined rural areas (designated as county-other), and the county-wide water use of irrigation, livestock, manufacturing, mining and steam-electric power. The demands are then compared to the existing water supplies of each WUG to determine potential shortages, or needs, by decade. Existing water supplies are legally and physically accessible for immediate use in the event of drought. Projected water demands and existing supplies are compared to identify either a surplus or a need for each WUG.

Table 1-1 summarizes the region's identified water needs in the event of a repeat of drought of the record. Demand management, such as conservation, or the development of new infrastructure to increase supplies are water management strategies that may be recommended by the planning group to meet those needs. This analysis assumes that no strategies are implemented, and that the identified needs correspond to future water shortages. Note that projected water needs generally increase over time, primarily due to anticipated population and economic growth. To provide a general sense of proportion, total projected needs as an overall percentage of total demand by water use category are presented in aggregate in Table 1-1. Projected needs for individual water user groups within the aggregate vary greatly, and may reach 100% for a given WUG and water use category. Detailed water needs by WUG and county appear in Chapter 4 of the 2016 Region K Regional Water Plan.

Table 1-1 Regional Water Needs Summary by Water Use Category

Water Use Category		2020	2030	2040	2050	2060	2070
Irrigation	Water Needs (acre-feet per year)	335,489	319,584	304,106	289,044	274,387	260,124
	% of the category's total water demand	55%	54%	53%	52%	50%	49%
Livestock	Water Needs (acre-feet per year)	-	-	-	-	-	-
	% of the category's total water demand	-	-	-	-	-	-
Manufacturing	Water Needs (acre-feet per year)	570	692	810	913	1,059	1,216
	% of the category's total water demand	1%	1%	1%	1%	1%	1%
Mining	Water Needs (acre-feet per year)	4,260	8,618	9,747	10,719	12,153	14,164
	% of the category's total water demand	20%	33%	35%	36%	38%	41%
Municipal	Water Needs (acre-feet per year)	7,389	27,362	45,011	66,372	118,804	180,979
	% of the category's total water demand	2%	8%	11%	14%	24%	32%
Steam-electric power	Water Needs (acre-feet per year)	25,363	26,751	26,775	31,974	42,212	54,627
	% of the category's total water demand	14%	14%	14%	16%	21%	26%
Total water needs (acre-feet per year)		**373,071**	**383,007**	**386,449**	**399,022**	**448,615**	**511,110**

2 Economic Impact Assessment Methodology Summary

This portion of the report provides a summary of the methodology used to estimate the potential economic impacts of future water shortages. The general approach employed in the analysis was to obtain estimates for income and job losses on the smallest geographic level that the available data would support, tie those values to their accompanying historic water use estimate (volume), and thereby determine a maximum impact per acre-foot of shortage for each of the socioeconomic measures. The calculations of economic impacts were based on the overall composition of the economy using many underlying economic "sectors." Sectors in this analysis refer to one or more of the 440 specific production sectors of the economy designated within IMPLAN (Impact for Planning Analysis), the economic impact modeling software used for this assessment. Economic impacts within this report are estimated for approximately 310 of those sectors, with the focus on the more water intense production sectors. The economic impacts for a single water use category consist of an aggregation of impacts to multiple related economic sectors.

2.1 Impact Assessment Measures

A required component of the regional and state water plans is to estimate the potential economic impacts of shortages due to a drought of record. Consistent with previous water plans, several key variables were estimated and are described in Table 2-1.

Table 2-1 Socioeconomic Impact Analysis Measures

Regional Economic Impacts	Description
Income losses - value added	The value of output less the value of intermediate consumption; it is a measure of the contribution to GDP made by an individual producer, industry, sector, or group of sectors within a year. For a shortage, value added is a measure of the income losses to the region, county, or WUG and includes the direct, indirect and induced monetary impacts on the region.
Income losses - electrical power purchase costs	Proxy for income loss in the form of additional costs of power as a result of impacts of water shortages.
Job losses	Number of part-time and full-time jobs lost due to the shortage.
Financial Transfer Impacts	**Description**
Tax losses on production and imports	Sales and excise taxes (not collected due to the shortage), customs duties, property taxes, motor vehicle licenses, severance taxes, other taxes, and special assessments less subsidies.
Water trucking costs	Estimate for shipping potable water.
Utility revenue losses	Foregone utility income due to not selling as much water.
Utility tax revenue losses	Foregone miscellaneous gross receipts tax collections.
Social Impacts	**Description**
Consumer surplus losses	A welfare measure of the lost value to consumers accompanying less water use.
Population losses	Population losses accompanying job losses.
School enrollment losses	School enrollment losses (K-12) accompanying job losses.

2.1.1 Regional Economic Impacts

Two key measures were included within the regional economic impacts classification: income losses and job losses. Income losses presented consist of the sum of value added losses and additional purchase costs of electrical power. Job losses are also presented as a primary economic impact measure.

Income Losses - Value Added Losses

Value added is the value of total output less the value of the intermediate inputs also used in production of the final product. Value added is similar to Gross Domestic Product (GDP), a familiar measure of the productivity of an economy. The loss of value added due to water shortages was estimated by input-output analysis using the IMPLAN software package, and includes the direct, indirect, and induced monetary impacts on the region.

Income Losses - Electric Power Purchase Costs

The electrical power grid and market within the state is a complex interconnected system. The industry response to water shortages, and the resulting impact on the region, are not easily modeled using traditional input/output impact analysis and the IMPLAN model. Adverse impacts on the region will occur, and were represented in this analysis by the additional costs associated with power purchases from other generating plants within the region or state. Consequently, the analysis employed additional power purchase costs as a proxy for the value added impacts for that water use category, and these are included as a portion of the overall income impact for completeness.

For the purpose of this analysis, it was assumed that power companies with insufficient water will be forced to purchase power on the electrical market at a projected higher rate of 5.60 cents per kilowatt hour. This rate is based upon the average day-ahead market purchase price of electricity in Texas from the recent drought period in 2011.

Job Losses

The number of jobs lost due to the economic impact was estimated using IMPLAN output associated with the water use categories noted in Table 1-1. Because of the difficulty in predicting outcomes and a lack of relevant data, job loss estimates were not calculated for the steam-electric power production or for certain municipal water use categories.

2.1.2 Financial Transfer Impacts

Several of the impact measures estimated within the analysis are presented as supplemental information, providing additional detail concerning potential impacts on a sub-portion of the economy or government. Measures included in this category include lost tax collections (on production and imports), trucking costs for imported water, declines in utility revenues, and declines in utility tax revenue collected by the state. Many of these measures are not solely adverse, with some having both positive and negative impacts. For example, cities and residents would suffer if forced to pay large costs for trucking in potable water. Trucking firms, conversely, would benefit from the transaction. Additional detail for each of these measures follows.

Tax Losses on Production and Imports

Reduced production of goods and services accompanying water shortages adversely impacts the collection of taxes by state and local government. The regional IMPLAN model was used to estimate reduced tax collections associated with the reduced output in the economy.

Water Trucking Costs

In instances where water shortages for a municipal water user group were estimated to be 80 percent or more of water demands, it was assumed that water would be trucked in to support basic consumption and sanitation needs. For water shortages of 80 percent or greater, a fixed cost of $20,000 per acre-foot of water was calculated and presented as an economic cost. This water trucking cost was applied for both the residential and non-residential portions of municipal water needs and only impacted a small number of WUGs statewide.

Utility Revenue Losses

Lost utility income was calculated as the price of water service multiplied by the quantity of water not sold during a drought shortage. Such estimates resulted from city-specific pricing data for both water and wastewater. These water rates were applied to the potential water shortage to determine estimates of lost utility revenue as water providers sold less water during the drought due to restricted supplies.

Utility Tax Losses

Foregone utility tax losses included estimates of uncollected miscellaneous gross receipts taxes. Reduced water sales reduce the amount of utility tax that would be collected by the State of Texas for water and wastewater service sales.

2.1.3 Social Impacts

Consumer Surplus Losses of Municipal Water Users

Consumer surplus loss is a measure of impact to the wellbeing of municipal water users when their water use is restricted. Consumer surplus is the difference between how much a consumer is willing and able to pay for the commodity (i.e., water) and how much they actually have to pay. The difference is a benefit to the consumer's wellbeing since they do not have to pay as much for the commodity as they would be willing to pay. However, consumer's access to that water may be limited, and the associated consumer surplus loss is an estimate of the equivalent monetary value of the negative impact to the consumer's wellbeing, for example, associated with a diminished quality of their landscape (i.e., outdoor use). Lost consumer surplus estimates for reduced outdoor and indoor use, as well as residential and commercial/institutional demands, were included in this analysis. Consumer surplus is an attempt to measure effects on wellbeing by monetizing those effects; therefore, these values should not be added to the other monetary impacts estimated in the analysis.

Lost consumer surplus estimates varied widely by location and type. For a 50 percent shortage, the estimated statewide consumer surplus values ranged from $55 to $2,500 per household (residential use), and from $270 to $17,400 per firm (non-residential).

Population and School Enrollment Losses

Population losses due to water shortages, as well as the related loss of school enrollment, were based upon the job loss estimates and upon a recent study of job layoffs and the resulting adjustment of the labor market, including the change in population.[1] The study utilized Bureau of Labor Statistics data regarding layoffs between 1996 and 2013, as well as Internal Revenue Service data regarding migration, to model an estimate of the change in the population as the result of a job layoff event. Layoffs impact both out-migration, as well as in-migration into an area, both of which can negatively affect the population of an area. In addition, the study found that a majority of those who did move following a layoff moved to another labor market rather than an adjacent county. Based on this study, a simplified ratio of job and net population losses was calculated for the state as a whole: for every 100 jobs lost, 18 people were assumed to move out of the area. School enrollment losses were estimated as a proportion of the population lost.

2.2 Analysis Context

The context of the economic impact analysis involves situations where there are physical shortages of surface or groundwater due to drought of record conditions. Anticipated shortages may be nonexistent in earlier decades of the planning horizon, yet population growth or greater industrial, agricultural or other sector demands in later decades may result in greater overall demand, exceeding the existing supplies. Estimated socioeconomic impacts measure what would happen if water user groups experience water shortages for a period of one year. Actual socioeconomic impacts would likely become larger as drought of record conditions persist for periods greater than a single year.

2.2.1 IMPLAN Model and Data

Input-Output analysis using the IMPLAN (Impact for Planning Analysis) software package was the primary means of estimating value added, jobs, and taxes. This analysis employed county and regional level models to determine key impacts. IMPLAN is an economic impact model, originally developed by the U.S. Forestry Service in the 1970's to model economic activity at varying geographic levels. The model is currently maintained by the Minnesota IMPLAN Group (MIG Inc.) which collects and sells county and state specific data and software. The year 2011 version of IMPLAN, employing data for all 254 Texas counties, was used to provide estimates of value added, jobs, and taxes on production for the economic sectors associated with the water user groups examined in the study. IMPLAN uses 440 sector-specific Industry Codes, and those that rely on water as a primary input were assigned to their relevant planning water user categories (manufacturing, mining, irrigation, etc.). Estimates of value added for a water use category were obtained by summing value added estimates across the relevant IMPLAN sectors

[1] Foote, Andrew, Grosz, Michel, Stevens, Ann. "Locate Your Nearest Exit: Mass Layoffs and Local Labor Market Response." University of California, Davis. April 2015. http://paa2015.princeton.edu/uploads/150194

associated with that water use category. Similar calculations were performed for the job and tax losses on production and import impact estimates.

Note that the value added estimates, as well as the job and tax estimates from IMPLAN, include three components:

- *Direct effects* representing the initial change in the industry analyzed;
- *Indirect effects* that are changes in inter-industry transactions as supplying industries respond to reduced demands from the directly affected industries; and,
- *Induced effects* that reflect changes in local spending that result from reduced household income among employees in the directly and indirectly affected industry sectors.

2.2.2 Elasticity of Economic Impacts

The economic impact of a water need is based on the relative size of the water need to the water demand for each water user group (Figure 2-1). Smaller water shortages, for example, less than 5 percent, were anticipated to result in no initial negative economic impact because water users are assumed to have a certain amount of flexibility in dealing with small shortages. As a water shortage deepens, however, such flexibility lessens and results in actual and increasing economic losses, eventually reaching a representative maximum impact estimate per unit volume of water. To account for such ability to adjust, an elasticity adjustment function was used in estimating impacts for several of the measures. Figure 2-1 illustrates the general relationship for the adjustment functions. Negative impacts are assumed to begin accruing when the shortage percentage reaches the lower bound b1 (10 percent in Figure 2-1), with impacts then increasing linearly up to the 100 percent impact level (per unit volume) once the upper bound for adjustment reaches the b2 level shortage (50 percent in Figure 2-1 example).

Initially, the combined total value of the three value added components (direct, indirect, and induced) was calculated and then converted into a per acre-foot economic value based on historical TWDB water use estimates within each particular water use category. As an example, if the total, annual value added for livestock in the region was $2 million and the reported annual volume of water used in that industry was 10,000 acre-feet, the estimated economic value per acre-foot of water shortage would be $200 per acre-foot. Negative economic impacts of shortages were then estimated using this value as the maximum impact estimate ($200 per acre-foot in the example) applied to the anticipated shortage volume in acre-feet and adjusted by the economic impact elasticity function. This adjustment varied with the severity as percentage of water demand of the anticipated shortage. If one employed the sample elasticity function shown in Figure 2-1, a 30% shortage in the water use category would imply an economic impact estimate of 50% of the original $200 per acre-foot impact value (i.e., $100 per acre-foot).

Such adjustments were not required in estimating consumer surplus, nor for the estimates of utility revenue losses or utility tax losses. Estimates of lost consumer surplus relied on city-specific demand curves with the specific lost consumer surplus estimate calculated based on the relative percentage of the city's water shortage. Estimated changes in population as well as changes in school enrollment were indirectly related to the elasticity of job losses.

Assumed values for the bounds b1 and b2 varied with water use category under examination and are presented in Table 2-2.

Figure 2-1 Example Economic Impact Elasticity Function (as applied to a single water user's shortage)

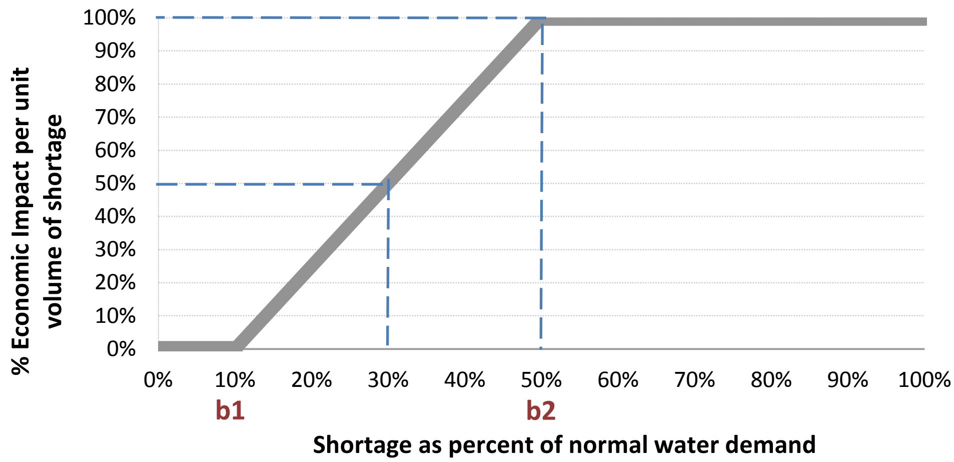

Table 2-2 Economic Impact Elasticity Function Lower and Upper Bounds

Water Use Category	Lower Bound (b1)	Upper Bound (b2)
Irrigation	**5%**	**50%**
Livestock	**5%**	**10%**
Manufacturing	**10%**	**50%**
Mining	**10%**	**50%**
Municipal (non-residential water intensive)	**50%**	**80%**
Steam-electric power	**20%**	**70%**

2.3 Analysis Assumptions and Limitations

Modeling of complex systems requires making assumptions and accepting limitations. This is particularly true when attempting to estimate a wide variety of economic impacts over a large geographic area and into future decades. Some of the key assumptions and limitations of the methodology include:

1. The foundation for estimating socioeconomic impacts of water shortages resulting from a drought are the water needs (potential shortages) that were identified as part of the regional water planning process. These needs have some uncertainty associated with them, but serve as a reasonable basis for evaluating potential economic impacts of a drought of record event.

2. All estimated socioeconomic impacts are snapshot estimates of impacts for years in which water needs were identified (i.e., 2020, 2030, 2040, 2050, 2060, and 2070). The estimates are independent and distinct “what if” scenarios for each particular year, and water shortages are assumed to be temporary events resulting from severe drought conditions. The evaluation assumed that no recommended water management strategies are implemented. In other words, growth occurs, future shocks are imposed on an economy at 10-year intervals, and the resulting impacts are estimated. Note that the estimates presented were not cumulative (i.e., summing up expected impacts from today up to the decade noted), but were simply an estimate of the magnitude of annual socioeconomic impacts should a drought of record occur in each particular decade based on anticipated supplies and demands for that same decade.

3. Input-output models such as IMPLAN rely on a static profile of the structure of the economy as it appears today. This presumes that the relative contributions of all sectors of the economy would remain the same, regardless of changes in technology, supplies of limited resources, and other structural changes to the economy that may occur into the future. This was a significant assumption and simplification considering the 50-year time period examined in this analysis. To presume an alternative future economic makeup, however, would entail positing many other major assumptions that would very likely generate as much or more error.

4. This analysis is not a cost-benefit analysis. That approach to evaluating the economic feasibility of a specific policy or project employs discounting future benefits and costs to their present value dollars using some assumed discount rate. The methodology employed in this effort to estimate the economic impacts of future water shortages did not use any discounting procedures to weigh future costs differently through time.

5. Monetary figures are reported in constant year 2013 dollars.

6. Impacts are annual estimates. The estimated economic model does not reflect the full extent of impacts that might occur as a result of persistent water shortages occurring over an extended duration. The drought of record in most regions of Texas lasted several years.

7. Value added estimates are the primary estimate of the economic impacts within this report. One may be tempted to add consumer surplus impacts to obtain an estimate of total adverse economic impacts to the region, but the consumer surplus measure represents the change to the wellbeing of households (and other water users), not an actual change in the flow of dollars through the economy. The two categories (value added and consumer surplus) are both valid impacts but should not be summed.

8. The value added, jobs, and taxes on production and import impacts include the direct, indirect and induced effects described in Section 2.2.1. Population and school enrollment losses also indirectly include such effects as they are based on the associated losses in employment. The remaining measures (consumer surplus, utility revenue, utility taxes, additional electrical power purchase costs, and potable water trucking costs), however, do not include any induced or indirect effects.

9. The majority of impacts estimated in this analysis may be considered smaller than those that might occur under drought of record conditions. Input-output models such as IMPLAN only capture "backward linkages" on suppliers (including households that supply labor to directly affected industries). While this is a common limitation in these types of economic impact modeling efforts, it is important to note that "forward linkages" on the industries that use the outputs of the directly affected industries can also be very important. A good example is impacts on livestock operators. Livestock producers tend to suffer substantially during droughts, not because there is not enough water for their stock, but because reductions in available pasture and higher prices for purchased hay have significant economic effects on their operations. Food processors could be in a similar situation if they cannot get the grains or other inputs that they need. These effects are not captured in IMPLAN, which is one reason why the impact estimates are likely conservative.

10. The methodology did not capture "spillover" effects between regions – or the secondary impacts that occur outside of the region where the water shortage is projected to occur.

11. The model did not reflect dynamic economic responses to water shortages as they might occur, nor does the model reflect economic impacts associated with a recovery from a drought of record including:
    a. The likely significant economic rebound to the landscaping industry immediately following a drought;
    b. The cost and years to rebuild liquidated livestock herds (a major capital item in that industry);
    c. Direct impacts on recreational sectors (i.e., stranded docks and reduced tourism); or,
    d. Impacts of negative publicity on Texas' ability to attract population and business in the event that it was not able to provide adequate water supplies for the existing economy.

12. Estimates for job losses and the associated population and school enrollment changes may exceed what would actually occur. In practice, firms may be hesitant to lay off employees, even in difficult economic times. Estimates of population and school enrollment changes are based on regional evaluations and therefore do not accurately reflect what might occur on a statewide basis.

13. The results must be interpreted carefully. It is the general and relative magnitudes of impacts as well as the changes of these impacts over time that should be the focus rather than the absolute numbers. Analyses of this type are much better at predicting relative percent differences brought about by a shock to a complex system (i.e., a water shortage) than the precise size of an impact. To illustrate, assuming that the estimated economic impacts of a drought of record on the manufacturing and mining water user categories are $2 and $1 million, respectively, one should be more confident that the economic impacts on manufacturing are twice as large as those on mining and that these impacts will likely be in the millions of dollars. But one should have less confidence that the actual total economic impact experienced would be $3 million.

3 Analysis Results

This section presents a breakdown of the results of the regional analysis for Region K. Projected economic impacts for six water use categories (irrigation, livestock. municipal, manufacturing, mining, and steam-electric power) are also reported by decade.

3.1 Overview of the Regional Economy

Table 3-1 presents the 2011 economic baseline as represented by the IMPLAN model and adjusted to 2013 dollars for Region K. In year 2011, Region K generated about $88 billion in gross state product associated with 975,000 jobs based on the 2011 IMPLAN data. These values represent an approximation of the current regional economy for a reference point.

Table 3-1 Region K Economy

Income ($ millions)*	Jobs	Taxes on production and imports ($ millions)*
$88,344	**975,269**	**$6,335**

[1]*Year 2013 dollars based on 2011 IMPLAN model value added estimates for the region.*

The remainder of Section 3 presents estimates of potential economic impacts for each water use category that could reasonably be expected in the event of water shortages associated with a drought of record and if no recommended water management strategies were implemented.

3.2 Impacts for Irrigation Water Shortages

Four of the 14 counties in the region are projected to experience water shortages in the irrigated agriculture water use category for one or more decades within the planning horizon. Estimated impacts to this water use category appear in Table 3-2. Note that tax collection impacts were not estimated for this water use category. IMPLAN data indicates a negative tax impact (i.e., increased tax collections) for the associated production sectors, primarily due to past subsidies from the federal government. Two factors led to excluding any reported tax impacts: 1) Federal support (subsidies) has lessened greatly since the year 2011 IMPLAN data was collected, and 2) It was not considered realistic to report increasing tax revenue collections for a drought of record.

Table 3-2 Impacts of Water Shortages on Irrigation in Region

Impact Measure	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$56	$52	$49	$46	$43	$40
Job losses	1,338	1,258	1,181	1,108	1,039	974

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

3.3 Impacts for Livestock Water Shortages

None of the 14 counties in the region are projected to experience water shortages in the livestock water use category for one or more decades within the planning horizon. Estimated impacts to this water use category appear in Table 3-3. Note that tax impacts are not reported for this water use category for similar reasons that apply to the irrigation water use category described above.

Table 3-3 Impacts of Water Shortages on Livestock in Region

Impact Measures	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	-	-	-	-	-	-
Jobs losses	-	-	-	-	-	-

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000***

3.4 Impacts for Municipal Water Shortages

Eleven of the 14 counties in the region are projected to experience water shortages in the municipal water use category for one or more decades within the planning horizon. Impact estimates were made for the two subtypes of use within municipal use: residential, and non-residential. The latter includes commercial and institutional users. Consumer surplus measures were made for both residential and non-residential demands. In addition, available data for the non-residential, water-intensive portion of municipal demand allowed use of IMPLAN and TWDB Water Use Survey data to estimate income loss, jobs, and taxes. Trucking cost estimates, calculated for shortages exceeding 80 percent, assumed a fixed cost of $20,000 per acre-foot to transport water for municipal use. The estimated impacts to this water use category appear in Table 3-4.

Table 3-4 Impacts of Water Shortages on Municipal Water Users in Region

Impact Measures	2020	2030	2040	2050	2060	2070
Income losses[1] ($ millions)*	$1	$152	$175	$376	$1,135	$2,325
Job losses[1]	21	2,634	3,074	6,604	19,795	40,435
Tax losses on production and imports[1] ($ millions)*	$0	$12	$14	$30	$92	$187
Consumer surplus losses ($ millions)*	$1	$29	$51	$105	$194	$347
Trucking costs ($ millions)*	-	$3	$4	$4	$2	$6
Utility revenue losses ($ millions)*	$23	$84	$138	$205	$339	$592
Utility tax revenue losses ($ millions)*	$0	$1	$2	$3	$6	$10

[1] Estimates apply to the water-intensive portion of non-residential municipal water use.
**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

3.5 Impacts of Manufacturing Water Shortages

Manufacturing water shortages in the region are projected to occur in 3 of the 14 counties in the region for at least one decade of the planning horizon. Estimated impacts to this water use category appear in Table 3-5.

Table 3-5 Impacts of Water Shortages on Manufacturing in Region

Impacts Measures	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$35	$52	$70	$88	$106	$126
Job losses	390	575	788	985	1,165	1,365
Tax losses on production and Imports ($ millions)*	$4	$6	$8	$10	$13	$16

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

3.6 Impacts of Mining Water Shortages

Mining water shortages in the region are projected to occur in 4 of the 14 counties in the region for at least one decade of the planning horizon. Estimated impacts to this water use type appear in Table 3-6.

Table 3-6 Impacts of Water Shortages on Mining in Region

Impact Measures	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$1,403	$1,236	$872	$485	$299	$342
Job losses	8,128	7,414	5,371	3,196	2,187	2,508
Tax losses on production and Imports ($ millions)*	$230	$197	$136	$71	$39	$44

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

3.7 Impacts of Steam-Electric Water Shortages

Steam-electric water shortages in the region are projected to occur in 4 of the 14 counties in the region for at least one decade of the planning horizon. Estimated impacts to this water use category appear in Table 3-7.

Note that estimated economic impacts to steam-electric water users:

- Are reflected as an income loss proxy in the form of the estimated additional purchasing costs for power from the electrical grid that could not be generated due to a shortage;
- Do not include estimates of impacts on jobs. Because of the unique conditions of power generators during drought conditions and lack of relevant data, it was assumed that the industry would retain, perhaps relocating or repurposing, their existing staff in order to manage their ongoing operations through a severe drought.
- Does not presume a decline in tax collections. Associated tax collections, in fact, would likely increase under drought conditions since, historically, the demand for electricity increases during times of drought, thereby increasing taxes collected on the additional sales of power.

Table 3-7 Impacts of Water Shortages on Steam-Electric Power in Region

Impact Measures	2020	2030	2040	2050	2060	2070
Income Losses ($ millions)*	$65	$66	$66	$98	$392	$736

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

3.8 Regional Social Impacts

Projected changes in population, based upon several factors (household size, population, and job loss estimates), as well as the accompanying change in school enrollment, were also estimated and are summarized in Table 3-8.

Table 3-8 Region-wide Social Impacts of Water Shortages in Region

Impact Measures	2020	2030	2040	2050	2060	2070
Consumer surplus losses ($ millions)*	$1	$29	$51	$105	$194	$347
Population losses	1,813	2,181	1,912	2,184	4,441	8,314
School enrollment losses	335	403	354	404	822	1,538

**** Year 2013 dollars, rounded. Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000.***

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Appendix A - County Level Summary of Estimated Economic Impacts for Region K

County level summary of estimated economic impacts of not meeting identified water needs by water use category and decade (in 2013 dollars, rounded). Values presented only for counties with projected economic impacts for at least one decade.

**** Entries denoted by a dash (-) indicate no economic impact. Entries denoted by a zero ($0) indicate income losses less than $500,000***

		Income losses (Million $)*						Job losses						Consumer Surplus (Million $)*					
County	Water Use Category	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
BASTROP	MANUFACTURING	$6	$15	$26	$37	$42	$48	77	189	329	462	533	609	-	-	-	-	-	-
BASTROP	MINING	$11	$185	$213	$243	$276	$312	80	1,320	1,514	1,730	1,962	2,220	-	-	-	-	-	-
BASTROP	MUNICIPAL	-	-	-	$74	$448	$1,057	-	-	-	1,279	7,760	18,326	$0	$2	$5	$14	$44	$121
BASTROP Total		**$17**	**$200**	**$239**	**$353**	**$766**	**$1,417**	**157**	**1,508**	**1,842**	**3,471**	**10,255**	**21,156**	**$0**	**$2**	**$5**	**$14**	**$44**	**$121**
BLANCO	MUNICIPAL	-	-	-	-	-	-	-	-	-	-	-	-	$0	$0	$0	$0	$0	$0
BLANCO Total		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
BURNET	MINING	$1	$4	$7	$11	$15	$21	13	38	71	105	147	197	-	-	-	-	-	-
BURNET	MUNICIPAL	-	-	-	$0	$3	$5	-	-	-	7	51	93	$0	$0	$0	$1	$2	$3
BURNET Total		**$1**	**$4**	**$7**	**$11**	**$18**	**$26**	**13**	**38**	**71**	**112**	**197**	**290**	**$0**	**$0**	**$0**	**$1**	**$2**	**$3**
COLORADO	IRRIGATION	$7	$6	$5	$4	$4	$3	150	130	112	96	80	66	-	-	-	-	-	-
COLORADO	MUNICIPAL	-	-	-	-	-	-	-	-	-	-	-	-	$0	$0	$0	$0	$0	$0
COLORADO Total		**$7**	**$6**	**$5**	**$4**	**$4**	**$3**	**150**	**130**	**112**	**96**	**80**	**66**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
FAYETTE	MANUFACTURING	$17	$20	$23	$26	$29	$32	224	264	303	337	379	425	-	-	-	-	-	-
FAYETTE	MINING	$1,387	$1,042	$646	$225	$1	$1	8,006	6,014	3,729	1,299	5	4	-	-	-	-	-	-
FAYETTE	MUNICIPAL	-	-	-	-	-	-	-	-	-	-	-	-	$0	$0	$0	$0	$0	$0
FAYETTE Total		**$1,405**	**$1,062**	**$669**	**$251**	**$30**	**$33**	**8,230**	**6,279**	**4,032**	**1,636**	**384**	**430**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
GILLESPIE	MANUFACTURING	$12	$17	$21	$25	$35	$45	89	122	156	186	253	330	-	-	-	-	-	-
FAYETTE	MUNICIPAL	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	$0
GILLESPIE Total		**$12**	**$17**	**$21**	**$25**	**$35**	**$45**	**89**	**122**	**156**	**186**	**253**	**330**	**-**	**-**	**-**	**-**	**-**	**$0**
HAYS	MINING	$3	$4	$6	$6	$7	$8	29	42	57	62	74	87	-	-	-	-	-	-
HAYS	MUNICIPAL	-	-	-	$44	$214	$557	-	-	-	771	3,705	9,655	-	$0	$1	$7	$22	$52
HAYS Total		**$3**	**$4**	**$6**	**$50**	**$221**	**$565**	**29**	**42**	**57**	**833**	**3,779**	**9,741**	**-**	**$0**	**$1**	**$7**	**$22**	**$52**
LLANO	MUNICIPAL	$1	$3	$2	$1	$2	$4	21	44	33	16	38	61	$0	$0	$0	$0	$0	$0
LLANO Total		**$1**	**$3**	**$2**	**$1**	**$2**	**$4**	**21**	**44**	**33**	**16**	**38**	**61**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
MATAGORDA	IRRIGATION	$29	$28	$27	$26	$25	$24	675	652	630	608	587	566	-	-	-	-	-	-

		Income losses (Million $)*						Job losses						Consumer Surplus (Million $)*					
County	Water Use Category	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070
MATAGORDA	STEAM ELECTRIC POWER	$65	$66	$66	$67	$67	$68	-	-	-	-	-	-	-	-	-	-	-	-
MATAGORDA Total		**$95**	**$94**	**$93**	**$93**	**$92**	**$92**	**675**	**652**	**630**	**608**	**587**	**566**	**-**	**-**	**-**	**-**	**-**	**-**
MILLS	IRRIGATION	$0	$0	$0	$0	$0	$0	-	-	-	-	-	-	-	-	-	-	-	-
MILLS	MUNICIPAL	-	-	-	-	-	-	-	-	-	-	-	-	$0	$0	$0	$0	$0	$0
MILLS Total		**$0**	**$0**	**$0**	**$0**	**$0**	**$0**	**-**	**-**	**-**	**-**	**-**	**-**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
SAN SABA	MUNICIPAL	-	-	-	-	-	-	-	-	-	-	-	-	$0	$0	$0	$0	$0	$0
SAN SABA Total		**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**$0**	**$0**	**$0**	**$0**	**$0**	**$0**
TRAVIS	MUNICIPAL	-	$149	$173	$256	$469	$702	-	2,589	3,041	4,531	8,242	12,299	$0	$27	$44	$83	$126	$170
TRAVIS	STEAM ELECTRIC POWER	-	-	-	$32	$325	$668	-	-	-	-	-	-	-	-	-	-	-	-
TRAVIS Total		**-**	**$149**	**$173**	**$288**	**$794**	**$1,370**	**-**	**2,589**	**3,041**	**4,531**	**8,242**	**12,299**	**$0**	**$27**	**$44**	**$83**	**$126**	**$170**
WHARTON	IRRIGATION	$20	$18	$17	$16	$14	$13	513	475	439	405	372	342	-	-	-	-	-	-
WHARTON Total		**$20**	**$18**	**$17**	**$16**	**$14**	**$13**	**513**	**475**	**439**	**405**	**372**	**342**	**-**	**-**	**-**	**-**	**-**	**-**
Regional Total		**$1,560**	**$1,557**	**$1,233**	**$1,093**	**$1,975**	**$3,568**	**9,877**	**11,880**	**10,414**	**11,894**	**24,187**	**45,282**	**$1**	**$29**	**$51**	**$105**	**$194**	**$347**

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APPENDICES

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CHAPTER 7.0: DROUGHT RESPONSE INFORMATION, ACTIVITIES AND RECOMMENDATION

This chapter presents information on drought management and drought contingency plans, as well as a summary of information provided by water systems in the Lower Colorado Regional Water Planning Area regarding drought management, including preparations and response throughout the Region.

Drought Definitions

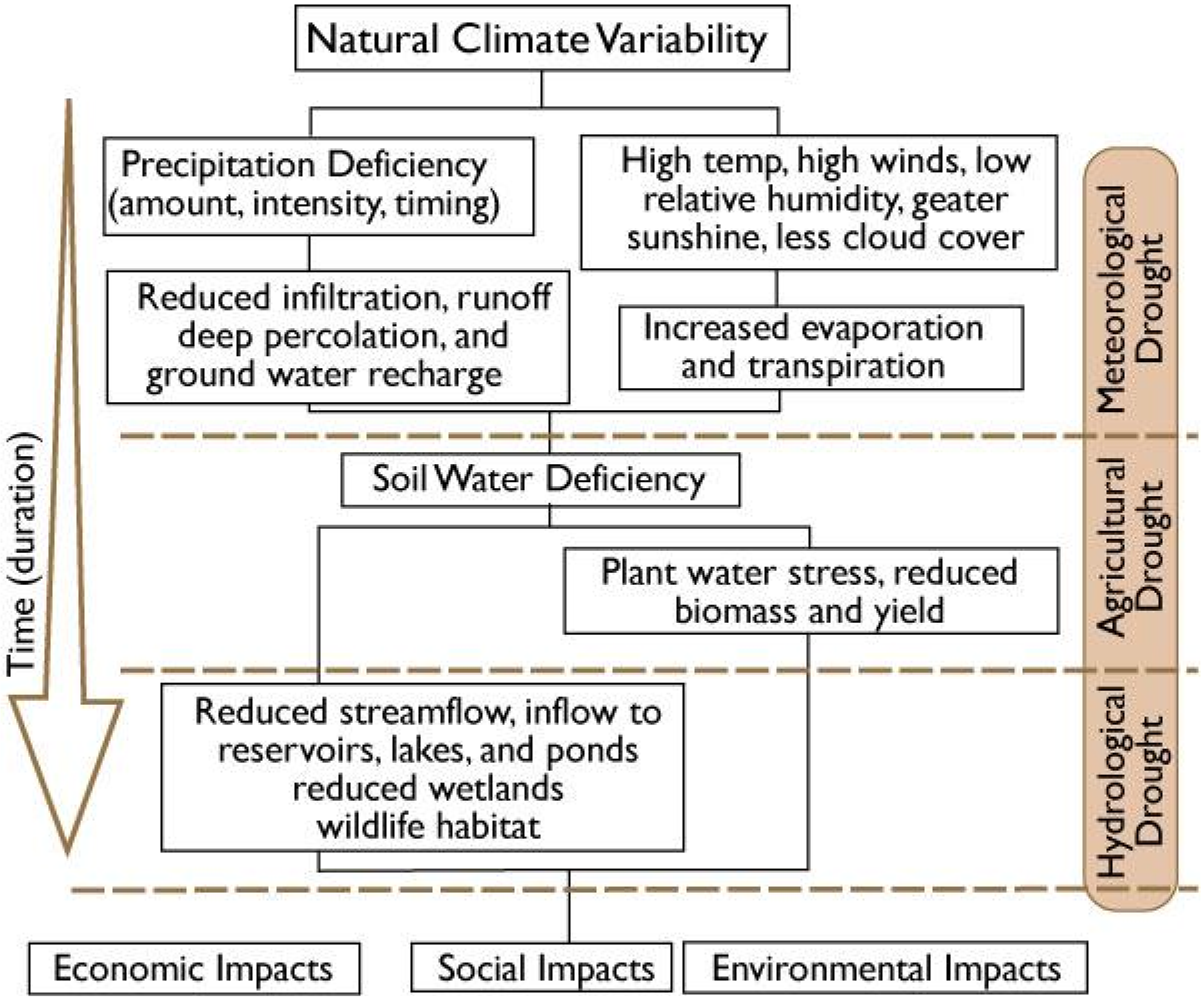
Drought is often referred to as a slow-moving emergency. The impact of droughts can be far-reaching but can be challenging to define due to the gradual and sometimes subtle progression of severity, as well as the tendency for temporal and geographic variations as isolated rain events shift perception of the drought severity. The types of droughts are sometimes characterized as meteorological, agricultural, and hydrological, which are events leading to the recognized socioeconomic impacts of drought. These drought terms are integrated and ordered such that as one type of drought intensifies it may lead to the development of another category of drought. The following definitions of categories of drought are taken from the State of Texas Drought Preparedness Plan and are further reflected in *Figure 7.1*:

- A meteorological drought is often defined as a period of substantially diminished precipitation duration and/or intensity that persists long enough to produce a significant hydrologic imbalance. The commonly used definition of meteorological drought is an interval of time, generally of the order of months or years, during which the actual moisture supply (typically rainfall in this region) of a given place consistently falls below the average moisture supply or average rainfall amount.
- Agricultural drought occurs when there is inadequate precipitation and/or soil moisture to sustain crop or forage production systems. The water deficit results in serious damage and economic loss to plant or animal agriculture. Agricultural drought usually begins after meteorological drought but before hydrological drought and can also affect livestock and other agricultural operations.
- Hydrological drought refers to reductions in surface and groundwater water supplies. It is measured as streamflow, and as lake, reservoir, and groundwater levels. There is usually a time lag between a lack of rain and lower amounts of measureable water in streams, lakes, and reservoirs.
- Socioeconomic drought occurs when physical water shortages start to affect the health, well-being, and quality of life of the people, or when the drought starts to affect the supply and demand of an economic product.

Determining if a dry weather pattern substantiates a meteorological drought requires an area-specific analysis that is first typically signified by dry meteorological patterns. Short intervals of dry patterns are considered within the norm of meteorological variation (seasonally and annually) so it is important to note that a true meteorological drought is dependent on the area in which it occurs.

In areas where surface and/or groundwater supplies are full at the start of a dry pattern there is often minimal impact on water use or economic and agricultural activity. However as dry pattern intensities deepen and duration of the meteorological drought continues and water supplies are stressed the impacts of meteorological drought transition and begin to indicate other drought categories.

Figure 7-1: Categories of Drought and Natural Climate Variability



Source: National Drought Mitigation Center website "What is Drought?"

7.1 DROUGHT OF RECORD

The definition of Drought of Record is "the period of time when natural hydrological conditions provided the least amount of water supply", per TAC Title 31, Part 10, Chapter 357, Subchapter A, Rule 357.10.

Hydrological droughts can be assessed using the Texas Commission on Environmental Quality (TCEQ) Water Availability Model (WAM); this assessment is directly associated with the use of the WAM model to determine firm availability of surface water for the Regional Water Plan.

Another indicator commonly used by federal and state agencies to characterize drought severity is the Palmer Drought Severity Index (PDSI). The PDSI is an estimate of soil moisture conditions calculated based on precipitation and temperature. The PDSI classifies soil moisture on a scale ranging from approximately -6.0 to 6.0, with values of approximately -0.49 to 0.49 reflecting normal conditions and -4.0 or lower representing extreme drought.

7.1.1 Drought of Record

Statewide, the period typically considered the Drought of Record occurred in the 1950s and had significant hydrologic and economic consequences throughout the State. Within the Lower Colorado Regional Planning Area, the Drought of Record is most specifically associated with the hydrologic conditions of the Highland Lakes. The current Drought of Record for the Highland Lakes began in May 1947 and lasted through April 1957. During this time, the Highland Lakes reached a lowest combined storage of 621,221 acre-feet on September 9, 1952.

7.1.2 Potential New Drought of Record

The Lower Colorado River Basin, at the writing of this report, is experiencing a prolonged drought which is significantly impacting the Highland Lakes. Recent modeling efforts which included hydrology through 2013 indicate that the basin Drought of Record continues to be the period between May 1947 and April 1957. Modeling efforts confirm that 2011 represents the worst single-year drought on record, or the dry year of the basin.

The Lower Colorado River Authority is closely monitoring lake levels and inflows. Inflows to the Highland Lakes have been well below the monthly average since March 2012, and inflows in 2014 were the second lowest for a calendar year since 1942. In February 2015, the Lower Colorado River Authority announced that the drought gripping the Highland Lakes indicates the onset of a new critical period of drought for the region, and that LCRA had lowered its firm yield estimates by about 100,000 acre-feet.

If the combined storage of the Highland Lakes falls to 30 percent of capacity, or 600,000 acre-feet, the LCRA Board of Directors will issue a Drought Worse than the Drought of Record declaration. Following a state-approved plan, LCRA would then require cities, industries and other firm customers to reduce their water use by 20 percent from a baseline year and would cut off all Highland Lakes water to interruptible customers. Should LCRA Board of Directors declare a Drought Worse than the Drought of Record, the termination and full extent of the drought will not be quantifiable until after the Highland Lakes are full again.

In February 2015, LCRA announced that preliminary 2014 data analysis shows the drought gripping the Highland Lakes is now the most severe drought the region has experienced in the period of record.

LCRA's February 18, 2015 Press Release states that:

> "As a direct result of the prolonged record-dry conditions and record-low inflows from the streams and tributaries feeding the Highland Lakes, the "firm yield," or inventory of water LCRA can provide reliably every year, has been decreased by about 100,000 acre-feet, to 500,000 acre-feet per year. (An acre-foot of water is 325,851 gallons.) Further reductions in firm yield are possible as the drought continues."

In a presentation to LCRA's Board the staff reported that "preliminary data shows the Highland Lakes are now in a new "critical period" marking the driest conditions on record, eclipsing the 1947-57 drought that until now was the worst on record".

Due to schedule requirements of the current regional plan development process, the planning group was able to extend the hydrologic data set used for the plan's surface water availability analysis through the end of 2013. However, since the full and final 2014 data sets are not yet available, analysis of the additional drought data through 2014 and beyond will need to be conducted for future planning analyses. It should be noted that year 2011 drought conditions account for most of the preliminary firm system yield reduction recently estimated by LCRA. Firm yield reduction impacts from inclusion of the 2011 data was also incorporated in the Region K water availability modeling since the data set used was extended through 2013.

The 5-year frequency of the regional planning cycles provides the opportunity on a regular basis to update the analyses that go into developing the plan. It should be noted that this plan includes additional new water management strategies including strategies aimed at managing and responding to the on-going drought, especially in light of its severity, even though it has diminished somewhat with recent inflows to the Highland Lakes.

Timeline of Current Central Texas Drought

While not yet considered a new drought of record, because the final naturalized inflow data sets are not yet available to fully analyze the severity of the drought beyond the end of 2013, it is important to note that the Lower Colorado River Basin is currently experiencing an historic drought. In any emergency event, there are a series of benchmarks that provide a valuable perspective of how conditions changed over time. Some of the impacts of the drought that have occurred since the beginning of the 2011-2016 regional planning cycle have been included for documentation purposes.

The drought has caused major impacts to reservoir levels, has helped create conditions to enable large wildfires, and has caused economic impacts to water users throughout the Lower Colorado Basin, including agriculture and recreational interests.

Wildfires occurred across Texas in September of 2011, as a result of the dry conditions. The most devastating one was the Bastrop Complex Fire in Bastrop County, which destroyed over 34,000 acres and more than 1,300 homes, and the loss of two lives. A massive wildfire in the Spicewood or Pedernales area of Burnet and Travis Counties also destroyed homes and property that month. 2011 became the new single driest year on record, replacing 1956 in the Lower Colorado Basin.

In late January of 2012, the wells in Spicewood Beach, Texas ran out of water. The residents had to depend on tanker trucks to deliver water to the town's storage tank. The Lower Colorado River Authority (LCRA) owned the water system at the time and oversaw the emergency water operation. Corix Utilities currently provides Spicewood Beach with retail water treatment.

The low water levels in Central Texas took their toll on rice farmers near the coast. Rice farming relies heavily on stored water from the Highland Lakes on the Colorado River. The low lake levels led to LCRA's request for emergency relief from the LCRA Water Management Plan from providing interruptible stored water to downstream non-Garwood Division irrigators, which was granted by TCEQ in 2012, 2013, 2014, and 2015.

The drought has also affected a wide range of industries and other LCRA firm water customers in Texas. Property values, tourism, and recreational businesses have suffered in the areas surrounding the Highland

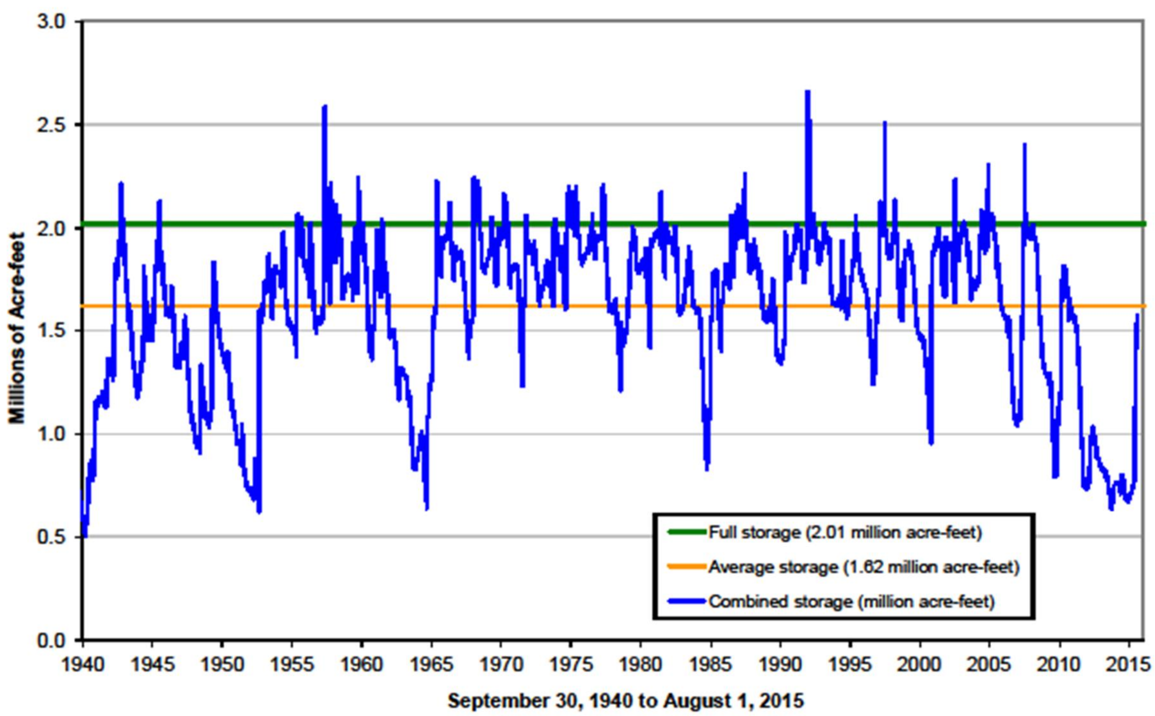
Lakes, and farmers downstream that have had their water supplies curtailed, as well as the industries that support agriculture, have all had major negative economic impacts in the last several years.

Until recently, when rains have come, they have been in large part downstream of the watersheds needed to provide inflows to Lake Travis and Lake Buchanan. In October 2013, historic flooding occurred in Austin, including Barton Creek and Onion Creek. The floodwater was not able to be captured and flowed downstream to Matagorda Bay instead. In addition, the drought has caused such extreme dryness in the soils in the Hill Country that even when normal levels of rainfall occur, the inflows to the Highland Lakes have continued to be extremely low.

In September 2014, TWDB authorized funding for construction of a new off-channel reservoir for LCRA along the Colorado River near Lane City in Wharton County. Construction of the reservoir began in late 2014 and is expected to be complete by 2018. A reservoir of this type will be able to catch future flood flows downstream of the Highland Lakes.

The current drought began in 2008 and resulted in persistently low lake levels from 2011 to mid-2015. Although the region's water supply reservoirs benefited from significant rain events in the spring and fall of 2015, reservoir storage has not fully recovered. As of November 2015, combined lake storage is at 78%. *Figure 7.2* shows how the combined storage in the last several years compares to historical storage levels dating back to 1940.

Figure 7-2: Total Combined Storage Levels of Lakes Buchanan and Travis



7.2 CURRENT DROUGHT PREPARATIONS AND RESPONSE

The TCEQ, in accordance with the Texas Administrative Code (TAC), requires all wholesale public water suppliers, retail public supplier, and irrigation districts to prepare and submit drought contingency plans (DCPs) meeting the requirements of 30 TAC Chapter§288(b) and to update these plans at least every five years.

While drought may be considered an emergency, it is often a slowly developing situation that provides increasing signs that water supplies could become scarce. By contrast, some supply deficiencies, such as equipment or pipeline failures, happen on shorter time intervals and provide little or no advance warning. System limitations that result from unexpected events including equipment failures, water supply contaminations, and other sudden decrease of supply should be planned for just as other emergency events. It is also important for communities to be aware that loss of supply may be a result of intentional damage or attack on a system.

A drought management efforts survey was created and distributed to 104 water systems and entities in October 2013, with 49 entities responding. The survey aimed at collecting information on voluntary and mandatory measures used by each water system. The survey database is included in *Appendix 7A*. As a voluntary measure, nine entities discontinued monthly flushing of water lines, 23 put restrictions on public landscaping irrigation, 24 water systems limited residential landscaping irrigations, and 19 entities implemented commercial irrigations. Additional details on the voluntary and mandatory measures and their implementation in recent years can be found in *Appendix 7A*. Actual survey responses are located on the Region K website at: http://www.regionk.org/?page_id=891.

The Drought Contingency Plans show that a variety of triggers have been specified by the different water supplies as initiators of water shortage conditions. These triggers include a threshold level of total water use, well levels, and conditions caused by mechanical failure of water service systems. Strategies planned for dealing with drought conditions included restrictions on water use for irrigation, vehicle washing, and construction. The amount of water saved for each drought response conditions varied by community.

Appendix 7B provides the drought triggers for severe and critical/emergency water shortages for water users in the region, as available from the Drought Contingency Plans. The water reduction goals for the triggers are also included.

7.3 EXISTING AND POTENTIAL EMERGENCY INTERCONNECTS

The Texas Administrative Code (31 TAC 357.42(d)) states that the regional water planning groups will collect confidential information on infrastructure and submit the information to the Executive Administrator of the Texas Water Development Board in accordance with the guidance provided.

The guidance provided by the Texas Water Development Board states that "RWPGs shall collect and summarize information on existing major water infrastructure facilities that may be used for emergency interconnects and provide this information to the EA confidentially and separately from the RWP document. This information may be collected in a tabular format that shows the potential user(s) of the interconnect(s), the potential supplier(s), the estimated potential volume of supply that could be provided via the interconnect (including the source name), and a general description of the facility/infrastructure and its location."

Based on response rates to a survey (on different subject matter) sent to Region K WUGs earlier in the planning cycle, the Region K Drought Committee determined that a low number of responses would be expected if the planning group sent a letter requesting emergency interconnect data. Instead of a letter/survey, the Drought Committee submitted an information request to the TCEQ for information on emergency interconnects within the counties in Region K. The TCEQ provided an Excel spreadsheet containing data on the potential user of the interconnect, the potential supplier, source information, and contact information. Information on existing and potential interconnect supply capacity and details related to location were not available. The confidential information was provided electronically on a CD, along with a transmittal letter, to the Executive Administrator prior to May 1, 2015.

Additionally, available DCPs for entities within the Region were reviewed to identify establishment or activation of interconnects as a drought response; such measures were not included in any of the DCPs available to the RWPG.

7.4 EMERGENCY RESPONSES TO LOCAL DROUGHT CONDITIONS OR LOSS OF MUNICIPAL SUPPLY

Emergency preparedness is of particular importance for entities that rely on a sole-source of water for supply purposes. In instances where water systems rely exclusively on a single source, the State of Texas has identified a need to develop emergency preparedness protocols should a source's availability be significantly and suddenly reduced for any reason, including drought, equipment failure, or accidental or deliberate source contamination.

7.4.1 WUGs with 2010 Population less than 7,500 and with a sole-source of water[1]

The Texas Administrative Code (31 TAC §357.42) requires that regional planning groups evaluate potential emergency responses to drought conditions or loss of existing water supplies for municipal water user groups with a 2010 population of less than 7,500 and with a sole-source of water, as well as all county-other water user groups.

A list of identified single-source municipal Water User Groups with population less than 7,500 and with a sole-source of water is provided in *Table 7.1* on the next page. The table also lists potential emergency water supply options for each Water User Group.

7.4.2 County-Other WUGs

Table 7.2 on the following pages provides the list of County-Other Water User Groups in Region K, and their potential emergency water supply options.

[1] Information in this subsection was obtained from the Texas Administrative Code, specifically TAC Title 30, Part 1, Chapter 288, Subchapter A, Rule 288.2.0

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Table 7-1: Municipal Region K WUGs under 7,500 in population (2010) and with a sole-source of water

Entity						Potential Emergency Water Supply Source(s)								Implementation Requirements				
Water User Group Name	County	2010 Census	2020 Population	2020 Demand (AF/year)	Supply Source(s)	Release from upstream reservoir	curtailment of upstream/downstream water rights	local groundwater well	brackish groundwater limited treatment	brackish groundwater desalination	emergency interconnect	other named local supply	trucked-in water	Type of infrastructure required	Entity providing supply	Other local entities required to participate/ coordinate	Emergency agreements/ arrangements already in place?	other
Barton Creek West WSC	Travis	1,456	1,456	432	Highland Lakes						X		X	1	A		unk	
Bastrop	Bastrop	7,218	9,653	1,957	Other Aquifer			X					X	2				
Bee Cave Village	Travis	3,925	4,740	1,777	Highland Lakes						X		X	1	L		unk	
Briarcliff Village	Travis	1,438	1,736	260	Highland Lakes								X					
Cimarron Park Water Company	Hays	2,055	2,150	249	Edwards BFZ			X					X	2				
Columbus	Colorado	3,655	3,832	1,135	Gulf Coast Aquifer	X		X					X	2,3				
Cottonwood Shores	Burnet	1,123	1,395	227	Highland Lakes			X			X		X	1,2	B		unk	
Eagle Lake	Colorado	3,639	3,816	523	Gulf Coast			X					X	2				
East Bernard	Wharton	2,272	2,411	380	Gulf Coast			X					X	2				
Goldthwaite	Mills	1,878	1,869	361	Trinity Aquifer			X					X	2				
Granite Shoals	Burnet	4,910	6,100	653	Highland Lakes						X		X	1	C		unk	
Horseshoe Bay	Burnet	3,418	1,192	747	Highland Lakes/Direct Reuse			X			X		X	1,2	D		unk	
Johnson City	Blanco	1,656	2,053	354	Trinity Aquifer			X					X	2				
Jonestown	Travis	1,834	1,987	408	Highland Lakes						X		X	1	E		unk	

Entity						Potential Emergency Water Supply Source(s)								Implementation Requirements				
Water User Group Name	County	2010 Census	2020 Population	2020 Demand (AF/year)	Supply Source(s)	Release from upstream reservoir	curtailment of upstream/downstream water rights	local groundwater well	brackish groundwater limited treatment	brackish groundwater desalination	emergency interconnect	other named local supply	trucked-in water	Type of infrastructure required	Entity providing supply	Other local entities required to participate/ coordinate	Emergency agreements/ arrangements already in place?	other
La Grange	Fayette	4,641	5,362	865	Yegua-Jackson	X		X			X		X	2,3			unk	
Lago Vista	Travis	6,041	7,580	1,868	Highland Lakes						X		X		G		unk	
Llano	Llano	3,232	3,565	862	Llano Lake								X					
Loop 360 WSC	Travis	1,900	1,998	1,174	Highland Lakes						X		X	1	H		unk	
Lost Creek MUD	Travis	3,726	4,369	1,092	City of Austin Contract								X	1			unk	
Marble Falls	Burnet	6,077	8,702	2,332	Highland Lakes			X			X		X	1,2	I		unk	
Meadowlakes	Burnet	1,777	2,207	849	Colorado Run-of-River/Highland Lakes			X			X		X	1,2	J		unk	
Mountain City	Hays	504	490	57	Edwards BFZ			X					X	2				
Palacios	Matagorda	4,718	5,035	679	Gulf Coast			X					X	2				
Point Venture	Travis	800	1,181	347	Highland Lakes						X		X	2	N		unk	
Rollingwood	Travis	1,412	1,421	384	City of Austin Contract								X					
Shady Hollow MUD	Travis	4,889	4,889	779	City of Austin Contract								X					
Smithville	Bastrop	3,817	4,913	842	Carrizo Wilcox	X		X					X	2,3				
Sunset Valley	Travis	749	1,134	386	City of Austin Contract, Edwards (partial)			X			X			2	H		unk	

Entity						Potential Emergency Water Supply Source(s)								Implementation Requirements				
Water User Group Name	County	2010 Census	2020 Population	2020 Demand (AF/year)	Supply Source(s)	Release from upstream reservoir	curtailment of upstream/downstream water rights	local groundwater well	brackish groundwater limited treatment	brackish groundwater desalination	emergency interconnect	other named local supply	trucked-in water	Type of infrastructure required	Entity providing supply	Other local entities required to participate/ coordinate	Emergency agreements/ arrangements already in place?	other
The Hills	Travis	2,472	3,000	1,449	Highland Lakes						X		X	2	M			
Travis County MUD #4	Travis	2,578	3,113	2,611	Highland Lakes						X		X		H,K		unk	
Travis County WCID #10	Travis	5,083	6,139	2,128	City of Austin Contract								X					
Travis County WCID #18	Travis	5,512	6,657	1,123	Highland Lakes			X			X		X	1,2	K		unk	
Travis County WCID #19	Travis	716	716	498	Highland Lakes						X		X		H,K		unk	
Travis County WCID #20	Travis	1,140	1,140	590	Highland Lakes						X		X	1	A		unk	
Volente	Travis	520	677	76	Trinity Aquifer			X					X	2				
Weimar	Colorado	2,151	2,256	556	Gulf Coast Aquifer	X		X					X	2,3				
West Lake Hills	Travis	3,063	3,699	1,564	City of Austin Contract						X		X	1	H		unk	

Type of Infrastructure Required:

1. Transmission pipeline and pump station
2. Water Well
3. River intake, transmission pipeline, and surface water treatment plant

Entities potentially providing emergency interconnect water

A. Travis County MUD 4
B. Horseshoe Bay
C. Sunrise Beach
D. Cottonwood Shores
E. Lago Vista
F. not used
G. City of Jonestown
H. City of Austin
I. City of Meadowlakes
J. City of Marble Falls
K. Travis County WCID #20
L. West Travis County PUA
M. Hurst Creek MUD
N. Travis County MUD #1

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Table 7-2: County-Other WUGs in Region K

Entity						Potential Emergency Water Supply Source(s)								Implementation Requirements				
Water User Group Name	**County**	**2010 Census**	**2020 Population**	**2020 Demand (AF/year)**	**Supply Source(s)**	**Release from upstream reservoir**	**curtailment of upstream/downstream water rights**	**local groundwater well**	**brackish groundwater limited treatment**	**brackish groundwater desalination**	**emergency interconnect**	**other named local supply**	**trucked-in water**	**Type of infrastructure required**	**Entity providing supply**	**Other local entities required to participate/ coordinate**	**Emergency agreements/ arrangements already in place?**	**other**
County-Other	Bastrop	8,697	10,290	1,873	Carrizo Wilcox/Queen City/Highland Lakes			X			X		X	well	Aqua WSC			
County-Other	Blanco	6,279	7,786	964	Colorado Other Local Supply/ Ellenburger San Saba Aquifer/Hickory/Trinity/Canyon Lake			X					X	well				
County-Other	Burnet	19,530	22,839	3,506	Ellenburger San Saba/Hickory/ Marble Falls Aquifer/Other Alluvium/Trinity/ Brazos River Authority Purchase from Little River Lake/Edwards BFZ/Highland Lakes			X					X	well				
County-Other	Colorado	11,429	11,980	1,475	Gulf Coast Aquifer			X					X	well				

Entity						Potential Emergency Water Supply Source(s)								Implementation Requirements				
Water User Group Name	**County**	**2010 Census**	**2020 Population**	**2020 Demand (AF/year)**	**Supply Source(s)**	**Release from upstream reservoir**	**curtailment of upstream/downstream water rights**	**local groundwater well**	**brackish groundwater limited treatment**	**brackish groundwater desalination**	**emergency interconnect**	**other named local supply**	**trucked-in water**	**Type of infrastructure required**	**Entity providing supply**	**Other local entities required to participate/ coordinate**	**Emergency agreements/ arrangements already in place?**	**other**
County-Other	Fayette	9,359	10,817	1,236	Gulf Coast Aquifer/Fayette WSC/Sparta/Yegua-Jackson/Highland Lakes			X					X	well				
County-Other	Gillespie	14,307	15,477	1,823	Edwards-Trinity Plateau/Ellenburger San Saba/Hickory/Trinity/Highland Lakes			X					X	well				
County-Other	Hays	20,249	25,255	3,107	Edwards BFZ/Trinity/Canyon Lake/Highland Lakes			X					X	well				
County-Other	Llano	6,563	5,746	610	Ellenburger-San Saba/Hickory/Other-alluvium/Highland Lakes			X			X		X	well	Horseshoe Bay			
County-Other	Matagorda	14,370	15,334	1,601	Gulf Coast Aquifer			X					X	well				
County-Other	Mills	3,011	2,996	385	Trinity			X					X	well				
County-Other	San Saba	1,917	2,028	316	Ellenburger-San Saba/Hickory/Marble Falls/Highland Lakes			X					X	well				

Entity						Potential Emergency Water Supply Source(s)								Implementation Requirements				
Water User Group Name	**County**	**2010 Census**	**2020 Population**	**2020 Demand (AF/year)**	**Supply Source(s)**	**Release from upstream reservoir**	**curtailment of upstream/downstream water rights**	**local groundwater well**	**brackish groundwater limited treatment**	**brackish groundwater desalination**	**emergency interconnect**	**other named local supply**	**trucked-in water**	**Type of infrastructure required**	**Entity providing supply**	**Other local entities required to participate/ coordinate**	**Emergency agreements/ arrangements already in place?**	**other**
County-Other	Travis	82,569	59,888	8,395	Other Aquifer/Trinity/Colorado Run-of-River/Highland Lakes			X			X		X	well	Lakeway MUD			
County-Other	Wharton	14,489	15,374	1,993	Gulf Coast			X					X	well				
County-Other	Williamson	12,306	16,658	2,586	Colorado Run-of-River, Highland Lakes								X					

7.5 REGION-SPECIFIC DROUGHT RESPONSE RECOMMENDATIONS AND MODEL DROUGHT CONTINGENCY PLANS

7.5.1 Surface Water

The Highland Lakes and Colorado River provide substantial water supply to the Lower Colorado Region, and almost exclusively provide the primary source water for a number of Central Texas municipalities including the City of Austin. The Lower Colorado River Authority manages the Highland Lakes and closely monitors total combined storage in the lakes and establishes drought stages based on combined storage levels. *Table 7.3* below summarizes recommended drought stage triggers and actions as identified in the LCRA's DCP Sample Plan for municipal use. LCRA provides sample drought contingency plans (DCP), and requires all customer DCPs to state the specific combined storage triggers located in its water management plan, and requires customers to update their plans every five years. The City of Austin also follows Drought Contingency Plan triggers based on the combined storage levels in the Highland Lakes, as well as other triggers based on peak day system demand.

Table 7-3: Summary of LCRA Recommended Drought Triggers and Responses

Drought Stage	*Trigger*	*Action*
Stage 1	Combined Storage less than 1.4 million acre-feet	5% reduction.
Stage 2 (Severe)	Combined Storage less than 900,000 acre-feet	10-20% reduction
Stage 3 (Critical)	Combined Storage less than 600,000 acre-feet	Minimum 20% reduction.
Stage 4	LCRA general manager or Board determines that conditions constitute a water supply emergency	Determined by LCRA Board.

Based on current LCRA DCP sample plan

The Lower Colorado Regional Water Planning Group (LCRWPG) acknowledges that the Wholesale Water Providers in Region K have extensive knowledge regarding surface water sources in the region, and they may play a leadership role in developing appropriate drought response actions for themselves and their customers. Please see Appendix 7B for severe and critical/emergency triggers and responses associated with LCRA and City of Austin customers. One area the LCRWPG feels could potentially be improved upon is the coordination and uniformity of Drought Stage levels for all users of a particular sources. It has been acknowledged that there can be some confusion when two water users of the same water source are at different Drought Stage levels, even if they are implementing similar drought responses.

7.5.2 Groundwater

A large portion of the region uses groundwater as their main source of supply. Throughout the region, the Drought Contingency Plans for groundwater users are developed specifically to their use and location. Aquifer characteristics can vary across the region and it can be difficult to require the same triggers for all users of a particular groundwater source that covers several counties. The LCRWPG acknowledges that the municipalities and water utilities that rely upon groundwater should have the best knowledge to develop their Drought Contingency Plan triggers and responses using their specialized knowledge. Please see Appendix 7B for severe and critical/emergency triggers and responses associated with groundwater users in the region. Even so, the LCRWPG encourages ongoing coordination between groundwater users, Groundwater Conservation Districts, and the Groundwater Management Areas to monitor local conditions for necessary modifications to the Drought Contingency Plans.

Several resources are available to aid in drought monitoring. The following sources provide information related to drought that groundwater suppliers, Groundwater Conservation Districts, and Groundwater Management Areas can all use to monitor drought conditions and help aid in making decisions related to triggers and drought response.

Texas Drought Preparedness Council:
http://www.txdps.state.tx.us/dem/CouncilsCommittees/droughtCouncil/stateDroughtPrepCouncil.htm

Palmer Drought Severity Index:

http://www.drought.gov/drought/content/productscurrent-drought-and-monitoring-drought-indicators/palmer-drought-severity-index

TCEQ drought information:

http://www.tceq.state.tx.us/response/drought/drought.html

7.5.3 Region-Specific Model-Drought Contingency Plans

Model drought contingency plans addressing the requirements of 30 TAC Chapter §288(b) were developed for Region K and are available in Appendix 7C. Model plans were developed for wholesale water providers and retail public water suppliers. These model plans were largely based on templates provided by the TCEQ, with modifications made to acknowledge coordination with the Lower Colorado Regional Water Planning Group and to make the template more specific to the region.

7.6 DROUGHT MANAGEMENT WATER MANAGEMENT STRATEGIES

7.6.1 Potentially Feasible Drought Management WMS Considered

The Lower Colorado Regional Water Planning Group considers drought management an integral component of meeting the future water needs of the Region. Although drought management measures are often temporary mechanisms to reduce water consumption and drought impact, it is equally evident that some drought management measures may develop into permanent shifts or reductions in water use practices in the region. The Lower Colorado River Authority and City of Austin, as well as other smaller water providers throughout the Region, have implemented drought contingency measures largely since 2011. As the current Central Texas Drought lengthens and deepens, these measures and the subsequent awareness for mindful water use among citizens have become an important part of managing water supplies throughout the Region, particularly in the Highland Lakes.

As such, the Planning Group reviewed each municipal Water User Group's Drought Contingency Plan and survey responses to determine what, if any, drought management WMS would be considered reasonable and effective in reducing water demands. Drought Management as a water management strategy was considered for each municipal WUG, regardless of whether they had water needs. In general, the following guidelines were utilized in considering drought management as a municipal WUG strategy:

- For municipal WUGs with GPCD equal to or less than 100 gallons per capita daily, a 5% demand reduction was recommended.

- For municipal WUGs with GPCD greater than 100 gallons per capita daily, a 15% demand reduction was recommended.

- The demand reduction percentages listed above were modified based on available Drought Contingency Plans for individual WUGs to reflect the communities identified goal for reduction during severe drought.

- Consideration was given whether water use restrictions were in place in 2011.

Drought management was also considered as a potentially feasible strategy for several irrigation water user groups with water needs. Irrigation in Colorado, Matagorda, and Wharton counties has severe shortages throughout the planning period, and drought management may be a necessary strategy to implement. Rice farming is prominent in these three counties, and generally involves growing both a first and second (ratoon) crop. Drought management would assume that most rice farmers would grow only a first crop, and not a second crop. In addition, drought management is recommended for irrigation in Mills County (Brazos Basin.) There are limited supplies of water in that area of the county, and it is assumed that the water use by agriculture would be reduced based on drought conditions.

7.6.2 Recommended Drought Management WMS

Drought management was recommended as a water management strategy for nearly all municipal WUGs that have Region K as their primary region, and for the irrigation WUGs mentioned in *Section 7.6.1*. Triggers associated with these recommended strategies include those referenced in the LCRA Water Management Plan and the individual municipality drought contingency plans. The Palmer Drought Severity Index is another resource that could be used for determining triggers for these strategies. Please refer to *Chapter 5, Section 5.2.4.8* for additional details.

Total water savings for drought management strategies within the Region reach approximately 157,000 AFY by the year 2070, with the largest portion of that coming from irrigation.

Other recommended drought-related strategies that may be implemented specifically to help manage drought and extend water supplies include two strategies for the City of Austin. The two City of Austin strategies include the Indirect Potable Reuse through Lady Bird Lake strategy and the Lake Austin Operations strategy, both discussed more fully, including drought triggers, in *Chapter 5, Section 5.2.3.2*.

7.7 OTHER DROUGHT RECOMMENDATIONS

Housed within the Office of Emergency Management within the Texas Department of Public Safety, the Drought Preparedness Council was authorized and established by the 76th legislature (HB-2660) in 1999, subsequent to the establishment of the Drought Monitoring and Response Committee (75th legislature, SB1.) The Council is composed of representatives of state agencies and appointees by the governor. As defined by the Texas Water Code, the Council is responsible for the monitoring and assessing drought conditions and advising elected and planning officials about drought-related topics.

The Lower Colorado Regional Water Planning Group (LCRWPG) reviewed and considered recommendations from the Drought Preparedness Council with regards to following the outline template provided by the Texas Water Development Board, making an effort to fully address the assessment of current drought preparations and planned responses, and evaluating the drought preparedness impacts of unanticipated population growth or industrial growth within the region over the planning horizon. The LCRWPG recommended conservation and drought management as water management strategies for municipalities, which will aid in buffering any unanticipated population growth. With respect to industrial growth, the LCRWPG has recommended several water management strategies for the wholesale water providers in the region to enhance supplies that may be needed to meet future growth not accounted for in the plan.

The Lower Colorado Regional Water Planning Group recognizes that the most valuable contingency will be completed at a local level. Further guidance and regional cooperation would be valuable in producing meaningful plans with clear trigger definition and implementation guidance. Communication of these between state, regional and local levels would also further facilitate necessary emergency responses when drought measures need to be implemented. The following recommendations are made to support development and implementation of meaningful Drought Contingency Plans during times of drought:

- Uniform consistency of drought stage definition among users of the same source of water.
- Coordination by water providers with local Groundwater Conservation Districts, in order to consider more uniform triggers and responses from a particular source within the district, as applicable.
- Coordination with wholesale providers regarding drought conditions and potential implementation of drought stages.
- Communication with customers upon reaching a voluntary drought stage level to raise public awareness and facilitate potential implementation of drought measures.
- Communication with customers upon reaching a mandatory drought stage level to reinforce the importance of compliance with mandatory drought measures, and emphasize heightened need for public awareness.

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APPENDIX 7A

Drought Contingency Survey Results

Water System	1. Voluntary Measures															
	2011 Water Savings		Annual Water Savings		a. Discontinuation of monthly flushing of water mains			b. Public landscaping irrigation restrictions			c. Residential landscaping irrigation limits			d. Commercial irrigation limits		
	Amount	Units	Amount	Units	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
TOTAL					9	9	9	18	23	13	19	24	13	15	19	12
AQUA WATER SUPPLY CORPORATION							1	Sep-11	1	1	Sep-11	1	1			
AUSTIN, CITY OF - AUSTIN WATER UTILITY							1									
BARTON CREEK WEST WATER SUPPLY CO																
BASTROP COUNTY WCID NO 2																
BASTROP, CITY OF																
BAY CITY, CITY OF	0	GPD	0	GPD			1			1			1			1
BEE CAVE, CITY OF																
BERTRAM, CITY OF								Jan - Dec	1							
BLANCO, CITY OF																
BROOKSMITH SUD																
BRUSHY CREEK MUD								Jan-Dec	1	1	Jan-Dec	1	1	Jan-Dec	1	1
BUDA, CITY OF								Jan - Dec	1		Jan - Dec	1		Jan - Dec	1	

Water System	1. Voluntary Measures															
	2011 Water Savings		Annual Water Savings		a. Discontinuation of monthly flushing of water mains			b. Public landscaping irrigation restrictions			c. Residential landscaping irrigation limits			d. Commercial irrigation limits		
	Amount	Units	Amount	Units	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
BURNET COUNTY																
BURNET, CITY OF							1			1	1			1		
CAMP OF THE HILLS																
CANYON LAKE WSC	0.75	mg	1	mg		1	1					1				
CAPITOL AGGREGATES, LTD.																
CEDAR PARK, CITY OF																
CHISHOLM TRAIL S U D																
CIMARRON PARK WATER COMPANY INC					May-Dec	1		May-Dec	1		May-Dec	1		May-Dec	1	
COLUMBUS, CITY OF							1			1			1			1
COTTONWOOD SHORES, CITY OF	15,000 gals/d	1	5.4	mg	1	1		1	1		1	1		1	1	
CREEDMOOR-MAHA WATER SUPPLY CORP																
DRIPPING SPRINGS , CITY OF																
DRIPPING SPRINGS WATER SUPPLY CORP	0		5%	39 AF	No			Nov	1		Nov	1		Nov	1	

Water System	1. Voluntary Measures																			
	2011 Water Savings		Annual Water Savings		a. Discontinuation of monthly flushing of water mains			b. Public landscaping irrigation restrictions			c. Residential landscaping irrigation limits			d. Commercial irrigation limits						
	Amount	Units	Amount	Units	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
EAGLE LAKE, CITY OF																
EAST BERNARD, CITY OF																
EL CAMPO, CITY OF						1	1		1	1		1	1		1	1
ELGIN, CITY OF																
ELLIOT RANCH WATER SYSTEM																
EQUISTAR CHEMICALS																
FARMERS CANAL COMPANY																
FAYETTE W S C																
FLATONIA, CITY OF																
FREDERICKSBURG, CITY OF																
GOFORTH SUD																
GOLDTHWAITE, CITY OF					1			1			1			1		
GRANITE SHOALS, CITY OF																
H & L NEW GULF, INC.																

Water System	1. Voluntary Measures															
	2011 Water Savings		Annual Water Savings		a. Discontinuation of monthly flushing of water mains			b. Public landscaping irrigation restrictions			c. Residential landscaping irrigation limits			d. Commercial irrigation limits		
	Amount	Units	Amount	Units	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
HIGHLAND HAVEN, CITY OF											May-Dec	1	1			
HORSESHOE BAY, CITY OF			10	ac/ft	Reduction	1	1	Dec	1	1	Dec	1	1	Dec	1	1
HURST CREEK MUD					May-Sept	1	1		1	1		1	1		1	1
JOHNSON CITY, CITY OF																
JONESTOWN, CITY OF																
KEMPNER WSC																
KINGSLAND WATER SUPPLY CORPORATION																
KYLE, CITY OF								1	1		1	1		1	1	
LA GRANGE, CITY OF					1			1			1					1
LAGO VISTA, CITY OF																
LAKE LBJ MUNICIPAL UTILITY DISTRICT																
LAKEWAY, CITY OF																
LAKEWAY MUD									1	1		1	1		1	1
LEANDER, CITY OF								1	1	1	1	1	1	1	1	1

Water System	1. Voluntary Measures															
	2011 Water Savings		Annual Water Savings		a. Discontinuation of monthly flushing of water mains			b. Public landscaping irrigation restrictions			c. Residential landscaping irrigation limits			d. Commercial irrigation limits		
	Amount	Units	Amount	Units	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
LEE COUNTY WATER SUPPLY CORPORATION																
LLANO, CITY OF																
LOOP 360 WATER SUPPLY CORP																
LOST CREEK MUNICIPAL UTILITY DIST								Oct-11	1		Oct-11	1		Oct-11	1	
LOWER COLORADO RIVER AUTHORITY (LCRA)								Sep-11	1		Sep-11	1		Sep-11	1	
MANOR, CITY OF																
MANVILLE WATER SUPPLY CORPORATION																
MARBLE FALLS, CITY OF																
MEADOWLAKES, CITY OF	11	Acre-feet		21			1	Jun-Dec	1	1	Jun-Dec	1	1	Jun-Dec	1	1
MEADOWLAKES MUD																
MOUNTAIN CITY																
MUNICIPAL GROUNDWATER																

Water System	1. Voluntary Measures															
	2011 Water Savings		Annual Water Savings		a. Discontinuation of monthly flushing of water mains			b. Public landscaping irrigation restrictions			c. Residential landscaping irrigation limits			d. Commercial irrigation limits		
	Amount	Units	Amount	Units	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
SOLUTIONS																
MUSTANG RIDGE																
NORTH AUSTIN MUD NO 1																
NORTHTOWN MUD																
PALACIOS, CITY OF																
PFLUGERVILLE, CITY OF			335.75	mg					1			1			1	
PLUM CREEK WATER COMPANY																
POINT VENTURE																
POLONIA WSC																
RICHLAND SPECIAL UTILITY DISTRICT																
RIVERCREST WATER SYSTEM																
RIVER PLACE MUD							1		1			1			1	
ROLLINGWOOD, CITY OF																
ROUND ROCK, CITY OF																

Water System	1. Voluntary Measures															
	2011 Water Savings		Annual Water Savings		a. Discontinuation of monthly flushing of water mains			b. Public landscaping irrigation restrictions			c. Residential landscaping irrigation limits			d. Commercial irrigation limits		
	Amount	Units	Amount	Units	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
SAN SABA, CITY OF			300, 000 - 400, 000	gpd	1	1	1	1	1	1	1	1	1	1	1	1
SCHULENBURG, CITY OF																
SHADY HOLLOW MUD																
SMITHVILLE, CITY OF																
STP NUCLEAR OPERATING COMPANY																
SUNRISE BEACH VILLAGE																
SUNSET VALLEY, CITY OF									1			1			1	
TEXAS BRINE CO. LLC																
TRAVIS CO WCID NO 10																
TRAVIS CO WCID NO 17								Jan - Dec	1		Jan - Dec	1		Jan - Dec	1	
TRAVIS CO WCID NO 18																

Water System	1. Voluntary Measures															
	2011 Water Savings		Annual Water Savings		a. Discontinuation of monthly flushing of water mains			b. Public landscaping irrigation restrictions			c. Residential landscaping irrigation limits			d. Commercial irrigation limits		
	Amount	Units	Amount	Units	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
TRAVIS CO WCID NO 19																
TRAVIS CO WCID NO 20																
TRAVIS COUNTY MUD NO 4																
VILLAGE OF BRIARCLIFF	70	Acre-feet	60	ac/ft	April - Dec	1		April - Dec	1		April - Dec	1				
VILLAGE OF THE HILLS																
VISTA DEL RIO WATER UTILITY									1			1				
VOLENTE, CITY OF																
WEIMAR, CITY OF																
WEIR WATER WORKS																
WELLS BRANCH MUD NO 1																
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	LCRA	Owned System 2011			Unknown			Unknown			Unknown			Unknown		

Water System	1. Voluntary Measures															
	2011 Water Savings		Annual Water Savings		a. Discontinuation of monthly flushing of water mains			b. Public landscaping irrigation restrictions			c. Residential landscaping irrigation limits			d. Commercial irrigation limits		
	Amount	Units	Amount	Units	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
WESTLAKE HILLS, CITY OF																
WHARTON, CITY OF							1			1			1			1
WHARTON CO WCID #2					July - Sep	1	1									
WILLIAMSON-TRAVIS CO MUD NO 1																

Water System	2. Mandatory Measures												
	2011 Water Savings		Annual Water Savings		a. Residential landscaping irrigation restrictions								
					1) Twice a week watering			2) Once a week watering			3) No outdoor spraying, drip application only		
	Amount	Units	Amount	Units	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
TOTAL					17	19	12	11	16	12	3	5	9
AQUA WATER SUPPLY CORPORATION							1						
AUSTIN, CITY OF - AUSTIN WATER UTILITY	2.5 billion	Gal	4.22 billion	Gal	Jan - Dec	1	1	Jan - Aug	1	1			1
BARTON CREEK WEST WATER SUPPLY CO													
BASTROP COUNTY WCID NO 2													
BASTROP, CITY OF													
BAY CITY, CITY OF	0	GPD	0	GPD			1			1			1
BEE CAVE, CITY OF													
BERTRAM, CITY OF													
BLANCO, CITY OF													
BROOKSMITH SUD													
BRUSHY CREEK MUD	90	MG			Nov-Dec	1					Oct		
BUDA, CITY OF					May - Dec	1	1						

Water System	2. Mandatory Measures												
	2011 Water Savings		Annual Water Savings		a. Residential landscaping irrigation restrictions								
					1) Twice a week watering			2) Once a week watering			3) No outdoor spraying, drip application only		
	Amount	Units	Amount	Units	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
BURNET COUNTY													
BURNET, CITY OF						1			1			1	
CAMP OF THE HILLS													
CANYON LAKE WSC						1	1			1			1
CAPITOL AGGREGATES, LTD.													
CEDAR PARK, CITY OF													
CHISHOLM TRAIL S U D													
CIMARRON PARK WATER COMPANY INC								May-Dec	1		May-Dec	1	
COLUMBUS, CITY OF							1			1			
COTTONWOOD SHORES, CITY OF	1000 gals/d	Gal	3.6 mg	Gal				1	1				
CREEDMOOR-MAHA WATER SUPPLY CORP													
DRIPPING SPRINGS , CITY OF													
DRIPPING SPRINGS WATER SUPPLY CORP			10%	78 AF	Nov				1				1

Water System	2. Mandatory Measures												
	2011 Water Savings		Annual Water Savings		a. Residential landscaping irrigation restrictions								
					1) Twice a week watering			2) Once a week watering			3) No outdoor spraying, drip application only		
	Amount	Units	Amount	Units	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
EAGLE LAKE, CITY OF													
EAST BERNARD, CITY OF													
EL CAMPO, CITY OF						1	1						
ELGIN, CITY OF													
ELLIOT RANCH WATER SYSTEM													
EQUISTAR CHEMICALS													
FARMERS CANAL COMPANY													
FAYETTE W S C													
FLATONIA, CITY OF													
FREDERICKSBURG, CITY OF													
GOFORTH SUD													
GOLDTHWAITE, CITY OF											1		
GRANITE SHOALS, CITY OF													
H & L NEW GULF, INC.													
HIGHLAND HAVEN, CITY OF								May-Dec	1	1			

Water System	2. Mandatory Measures												
	2011 Water Savings		Annual Water Savings		a. Residential landscaping irrigation restrictions								
					1) Twice a week watering			2) Once a week watering			3) No outdoor spraying, drip application only		
	Amount	Units	Amount	Units	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
HORSESHOE BAY, CITY OF			10	acre-feet	Feb	1	1			1			
HURST CREEK MUD					2011	1	1	Sep-11	1	1			1
JOHNSON CITY, CITY OF					1			1					
JONESTOWN, CITY OF													
KEMPNER WSC													
KINGSLAND WATER SUPPLY CORPORATION					Aug-11								
KYLE, CITY OF					1	1							
LA GRANGE, CITY OF					1			1					1
LAGO VISTA, CITY OF													
LAKE LBJ MUNICIPAL UTILITY DISTRICT													
LAKEWAY, CITY OF													
LAKEWAY MUD						1	1		1	1			
LEANDER, CITY OF					1		1			1		1	
LEE COUNTY WATER													

Water System	2. Mandatory Measures												
	2011 Water Savings		Annual Water Savings		a. Residential landscaping irrigation restrictions								
					1) Twice a week watering			2) Once a week watering			3) No outdoor spraying, drip application only		
	Amount	Units	Amount	Units	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
SUPPLY CORPORATION													
LLANO, CITY OF													
LOOP 360 WATER SUPPLY CORP													
LOST CREEK MUNICIPAL UTILITY DIST								Oct-11	1				
LOWER COLORADO RIVER AUTHORITY (LCRA)					Sep-11	1				1			1
MANOR, CITY OF													
MANVILLE WATER SUPPLY CORPORATION					June	1							
MARBLE FALLS, CITY OF													
MEADOWLAKES, CITY OF	20	acre-feet	70	acre-feet			1			1			1
MEADOWLAKES MUD													
MOUNTAIN CITY													
MUNICIPAL GROUNDWATER SOLUTIONS													

Water System	2. Mandatory Measures												
	2011 Water Savings		Annual Water Savings		a. Residential landscaping irrigation restrictions								
					1) Twice a week watering			2) Once a week watering			3) No outdoor spraying, drip application only		
	Amount	Units	Amount	Units	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
MUSTANG RIDGE													
NORTH AUSTIN MUD NO 1													
NORTHTOWN MUD													
PALACIOS, CITY OF													
PFLUGERVILLE, CITY OF						1			1				
PLUM CREEK WATER COMPANY													
POINT VENTURE					July	1		Aug - Dec	1				
POLONIA WSC													
RICHLAND SPECIAL UTILITY DISTRICT													
RIVERCREST WATER SYSTEM													
RIVER PLACE MUD						1			1			1	
ROLLINGWOOD, CITY OF													
ROUND ROCK, CITY OF													
SAN SABA, CITY OF					1	1							1

Water System	2011 Water Savings		Annual Water Savings		2. Mandatory Measures – a. Residential landscaping irrigation restrictions – 1) Twice a week watering			2) Once a week watering			3) No outdoor spraying, drip application only		
	Amount	Units	Amount	Units	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
SCHULENBURG, CITY OF													
SHADY HOLLOW MUD													
SMITHVILLE, CITY OF													
STP NUCLEAR OPERATING COMPANY													
SUNRISE BEACH VILLAGE													
SUNSET VALLEY, CITY OF						1			1				
TEXAS BRINE CO. LLC													
TRAVIS CO WCID NO 10													
TRAVIS CO WCID NO 17					Jan - Dec	1		July - Oct	1				
TRAVIS CO WCID NO 18													
TRAVIS CO WCID NO 19													
TRAVIS CO WCID NO 20													
TRAVIS COUNTY MUD NO 4													
VILLAGE OF BRIARCLIFF					April - Dec	1		April - Dec	1			1	

Water System	2. Mandatory Measures															
	2011 Water Savings		Annual Water Savings		a. Residential landscaping irrigation restrictions											
					1) Twice a week watering			2) Once a week watering			3) No outdoor spraying, drip application only					
	Amount	Units	Amount	Units	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?			
VILLAGE OF THE HILLS																
VISTA DEL RIO WATER UTILITY									1							
VOLENTE, CITY OF																
WEIMAR, CITY OF																
WEIR WATER WORKS																
WELLS BRANCH MUD NO 1																
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY																
WESTLAKE HILLS, CITY OF																
WHARTON, CITY OF										1						
WHARTON CO WCID #2																
WILLIAMSON-TRAVIS CO MUD NO 1																

Water System	2. Mandatory Measures (Cont.)											
	b. Limits on other outdoor water use											
	1) No water features, unless water is recycled			2) No water features			3) Golf course water use restrictions			4) Prohibition on watering golf courses unless from water source other than provided by the city		
	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
TOTAL	6	15	13	3	7	8	4	5	10	1	1	6
AQUA WATER SUPPLY CORPORATION			1									
AUSTIN, CITY OF - AUSTIN WATER UTILITY		1	1	Sept - Dec	1	1	Sept - Dec	1	1			1
BARTON CREEK WEST WATER SUPPLY CO												
BASTROP COUNTY WCID NO 2												
BASTROP, CITY OF												
BAY CITY, CITY OF			1			1			1			1
BEE CAVE, CITY OF												
BERTRAM, CITY OF												
BLANCO, CITY OF												
BROOKSMITH SUD												
BRUSHY CREEK MUD	Oct-Dec	1		Oct-Dec	`							
BUDA, CITY OF	Jan - Dec	1	1			1	May - Dec	1				1
BURNET COUNTY												
BURNET, CITY OF		1			1						1	
CAMP OF THE HILLS												
CANYON LAKE WSC			1			1						

Water System	2. Mandatory Measures (Cont.) b. Limits on other outdoor water use											
	1) No water features, unless water is recycled			2) No water features			3) Golf course water use restrictions			4) Prohibition on watering golf courses unless from water source other than provided by the city		
	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
CAPITOL AGGREGATES, LTD.												
CEDAR PARK, CITY OF												
CHISHOLM TRAIL S U D												
CIMARRON PARK WATER COMPANY INC				May-Dec	1							
COLUMBUS, CITY OF									1			
COTTONWOOD SHORES, CITY OF												
CREEDMOOR-MAHA WATER SUPPLY CORP												
DRIPPING SPRINGS , CITY OF												
DRIPPING SPRINGS WATER SUPPLY CORP		1				1						
EAGLE LAKE, CITY OF												
EAST BERNARD, CITY OF												
EL CAMPO, CITY OF												
ELGIN, CITY OF												
ELLIOT RANCH WATER SYSTEM												
EQUISTAR CHEMICALS												
FARMERS CANAL COMPANY												
FAYETTE W S C												
FLATONIA, CITY OF												

Water System	2. Mandatory Measures (Cont.)											
	b. Limits on other outdoor water use											
	1) No water features, unless water is recycled			2) No water features			3) Golf course water use restrictions			4) Prohibition on watering golf courses unless from water source other than provided by the city		
	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
FREDERICKSBURG, CITY OF												
GOFORTH SUD												
GOLDTHWAITE, CITY OF												
GRANITE SHOALS, CITY OF												
H & L NEW GULF, INC.												
HIGHLAND HAVEN, CITY OF												
HORSESHOE BAY, CITY OF	Feb	1	1									
HURST CREEK MUD		1	1			1			1			
JOHNSON CITY, CITY OF												
JONESTOWN, CITY OF												
KEMPNER WSC												
KINGSLAND WATER SUPPLY CORPORATION												
KYLE, CITY OF	1											
LA GRANGE, CITY OF			1			1			1	1		
LAGO VISTA, CITY OF												
LAKE LBJ MUNICIPAL UTILITY DISTRICT												
LAKEWAY, CITY OF												
LAKEWAY MUD		1	1					1	1			
LEANDER, CITY OF			1				1	1	1			
LEE COUNTY WATER												

Water System	2. Mandatory Measures (Cont.)											
	b. Limits on other outdoor water use											
	1) No water features, unless water is recycled			2) No water features			3) Golf course water use restrictions			4) Prohibition on watering golf courses unless from water source other than provided by the city		
	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
SUPPLY CORPORATION												
LLANO, CITY OF												
LOOP 360 WATER SUPPLY CORP												
LOST CREEK MUNICIPAL UTILITY DIST												
LOWER COLORADO RIVER AUTHORITY (LCRA)									1			
MANOR, CITY OF												
MANVILLE WATER SUPPLY CORPORATION												
MARBLE FALLS, CITY OF												
MEADOWLAKES, CITY OF			1			1	Jun-Dec	1	1			1
MEADOWLAKES MUD												
MOUNTAIN CITY												
MUNICIPAL GROUNDWATER SOLUTIONS												
MUSTANG RIDGE												
NORTH AUSTIN MUD NO 1												
NORTHTOWN MUD												
PALACIOS, CITY OF												
PFLUGERVILLE, CITY OF		1										
PLUM CREEK WATER												

Water System	2. Mandatory Measures (Cont.)											
	b. Limits on other outdoor water use											
	1) No water features, unless water is recycled			2) No water features			3) Golf course water use restrictions			4) Prohibition on watering golf courses unless from water source other than provided by the city		
	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
COMPANY												
POINT VENTURE	Aug - Dec	1										
POLONIA WSC												
RICHLAND SPECIAL UTILITY DISTRICT												
RIVERCREST WATER SYSTEM												
RIVER PLACE MUD		1			1							
ROLLINGWOOD, CITY OF												
ROUND ROCK, CITY OF												
SAN SABA, CITY OF	1	1	1									1
SCHULENBURG, CITY OF												
SHADY HOLLOW MUD												
SMITHVILLE, CITY OF												
STP NUCLEAR OPERATING COMPANY												
SUNRISE BEACH VILLAGE												
SUNSET VALLEY, CITY OF					1							
TEXAS BRINE CO. LLC												
TRAVIS CO WCID NO 10												
TRAVIS CO WCID NO 17		1			1							
TRAVIS CO WCID NO 18												

Water System	2. Mandatory Measures (Cont.)											
	b. Limits on other outdoor water use											
	1) No water features, unless water is recycled			2) No water features			3) Golf course water use restrictions			4) Prohibition on watering golf courses unless from water source other than provided by the city		
	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
TRAVIS CO WCID NO 19												
TRAVIS CO WCID NO 20												
TRAVIS COUNTY MUD NO 4												
VILLAGE OF BRIARCLIFF		1			1							
VILLAGE OF THE HILLS												
VISTA DEL RIO WATER UTILITY		1										
VOLENTE, CITY OF												
WEIMAR, CITY OF												
WEIR WATER WORKS												
WELLS BRANCH MUD NO 1												
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY												
WESTLAKE HILLS, CITY OF												
WHARTON, CITY OF			1						1			1
WHARTON CO WCID #2												
WILLIAMSON-TRAVIS CO MUD NO 1												

Water System	2. Mandatory Measures (Cont.)														
	b. Limits on other outdoor water use												c. Prohibition of applications for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind		
	5) Prohibition of washing down sidewalks, parking lots and other hard-surface areas			6) Prohibition of flushing gutters			7) Prohibition of water use for washing vehicles			8) Prohibition of water use for pool maintenance					
	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
TOTAL	14	20	13	8	12	12	8	15	13	2	4	6	2	3	6
AQUA WATER SUPPLY CORPORATION			1			1			1			1			1
AUSTIN, CITY OF - AUSTIN WATER UTILITY	Sept - Dec	1	1			1									
BARTON CREEK WEST WATER SUPPLY CO															
BASTROP COUNTY WCID NO 2															
BASTROP, CITY OF															
BAY CITY, CITY OF			1			1			1			1			1
BEE CAVE, CITY OF															
BERTRAM, CITY OF															
BLANCO, CITY OF															
BROOKSMITH SUD															
BRUSHY CREEK MUD	Oct			Oct			Oct			Oct					
BUDA, CITY OF	Jan - Dec	1	1	May - Dec	1	1	May - Dec	1	1						

Water System	2. Mandatory Measures (Cont.)														
	b. Limits on other outdoor water use												c. Prohibition of applications for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind		
	5) Prohibition of washing down sidewalks, parking lots and other hard-surface areas			6) Prohibition of flushing gutters			7) Prohibition of water use for washing vehicles			8) Prohibition of water use for pool maintenance					
	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
BURNET COUNTY															
BURNET, CITY OF		1			1			1			1				
CAMP OF THE HILLS															
CANYON LAKE WSC			1						1			1			
CAPITOL AGGREGATES, LTD.															
CEDAR PARK, CITY OF															
CHISHOLM TRAIL S U D															
CIMARRON PARK WATER COMPANY INC	May-Dec	1		May-Dec	1		May-Dec	1					May-Dec	1	
COLUMBUS, CITY OF									1						
COTTONWOOD SHORES, CITY OF	1	1													
CREEDMOOR-MAHA WATER SUPPLY CORP															
DRIPPING SPRINGS , CITY OF															
DRIPPING SPRINGS WATER SUPPLY CORP		1				1		1				1			1
EAGLE LAKE, CITY OF															

Water System	2. Mandatory Measures (Cont.)														
	b. Limits on other outdoor water use												c. Prohibition of applications for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind		
	5) Prohibition of washing down sidewalks, parking lots and other hard-surface areas			6) Prohibition of flushing gutters			7) Prohibition of water use for washing vehicles			8) Prohibition of water use for pool maintenance					
	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
EAST BERNARD, CITY OF															
EL CAMPO, CITY OF														1	1
ELGIN, CITY OF															
ELLIOT RANCH WATER SYSTEM															
EQUISTAR CHEMICALS															
FARMERS CANAL COMPANY															
FAYETTE W S C															
FLATONIA, CITY OF															
FREDERICKSBURG, CITY OF															
GOFORTH SUD															
GOLDTHWAITE, CITY OF															
GRANITE SHOALS, CITY OF															
H & L NEW GULF, INC.															
HIGHLAND HAVEN, CITY OF	May-Dec	1	1				May-Dec	1	1						

Water System	2. Mandatory Measures (Cont.)														
	b. Limits on other outdoor water use												c. Prohibition of applications for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind		
	5) Prohibition of washing down sidewalks, parking lots and other hard-surface areas			6) Prohibition of flushing gutters			7) Prohibition of water use for washing vehicles			8) Prohibition of water use for pool maintenance					
	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
HORSESHOE BAY, CITY OF	Feb	1	1			1	Feb	1	1						
HURST CREEK MUD		1	1			1		1	1			1			1
JOHNSON CITY, CITY OF	1						1								
JONESTOWN, CITY OF															
KEMPNER WSC															
KINGSLAND WATER SUPPLY CORPORATION															
KYLE, CITY OF	1	1													
LA GRANGE, CITY OF	1			1			1			1			1		
LAGO VISTA, CITY OF															
LAKE LBJ MUNICIPAL UTILITY DISTRICT															
LAKEWAY, CITY OF															
LAKEWAY MUD		1	1		1	1		1	1						
LEANDER, CITY OF	1	1	1	1	1	1			1						
LEE COUNTY WATER SUPPLY CORPORATION															
LLANO, CITY OF															

Water System	2. Mandatory Measures (Cont.)														
	b. Limits on other outdoor water use												c. Prohibition of applications for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind		
	5) Prohibition of washing down sidewalks, parking lots and other hard-surface areas			6) Prohibition of flushing gutters			7) Prohibition of water use for washing vehicles			8) Prohibition of water use for pool maintenance					
	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
LOOP 360 WATER SUPPLY CORP															
LOST CREEK MUNICIPAL UTILITY DIST															
LOWER COLORADO RIVER AUTHORITY (LCRA)															
MANOR, CITY OF															
MANVILLE WATER SUPPLY CORPORATION															
MARBLE FALLS, CITY OF															
MEADOWLAKES, CITY OF			1			1			1			1			
MEADOWLAKES MUD															
MOUNTAIN CITY															
MUNICIPAL GROUNDWATER SOLUTIONS															
MUSTANG RIDGE															
NORTH AUSTIN MUD NO 1															

Water System	2. Mandatory Measures (Cont.)														
	b. Limits on other outdoor water use												c. Prohibition of applications for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind		
	5) Prohibition of washing down sidewalks, parking lots and other hard-surface areas			6) Prohibition of flushing gutters			7) Prohibition of water use for washing vehicles			8) Prohibition of water use for pool maintenance					
	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
NORTHTOWN MUD															
PALACIOS, CITY OF															
PFLUGERVILLE, CITY OF		1			1			1							
PLUM CREEK WATER COMPANY															
POINT VENTURE	Aug - Dec	1		Aug - Dec	1										
POLONIA WSC															
RICHLAND SPECIAL UTILITY DISTRICT															
RIVERCREST WATER SYSTEM															
RIVER PLACE MUD		1			1			1			1			1	
ROLLINGWOOD, CITY OF															
ROUND ROCK, CITY OF															
SAN SABA, CITY OF	1	1	1	1	1	1	1	1	1						
SCHULENBURG, CITY OF															
SHADY HOLLOW MUD															
SMITHVILLE, CITY OF															

Water System	2. Mandatory Measures (Cont.)														
	b. Limits on other outdoor water use												c. Prohibition of applications for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind		
	5) Prohibition of washing down sidewalks, parking lots and other hard-surface areas			6) Prohibition of flushing gutters			7) Prohibition of water use for washing vehicles			8) Prohibition of water use for pool maintenance					
	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
STP NUCLEAR OPERATING COMPANY															
SUNRISE BEACH VILLAGE															
SUNSET VALLEY, CITY OF		1			1			1							
TEXAS BRINE CO. LLC															
TRAVIS CO WCID NO 10															
TRAVIS CO WCID NO 17	July - Oct	1		July - Oct	1										
TRAVIS CO WCID NO 18															
TRAVIS CO WCID NO 19															
TRAVIS CO WCID NO 20															
TRAVIS COUNTY MUD NO 4															
VILLAGE OF BRIARCLIFF		1			1			1							
VILLAGE OF THE HILLS															
VISTA DEL RIO WATER UTILITY		1						1			1				1
VOLENTE, CITY OF															

Water System	2. Mandatory Measures (Cont.)														
	b. Limits on other outdoor water use												c. Prohibition of applications for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind		
	5) Prohibition of washing down sidewalks, parking lots and other hard-surface areas			6) Prohibition of flushing gutters			7) Prohibition of water use for washing vehicles			8) Prohibition of water use for pool maintenance					
	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
WEIMAR, CITY OF															
WEIR WATER WORKS															
WELLS BRANCH MUD NO 1															
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY															
WESTLAKE HILLS, CITY OF															
WHARTON, CITY OF			1			1		1	1		1				
WHARTON CO WCID #2															
WILLIAMSON-TRAVIS CO MUD NO 1															

Water System	3. Other											
	2011 Water Savings		Annual Water Savings		a.				b.			
	Amount	Units	Amount	Units	a.	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	b.	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
TOTAL												
AQUA WATER SUPPLY CORPORATION												
AUSTIN, CITY OF – AUSTIN WATER UTILITY												
BARTON CREEK WEST WATER SUPPLY CO												
BASTROP COUNTY WCID NO 2												
BASTROP, CITY OF												
BAY CITY, CITY OF												
BEE CAVE, CITY OF												
BERTRAM, CITY OF												
BLANCO, CITY OF												
BROOKSMITH SUD												
BRUSHY CREEK MUD												
BUDA, CITY OF												
BURNET COUNTY												
BURNET, CITY OF					Reuse water used for golf courses		1					
CAMP OF THE HILLS												

Water System	3. Other												
	2011 Water Savings		Annual Water Savings		a.				b.				
	Amount	Units	Amount	Units	a.	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	b.	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
CANYON LAKE WSC												
CAPITOL AGGREGATES, LTD.												
CEDAR PARK, CITY OF												
CHISHOLM TRAIL S U D												
CIMARRON PARK WATER COMPANY INC												
COLUMBUS, CITY OF												
COTTONWOOD SHORES, CITY OF												
CREEDMOOR-MAHA WATER SUPPLY CORP												
DRIPPING SPRINGS , CITY OF												
DRIPPING SPRINGS WATER SUPPLY CORP												
EAGLE LAKE, CITY OF												
EAST BERNARD, CITY OF												
EL CAMPO, CITY OF												
ELGIN, CITY OF												
ELLIOT RANCH WATER SYSTEM												
EQUISTAR CHEMICALS												
FARMERS CANAL COMPANY												
FAYETTE W S C												

Water System	3. Other											
	2011 Water Savings		Annual Water Savings		a.				b.			
	Amount	Units	Amount	Units	a.	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	b.	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
FLATONIA, CITY OF												
FREDERICKSBURG, CITY OF												
GOFORTH SUD												
GOLDTHWAITE, CITY OF					No outdoor use during 2011 drought	1						
GRANITE SHOALS, CITY OF												
H & L NEW GULF, INC.												
HIGHLAND HAVEN, CITY OF												
HORSESHOE BAY, CITY OF												
HURST CREEK MUD												
JOHNSON CITY, CITY OF												
JONESTOWN, CITY OF												
KEMPNER WSC												
KINGSLAND WATER SUPPLY CORPORATION												
KYLE, CITY OF												
LA GRANGE, CITY OF												
LAGO VISTA, CITY OF												
LAKE LBJ MUNICIPAL UTILITY												

Water System	3. Other											
	2011 Water Savings		Annual Water Savings		a.				b.			
	Amount	Units	Amount	Units	a.	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	b.	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
DISTRICT												
LAKEWAY, CITY OF												
LAKEWAY MUD												
LEANDER, CITY OF												
LEE COUNTY WATER SUPPLY CORPORATION												
LLANO, CITY OF												
LOOP 360 WATER SUPPLY CORP												
LOST CREEK MUNICIPAL UTILITY DIST												
LOWER COLORADO RIVER AUTHORITY (LCRA)												
MANOR, CITY OF												
MANVILLE WATER SUPPLY CORPORATION												
MARBLE FALLS, CITY OF												
MEADOWLAKES, CITY OF												
MEADOWLAKES MUD												
MOUNTAIN CITY												
MUNICIPAL GROUNDWATER SOLUTIONS												
MUSTANG RIDGE												

Water System	3. Other											
	2011 Water Savings		Annual Water Savings		a.				b.			
	Amount	Units	Amount	Units	a.	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	b.	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
NORTH AUSTIN MUD NO 1												
NORTHTOWN MUD												
PALACIOS, CITY OF												
PFLUGERVILLE, CITY OF												
PLUM CREEK WATER COMPANY												
POINT VENTURE												
POLONIA WSC												
RICHLAND SPECIAL UTILITY DISTRICT												
RIVERCREST WATER SYSTEM												
RIVER PLACE MUD												
ROLLINGWOOD, CITY OF												
ROUND ROCK, CITY OF												
SAN SABA, CITY OF												
SCHULENBURG, CITY OF												
SHADY HOLLOW MUD												
SMITHVILLE, CITY OF												
STP NUCLEAR OPERATING COMPANY												
SUNRISE BEACH VILLAGE												

Water System	3. Other											
	2011 Water Savings		Annual Water Savings		a.				b.			
	Amount	Units	Amount	Units	a.	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	b.	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
SUNSET VALLEY, CITY OF					No filling or refilling of pools (except to repair leaks)		1		No filling or refilling of spas		1	
TEXAS BRINE CO. LLC												
TRAVIS CO WCID NO 10												
TRAVIS CO WCID NO 17												
TRAVIS CO WCID NO 18												
TRAVIS CO WCID NO 19												
TRAVIS CO WCID NO 20												
TRAVIS COUNTY MUD NO 4												
VILLAGE OF BRIARCLIFF												
VILLAGE OF THE HILLS												
VISTA DEL RIO WATER UTILITY												
VOLENTE, CITY OF												
WEIMAR, CITY OF												
WEIR WATER WORKS												
WELLS BRANCH MUD NO 1												

Water System	3. Other											
	2011 Water Savings		Annual Water Savings		a.				b.			
	Amount	Units	Amount	Units	a.	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?	b.	Was this Drought Management Measure used in 2011? If so, what month(s)?	Has this Measure been implemented since 2011?	Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY												
WESTLAKE HILLS, CITY OF												
WHARTON, CITY OF												
WHARTON CO WCID #2												
WILLIAMSON-TRAVIS CO MUD NO 1												

APPENDIX 7B

Existing Drought Triggers and Reduction Goals

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
			Trigger	Goal	Trigger	Goal
AQUA WSC	BASTROP	CARRIZO-WILCOX AQUIFER	1. Major water line breaks, or pump or system failures occur, which cause an unprecedented loss of capability to provide water service; or 2. Natural or man-made contamination of the water supply source(s).	Achieve a minimum of 20% reduction in daily water demand	1. Major water line breaks, or pump or system failures occur, which cause an unprecedented loss of capability to provide water service; or 2. Natural or man-made contamination of the water supply source(s).	Achieve a minimum of 20% reduction in daily water demand
BASTROP	BASTROP	OTHER AQUIFER	Daily water demand exceeds 95% of total production capability for 3 consecutive days and that Stage 2 have been implemented, and City Manager determines demand will not drop below without conservation by customers.	Achieve reduction in daily demand to 95% or less of the Total Production Capability	1. Major water line breaks, or pump or system failures occur, which cause an unprecedented loss of capability to provide water service; or 2. Natural or man-made contamination of the water supply source(s); or 3. Daily water demand equals 100% of the Total Production Capacity for three (3) consecutive days.	Achieve reduction in daily demand sufficient to assure the water system for the protection of public health and safety
BASTROP COUNTY WCID #2	BASTROP	CARRIZO-WILCOX AQUIFER	NA	NA	NA	NA
COUNTY-OTHER	BASTROP	CARRIZO- WILCOX, OTHER AQUIFER	NA	NA	NA	NA
CREEDMOOR-MAHA WSC	BASTROP	CARRIZO-WILCOX AQUIFER	NA	NA	NA	NA

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage Trigger	Severe Water Shortage Goal	Critical/Emergency Water Shortage Trigger	Critical/Emergency Water Shortage Goal
ELGIN	BASTROP	CARRIZO-WILCOX AQUIFER	Average daily consumption is 95% of capacity for 24-hour period; aquifer level drops to critical level or average consumption will not enable storage levels to be maintained; and system demand exceeds available high service pump capacity; detection of water system failure from act of God; delivery capability is reduced due to mechanical failure requiring more than 12 hours to repair	not defined	Average daily consumption is 95% of capacity for 24-hour period; aquifer level drops to critical level or average consumption will not enable storage levels to be maintained; and system demand exceeds available high service pump capacity; detection of water system failure from act of God; delivery capability is reduced due to mechanical failure requiring more than 12 hours to repair	not defined
LEE COUNTY WSC	BASTROP	CARRIZO-WILCOX AQUIFER	Continually falling treated water storage levels which do not refill above 70% overnight	20% reduction	Continually falling treated water storage levels which do not refill above 60% overnight	30% reduction
POLONIA WSC	BASTROP	CARRIZO-WILCOX AQUIFER	NA	NA	NA	NA
SMITHVILLE	BASTROP	CARRIZO-WILCOX AQUIFER	NA	NA	NA	NA
BLANCO	BLANCO	BLANCO LAKE/CANYON LAKE/TRINITY AQUIFER	Director of Public Works determines severe conditions are present	15-30% reduction in water use	Director of Public Works determines critical conditions are present	15-30% reduction in water use

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
			Trigger	Goal	Trigger	Goal
CANYON LAKE WATER SERVICE COMPANY	BLANCO	CANYON LAKE	Failure of major system component resulting in system pressure below 20psi for 24 hours or more; consumption is 95% or more of max capacity for 3 consecutive days; consumption of 100% of max production capacity and storage levels unable to recover in one 24 hour period; other unforeseen events; Canyon Reservoir drops to or below 880 ft msl	25% reduction in water use	Failure of major system component resulting in system pressure below 20psi for 24 hours or more; consumption is 95% or more of max capacity for 3 consecutive days; consumption of 100% of max production capacity and storage levels unable to recover in one 24 hour period; other unforeseen events; Canyon Reservoir drops to or below 880 ft msl	25% reduction in water use
COUNTY-OTHER	BLANCO	ELLENBURGER- SAN SABA, HICKORY, OTHER LOCAL SUPPLY, TRINITY, and EDWARDS- TRINITY (PLATEAU)	NA	NA	NA	NA
JOHNSON CITY	BLANCO	ELLENBURGER SAN-SABA	Well drawdown level is at or below 50% of original capacity; or recharge has slowed and/or when pumping time from wells meets or exceeds 80% of one day or 18.5 hours for three consecutive days.	20% reduction in demand	Well drawdown level is at or below 35% of original capacity; or recharge has slowed and/or when pumping time from wells meets or exceeds 80% of one day or 20 hours for three consecutive days.	50% reduction in demand
BERTRAM	BURNET	ELLENBURGER-SAN SABA	Static water well is 75 feet or greater below surface, total demand trigger, falling treated reservoir levels	11% reduction in demand	Static water well is 85 feet or greater below surface, total demand trigger, falling treated reservoir levels	20% reduction in demand

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
			Trigger	Goal	Trigger	Goal
BURNET	BURNET	ELLENBURGER-SAN SABA	Multiple conditions listed covering different scenarios	not defined	Multiple conditions listed covering different scenarios	not defined
CHISHOLM TRAIL SUD	BURNET	EDWARDS-TRINITY and BRAZOS RIVER AUTHORITY	Multiple triggers, Domel Well No. 1 declines to or stabilizes below 23 feet above pump suction (10psi) for 3 consecutive days and/or Domel Well No. 2 declines below 14 feet above pump suction (6psi) for 3 days; Lake Georgetown drops to 760 feet and no rainfall /inflow from Williamson County Regional Raw Water Line expected within 30 days; or daily demand equals or exceeds safe capabilities; Georgetown institutes delivery curtailment other failures	Peak demand of 1.3 times annual average daily demand	Daily demand equals or exceeds safe capabilities; Georgetown institutes delivery curtailment other failures; event occurs or District system component fail that warrants critical conservation measures.	Peak demand equal to or less than average annual daily demand.
COTTONWOOD SHORES	BURNET	HIGHLAND LAKES	Combined storage of Travis/Buchanan at or below 900,000 ac-ft; or LCRA requests reduced water use	10-20% reduction in total use or other LCRA reduction targets	Major water line breaks, or pump or system failures occur; or natural or man-made contaminant of the water supply source(s)	Water use will be prohibited until further notice
COUNTY-OTHER	BURNET	ELLENBURGER-SAN SABA, TRINITY, HICKORY, HIGHLAND LAKES, and MARBLE FALLS	NA	NA	NA	NA

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage Trigger	Severe Water Shortage Goal	Critical/Emergency Water Shortage Trigger	Critical/Emergency Water Shortage Goal
GRANITE SHOALS	BURNET	HIGHLAND LAKES	NA	NA	NA	NA
HORSESHOE BAY	BURNET	HIGHLAND LAKES	Drought year with severe water shortage, or loss/failure of water production/distribution that decrease supply by 10-25%; or drought conditions worsen; or LCRA enacts surface water withdrawal restrictions up to 10-25%; or short/long-term situation requiring reduction of 10-25% consumption	10-25% reduction	1. Critical drought conditions resulting in emergency water conditions and curtailment of water use; 2. Loss or damage to Horseshoe Bay water production or water distribution appurtenance or facility that would decrease water supply system capabilities by 35%; 3. Any other emergency water supply or demand issue the LCRA General Manager or the LCRA Board determines to warrant the declaration of Stage 4; 4. Any surface water supplies withdrawal restriction enacted by the LCRA that would entail a 35% reduction in water supply to the City of Horseshoe Bay; 5. Any short term or long term water supply situation requiring a 35% reduction in water consumption	35% reduction

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
			Trigger	Goal	Trigger	Goal
KEMPNER WSC	BURNET	BRAZOS RIVER AUTHORITY LITTLE RIVER LAKE	Failure of major component or event which reduces minimum pressure in system below 20 psi for 24 hours or more; water consumption 95% or more of maximum available for 3 days; water consumption of 100% or maximum available and storage levels in system drop during one 24 hour period; an unforeseen event that would risk health and public safety	not defined	Failure of major component or event which reduces minimum pressure in system below 20 psi for 24 hours or more; water consumption 95% or more of maximum available for 3 days; water consumption of 100% or maximum available and storage levels in system drop during one 24 hour period; an unforeseen event that would risk health and public safety	not defined
KINGSLAND WSC	BURNET	HIGHLAND LAKES	Defer to LCRA		Defer to LCRA	
MARBLE FALLS	BURNET	HIGHLAND LAKES	Storage of Highland Lakes is 600,000 acre-feet or less or LCRA declares drought worse than DOR; or total daily demand equals/exceeds 95% of plant capacity for 2 days or 96% for one day; or continually falling treated reservoir levels that do not refill above 75% overnight; or region wide drought.	20% minimum reduction in daily demand	LCRA notification of Stage 4; major water line breaks or pump or system failures; natural or man-made contamination of water supply; region-wide drought	25% minimum reduction in daily demand

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
			Trigger	Goal	Trigger	Goal
MEADOWLAKES	BURNET	OTHER LOCAL SUPPLY and HIGHLAND LAKES	90% treatment capacity or Highland Lakes storage 600,000 acre-feet	20% reduction	Major water line breaks, or pump or system failures occur; or natural or man-made contaminant of the water supply source(s); or LCRA or City determination of emergency	70% reduction
COLUMBUS	COLORADO	GULF COAST	Multiple conditions listed covering different scenarios	not defined	Multiple conditions listed covering different scenarios	not defined
COUNTY-OTHER	COLORADO	GULF COAST	NA	NA	NA	NA
EAGLE LAKE	COLORADO	GULF COAST	When production exceeds 1.2 MGD for three consecutive days	not defined	When production exceeds 1.3 MGD for three consecutive days	not defined
WEIMAR	COLORADO	GULF COAST	NA	NA	NA	NA
AQUA WSC	FAYETTE	CARRIZO-WILCOX AQUIFER	1. Major water line breaks, or pump or system failures occur, which cause an unprecedented loss of capability to provide water service; or 2. Natural or man-made contamination of the water supply source(s).	Achieve a minimum of 20% reduction in daily water demand	1. Major water line breaks, or pump or system failures occur, which cause an unprecedented loss of capability to provide water service; or 2. Natural or man-made contamination of the water supply source(s).	Achieve a minimum of 20% reduction in daily water demand
COUNTY-OTHER	FAYETTE	GULF COAST, QUEEN CITY, SPARTA, and HIGHLAND LAKES	NA	NA	NA	NA

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage Trigger	Severe Water Shortage Goal	Critical/Emergency Water Shortage Trigger	Critical/Emergency Water Shortage Goal
FAYETTE WSC	FAYETTE	QUEEN CITY and GULF COAST	NA	NA	NA	NA
FLATONIA	FAYETTE	YEGUA-JACKSON and GULF COAST	NA	NA	NA	NA
LA GRANGE	FAYETTE	QUEEN CITY and SPARTA	Multiple conditions listed covering different scenarios	5%	Multiple conditions listed covering different scenarios	5%
LEE COUNTY WSC	FAYETTE	CARRIZO-WILCOX AQUIFER	Continually falling treated water storage levels which do not refill above 70% overnight	20%	Continually falling treated water storage levels which do not refill above 60% overnight	30% reduction
SCHULENBURG	FAYETTE	GULF COAST	NA	NA	NA	NA
COUNTY-OTHER	GILLESPIE	COLORADO and GUADALUPE	NA	NA	NA	NA
FREDERICKSBURG	GILLESPIE	ELLENBURGER- SAN SABA and HICKORY	Multiple conditions listed covering different scenarios	15% reduction in average daily demand; 25% reduction in Max daily demand	When City Manager determines that Stage 3 (Severe) conditions are exceeded.	20% reduction in average daily demand; 40% reduction in Max daily demand
AUSTIN	HAYS	HIGHLAND LAKES/RESERVOIR SYSTEM/COLORADO RUN-OF-RIVER	Demand 260 mgd for 3 consecutive days; Combined Lake storage less than 900,000 acft;	Reduce water use by 15% to 20%	Combined Lake storage less than 600,000 acft; As determined by City Manager - system outage, equipment failure, contamination, etc	Reduce water use to levels deemed necessary

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
			Trigger	Goal	Trigger	Goal
BUDA	HAYS	EDWARDS-BFZ and CANYON LAKE	BSEACD declares exceptional stage; BSEACD declares Alarm stage or greater and GBRA declaring Stage III; Daily demand reaches 85% of available supply; quality/supply/distribution system or other emergency exists per city Manager	Reduce overall use by 20% and reduce pumping from BSEACD by 40%		
CIMARRON PARK WATER COMPANY	HAYS	EDWARDS-BFZ	BSEACD declares exceptional stage; BSEACD declares Alarm stage or greater and GBRA declaring Stage III; Daily demand reaches 85% of available supply; quality/supply/distribution system or other emergency exists per city Manager	20% reduction of overall water use; 40% pumping reduction from BSEACD	BSEACD declares emergency response stage; BSEACD declares Critical stage or greater and GBRA declaring Stage IV; Daily demand reaches 90% of available supply; quality/supply/distribution system or other emergency exists per city Manager	20% reduction of overall water use; 40% pumping reduction from BSEACD
COUNTY-OTHER	HAYS	HIGHLAND LAKES and EDWARDS-BFZ	NA	NA	NA	NA

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage Trigger	Severe Water Shortage Goal	Critical/Emergency Water Shortage Trigger	Critical/Emergency Water Shortage Goal
DRIPPING SPRINGS	HAYS	HIGHLAND LAKES	The static water level in DSWSC Well No. 4 is 225 feet or greater below the surface of the ground, the total daily water demand equals or exceeds 950,000 gallons for four(4) consecutive days, the total daily water demand equals or exceeds 1,200,000 gallons on a single day, continually falling water reservoir levels do not refill above 50 percent overnight, notice is given by the LCRA that total daily water demand equals or exceeds 95 percent of the total operating surface water treatment capacity for (3) consecutive days, or 97 percent on a single day, combined storage of Lakes Travis and Buchanan reaches 600,000 acre-feet, in accordance with the LCRA DCP, and the LCRA Board declares a drought worse than the Drought of Record or other water supply emergency and orders the mandatory curtailment of firm water supplies.	Minimum 20% reduction from either or both the 950,000 gallon daily water demand and the 1,200,000 gallon single day demand.	1. Major water line breaks, or pump or system failures occur, which cause an unprecedented loss of capability to provide water service; or 2. Natural or man-made contamination of the water supply source(s).	Achieve a reduction in daily water demand sufficient that will allow DSWSC to supply water within the capability of the system during the emergency event.

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage Trigger	Severe Water Shortage Goal	Critical/Emergency Water Shortage Trigger	Critical/Emergency Water Shortage Goal
DRIPPING SPRINGS WSC	HAYS	HIGHLAND LAKES/TRINITY AQUIFER	Static well level in DSWSC Well No 4 is 225 feet or greater below ground surface; or daily demand equals/exceeds 950,000 gallons for 4 days; or total daily demand exceeds 1.2mgd for a single day; or continually falling reservoir levels do not refill above 50% overnight; or LCRA gives notice that total daily demand equals or exceeds 95% for 3 consecutive days or 97% of single day of total operation surface water treatment capacity; combined storage of Travis/Buchanan is 600,000 acre/feet; or LCRA declares a drought worse that drought of record	Minimum 20% reduction from either or both the 950,000 gallon daily water demand and the 1,200,000 gallon single day demand.	1. Major water line breaks, or pump or system failures occur, which cause an unprecedented loss of capability to provide water service; or 2. Natural or man-made contamination of the water supply source(s).	Achieve a reduction in daily water demand sufficient that will allow DSWSC to supply water within the capability of the system during the emergency event.
GOFORTH SUD	HAYS	CANYON LAKE/EDWARDS-BFZ	Any of Goforth's providers initiates Stage II; or consumption reaches 90% of daily maximum supply for 3 days; water level in any storage tanks cannot be replenished for 3 days	25% reduction in total use		
MOUNTAIN CITY	HAYS	EDWARDS-BFZ	Defer to BSEACD		Defer to BSEACD	

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage Trigger	Severe Water Shortage Goal	Critical/Emergency Water Shortage Trigger	Critical/Emergency Water Shortage Goal
PLUM CREEK WATER COMPANY	HAYS		NA	NA	NA	NA
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	HAYS	HIGHLAND LAKES	For surface, daily demand exceeds 95% of total capacity for LCRA treatment plant for 3 consecutive days or 97% on a single day; or contracted peak day capacity for systems supplied by non-LCRA provider; groundwater when maximum daily use equals/exceeds 95% of pump capacity for three days; Highland lakes are 600,000 acre-feet; LCRA Board determines drought or record	20% reduction in use	1. Major water line breaks, or pump or system failures occur, which cause an unprecedented loss of capability to provide water service; or 2. Natural or man-made contamination of the water supply source(s).	Customers are required to eliminate non-essential water uses during an emergency.
COUNTY-OTHER	LLANO	ELLENBURGER- SAN SABA, HICKORY, and HIGHLAND LAKES	NA	NA	NA	NA

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
			Trigger	Goal	Trigger	Goal
HORSESHOE BAY	LLANO		Drought year with severe water shortage, or loss/failure of water production/distribution that decrease supply by 10-25%; or drought conditions worsen; or LCRA enacts surface water withdrawal restrictions up to 10-25%; or short/long-term situation requiring reduction of 10-25% consumption	10-25% reduction	1. Critical drought conditions resulting in emergency water conditions and curtailment of water use; 2. Loss or damage to Horseshoe Bay water production or water distribution appurtenance or facility that would decrease water supply system capabilities by 35%; 3. Any other emergency water supply or demand issue the LCRA General Manager or the LCRA Board determines to warrant the declaration of Stage 4; 4. Any surface water supplies withdrawal restriction enacted by the LCRA that would entail a 35% reduction in water supply to the City of Horseshoe Bay; 5. Any short term or long term water supply situation requiring a 35% reduction in water consumption	35% reduction
KINGSLAND WSC	LLANO	HIGHLAND LAKES, and OTHER AQUIFER	Based on LCRA drought plan		Based on LCRA drought plan	

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage Trigger	Severe Water Shortage Goal	Critical/Emergency Water Shortage Trigger	Critical/Emergency Water Shortage Goal
LLANO	LLANO	HIGHLAND LAKES/LLANO LAKE	1. The 7-day moving average daily discharge of the median flow between the Llano River at Llano and the Llano River at Mason is equal to or less than 19 cfs. 2. The Goal for Stage 2 cannot be met under Stage 2 Restriction.	Limit the daily pumpage at the water treatment plant to 0.88 million gallons per day.	1. The 7-day moving average daily discharge of the median flow between the Llano River at Llano and the Llano River at Mason is equal to or less than 7 cfs. 2. The Goal for Stage 3 cannot be met under Stage 3 Restriction.	Limit the daily pumpage at the water treatment plant to 0.66 million gallons per day.
SUNRISE BEACH VILLAGE	LLANO	HIGHLAND LAKES, and HICKORY	Defer to LCRA		Defer to LCRA	
BAY CITY	MATAGORDA	GULF COAST	Total daily demand equals or exceeds 90% of City's water well pumping capacity for 7 consecutive days	20% reduction in demand	1. Major water line breaks, or pump or system failures occur, which cause an unprecedented loss of capability to provide water service; or 2. Natural or man-made contamination of the water supply source(s).	40% reduction in demand
COUNTY-OTHER	MATAGORDA	HIGHLAND LAKES, and GULF COAST	NA	NA	NA	NA
PALACIOS	MATAGORDA	GULF COAST	To be determined by Mayor	To be determined by Mayor	To be determined by Mayor	To be determined by Mayor

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
			Trigger	Goal	Trigger	Goal
BROOKESMITH SUD	MILLS	BROWNWOOD LAKE	1. The imminent or actual failure of a major component of the system, which would cause an immediate health or safety hazard. 2. Water demand is exceeding 75% of system capacity or 3.375 mgd for three consecutive days. 3. Failure of BCWID No. 1 to deliver water contracted for. 4. All available water supply is so low that the pumps cannot pump the daily water demand.	To be determined by Manager	1. The imminent or actual failure of a major component of the system, which would cause an immediate health or safety hazard. 2. Water demand is exceeding 75% of system capacity or 3.375 mgd for three consecutive days. 3. Failure of BCWID No. 1 to deliver water contracted for. 4. All available water supply is so low that the pumps cannot pump the daily water demand.	To be determined by Manager
COUNTY-OTHER	MILLS	TRINITY	NA	NA	NA	NA
GOLDTHWAITE	MILLS	TRINITY, and GOLDTHWAITE RESERVOIR	NA	NA	NA	NA
COUNTY-OTHER	SAN SABA	ELLENBURGER- SAN SABA, HICKORY, MARBLE FALLS, and HIGHLAND LAKES	NA	NA	NA	NA
RICHLAND SUD	SAN SABA	ELLENBURGER-SAN SABA	NA	NA	NA	NA

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
			Trigger	Goal	Trigger	Goal
SAN SABA	SAN SABA	ELLENBURGER-SAN SABA AQUIFER	Average daily consumption 110% of rated capacity or consumption will not let storage levels be maintained; Demand exceeds available high service pump capacity; any two conditions in "moderate drought" occur at the same time for 24 hour period;	50% reduction in demand	System is contaminated; system fails from acts of God	To be determined
AQUA WSC	TRAVIS	CARRIZO-WILCOX AQUIFER	1. Major water line breaks, or pump or system failures occur, which cause an unprecedented loss of capability to provide water service; or 2. Natural or man-made contamination of the water supply source(s).	Achieve a minimum of 20% reduction in daily water demand	1. Major water line breaks, or pump or system failures occur, which cause an unprecedented loss of capability to provide water service; or 2. Natural or man-made contamination of the water supply source(s).	Achieve a minimum of 20% reduction in daily water demand
AUSTIN	TRAVIS	HIGHLAND LAKES/RESERVOIR SYSTEM/COLORADO RUN-OF-RIVER	Demand 260 mgd for 3 consecutive days; Combined Lake storage less than 900,000 acft;	Reduce water use by 15% to 20%	Combined Lake storage less than 600,000 acft; As determined by City Manager - system outage, equipment failure, contamination, etc	Reduce water use to levels deemed necessary
BARTON CREEK WEST WSC	TRAVIS	HIGHLAND LAKES	NA	NA	NA	NA
BEE CAVE	TRAVIS	HIGHLAND LAKES	NA	NA	NA	NA
BRIARCLIFF	TRAVIS	HIGHLAND LAKES	NA	NA	NA	NA

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
			Trigger	Goal	Trigger	Goal
CEDAR PARK	TRAVIS	HIGHLAND LAKES/RESERVOIR SYSTEM	(i) Daily water consumption equals or exceeds 95% of operating capacity for 3 days; (ii) Combined storage of Highland lakes are less than 750,000 AF but greater than 600,000 AF (iii) Water system is contaminated whether accidentally or intentionally. Severe condition is reached immediately upon detection; (iv) City Manager discretion	Achieve a minimum of 20% reduction in daily water demand	To be determined by City Manager	Achieve a minimum of 30% reduction in daily water demand
COUNTY-OTHER	TRAVIS	CARRIZO-WILCOX, CITY OF AUSTIN - ROR (MUNICIPAL), EDWARDS-BFZ, HIGHLAND LAKES, and TRINITY	NA	NA	NA	NA
CREEDMOOR-MAHA WSC	TRAVIS	CITY OF AUSTIN - ROR (MUNICIPAL) and EDWARDS-BFZ	NA	NA	NA	NA

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
			Trigger	Goal	Trigger	Goal
ELGIN	TRAVIS	CARRIZO-WILCOX AQUIFER	Average daily consumption is 95% of capacity for 24-hour period; aquifer level drops to critical level or average consumption will not enable storage levels to be maintained; and system demand exceeds available high service pump capacity; detection of water system failure from act of God; delivery capability is reduced due to mechanical failure requiring more than 12 hours to repair	not defined	Average daily consumption is 95% of capacity for 24-hour period; aquifer level drops to critical level or average consumption will not enable storage levels to be maintained; and system demand exceeds available high service pump capacity; detection of water system failure from act of God; delivery capability is reduced due to mechanical failure requiring more than 12 hours to repair	not defined
GOFORTH SUD	TRAVIS	CANYON LAKE/EDWARDS-BFZ	Any of Goforth's providers initiates Stage **II**; or consumption reaches 90% of daily maximum supply for 3 days; water level in any storage tanks cannot be replenished for 3 days	Up to 40% reduction in total use, dependent on source of water	Any of Goforth's providers initiates Stage **III**; or consumption reaches 95% of daily maximum supply for 3 days; water level in any storage tanks cannot be replenished for 5 days	Up to 40% reduction in total use, dependent on source of water

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage Trigger	Severe Water Shortage Goal	Critical/Emergency Water Shortage Trigger	Critical/Emergency Water Shortage Goal
JONESTOWN	TRAVIS	HIGHLAND LAKES	Total daily water demand equals or exceeds 95 percent of the total operating system treatment capacity for three consecutive days, or 97 percent on a single day; or Combined storage of Lakes Travis and Buchanan reaches 600,000 acre-feet, in accordance with the LCRA DCP, or The LCRA Board declares a drought worse than the Drought of Record or other water supply emergency and orders the mandatory curtailment of firm water supplies.	Achieve a minimum 20% reduction in water use.	1. Major water line breaks, or pump or system failures occur, which cause an unprecedented loss of capability to provide water service; or 2. Natural or man-made contamination of the water supply source(s). 3. Any other emergency condition or LCRA determination.	As determined by the LCRA Board.
LAGO VISTA	TRAVIS	HIGHLAND LAKES	Demand equals or exceeds 95% treatment capacity for 3 consecutive days or a single day; or supply reaches 600,000 acre-feet	Achieve a minimum 20% reduction in water use.	1. Major water line breaks, or pump or system failures occur, which cause an unprecedented loss of capability to provide water service; or 2. Natural or man-made contamination of the water supply source(s). 3. Any other emergency condition or LCRA determination.	As determined by the LCRA Board.

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
			Trigger	Goal	Trigger	Goal
LAKEWAY	TRAVIS	HIGHLAND LAKES	Total daily water demand equals or exceeds 95 percent of the total operating system treatment capacity for three consecutive days, or 97 percent on a single day; or Combined storage of Lakes Travis and Buchanan reaches 750,000 acre-feet, in accordance with the LCRA DCP, or	Achieve a minimum 20% reduction in water use.	The LCRA Board declares a drought worse than the Drought of Record or other water supply emergency and orders the mandatory curtailment of firm water supplies; or Major water line breaks, or pump or system failures occur, which cause an unprecedented loss of capability to provide water service; or Combined storage of Lakes Travis and Buchanan reaches 600,000 acre-feet, in accordance with the LCRA DCP	As determined by the LCRA Board.
LEANDER	TRAVIS	HIGHLAND LAKES	Defer to LCRA		Defer to LCRA	
LOOP 360 WSC	TRAVIS	HIGHLAND LAKES	NA	NA	NA	NA
LOST CREEK MUD	TRAVIS	CITY OF AUSTIN - ROR (MUNICIPAL)	900,000 ac-ft or less of storage in highland lakes	Reduce water use by 15% to 20%	600,000 ac-ft or less of storage in highland lakes	Reduce water use to levels deemed necessary
MANOR	TRAVIS	OTHER AQUIFER, CITY OF AUSTIN - ROR (MUNICIPAL), and HIGHLAND LAKES	NA	NA	NA	NA

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
			Trigger	Goal	Trigger	Goal
MANVILLE WSC	TRAVIS	HIGHLAND LAKES/EDWARDS-BFZ AQUIFER/OTHER AQUIFER/COLORADO RUN OF RIVER	Failure of major component of system or health/safety hazard; or water demand exceeds capacity for 24 hours; or production is 100% and stroage tank levels are decreasing at 5% per day; or total production of wells fall by an additional 15%.	15% reduction of average daily water use	1. Major water line breaks, or pump or system failures occur, which cause an unprecedented loss of capability to provide water service; or 2. Natural or man-made contamination of the water supply source(s).	To be determined
MUSTANG RIDGE	TRAVIS	OTHER AQUIFER	NA	NA	NA	NA
NORTH AUSTIN MUD #1	TRAVIS	CITY OF AUSTIN - ROR (MUNICIPAL)	Daily consumption 95% of the District's supply/distribution capacity; demand exceeds availablehigh service pump capacity; system is contaminated; system fails due to act of God; mechanical failure of pumping equipment; required under contract	15% reduction	a. there is a failure of water treating facilities; b. there is a contamination of water source; or c. required under any District water supply contract.	20% reduction

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
			Trigger	Goal	Trigger	Goal
NORTHTOWN MUD	TRAVIS		Demand exceeds available high service pump capacity; system is contaminated; system fails due to act of God; mechanical failure; District Manager deems it necessary; required by Water Supplier under District supply contract; otherwise determined by the Board.	15% reduction	District may impose additional water restrictions to protect the public health and safety in the event of an unusual water system operational event, catastrophic occurrence or severe weather event, or as otherwise required by the Board or a Water Supplier under any District water supply contract.	To be determined

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage Trigger	Severe Water Shortage Goal	Critical/Emergency Water Shortage Trigger	Critical/Emergency Water Shortage Goal
PFLUGERVILLE	TRAVIS	HIGHLAND LAKES	Average consumption reaches 90% production/distribution for 3 consecutive days; or Highland Lakes fall to 700,000; or City Manager determines implementation is necessary	25% reduction in usage	(1) The combined storage of the Highland Lakes reaches 600,000 acre feet or Lake Pflugerville is down to its 625 elevation. (2) Major water line breaks, or pump or system failures occur, and cause unexpected loss of capability to provide water service; (3) System demand exceeds available high service pump capacity; (4) There is detection of accidental or intentional contamination of the water system; (5) There is detection of water systems failure from acts of God (e.g., tornados, hurricanes, etc.) or man; (6) A mechanical failure of pumping equipment occurs during a moderate drought and will require more than 12 hours to repair; or (7) Implementation is necessary under the city's wholesale water contract with the Lower Colorado River Authority.	75% reduction in usage
POINT VENTURE	TRAVIS	HIGHLAND LAKES	NA	NA	NA	NA

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage Trigger	Severe Water Shortage Goal	Critical/Emergency Water Shortage Trigger	Critical/Emergency Water Shortage Goal
ROLLINGWOOD	TRAVIS	CITY OF AUSTIN - ROR (MUNICIPAL)	Defer to City of Austin		Defer to City of Austin	
ROUND ROCK	TRAVIS	EDWARDS - BFZ	Defer to Brazos River Authority Plan; storage/reservoir is at or below stage 3 trigger as shown in plan; reservoir, group of reservoirs, or entire BRA system is below stage 3; critical infrastructure is damaged	7% reduction	Defer to Brazos River Authority Plan	
SHADY HOLLOW MUD	TRAVIS	CITY OF AUSTIN - ROR (MUNICIPAL)	Defer to City of Austin		Defer to City of Austin	
SUNSET VALLEY	TRAVIS	CITY OF AUSTIN - ROR (MUNICIPAL); EDWARDS - BFZ	System failure or contamination of City groundwater; or declaration of Stage **II** by City of Austin or alarm stage by BSEACD; or LCRA requires firm customers to implement mandatory water restrictions.	20% reduction	System failure or contamination of City groundwater; or declaration of Stage **III** by City of Austin or critical stage by BSEACD; or LCRA requires firm customers to curtail use on a pro rata basis	30% reduction
THE HILLS	TRAVIS	HIGHLAND LAKES	NA	NA	NA	NA

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
			Trigger	Goal	Trigger	Goal
TRAVIS COUNTY MUD #4	TRAVIS	HIGHLAND LAKES	Notification by the District that Stage 3 requirements and constrictions are in place	Reduce and maintain maximum daily water demand at or below ninety five percent (90%) of MUD 4 system capacity.	Notification by the District that Stage 4 requirements and constrictions are in place	Reduce and maintain maximum daily water demand at or below ninety five percent (95%) of MUD 4 system capacity.
TRAVIS COUNTY WCID #10	TRAVIS	HIGHLAND LAKES	Combined storage of Travis/Buchanan at or below 900,000 ac-ft; or LCRA requests reduced water use	25% reduction	Combined storage of Travis/Buchanan at or below 600,000 ac-ft; or LCRA requests reduced water use	As determined by the LCRA Board.
TRAVIS COUNTY WCID #17	TRAVIS	HIGHLAND LAKES	Combined storage of Travis/Buchanan above 600,000 AFY and below 750,000 ac-ft; or LCRA requests reduced water use	25% reduction in daily demand	Combined storage of Travis/Buchanan at or below 600,000 ac-ft; or LCRA requests reduced water use	30-40% reduction in daily demand

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage Trigger	Severe Water Shortage Goal	Critical/Emergency Water Shortage Trigger	Critical/Emergency Water Shortage Goal
TRAVIS COUNTY WCID #18	TRAVIS	HIGHLAND LAKES	Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 3 of this Plan when continually falling water reservoirs in the District result in ground storage tank levels of less than 35% capacities during periods of peak flow or the levels in the ground storage tanks are such as they only provide minimum water pressures at the upper ends of the pressure planes. Stage 3 may also be requested by the wholesale water supplier in periods of supply emergency.	30% reduction in daily demand	Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 4 of this Plan when continually falling levels in any ground storage tank falls below 25% of capacity which results in low pressure in any pressure plane, or as requested by the wholesale water supplier during periods of drought emergency.	40% reduction in daily demand
TRAVIS COUNTY WCID #19	TRAVIS	HIGHLAND LAKES	When District's Operator is notified by MUD 4 that it is implementing Stage 3	Reduce and maintain maximum daily demand at or below 90% of MUD 4 system capacity	When District's Operator is notified by MUD 4 that it is implementing Stage 4	Reduce and maintain maximum daily demand at or below 95% of MUD 4 system capacity
TRAVIS COUNTY WCID #20	TRAVIS	HIGHLAND LAKES	Defer to LCRA		Defer to LCRA	
VOLENTE	TRAVIS		NA	NA	NA	NA

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WUG Name	County	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
			Trigger	Goal	Trigger	Goal
WELLS BRANCH MUD	TRAVIS	CITY OF AUSTIN - ROR (MUNICIPAL)	Defer to City of Austin		Defer to City of Austin	
WEST LAKE HILLS	TRAVIS	CITY OF AUSTIN - ROR (MUNICIPAL)	Defer to City of Austin		Defer to City of Austin	
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	TRAVIS	HIGHLAND LAKES	Surface water daily demand equals 95% of either the total design of LCRA WTP for 3 consecutive days (or 97% on single day) or contracted peak day capacity of systems supplied by non-LCRA provider. Groundwater daily usage equals 95% of pump/well rated capacity for 3 consecutive days; or wen combine storage of Travis/Buchanan are 600,000 ac-ft; or LCRA Board determines a drought worse than the drought of record	20% reduction in water use	1. Major water line breaks, or pump or system failures occur, which cause an unprecedented loss of capability to provide water service; or 2. Natural or man-made contamination of the water supply source(s).	Customers are required to eliminate non-essential water uses during an emergency.
WILLIAMSON-TRAVIS COUNTY MUD #1	TRAVIS	HIGHLAND LAKES	NA	NA	NA	NA
COUNTY-OTHER	WHARTON	GULF COAST	NA	NA	NA	NA
EAST BERNARD	WHARTON	GULF COAST	NA	NA	NA	NA

Existing Drought Trigger Summary for 2016 Region K Water Plan (Updated July 30, 2013)

WUG Name	County	Source Name	Severe Water Shortage		Critical/Emergency Water Shortage	
			Trigger	Goal	Trigger	Goal
EL CAMPO	WHARTON	GULF COAST AQUIFER	Total daily demand equals or exceeds 4.5 MGD for 3 consecutive days or 5.0 MGD on a single day	Achieve a 15% reduction in daily water pumpage	Total daily demand equals or exceeds 5.0MGD for 3 consecutive days or 5.5 MGD on a single day	Achieve a 20% reduction in daily water pumpage
WHARTON	WHARTON	GULF COAST	Total daily demand equals or exceeds 3.5 MGD for 3 consecutive days or 3.75 MGD on a single day	Achieve a 15% reduction in daily water pumpage	Total daily demand equals or exceeds 3.75 MGD for 3 consecutive days or 4.0 MGD on a single day	Achieve a 20% reduction in daily water pumpage
AUSTIN	WILLIAMSON	HIGHLAND LAKES/RESERVOIR SYSTEM/COLORADO RUN-OF-RIVER	Demand 260 mgd for 3 consecutive days; Combined Lake storage less than 900,000 acft;	Reduce water use by 15% to 20%	Combined Lake storage less than 600,000 acft; As determined by City Manager - system outage, equipment failure, contamination, etc	Reduce water use to levels deemed necessary
COUNTY-OTHER	WILLIAMSON	CITY OF AUSTIN - ROR (MUNICIPAL), TRINITY, and EDWARDS - BFZ	NA	NA	NA	NA
NORTH AUSTIN MUD #1	WILLIAMSON	CITY OF AUSTIN - ROR (MUNICIPAL)	Daily consumption 95% of the District's supply/distribution capacity; demand exceeds available high service pump capacity; system is contaminated; system fails due to act of God; mechanical failure of pumping equipment; required under contract	15% reduction	a. there is a failure of water treating facilities; b. there is a contamination of water source; or c. required under any District water supply contract.	20% reduction
WELLS BRANCH MUD	WILLIAMSON	CITY OF AUSTIN - ROR (MUNICIPAL)	Defer to City of Austin		Defer to City of Austin	

APPENDIX 7C

Region-Specific Model Drought Contingency Plans

Model Region K Drought Contingency Plan Template

Utility/Water Supplier

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Model Drought Contingency Plan Template (Utility / Water Supplier)

Brief Introduction and Background

Include information such as
- Name of Utility
- Address, City, Zip Code
- CCN#
- PWS #s

Section I: Declaration of Policy, Purpose, and Intent

In order to conserve the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, the ___________________ (name of your water supplier) hereby adopts the following regulations and restrictions on the delivery and consumption of water through an ordinance/or resolution.

Water uses regulated or prohibited under this Drought Contingency Plan (the Plan) are considered to be non-essential and continuation of such uses during times of water shortage or other emergency water supply condition are deemed to constitute a waste of water which subjects the offender(s) to penalties as defined in Section XI of this Plan.

Section II: Public Involvement

Opportunity for the public to provide input into the preparation of the Plan was provided by the ______________ (name of your water supplier) by means of ________________ (describe methods used to inform the public about the preparation of the plan and provide opportunities for input; for example, scheduling and providing public notice of a public meeting to accept input on the Plan).

Section III: Public Education

The ______________ (name of your water supplier) will periodically provide the public with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated and the drought response measures to be implemented in each stage. This information will be provided by means of __________________ (describe methods to be used to provide information to the public about the Plan; for example, public events, press releases or utility bill inserts).

Section IV: Coordination with the Lower Colorado Regional Water Planning Group

The service area of the _____________ (name of your water supplier) is located within the Lower Colorado Regional Water Planning Area and ___________ (name of your water supplier) has provided a copy of this Plan to the Lower Colorado Regional Water Planning Group.

Section V: Authorization

The ___________________ (designated official; for example, the mayor, city manager, utility director, general manager, etc.), or his/her designee is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The _______________, (designated official) or his/her designee shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

Section VI: Application

The provisions of this Plan shall apply to all persons, customers, and property utilizing water provided by the __________________ (name of your water supplier). The terms person and customer as used in the Plan include individuals, corporations, partnerships, associations, and all other legal entities.

Section VII: Definitions

For the purposes of this Plan**,** the following definitions shall apply:

<u>Aesthetic water use</u>: water use for ornamental or decorative purposes such as fountains, reflecting pools, and water gardens.

<u>Commercial and institutional water use</u>: water use which is integral to the operations of commercial and non-profit establishments and governmental entities such as retail establishments, hotels and motels, restaurants, and office buildings.

<u>Conservation</u>: those practices, techniques, and technologies that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water or increase the recycling and reuse of water so that a supply is conserved and made available for future or alternative uses.

<u>Customer</u>: any person, company, or organization using water supplied by __________________ (name of your water supplier).

<u>Domestic water use</u>: water use for personal needs or for household or sanitary purposes such as drinking, bathing, heating, cooking, sanitation, or for cleaning a residence, business, industry, or institution.

<u>Even number address</u>: street addresses, box numbers, or rural postal route numbers ending in 0, 2, 4, 6, or 8 and locations without addresses.

Industrial water use: the use of water in processes designed to convert materials of lower value into forms having greater usability and value.

Landscape irrigation use: water used for the irrigation and maintenance of landscaped areas, whether publicly or privately owned, including residential and commercial lawns, gardens, golf courses, parks, and rights-of-way and medians.

Non-essential water use: water uses that are not essential nor required for the protection of public, health, safety, and welfare, including:

(a) irrigation of landscape areas, including parks, athletic fields, and golf courses, except otherwise provided under this Plan;
(b) use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle;
(c) use of water to wash down any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
(d) use of water to wash down buildings or structures for purposes other than immediate fire protection;
(e) flushing gutters or permitting water to run or accumulate in any gutter or street;
(f) use of water to fill, refill, or add to any indoor or outdoor swimming pools or Jacuzzi-type pools;
(g) use of water in a fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life;
(h) failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s); and
(i) use of water from hydrants for construction purposes or any other purposes other than fire fighting.

Odd numbered address: street addresses, box numbers, or rural postal route numbers ending in 1, 3, 5, 7, or 9.

Section VIII: Criteria for Initiation and Termination of Drought Response Stages

The ________________ (designated official) or his/her designee shall monitor water supply and/or demand conditions on a __________ (example: daily, weekly, monthly) basis and shall determine when conditions warrant initiation or termination of each stage of the Plan, that is, when the specified triggers are reached.

The triggering criteria described below are based on ______________________________________

____

(*provide a brief description of the rationale for the triggering criteria; for example, triggering criteria / trigger levels based on a statistical analysis of the vulnerability of the water source under drought of record conditions, or based on known system capacity limits*).

Stage 1 Triggers -- MILD Water Shortage Conditions

Requirements for initiation

Customers shall be requested to voluntarily conserve water and adhere to the prescribed restrictions on certain water uses, defined in Section VII Definitions, when ____

(*Describe triggering criteria / trigger levels; see examples below*).

Following are examples of the types of triggering criteria that might be used in one or more successive stages of a drought contingency plan. One or a combination of such criteria must be defined for each drought response stage, but usually not all will apply. Select those appropriate to your system:

Example 1: *Annually, beginning on May 1 through September 30.*

Example 2: *When the water supply available to the _______ (name of your water supplier) is equal to or less than _______ (acre-feet, percentage of storage, etc.).*

Example 3: *When, pursuant to requirements specified in the _____________(name of **your** water supplier) wholesale water purchase contract with ____________ (name of your wholesale water supplier), notification is received requesting initiation of Stage 1 of the Drought Contingency Plan.*

Example 4: *When flows in the _______ (name of stream or river) are equal to or less than ____cubic feet per second.*

Example 5: *When the static water level in the ____________ (name of your water supplier) well(s) is equal to or less than _____ feet above/below mean sea level.*

Example 6: *When the specific capacity of the __________________ (name of your water supplier) well(s) is equal to or less than _____ percent of the well's original specific capacity.*

Example 7: *When total daily water demand equals or exceeds ______ million gallons for ___consecutive days of ____ million gallons on a single day (example: based on the safe operating capacity of water supply facilities).*

Example 8: *Continually falling treated water reservoir levels which do not refill above __ percent overnight (example: based on an evaluation of minimum treated water storage required to avoid system outage).*

The public water supplier may devise other triggering criteria which are tailored to its system.

Requirements for termination

Stage 1 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (e.g. 3) consecutive days.

Stage 2 Triggers -- MODERATE Water Shortage Conditions

Requirements for initiation

Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses provided in Section IX of this Plan when _____________ (*describe triggering criteria; see examples in Stage 1*).

Requirements for termination

Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (example: 3) consecutive days. Upon termination of Stage 2, Stage 1 becomes operative.

Stage 3 Triggers -- SEVERE Water Shortage Conditions

Requirements for initiation

Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 3 of this Plan when **____________** (*describe triggering criteria; see examples in Stage 1*).

Requirements for termination
Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of **___** (example: 3) consecutive days. Upon termination of Stage 3, Stage 2 becomes operative.

Stage 4 Triggers -- CRITICAL Water Shortage Conditions

Requirements for initiation
Customers shall be required to comply with the requirements and restrictions on certain non-essential water uses for Stage 4 of this Plan when **____________** (*describe triggering criteria; see examples in Stage 1*).

Requirements for termination
Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of **___** (example: 3) consecutive days. Upon termination of Stage 4, Stage 3 becomes operative.

Stage 5 Triggers -- EMERGENCY Water Shortage Conditions

Requirements for initiation
Customers shall be required to comply with the requirements and restrictions for Stage 5 of this Plan when **____________** (designated official), or his/her designee, determines that a water supply emergency exists based on:

1. Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; **or**

2. Natural or man-made contamination of the water supply source(s).

Requirements for termination
Stage 5 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of **___** (example: 3) consecutive days.

Stage 6 Triggers -- WATER ALLOCATION

Requirements for initiation
Customers shall be required to comply with the water allocation plan prescribed in Section IX of this
Plan and comply with the requirements and restrictions for Stage 5 of this Plan when **____________** (describe triggering criteria, see examples in Stage 1).

Requirements for termination - Water allocation may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of **___** (example: 3) consecutive days.

Note: The inclusion of WATER ALLOCATION as part of a drought contingency plan may not be required in all cases. For example, for a given water supplier, an analysis of water supply availability under drought of record conditions may indicate that there is essentially no risk of water supply shortage. Hence, a drought contingency plan for such a water supplier might only address facility capacity limitations and emergency conditions (example: supply source contamination and system capacity limitations).

Section IX: Drought Response Stages

The _______________ (designated official), or his/her designee, shall monitor water supply and/or demand conditions on a daily basis and, in accordance with the triggering criteria set forth in Section VIII of this Plan, shall determine that a mild, moderate, severe, critical, emergency or water shortage condition exists and shall implement the following notification procedures:

Notification

Notification of the Public:
The ________ (designated official) or his/ her designee shall notify the public by means of:

Examples:
publication in a newspaper of general circulation,
direct mail to each customer,
public service announcements,
signs posted in public places
take-home fliers at schools.

Additional Notification:
The _________ (designated official) or his/ her designee shall notify directly, or cause to be notified directly, the following individuals and entities:

Examples:
Mayor / Chairman and members of the City Council / Utility Board
Fire Chief(s)
City and/or County Emergency Management Coordinator(s)
County Judge & Commissioner(s)
State Disaster District / Department of Public Safety
TCEQ *(required when* mandatory *restrictions are imposed)*
Major water users
Critical water users, i.e. hospitals
Parks / street superintendents & public facilities managers

Note: The plan should specify direct notice only as appropriate to respective drought stages.

Stage 1 Response -- MILD Water Shortage Conditions

Target: Achieve a voluntary ___ percent reduction in __________(example: total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, activation and use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

Voluntary Water Use Restrictions for Reducing Demand :

(a) Water customers are requested to voluntarily limit the irrigation of landscaped areas to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and to irrigate landscapes only between the hours of midnight and 10:00 a.m. and 8:00 p.m. to midnight on designated watering days.

(b) All operations of the ______________ (name of your water supplier) shall adhere to water use restrictions prescribed for Stage 2 of the Plan.

(c) Water customers are requested to practice water conservation and to minimize or discontinue water use for non-essential purposes.

Stage 2 Response -- MODERATE Water Shortage Conditions

Target: Achieve a ___ percent reduction in __________ (example: total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by ____________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

Water Use Restrictions for Demand Reduction:
Under threat of penalty for violation, the following water use restrictions shall apply to all persons:

(a) Irrigation of landscaped areas with hose-end sprinklers or automatic irrigation systems shall be limited to Sundays and Thursdays for customers with a street address ending in an even number (0, 2, 4, 6 or 8), and Saturdays and Wednesdays for water customers with a street address ending in an odd number (1, 3, 5, 7 or 9), and irrigation of landscaped areas is further limited to the hours of 12:00 midnight until 10:00 a.m. and between 8:00 p.m. and 12:00 midnight on designated watering days. However, irrigation of landscaped areas is permitted at anytime if it is by means of a hand-held hose, a faucet filled bucket or watering can of five (5) gallons or less, or drip irrigation system.

(b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8:00 p.m. and 12:00 midnight. Such washing, when allowed, shall be done with a hand-held bucket or a hand-held hose equipped with a positive shutoff nozzle for quick rises. Vehicle washing may be done at any time on the immediate premises of a commercial car wash or commercial service station. Further, such washing may be exempted from these regulations if the health, safety, and welfare of the public is contingent upon frequent vehicle cleansing, such as garbage trucks and vehicles used to transport food and perishables.

(c) Use of water to fill, refill, or add to any indoor or outdoor swimming pools, wading pools, or Jacuzzi-type pools is prohibited except on designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight.

(d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.

(e) Use of water from hydrants shall be limited to fire fighting, related activities, or other activities necessary to maintain public health, safety, and welfare, except that use of water from designated fire hydrants for construction purposes may be allowed under special permit from the ____________________ (name of your water supplier).

(f) Use of water for the irrigation of golf course greens, tees, and fairways is prohibited except on designated watering days between the hours 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight. However, if the golf course utilizes a water source other than that provided by the _______________ (name of your water supplier), the facility shall not be subject to these regulations.

(g) All restaurants are prohibited from serving water to patrons except upon request of the patron.

(h) The following uses of water are defined as non-essential and are prohibited:

1. wash down of any sidewalks, walkways, driveways, parking lots, tennis courts, or other hard-surfaced areas;
2. use of water to wash down buildings or structures for purposes other than immediate fire protection;
3. use of water for dust control;
4. flushing gutters or permitting water to run or accumulate in any gutter or street; and
5. failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s).

Stage 3 Response -- SEVERE Water Shortage Conditions

<u>Target</u>: Achieve a ___ percent reduction in __________ (example: total water use, daily water demand, etc.).

<u>Best Management Practices for Supply Management</u>:

Describe additional measures, if any, to be implemented directly by ____________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

<u>Water Use Restrictions for Demand Reduction</u>:
All requirements of Stage 2 shall remain in effect during Stage 3 except:

(a) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 12:00 midnight and 10:00 a.m. and between 8 p.m. and 12:00 midnight and shall be by means of hand-held hoses, hand-held buckets, drip irrigation, or permanently installed automatic sprinkler system only. The use of hose-end sprinklers is prohibited at all times.

(b) The watering of golf course tees is prohibited unless the golf course utilizes a water source other than that provided by the ____________________ (name of your water supplier).

(c) The use of water for construction purposes from designated fire hydrants under special permit is to be discontinued.

Stage 4 Response -- CRITICAL Water Shortage Conditions

<u>Target</u>: Achieve a ___ percent reduction in __________ (example: total water use, daily water demand, etc.).

<u>Best Management Practices for Supply Management</u>:

Describe additional measures, if any, to be implemented directly by ____________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

<u>Water Use Restrictions for Reducing Demand:</u>. All requirements of Stage 2 and 3 shall remain in effect during Stage 4 except:

(a) Irrigation of landscaped areas shall be limited to designated watering days between the hours of 6:00 a.m. and 10:00 a.m. and between 8:00 p.m. and 12:00

midnight and shall be by means of hand-held hoses, hand-held buckets, or drip irrigation only. The use of hose-end sprinklers or permanently installed automatic sprinkler systems are prohibited at all times.

(b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle not occurring on the premises of a commercial car wash and commercial service stations and not in the immediate interest of public health, safety, and welfare is prohibited. Further, such vehicle washing at commercial car washes and commercial service stations shall occur only between the hours of 6:00 a.m. and 10:00 a.m. and between 6:00 p.m. and 10 p.m.

(c) The filling, refilling, or adding of water to swimming pools, wading pools, and Jacuzzi-type pools is prohibited.

(d) Operation of any ornamental fountain or pond for aesthetic or scenic purposes is prohibited except where necessary to support aquatic life or where such fountains or ponds are equipped with a recirculation system.

(e) No application for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind shall be approved, and time limits for approval of such applications are hereby suspended for such time as this drought response stage or a higher-numbered stage shall be in effect.

Stage 5 Response -- EMERGENCY Water Shortage Conditions

<u>Target</u>: Achieve a ___ percent reduction in __________ (example: total water use, daily water demand, etc.).

<u>Best Management Practices for Supply Management</u>:

Describe additional measures, if any, to be implemented directly by ____________ (name of your water supplier) to manage limited water supplies and/or reduce water demand. Examples include: reduced or discontinued flushing of water mains, reduced or discontinued irrigation of public landscaped areas; use of an alternative supply source(s); use of reclaimed water for non-potable purposes.

<u>Water Use Restrictions for Reducing Demand</u>. All requirements of Stage 2, 3, and 4 shall remain in effect during Stage 5 except:

(a) Irrigation of landscaped areas is absolutely prohibited.

(b) Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane or other vehicle is absolutely prohibited.

Section X: Enforcement

(a) No person shall knowingly or intentionally allow the use of water from the ___________________ (name of your water supplier) for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this Plan, or in an amount in excess of that permitted by the drought response stage in effect at the time pursuant to action taken by _____________(designated official), or his/her designee, in accordance with provisions of this Plan.

(b) Any person who violates this Plan is guilty of a misdemeanor and, upon conviction shall be punished by a fine of not less than _______ dollars ($__) and not more than ______ dollars ($__). Each day that one or more of the provisions in this Plan is violated shall constitute a separate offense. If a person is convicted of three or more distinct violations of this Plan, the _____________ (designated official) shall, upon due notice to the customer, be authorized to discontinue water service to the premises where such violations occur. Services discontinued under such circumstances shall be restored only upon payment of a re-connection charge, hereby established at $______, and any other costs incurred by the ____________________ (name of your water supplier) in discontinuing service. In addition, suitable assurance must be given to the ________________ (designated official) that the same action shall not be repeated while the Plan is in effect. Compliance with this plan may also be sought through injunctive relief in the district court.

(c) Any person, including a person classified as a water customer of the ______________ (name of your water supplier), in apparent control of the property where a violation occurs or originates shall be presumed to be the violator, and proof that the violation occurred on the person's property shall constitute a rebuttable presumption that the person in apparent control of the property committed the violation, but any such person shall have the right to show that he/she did not commit the violation. Parents shall be presumed to be responsible for violations of their minor children and proof that a violation, committed by a child, occurred on property within the parents' control shall constitute a rebuttable presumption that the parent committed the violation, but any such parent may be excused if he/she proves that he/she had previously directed the child not to use the water as it was used in violation of this Plan and that the parent could not have reasonably known of the violation.

d) Any employee of the _______________ (name of your water supplier), police officer, or other _____ employee designated by the ___________ (designated official), may issue a citation to a person he/she reasonably believes to be in violation of this Ordinance. The citation shall be prepared in duplicate and shall contain the name and address of the alleged violator, if known, the offense charged, and shall direct him/her to appear in the _____________ (example: municipal court) on the date shown on the citation for which the date shall not be less than 3 days nor more than 5 days from the date the citation was issued. The alleged violator shall be served a copy of the citation. Service of the citation shall be complete upon delivery of the citation to the alleged violator, to an agent or employee of a violator, or to a person over 14 years of age who is a member of the violator's immediate family or is a resident of the violator's residence. The alleged violator shall appear in _________ (example: municipal court) to enter a plea of guilty or not guilty for the violation of this Plan. If the alleged violator fails to appear in __________ (example: municipal court), a warrant for his/her arrest may be issued. A summons to appear may be issued in lieu of an arrest warrant. These cases shall be expedited and given preferential setting in __________ (example: municipal court) before all other cases.

Section XI: Variances

The ________________ (designated official), or his/her designee, may, in writing, grant temporary variance for existing water uses otherwise prohibited under this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the health, sanitation, or fire protection for the public or the person requesting such variance and if one or more of the following conditions are met:

(a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.
(b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Ordinance shall file a petition for variance with the _________________ (name of your water supplier) within 5 days after the Plan or a particular drought response stage has been invoked. All petitions for variances shall be reviewed by the __________ (designated official), or his/her designee, and shall include the following:

(a) Name and address of the petitioner(s).
(b) Purpose of water use.
(c) Specific provision(s) of the Plan from which the petitioner is requesting relief.
(d) Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.
(e) Description of the relief requested.
(f) Period of time for which the variance is sought.
(g) Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
(h) Other pertinent information.

EXAMPLE RESOLUTION FOR ADOPTION OF A

DROUGHT CONTINGENCY PLAN

RESOLUTION NO. __________

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE ___________________ (name of water supplier) ADOPTING A DROUGHT CONTINGENCY PLAN.

WHEREAS, the Board recognizes that the amount of water available to the ____________ (name of water supplier) and its water utility customers are limited and subject to depletion during periods of extended drought;

WHEREAS, the Board recognizes that natural limitations due to drought conditions and other acts of God cannot guarantee an uninterrupted water supply for all purposes;

WHEREAS, Section 11.1272 of the *Texas Water Code* and applicable rules of the Texas Commission on Environmental Quality require all public water supply systems in Texas to prepare a drought contingency plan; and

WHEREAS, as authorized under law, and in the best interests of the customers of the _________________ (name of water supply system), the Board deems it expedient and necessary to establish certain rules and policies for the orderly and efficient management of limited water supplies during drought and other water supply emergencies;

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE _________________ (name of water supplier):

SECTION 1. That the Drought Contingency Plan attached hereto as Exhibit "A" and made part hereof for all purposes be, and the same is hereby, adopted as the official policy of the ________________ (name of water supplier).

SECTION 2. That the _______________ (e.g., general manager) is hereby directed to implement, administer, and enforce the Drought Contingency Plan.

SECTION 3. That this resolution shall take effect immediately upon its passage.

DULY PASSED BY THE BOARD OF DIRECTORS OF THE _______________, ON THIS __ day of ______________, 20__.

____

President, Board of Directors
ATTESTED TO:

____
Secretary, Board of Directors

Model Region K Drought Contingency Plan Template

Irrigation Uses

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Model Drought Contingency Plan Template (Irrigation Uses)

DROUGHT CONTINGENCY PLAN
FOR
(Name of irrigation district)
(Address)
(Date)

Section I: Declaration of Policy, Purpose, and Intent

The Board of Directors of the ____________________ (name of irrigation district) deems it to be in the interest of the District to adopt Rules and Regulations governing the equitable and efficient allocation of limited water supplies during times of shortage. These Rules and Regulations constitute the District's drought contingency plan required under Section 11.1272, Texas Water Code, *Vernon's Texas Codes Annotated*, and associated administrative rules of the Texas Commission on Environmental Quality (Title 30, Texas Administrative Code, Chapter 288).

Section II: User Involvement

Opportunity for users of water from the __________________ (name of irrigation district) was provided by means of _________________ (describe methods used to inform water users about the preparation of the plan and opportunities for input; for example, scheduling and providing notice of a public meeting to accept user input on the plan).

Section III: User Education

The ______________ (name of irrigation district) will periodically provide water users with information about the Plan, including information about the conditions under which water allocation is to be initiated or terminated and the district's policies and procedures for water allocation. This information will be provided by means of _______________ (e.g. describe methods to be used to provide water users with information about the Plan; for example, by providing copies of the Plan and by posting water allocation rules and regulations on the district's public bulletin board).

Section IV: Authorization

The _______________ (e.g., general manager) is hereby authorized and directed to implement the applicable provision of the Plan upon determination by the Board that such implementation is necessary to ensure the equitable and efficient allocation of limited water supplies during times of shortage.

Section V: Application

The provisions of the Plan shall apply to all persons utilizing water provided by the ________________ (name of irrigation district). The term "person" as used in the Plan includes individuals, corporations, partnerships, associations, and all other legal entities.

Section VI: Initiation of Water Allocation

The __________ (designated official) shall monitor water supply conditions on a __________ (e.g. weekly, monthly) basis and shall make recommendations to the Board regarding irrigation of water allocation. Upon approval of the Board, water allocation will become effective when _________________ (describe the criteria and the basis for the criteria):

Below are examples of the types of triggering criteria that might be used; singly or in combination, in an irrigation district's drought contingency plan:

Example 1: Water in storage in the ___________ (name of reservoir) is equal to or less than _____________ (acre-feet and/or percentage of storage capacity).

Example 2: Combined storage in the _________________ (name or reservoirs) reservoir system is equal to or less than _____________ (acre-feet and/or percentage of storage capacity).

Example 3: Flows as measured by the U.S. Geological Survey gage on the ______________ (name of reservoir) near _________________ ______________, Texas reaches ____ cubic feet per second (cfs).

Example 4: The storage balance in the district's irrigation water rights account reaches ______ acre-feet.

Example 5: The storage balance in the district's irrigation water rights account reaches an amount equivalent to _______ (number) irrigations for each flat rate acre in which all flat rate assessments are paid and current.

Example 6: The ____________ (name of entity supplying water to the irrigation district) notifies the district that water deliveries will be limited to ___________ acre-feet per year (i.e. a level below that required for unrestricted irrigation).

Section VII: Termination of Water Allocation

The district's water allocation policies will remain in effect until the conditions defined in Section IV of the Plan no longer exist and the Board deems that the need to allocate water no longer exists.

Section VIII: Notice

Notice of the initiation of water allocation will be given by notice posted on the District's public bulletin board and by mail to each ________ (e.g. landowner, holders of active irrigation accounts, etc.).

Section IX: Water Allocation

(a) In identifying **specific, quantified targets** for water allocation to be achieved during periods of water shortages and drought, each irrigation user shall be allocated _____ irrigations or ________ acre-feet of water each flat rate acre on which all taxes, fees, and charges have been paid. The water allotment in each irrigation account will be expressed in acre-feet of water.

Include explanation of water allocation procedure. For example, in the Lower Rio Grande Valley, an "irrigation" is typically considered to be equivalent to eight (8) inches of water per irrigation acre; consisting of six (6) inches of water per acre applied plus two (2) inches of water lost in transporting the water from the river to the land. Thus, three irrigations would be equal to 24 inches of water per acre or an allocation of 2.0 acre-feet of water measured at the diversion from the river.

(b) As additional water supplies become available to the District in an amount reasonably sufficient for allocation to the District's irrigation users, the additional water made available to the District will be equally distributed, on a pro rata basis, to those irrigation users having _________________.

Example 1: **An account balance of less than ______ irrigations for each flat rate acre (i.e. ____ acre-feet).**

Example 2: **An account balance of less than _____ acre-feet of water for each flat rate acre.**

Example 3: **An account balance of less than _ ___ acre-feet of water.** (c) The amount of water charged against a user's water allocation will be ____ (e.g. eight inches) per irrigation, or one allocation unit, unless water deliveries to the land are metered. Metered water deliveries will be charges based on actual measured use. In order to maintain parity in charging use against a water allocation between non-metered and metered deliveries, a loss factor of ____ percent of the water delivered in a metered situation will be added to the measured use and will be charged against the user's water allocation. Any metered use, with the loss factor applied, that is less than eight (8) inches per acre shall be credited back to the allocation unit and will be available to the user. It shall be a violation of the Rules and Regulations for a water user to use water in excess of the amount of water contained in the users irrigation account.

(d) Acreage in an irrigation account that has not been irrigated for any reason within the last two (2) consecutive years will be considered inactive and will not be allocated water. Any landowner whose land has not been irrigated within the last two (2) consecutive years, may, upon application to the District expressing intent to irrigate the land, receive future allocations. However, irrigation water allocated shall be applied only upon the acreage to which it was allocated and such water allotment cannot be transferred until there have been two consecutive years of use.

Section X: Transfers of Allotments

(a) A water allocation in an active irrigation account may be transferred within the boundaries of the District from one irrigation account to another. The transfer of water can only be made by the landowner's agent who is authorized in writing to act on behalf of the landowner in the transfer of all or part of the water allocation from the described land of the landowner covered by the irrigation account.

(b) A water allocation may not be transferred to land owned by a landowner outside the District boundaries.

or

A water allocation may be transferred to land outside the District's boundaries by paying the current water charge as if the water was actually delivered by the District to the land covered by an irrigation account. The amount of water allowed to be transferred shall be stated in terms of acre-feet and deducted from the landowner's current allocation balance in the irrigation account. Transfers of water outside the District shall not affect the allocation of water under Section VII of these Rules and Regulations.

(c) Water from outside the District may not be transferred by a landowner for use within the District.

or

Water from outside the District may be transferred by a landowner for use within the District. The District will divert and deliver the water on the same basis as District water is delivered, except that a ___ percent conveyance loss will be charged against the amount of water transferred for use in the District as the water is delivered.

Section XI: Penalties

Any person who willfully opens, closes, changes or interferes with any headgate or uses water in violation of these Rules and Regulations, shall be considered in violation of Section 11.0083, Texas Water Code, *Vernon's Texas Codes Annotated*, which provides for punishment by fine of not less than $10.00 nor more than $200.00 or by confinement in the county jail for not more than thirty (30) days, or both, for each violation, and these penalties provided by the laws of the State and may by enforced by complaints filed in the appropriate court jurisdiction in ______ County, all in accordance with Section 11.083; and in addition, the District may pursue a civil remedy in the way of damages and/or injunction against the violation of any of the foregoing Rules and Regulations.

Section XII: Severability

It is hereby declared to be the intention of the Board of Directors of the _____________ (name of irrigation district) that the sections, paragraphs, sentences, clauses, and phrases of this Plan shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Plan, since the same would not have been enacted by the Board without the incorporation into this Plan of any such unconstitutional phrase, clause, sentence, paragraph, or section.

Section XIII: Authority

The foregoing rules and regulations are adopted pursuant to and in accordance with Sections 11.039, 11.083, 11.1272; Section 49.004; and Section 58.127-130 of the Texas Water Code, *Vernon's Texas Codes Annotated.*

Section XIV: Effective Date of Plan

The effective date of this Rule shall be five (5) days following the date of Publication hereof and ignorance of the Rules and Regulations is not a defense for a prosecution for enforcement of the violation of the Rules and Regulations.

EXAMPLE RESOLUTION FOR ADOPTION OF A DROUGHT CONTINGENCY PLAN

RESOLUTION NO. __________

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE _________________ (name of water supplier) ADOPTING A DROUGHT CONTINGENCY PLAN.

WHEREAS, the Board recognizes that the amount of water available to the ____________ (name of water supplier) and its water utility customers is limited and subject to depletion during periods of extended drought;

WHEREAS, the Board recognizes that natural limitations due to drought conditions and other acts of God cannot guarantee an uninterrupted water supply for all purposes;

WHEREAS, Section 11.1272 of the Texas Water Code and applicable rules of the Texas Commission on Environmental Quality require all public water supply systems in Texas to prepare a drought contingency plan; and

WHEREAS, as authorized under law, and in the best interests of the customers of the _________________(name of water supply system), the Board deems it expedient and necessary to establish certain rules and policies for the orderly and efficient management of limited water supplies during drought and other water supply emergencies;

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE _________________ (name of water supplier):

SECTION 1. That the Drought Contingency Plan attached hereto as Exhibit A and made part hereof for all purposes be, and the same is hereby, adopted as the official policy of the ________________ (name of water supplier).

SECTION 2. That the _______________ (e.g., general manager) is hereby directed to implement, administer, and enforce the Drought Contingency Plan.

SECTION 3. That this resolution shall take effect immediately upon its passage.

DULY PASSED BY THE BOARD OF DIRECTORS OF THE _______________, ON THIS __ day of ______________, 20__.

____
President, Board of Directors

ATTESTED TO:

________________________Secretary, Board of Director

Model Region K Drought Contingency Plan Template

Wholesale Water Providers

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Model Drought Contingency Plan Template (**Wholesale Public Water Suppliers**)

DROUGHT CONTINGENCY PLAN
FOR THE
(Name of wholesale water supplier)
(address)
(CCN)
(PWS)
(Date)

Section I: Declaration of Policy, Purpose, and Intent

In order to conserve the available water supply and/or to protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation, and fire protection, and to protect and preserve public health, welfare, and safety and minimize the adverse impacts of water supply shortage or other water supply emergency conditions, the ___________________ (name of your water supplier) adopts the following Drought Contingency Plan (the Plan).

Section II: Public Involvement

Opportunity for the public and wholesale water customers to provide input into the preparation of the Plan was provided by _____________ (name of your water supplier) by means of ______________ (describe methods used to inform the public and wholesale customers about the preparation of the plan and opportunities for input; for example, scheduling and proving public notice of a public meeting to accept input on the Plan).

Section III: Wholesale Water Customer Education

The ____________ (name of your water supplier) will periodically provide wholesale water customers with information about the Plan, including information about the conditions under which each stage of the Plan is to be initiated or terminated and the drought response measures to be implemented in each stage. This information will be provided by means of __________________ (e.g., describe methods to be used to provide customers with information about the Plan; for example, providing a copy of the Plan or periodically including information about the Plan with invoices for water sales).

Section IV: Coordination with the Lower Colorado Regional Water Planning Group

The service area of the _____________ (name of your water supplier) is located within the Lower Colorado Regional Water Planning Area and ___________ (name of your water supplier) has provided a copy of this Plan to the Lower Colorado Regional Water Planning Group.

Section V: Authorization

The ___________________ (designated official; for example, the general manager or executive director), or his/her designee, is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The _______________, or his/her designee, shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan.

Section VI: Application

The provisions of this Plan shall apply to all customers utilizing water provided by the __________________ (name of your water supplier). The terms person and customer as used in the Plan include individuals, corporations, partnerships, associations, and all other legal entities.

Section VII: Criteria for Initiation and Termination of Drought Response Stages

The ____________ (designated official), or his/her designee, shall monitor water supply and/or demand conditions on a (e.g., weekly, monthly) basis and shall determine when conditions warrant initiation or termination of each stage of the Plan. Customer notification of the initiation or termination of drought response stages will be made by mail or telephone. The news media will also be informed.

The triggering criteria described below are based on:
____
____ (provide a brief description of the rationale for the triggering criteria; for example, triggering criteria are based on a statistical analysis of the vulnerability *of the water source under drought of record conditions).*

Stage 1 Triggers -- MILD Water Shortage Conditions

Requirements for initiation: The _____________ (name of your water supplier) will recognize that a mild water shortage condition exists when______________(*describe triggering criteria, see examples below).*

> ***Below are examples of the types of triggering criteria that might be used in a wholesale water supplier=s drought contingency plan. One or a combination of such criteria may be defined for each drought response stage:***
>
> ***Example 1: Water in storage in the _________ (name of reservoir) is equal to or less than _______ (acre-feet and/or percentage of storage capacity).***

Example 2: ***When the combined storage in the __________ (name of reservoirs) is equal to or less than ______ (acre-feet and/or percentage of storage capacity).***

Example 3: ***Flows as measured by the U.S. Geological Survey gage on the ________ (name of river) near ________, Texas reaches ___ cubic feet per second (cfs).***

Example 4: ***When total daily water demand equals or exceeds ______ million gallons for ___consecutive days or ____ million gallons on a single day.***

Example 5: ***When total daily water demand equals or exceeds ___ percent of the safe operating capacity of ____________ million gallons per day for ___consecutive days or ___ percent on a single day.***

Requirements for termination: Stage 1 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (e.g., 30) consecutive days. The _________ (name of water supplier) will notify its wholesale customers and the media of the termination of Stage 1 in the same manner as the notification of initiation of Stage 1 of the Plan.

Stage 2 Triggers -- MODERATE Water Shortage Conditions

Requirements for initiation: The _____________ (name of your water supplier) will recognize that a moderate water shortage condition exists when______________(describe triggering criteria).

Requirements for termination**:** Stage 2 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (e.g., 30) consecutive days. Upon termination of Stage 2, Stage 1 becomes operative. The _________ (name of your water supplier) will notify its wholesale customers and the media of the termination of Stage 2 in the same manner as the notification of initiation of Stage 1 of the Plan.

Stage 3 Triggers -- SEVERE Water Shortage Conditions

Requirements for initiation: The _____________ (name of your water supplier) will recognize that a severe water shortage condition exists when______________(*describe triggering criteria; see examples in Stage 1*).

Requirements for termination**:** Stage 3 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (e.g., 30) consecutive days. Upon termination of Stage 3, Stage 2 becomes operative. The _________ (name of your water supplier) will notify its wholesale customers and the media of the termination of Stage 2 in the same manner as the notification of initiation of Stage 3 of the Plan.

Stage 4 Triggers -- CRITICAL Water Shortage Conditions

Requirements for initiation - The _____________ (name of your water supplier) will recognize that an emergency water shortage condition exists when______________(*describe triggering criteria*; *see examples below*).

Example 1. ***Major water line breaks, or pump or system failures occur, which cause unprecedented loss of capability to provide water service; or***

Example 2. ***Natural or man-made contamination of the water supply source(s).***

Requirements for termination**:** Stage 4 of the Plan may be rescinded when all of the conditions listed as triggering events have ceased to exist for a period of ___ (e.g., 30) consecutive days. The _________ (name of your water supplier) will notify its wholesale customers and the media of the termination of Stage 4.

Section VIII: Drought Response Stages

The _________ (designated official), or his/her designee, shall monitor water supply and/or demand conditions and, in accordance with the triggering criteria set forth in Section VI, shall determine that mild, moderate, or severe water shortage conditions exist or that an emergency condition exists and shall implement the following actions:

Stage 1 Response -- MILD Water Shortage Conditions

Target: Achieve a voluntary __ percent reduction in __________ (e.g., total water use, daily water demand, etc.).

Best Management Practices for Supply Management:

Describe additional measures, if any, to be implemented directly by ____________ (designated official), or his/her designee(s), to manage limited water supplies and/or reduce water demand. Examples include modifying reservoir operations procedures, interconnection with another water system, and use of reclaimed water for non-potable purposes.

Water Use Restrictions for Reducing Demand:

(a) The ________________ (designated official), or his/her designee(s), will contact wholesale water customers to discuss water supply and/or demand conditions and will request that wholesale water customers initiate voluntary measures to reduce water use (e.g., implement Stage 1 of the customer's drought contingency plan).

(b) The _________________ (designated official), or his/her designee(s), will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.

Stage 2 Response -- MODERATE Water Shortage Conditions

<u>Target:</u> Achieve a ___ percent reduction in __________ (e.g., total water use, daily water demand, etc.).

<u>Best Management Practices for Supply Management</u>:

Describe additional measures, if any, to be implemented directly by ____________ (designated official), or his/her designee(s), to manage limited water supplies and/or reduce water demand. Examples include modifying reservoir operations procedures, interconnection with another water system, and use of reclaimed water for non-potable purposes.

Water Use Restrictions for Reducing Demand:

(a) The ________________ (designated official), or his/her designee(s), will initiate weekly contact with wholesale water customers to discuss water supply and/or demand conditions and the possibility of pro rata curtailment of water diversions and/or deliveries.

(b) The ________________ (designated official), or his/her designee(s), will request wholesale water customers to initiate mandatory measures to reduce non-essential water use (e.g., implement Stage 2 of the customer's drought contingency plan).

(c) The _________________ (designated official), or his/her designee(s), will initiate preparations for the implementation of pro rata curtailment of water diversions and/or deliveries by preparing a monthly water usage allocation baseline for each wholesale customer according to the procedures specified in Section VI of the Plan.

(d) The _________________ (designated official), or his/her designee(s), will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.

Stage 3 Response -- SEVERE Water Shortage Conditions

<u>Target:</u> Achieve a ___ percent reduction in __________ (e.g., total water use, daily water demand, etc.).

<u>Best Management Practices for Supply Management</u>:

Describe additional measures, if any, to be implemented directly by ____________ (designated official), or his/her designee(s), to manage limited water supplies and/or reduce water demand. Examples include modifying reservoir operations procedures, interconnection with another water system, and use of reclaimed water for non-potable purposes.

Water Use Restrictions for Reducing Demand:

(a) The ________________ (designated official), or his/her designee(s), will contact wholesale water customers to discuss water supply and/or demand conditions and will request that wholesale water customers initiate additional mandatory measures to reduce non-essential water use (e.g., implement Stage 2 of the customer's drought contingency plan).

(b) The _________________ (designated official), or his/her designee(s), will initiate pro rata curtailment of water diversions and/or deliveries for each wholesale customer according to the procedures specified in Section VI of the Plan.

(c) The _________________ (designated official), or his/her designee(s), will provide a weekly report to news media with information regarding current water supply and/or demand conditions, projected water supply and demand conditions if drought conditions persist, and consumer information on water conservation measures and practices.

Stage 4 Response -- EMERGENCY Water Shortage Conditions

Whenever emergency water shortage conditions exist as defined in Section VII of the Plan, the _______________ (designated official) shall:

1. Assess the severity of the problem and identify the actions needed and time required to solve the problem.

2. Inform the utility director or other responsible official of each wholesale water customer by telephone or in person and suggest actions, as appropriate, to alleviate problems (e.g., notification of the public to reduce water use until service is restored).

3. If appropriate, notify city, county, and/or state emergency response officials for assistance.

4. Undertake necessary actions, including repairs and/or clean-up as needed.

5. Prepare a post-event assessment report on the incident and critique of emergency response procedures and actions.

Section IX: Pro Rata Water Allocation

In the event that the triggering criteria specified in Section VII of the Plan for Stage 3 Severe Water Shortage Conditions have been met, the ____________ (designated official) is hereby authorized initiate allocation of water supplies on a pro rata basis in accordance with Texas Water Code Section 11.039.

Section X: Enforcement

During any period when pro rata allocation of available water supplies is in effect, wholesale customers shall pay the following surcharges on excess water diversions and/or deliveries:

____ times the normal water charge per acre-foot for water diversions and/or deliveries in excess of the monthly allocation up through 5 percent above the monthly allocation.

____ times the normal water charge per acre-foot for water diversions and/or deliveries in excess of the monthly allocation from 5 percent through 10 percent above the monthly allocation.

____ times the normal water charge per acre-foot for water diversions and/or deliveries in excess of the monthly allocation from 10 percent through 15 percent above the monthly allocation.

____ times the normal water charge per acre-foot for water diversions and/or deliveries more than 15 percent above the monthly allocation.

The above surcharges shall be cumulative.

Section XI: Variances

The ________________ (designated official), or his/her designee, may, in writing, grant a temporary variance to the pro rata water allocation policies provided by this Plan if it is determined that failure to grant such variance would cause an emergency condition adversely affecting the public health, welfare, or safety and if one or more of the following conditions are met:

(a) Compliance with this Plan cannot be technically accomplished during the duration of the water supply shortage or other condition for which the Plan is in effect.

(b) Alternative methods can be implemented which will achieve the same level of reduction in water use.

Persons requesting an exemption from the provisions of this Plan shall file a petition for variance with the _________________ (designated official) within 5 days after pro rata allocation has been invoked. All petitions for variances shall be reviewed by the __________ (governing body), and shall include the following:

(a) Name and address of the petitioner(s).
(b) Detailed statement with supporting data and information as to how the pro rata allocation of water under the policies and procedures established in the Plan adversely affects the petitioner or what damage or harm will occur to the petitioner or others if petitioner complies with this Ordinance.
(c) Description of the relief requested.
(d) Period of time for which the variance is sought.
(e) Alternative measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date.
(f) Other pertinent information.

Variances granted by the ___________________ (governing body) shall be subject to the following conditions, unless waived or modified by the ____________ (governing body) or its designee:
(a) Variances granted shall include a timetable for compliance.
(b) Variances granted shall expire when the Plan is no longer in effect, unless the petitioner has failed to meet specified requirements.

No variance shall be retroactive or otherwise justify any violation of this Plan occurring prior to the issuance of the variance.

Section XII: Severability

It is hereby declared to be the intention of the **________________** (governing body of your water supplier) that the sections, paragraphs, sentences, clauses, and phrases of this Plan are severable and, if any phrase, clause, sentence, paragraph, or section of this Plan shall be declared unconstitutional by the valid judgment or decree of any court of competent jurisdiction, such unconstitutionality shall not affect any of the remaining phrases, clauses, sentences, paragraphs, and sections of this Plan, since the same would not have been enacted by the **____________________** (governing body of your water supplier) without the incorporation into this Plan of any such unconstitutional phrase, clause, sentence, paragraph, or section.

EXAMPLE RESOLUTION FOR ADOPTION OF A

DROUGHT CONTINGENCY PLAN

RESOLUTION NO. __________

A RESOLUTION OF THE BOARD OF DIRECTORS OF THE ___________________ (name of water supplier) ADOPTING A DROUGHT CONTINGENCY PLAN.

WHEREAS, the Board recognizes that the amount of water available to the ____________ (name of water supplier) and its water utility customers is limited and subject to depletion during periods of extended drought;

WHEREAS, the Board recognizes that natural limitations due to drought conditions and other acts of God cannot guarantee an uninterrupted water supply for all purposes;

WHEREAS, Section 11.1272 of the *Texas Water Code* and applicable rules of the Texas Commission on Environmental Quality require all public water supply systems in Texas to prepare a drought contingency plan; and

WHEREAS, as authorized under law, and in the best interests of the customers of the _________________(name of water supply system), the Board deems it expedient and necessary to establish certain rules and policies for the orderly and efficient management of limited water supplies during drought and other water supply emergencies;

NOW THEREFORE, BE IT RESOLVED BY THE BOARD OF DIRECTORS OF THE _________________ (name of water supplier):

SECTION 1. That the Drought Contingency Plan attached hereto as “Exhibit A” and made

part hereof for all purposes be, and the same is hereby, adopted as the official policy of the ________________ (name of water supplier).

SECTION 2. That the _______________ (e.g., general manager) is hereby directed to implement, administer, and enforce the Drought Contingency Plan.

SECTION 3. That this resolution shall take effect immediately upon its passage.

DULY PASSED BY THE BOARD OF DIRECTORS OF THE _______________, ON THIS __ day of ______________, 20__.

____

President, Board of Directors

ATTESTED TO:

____

Secretary, Board of Directors

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APPENDICES

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CHAPTER 8.0: ADDITIONAL RECOMMENDATIONS (INCLUDING UNIQUE ECOLOGICAL STREAM SEGMENTS AND RESERVOIR SITES, LEGISLATIVE ISSUES, AND REGIONAL POLICY ISSUES)

8.1 SUMMARY OF POLICY RECOMMENDATIONS

The approved scope-of-work for the development of the SB 1 water plan for the Lower Colorado Region included a subtask to "prepare possible legislative, regulatory, and administrative recommendations." In this regard, the Lower Colorado Regional Water Planning Group (LCRWPG) established a Legislation and Policy Committee and charged it with the responsibility for coordinating a three-step process to:

- Identify, define, and screen policy issues
- Evaluate issues and policy options
- Develop recommendations for consideration by the LCRWPG

The following recommendations are offered by the Lower Colorado Regional Water Planning Group (LCRWPG) for consideration by the Texas Legislature, TWDB, TCEQ, other water planning regions and all stakeholders and participants in Texas' regional and state water planning efforts. Each policy includes background information, policy statement(s), and action(s) the LCRWPG recommends.

The LCRWPG utilized a three-year long intensive policy development process in the first planning cycle, and a comprehensive review in each subsequent planning cycle to produce these results. Only policies that have met with the consensus approval of the LCRWPG's diverse voting membership are recommended by the LCRWPG. These policies have undergone a multi-level development process with extensive planning group review.

It is the hope of the many contributors to this process that these recommendations will lead to public policies and processes that improve upon the already impressive methods Texas uses to accomplish water planning.

8.1.1 Management of Surface Water Resources: Inter-Basin Transfers and Model Linking

8.1.1.1 Background Information

As water marketing pressures intensify to meet demands in more arid portions of the State, the potential increases for harm to the environment and the economies in areas from which water is extracted.

Proposed inter-basin transfers (IBTs) must be managed carefully relative to impairment of existing water rights, consistency with the public welfare including the need for water, consistency with state and regional water supply planning, and environmental and water quality issues.

For permits related to inter-basin transfers, the inclusion of special provisions to ensure the protection of the economic and public welfare interests in the basin of origin is imperative. Business, industry, agriculture and other economically important water users developed originally as a result of water availability. Without some means of protecting these users, water transfers should be carefully considered, including their potential impact on the economy of the entire region.

Some identified strategies for dealing with water supply shortages may impact sustainability of groundwater, when development of surface water supplies could be utilized instead. This approach could result in long-term adverse consequences for the region. Likewise, further development or transfer of surface water supplies could be detrimental to groundwater recharge and similarly result in long-term adverse consequences to the region.

Water is also an essential component for electric power generation. The availability of water resources should be considered when locating and developing new electric generating facilities.

8.1.1.2 Policy Statements

<u>8.1.1.2.1. Inter-Basin Transfers</u>

It is essential that current water supplies be protected and preserved to meet water commitments within the basin. Inter-basin transfers (IBTs) should follow principles established by LCRWPG in the first planning cycle, and revised in each subsequent planning cycle, for transporting water outside of the region.

In addition to the required elements for obtaining an IBT permit from TCEQ, the following nine-point policy identifies the conceptual elements and guidelines for transporting water outside of the Lower Colorado Regional Water Planning Area (LCRWPA):

1. A cooperative regional water solution shall benefit each region.
2. The LCRWPA's water shortages shall be substantially reduced.
3. Proposed actions for inter-regional water transfers shall have minimal detrimental water quality, environmental, social, economic, and cultural impacts.
4. Regional water plans with exports of significant water resources shall provide for the improvement of lake recreation and tourism in the LCRWPA over what would occur without water exports.
5. Each region shall determine its own water management strategies to meet internal water shortages when those strategies involve internal water supplies and/or water demand management.
6. Cooperative regional solutions shall include consideration of alternatives to resolve conflicts over groundwater availability and should be consistent with LCRWPG's groundwater policies and the applicable rules of involved groundwater conservation districts.
7. Any water export from the Colorado River shall not be guaranteed on a permanent basis.
8. Any water export from the Colorado River shall make maximum use of flood or excess inflows below Austin, and shall occur only after in-basin demands are met in the LCRWPA. Provisions and supporting technical reviews included in a draft permit to support this principle shall be reviewed by the Regional Water Planning Group to assure consistency with the planning process.
9. Any water export from the Colorado River shall comply with the LCRA's inter-basin water transfer policy.

These nine elements are to be fundamental considerations for any out-of-basin water transfers.

8.1.1.2.2. Linking Groundwater and Surface Water Models (Also See Groundwater)

Future groundwater and surface water modeling development by the state's water permitting and planning agencies should include the ability to link such models to better integrate the effects of changes in the uses or availability of either groundwater or surface water on each other in varying conditions such as flood or drought. Such linking of models may be more appropriate for specific areas where groundwater and surface water closely relate and interact, such as concentrations of base-flow springs or stream-based recharge. The LCRWPG supports the development of methodologies to utilize available empirical data from public and private sectors to calibrate both groundwater and surface water models.

8.1.1.3 Actions Needed

Texas Legislature – The LCRWPG encourages the Legislature to:

1. Maintain and strengthen water policies designed to protect **basins of origin** in the event of inter-basin transfers. These policies should consider the nine points presented above.
2. Support State funding for linking groundwater and surface water models by the TWDB during the development of the next generation of Groundwater Availability Models/Water Availability Models (GAMs/WAMs) with a priority for specific areas where groundwater and surface water closely relate and interact, such as concentrations of base-flow springs or stream-based recharge. Encourage the validation and calibration of models with data and technical reviews available from the public and private sectors.

Texas Commission on Environmental Quality (TCEQ) – The LCRWPG encourages TCEQ to:

1. Include provisions in water right permits related to inter-basin transfers that protect the basin of origin. Obtain concurrence that draft permits are consistent with the regional water planning process.
2. Provide the Regional Water Planning Groups with technical review summaries including WAM runs for pending permits affecting the region to ensure consistency with the regional planning process.

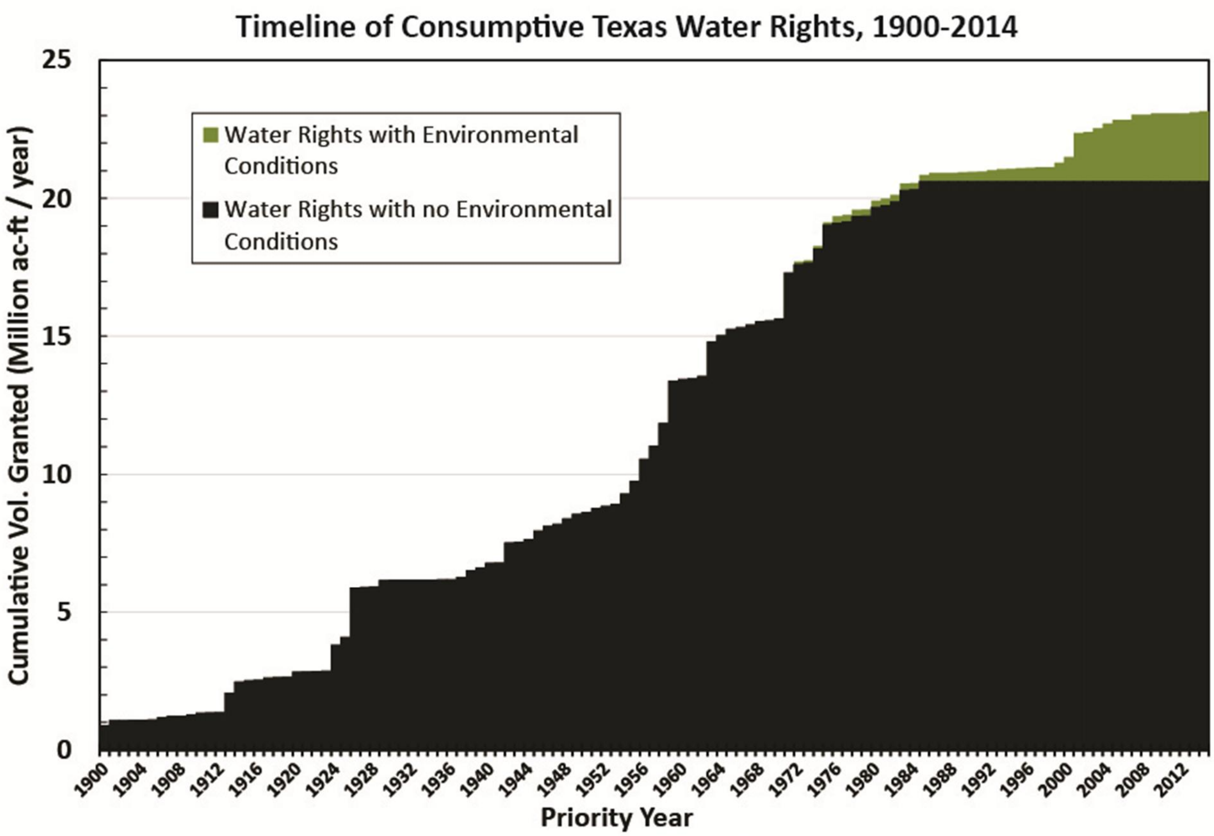
8.1.2 Environmental – Instream Flows and Freshwater Inflows to Bays and Estuaries

8.1.2.1 Background Information

Healthy and productive rivers, bays and coastal estuaries are the natural heritage of all Texans and support billions of dollars in economic activity annually. Texas' fish and wildlife resources need and deserve preservation and, in some cases, restoration.

Fortunately, a large percentage of surface water rights in Texas are currently underutilized, thereby resulting in sufficient natural flows to provide for essential environmental needs during drought conditions. However, increasing utilization of existing water rights coupled with new water rights potentially threaten the availability of these essential environmental flows.

Total authorizations state-wide for consumptive use are approximately 22 million acre-feet of water per year and the vast majority of those authorizations were issued prior to 1985 without conditions to protect environmental flows. This creates a challenge that must be addressed in order to preserve Texas' fish and wildlife habitat.



Note: Hydropower, contracts, recreation and other non-consumptive water rights excluded. Rights before 1900 set to 1900.
Source: National Wildlife Federation analysis of data provided by the Texas Commission on Environmental Quality, May 2015.

8.1.2.2 Policy Statement

The LCRWPG supports the protection of instream flows and bay and estuary inflows at levels sufficient to protect native species throughout extended periods of drought at population levels that would enable the species to fully recover upon the return of normal weather conditions. During normal weather conditions, flows sufficient to ensure a healthy habitat for fish and wildlife should be assured. This requires addressing the specific water quality, flow rates and timing that are required to sustain a healthy and productive riparian and estuarine ecosystem as well as the physical form of the river such as deep pools, riffles, bluffs, terraces, and its vegetation, springs, and tributaries.

The LCRWPG recommends the following actions to accomplish environmental flow protection through the surface water permitting process by:

1. In areas where appropriating additional quantities of water could threaten the adequacy of environmental flows, permits for additional quantities of water should include environmental

flow conditions and mitigation plans consistent with the environmental flow standards that are adopted by TCEQ.

2. In areas where current flows are not adequate to meet environmental flows standards adopted by TCEQ, the SB3 Basin and Bay Area Stakeholder Groups (BBASC) should develop strategies to ensure that the water needed to support a sound ecological environment for fish and wildlife is present in each river basin and bay system. In addition, the state should create a funding mechanism to assist with implementation of appropriate strategies to ensure environmental flows.

3. The state should aggressively seek the conversion of pertinent water rights to environmental uses through programs such as the voluntary sale or lease of under-utilized water rights back to the state as a means of regaining adequate flow conditions. These water rights should then be set aside to provide for environmental flow protection.

4. Environmental flow needs should be considered in regional water planning. A State agency should change policy to address proactive measures to meet environmental needs where needed. A methodology for incorporating environmental flow needs into the RWP would need to be developed and recommended to the State legislature.

8.1.2.3 Actions Needed

Texas Legislature

- Monitor the Environmental Flows Allocation Process set up by the 80th Texas Legislature through Senate Bill 3.
- Appropriate funding to support further research and field studies to support development of updated environmental flows standards.
- Appropriate funding to support the purchase and conversion of pertinent water rights to environmental uses through voluntary transactions.
- Discuss the addition of policies to address environmental flow needs to the regional water planning process.

Colorado and Lavaca Basin and Bays Stakeholder Group

- Develop workplans to study and determine the most effective strategies to secure water to meet environmental flow needs.
- Continue studying the river/bay systems and update environment flow standards when necessary and as new research and information becomes available.

8.1.2.4 Timing and/or Conflicts

The SB3 process is underway for the Colorado and Lavaca Rivers and Matagorda/Lavaca Bays. Rulemaking has been completed at TCEQ resulting in the adoption of environmental flows standards. The BBASC has developed a workplan and is supervising scientific studies to increase their understanding of the Colorado and Lavaca Rivers and Matagorda Bay systems. More studies are possible depending on funding from the legislature. The BBASC will consider whether or not to change/update standards over the next 5-7 years through an adaptive management process.

8.1.3 Environmental – Sustainable Growth, Including Impacts of Growth

8.1.3.1 Background Information

Sacrifices and trade-offs are often necessary to meet a greater common good, and this seems particularly true of water planning. With finite water resources available, sacrifices are likely inevitable. As always, water planning in Texas assumes certain demands can and should be met.

The state has not examined the issue of whether current planning efforts encourage the development of water supply strategies and trade-offs between various water users to support what may be a level of growth that is unsustainable. For example, if mining aquifers reduces viability of the region's ecosystems, how should the state weigh these projected impacts against potential growth in water demand for cities and industries?

Business, industry, municipalities, agriculture and other economically important water users originally develop around water availability and its likely sustainability. Without some consideration of the impacts and provision of protections or adequate financial remuneration for these users, water transfers from one region to another may adversely affect the economy of the one region to benefit another area of the state.

8.1.3.2 Policy Statement

It is vital that the state assess sustainability of water-consuming growth patterns that regional water planning efforts potentially directly or indirectly support.

The LCRWPG recommends that efforts be made to understand and quantify the relationship between economic development and water supply sustainability to support and encourage meaningful dialogue that could lead to the creation of a responsible policy framework for truly sustainable water development and use in Texas.

The LCRWPG supports using education to address these concerns while the dialogue and policy development on sustainability takes shape. The LCRWPG strongly supports the proposed statewide Water IQ public education campaign and encourages that this campaign focus on responsible use of this valuable natural resource.

8.1.3.3 Actions Needed

Texas Legislature – The LCRWPG encourages the Legislature to provide for a comprehensive water sustainability study to address:

- Relationships between water planning and economic growth
- Long-term sustainability of water supplies
- Combined impacts to all water users of fully implementing all regionally recommended water management strategies

- Impact on long-term food security, for Texas and national uses, due to the conversion of water currently used for agriculture to other uses, and the depletion over time of agricultural water supplies
- Methods used by other states or nations to encourage sustainable economic growth and water use conservation and efficiencies by all users.

The LCRWPG further encourages the Legislature to fully fund the Water IQ public education program, directing its staff to include sustainability education as presented in the above policy statement.

8.1.3.4 Timing and/or Conflicts

This is for immediate action by the Texas Legislature.

8.1.4 Groundwater

8.1.4.1 Background Information

Groundwater resources vary greatly across the state and regions, both in quantity and quality. The difficulties and problems inherent in managing these diverse resources have been delegated to locally organized Groundwater Conservation Districts (GCDs) which have been designated by the Legislature as the preferred method of groundwater management in Texas. These local governmental entities are responsible for management, conservation, preservation, protection, and enhancement of groundwater resources in their individual jurisdictions. GCDs vary from small, one or two person offices in single county districts to larger agencies covering multiple counties and employing a staff of twenty or more.

GCDs have been an integral part of the regional planning process and have provided valuable input on local aquifer characteristics, usage, and availability. This input has resulted in a clearer picture of the importance of groundwater in the State's future.

Groundwater is a major source of water in large portions of Texas. Planning efforts must ensure that this water supply will remain a long-term, viable option for consumption by local residents, agriculture, commercial, and other users. As most of the State's surface water resources are fully subscribed and new reservoir projects are limited and controversial, many are looking to groundwater projects to fill the need where demands exceed or are expected to exceed supplies. These areas are increasingly looking to strategies such as brackish groundwater desalination, aquifer storage and recovery, and importation of groundwater from less populated areas.

Each of the strategies have questions to be addressed and are not without controversy which underscores the need for more inclusive and coordinated planning efforts on the State, regional, and local levels in order to avoid long-term adverse consequences at either end of the supply line.

In HB 1763 (2005) the Legislature set forth a vehicle for accomplishing aquifer-wide management of the resource through Groundwater Management Area (GMA) adoption of Desired Future Conditions (DFCs) for each aquifer and portion of an aquifer underlying the GMA. The next round of DFCs are to be provided to the TWDB by May 1, 2016 and every five years thereafter. The TWDB uses the DFCs to provide the GCDs within the GMA with the Modeled Available Groundwater (MAG) for each relevant aquifer underlying the GMA. Regional water planning groups are obligated to use the calculated MAG volumes derived from the DFCs for the relevant aquifers as the amount of groundwater available for regional planning purposes. Other non-relevant aquifers do not require DFCs and therefore, available supply volumes for planning purposes will likely be determined by the planning groups using information provided by the GCDs.

The groundwater planning process under HB 1763 was substantially modified by SB 660 in 2011 to generally involve more public participation opportunity and a more rigorous consideration of DFCs. The new planning requirements, which are borne by the GCDs, are unfunded and may prove to be a difficult responsibility for GCDs, many of which have limited resources, to fulfill in a manner that is beneficial to the overall State water planning process. This concern coupled with the increased level of importance placed on the water availability estimates for determining eligibility for SWIFT funding may warrant special consideration.

Region K has reviewed a variety of groundwater policy issues. Some have been incorporated into other sections of this policy document. Eight issues and corresponding policy statements are discussed below.

8.1.4.2 Policy Statements

8.1.4.2.1. The Rule of Capture

Texas groundwater law is based on the Rule of Capture. The Rule of Capture is a tort rule of non-liability established in 1904 that allows the owner of the overlying property to pump or capture any amount of groundwater provided that it is not wasteful, malicious or does not cause subsidence. GCDs may modify the Rule of Capture by means of rule-making authority described in Texas Water Code Chapter 36. Region K policy is to continue its support of GCDs and their ability to modify the Rule of Capture when and where appropriate.

8.1.4.2.2. Groundwater Ownership

The debate over groundwater ownership in Texas has been provided with some clarity from both the Legislature through the passing of SB 332 in 2011 and the Texas Supreme Court with the opinion issued in the *Edwards Aquifer Authority v. Day* case in 2012. In short, SB 332 recognized that a landowner has a property interest in groundwater in place subject to reasonable regulation by a GCD but also concluded that "unreasonable" regulation by a GCD may constitute a compensable taking of that property for public use. Similarly, the *Day* case affirmed the authority of the Edwards Aquifer Authority to limit pumping but also found that land ownership includes an interest in groundwater in place. The two events together validate the role of GCDs to manage groundwater but confirm that the landowner is entitled to compensation when regulation constitutes a taking of the property. These findings, however, provide little guidance on when such regulation becomes a taking or how to determine the amount of compensation when a taking has occurred.

Region K recognizes the importance of managing the groundwater resources of the State and it is Region K's policy to support GCDs as the preferred method of groundwater management and their long-term financial and institutional stability to serve their statutory purpose.

8.1.4.2.3. Groundwater Management by GCDs

Region K supports local management of groundwater by GCDs as well as aquifer-wide planning and coordination between GCDs within GMAs. GCDs have been managing and regulating groundwater since the early 1950's and should be maintained as the State's preferred method of groundwater management and regulation.

Region K supports the establishment of GCDs by the most effective mechanism and configuration considering what is determined to be the option that is most reasonable, practical, effective, efficient and achievable. To this end, consideration should be given to the possibility of annexation of new areas into existing GCDs or consolidation of existing GCDs in an effort to optimize and enable more effective and efficient groundwater management provided that it is feasible and locally supported. New GCDs should continue to be delineated, established, and confirmed by local confirmation elections. Region K recognizes that GCDs are local governments that are confirmed by local elections, and it is Region K's policy that any such attempts to annex, consolidate existing GCDs, or other reorganization of GCDs must be referred to the local election process for validation or rejection.

8.1.4.2.4. DFCs and MAGs

Region K supports GMA-wide cooperation in management of groundwater resources including joint efforts among GCDs with shared relevant aquifers to establish and implement compatible rules and management plans to preserve the GMA-adopted DFCs. DFCs of adjacent GMAs for a shared aquifer should be compatible. While the DFC is the appropriate metric and management goal, the MAG should be given appropriate consideration as a management tool when establishing rules and making permitting decisions. Permitting decisions informed by the MAG and other relevant considerations should be followed by continuous and long-term aquifer monitoring of the actual aquifer conditions to ensure preservation of the DFC. Region K recommends that GCDs commit to long-term aquifer monitoring programs and data collection to refine the models and other analytical tools such that long-term effects of pumping can be more accurately predicted and factored into groundwater management decisions. Where DFCs are compromised as measured by actual aquifer conditions, Region K supports the use of mitigation plans or authority by GCDs to adjust permits as necessary.

The GMA planning process provides an opportunity to unify the legal and institutional disconnect between surface and groundwater management if DFCs are established where appropriate to refer to a surface water condition that is affected by groundwater pumping and management. Region K policy encourages GMAs to establish such surface water-related DFCs (e.g. minimum springflows, baseflows, reservoir inflows, etc.) where appropriate.

8.1.4.2.5. Sustainability

Region K supports a sustainable approach to groundwater management in areas where such an approach is reasonably achievable. Sustainability is defined as balancing groundwater withdrawals with natural recharge and replenishment to maintain long-term stability in regional or local groundwater supplies. It is Region K policy to look to GCDs within a given GMA to cooperate in determining the degree to which sustainability can be achieved.

8.1.4.2.6. Groundwater Marketing (e.g. Water Rights Leases, Sales, Transfers)

Region K policy is to establish coordination between water marketing proposals with local GCDs and RWPGs and support the requirement that state agencies and private interests comply with all local GCD rules, state-certified groundwater management plans, and state and regional water plans.

8.1.4.2.7. Improving Groundwater Availability Data

Region K policy is to encourage new funding sources for GCDs specific to data collection and storage methods that emphasize ease of public accessibility. Region K policy is to support the funding needs of the TWDB for the maintenance and expansion of state-wide groundwater databases.

8.1.4.2.8. Funding and Technical Assistance for GMA Planning

The expanded process and additional complexity added to the GCD's joint-regional groundwater planning responsibilities through SB 660 in 2011 is influencing the planning area GMA's determination of certain aquifers as "non-relevant for regional planning purposes" in order to avoid extensive and costly reporting and public vetting processes. Further, the relevant aquifers with DFCs that are being proposed or continued will require GCD funds and resources to complete the more rigorous process that might otherwise be used to further develop the GAMs and planning tools. It is Region K policy to encourage the TWDB to provide funding to facilitate GMA's role in determining groundwater availability estimates for Regional planning. Additionally, Region K supports funding for the TWDB to provide the technical assistance to the GMAs as required by SB 660.

8.1.4.2.9. Temporary Aquifer Over-Drafting

The LCRWPG supports the limited use of temporary aquifer over-drafting as an aquifer management strategy for GCDs where: 1) no other viable strategy is available; 2) it is allowable under the policies of the local groundwater conservation district; 3) the aquifer can be reasonably expected to recover following the temporary over-drafting; and 4) the temporary over-drafting does not cause an exceedance of the applicable Desired Future Condition (DFC). The supported goal in this case would be to meet a temporary, drought-driven need through the temporary over-drafting of the aquifer with the intention of under-drafting sufficiently following the drought event to allow aquifer recovery, such that long-term withdrawal rates allow for meeting the DFC. The LCRWPG does not support over-drafting under any circumstances that could reasonably be expected to contribute to subsidence.

8.1.4.3 Actions Needed

Texas Legislature – The LCRWPG encourages the Texas Legislature to:

1. Sufficiently fund TWDB programs specifically related to GMA planning, groundwater conservation, protection, enhancement, groundwater availability modeling (including development/ review/ updating/ recalibration), technical assistance to GCDs and GMAs, and database management and accessibility. Specifically, funding should be provided to the TWDB to be allocated for GMAs for regional water planning in a manner similar to funding available to Regional Water Planning Groups; and
2. Confirm that the State has joint liability with GCDs when GCD decisions that are made to satisfy statutory groundwater management obligations are judged to be compensable takings. Such joint liability would require that the State contribute financially to the just compensation for the taking.

Texas Water Development Board – The LCRWPG encourages TWDB to:

1. Seek adequate funding for GMA planning, groundwater related programs, GAM needs, and technical assistance to GCDs and GMAs;

2. Continue assisting GCDs in their management planning, groundwater quantity and quality research, water conservation programs, and inter-agency cooperative database management efforts (such as the Texas Water Information Network); and
3. Review and revise its regional water planning rules to allow more flexibility in aquifer management during times of drought, where deemed appropriate by the local GCD.

Groundwater Conservation Districts – The LCRWPG encourages GCDs to:

1. Work cooperatively with GMA and regional planning efforts; and
2. Continue to expand or develop groundwater research and database efforts in order to be the primary resource for groundwater data in their jurisdiction.

8.1.4.4 Timing and/or Conflicts

The 85th Session of the Texas Legislature will occur in 2017 and will be setting the budget for the following biennium which will have direct impacts on funding programs needed by the TWDB, GCDs, and RWPGs.

The first round of GMA planning has been completed and groundwater planning through the GMA process has further developed into a process that assigns the responsibility for determining groundwater availability for planning purposes to GCDs. The importance of this role should be recognized through the implementation of the recommended actions in the 85th legislative session. The GMA MAG process will have run its initial course, and the process would therefore be ripe for making the Region K- suggested legislative change to Chapter 36 of the Water Code to require GCDs to monitor and manage for achieving DFCs as a logical next step in that process while using the MAGs as beginning points rather than as groundwater development caps.

8.1.5 Potential Impacts to Agricultural and Rural Water Supplies

8.1.5.1 Background Information

Some water supply strategies feature transfers of water from rural to urban areas to meet projected urban growth in Texas. These strategies may not adequately assess the potential for harm to rural economies and rural culture. As former Texas Agriculture Commissioner Susan Combs once said, "We can't afford to dewater or leave behind rural Texas."

While compensation to select individuals may occur to facilitate water transfers from one region to another, the economic impacts of the transfer from one region may extend well beyond the individuals who are compensated and may result in negative impacts to others. In other cases, irrigators are often purchasers of water from water rights owners who may sell the water for other uses, thus limiting access to water for irrigated agriculture.

As previously stated, water transfers and water marketing must be carefully considered, and potentially utilized to help fund water conservation and efficiency projects.

In general, much of agriculture and rural Texas cannot afford water at the prices that some cities and industry will pay. Water pricing should be examined for its impact on the availability of water to meet projected needs for agriculture and rural Texas.

8.1.5.2 Policy Statement

The state should be careful that transfers of surface water or groundwater occur only after sufficient study and consideration of local supplies and economies that could be adversely affected, including mitigation opportunities and funding mechanisms.

8.1.5.3 Actions Needed

Texas Legislature – The LCRWPG encourages the Legislature to:

1. Strengthen GCDs' abilities to reasonably protect and preserve groundwater supplies for both present and future local uses.
2. Maintain water policies that protect basins of origin in interbasin transfers of surface water.
3. Require that TCEQ provide notice to regional water planning groups of pending water supply actions.
4. Support funding for rural community infrastructure and water supply planning for regional planning, emergency water connections and redundant drinking supplies.

Texas Commission on Environmental Quality – The LCRWPG encourages TCEQ to provide pertinent technical reviews and draft surface water permits to affected regional water planning groups to confirm consistency with regional water plans.

8.1.5.4 Timing and/or Conflicts

These recommendations should be implemented during the next legislative session.

8.1.6 Agricultural Water Conservation

8.1.6.1 Background Information

With finite water resources available to a growing Texas populace, it is necessary that all possible means of stretching those finite resources be explored and implemented. Agriculture, being the single largest water user group, represents the area where conservation may offer the most hope for freeing up substantial water supplies.

The profit margins of irrigated agriculture may not allow producers to invest in major water conservation measures without participation by others. The Natural Resources Conservation Service (NRCS) of the United States Department of Agriculture administers a number of conservation programs that could be utilized and further optimized to enhance the likelihood of irrigators implementing water conserving practices.

The NRCS Environmental Quality Incentives Program (EQIP) is the NRCS' most likely platform for encouraging agricultural water conservation. Water quantity is a national and state priority of EQIP.

EQIP funding is continually subject to Congressional appropriations that determine the program's viability on an annual basis.

While no longer a contemplated project, the LCRA-SAWS Water Project (LSWP) offers a responsible template for partnerships that offer hope for meeting the water needs of a growing economy without threatening the health of the environment or other sectors of the regional economy. There exists an opportunity for the development of public/private partnerships for the purpose of enhancing the sustainability of agricultural and environmental water supplies in ways that market forces may not otherwise provide. With the utilization of available marketing techniques the potential exists for responsible corporate conservation sponsors to gain positive recognition for helping to accomplish meaningful agricultural conservation while supporting healthy riverine and estuarine habitats.

8.1.6.2 Policy Statement

The LCRWPG encourages agricultural water conservation as a method of stretching existing supplies by reducing agricultural demands in order to increase water availability to meet new and existing water demands. The LCRWPG further recognizes the need for public and private partnerships with irrigators to fund experimental, existing, and proven water conservation technology.

8.1.6.3 Actions Needed

United States Congress – The LCRWPG encourages that Congress sufficiently fund NRCS programs aimed at implementing known water conservation technology and at developing promising, new technology for water conservation.

Texas Water Development Board – The LCRWPG encourages TWDB to aid the NRCS State Conservationist in targeting water conservation program funding to projects that offer the most water conservation benefit for the state. The TWDB should also offer expert testimony to the Agriculture Committees of both the Senate and the House regarding the need and effectiveness of water conservation accomplished through EQIP in order to highlight the ongoing need for adequate NRCS EQIP funding. The LCRWPG further encourages TWDB to provide leadership in encouraging corporate sponsorship of agricultural water conservation initiatives.

Joint TCEQ, TWDB and Legislature – Develop water use metrics and efficiency standards and best management practices, including monitoring and delivery systems basin-wide.

Regional Planning Groups – The LCRWPG encourages all planning groups to adopt water plans that capitalize on the potential for partnering between water user groups to accomplish much needed water conservation in ways that share both the burdens and the benefits between water user groups.

8.1.6.4 Timing and/or Conflicts

Creative funding and implementation of water conservation is an ongoing responsibility for all water users groups and their constituents.

8.1.7 Municipal/ Industrial Conservation

8.1.7.1 Consistent GPCD Methodology

8.1.7.1.1. Background Information

In its December 2008 report to the 81st Texas Legislature, the Texas Water Conservation Advisory Council cautioned:

“The tendency of the media or individuals to use gallons per capita per day (GPCD) as a way to compare conservation efforts of communities is also problematic when the metric is not uniformly defined. Therefore, the Council has determined that it should be a priority to develop standard methodologies for water use metrics and water conservation metrics and definitions.”

While GPCD can be a good measure for internal year-to-year comparisons within one water system, there is no standard accepted methodology for calculating GPCD by Texas water providers.

SB 181 was passed by the Legislature in 2011 to develop a consistent methodology for calculating GPCD. The TWDB and the TCEQ, with the assistance of the TWCAC, finalized the document, “Guidance and Methodology for Reporting on Water Conservation and Water Use,” in December of 2012. It can be found on the TCEQ web site.

8.1.7.1.2. Policy Statement

The LCRWPG supports the use of the Texas GPCD calculator developed by the TWDB with the assistance of the Texas Water Conservation Advisory Council (TWCAC).

8.1.7.1.3. Actions Needed

Texas Legislature and TWDB – The LCRWPG encourages the continued support for efforts by the TWCAC to develop consistent methodology for calculating commercial, industrial and institutional measurements that can successfully track water use and water savings over time for these water use sectors.

8.1.7.2 Consistent Water Savings Metrics

8.1.7.2.1. Background Information

The 2004 TWDB Report 362, Water Conservation Best Management Practices (BMP) Guide evaluated and recommended water use efficiency measures and provided guidance on how to determine water savings. Measures ranged from toilet and washing machine incentives to water loss reduction programs. Additional conservation strategies such as irrigation standard requirements, mandatory watering schedules, soil depth requirements, irrigation efficiency upgrades and other strategies have not been studied extensively to evaluate effective water savings. Many of the BMPs found in the 2004 report have been updated by the Texas Water Conservation Advisory Council. These BMPs can be found at the Council’s website www.savetexaswater.org. However, most of these measures do not include water savings estimates or metrics.

8.1.7.2.2. Policy Statement

The LCRWPG supports the development of consistent metrics to assess the amount of water saved per conservation measure or technique in order to track the success of conservation strategies. Recent efforts with tracking and measuring savings from academic institutions such as Texas Agrilife and the Pecan Street public/private partnership should be supported by the state and local water entities.

8.1.7.2.3. Actions Needed

Texas Legislature and TWDB – The LCRWPG encourages the funding of research efforts to determine water savings and incorporate the information into current and future BMPs found on the Council website. This information should be aimed at providing water suppliers with useful information for developing and implementing conservation goals and successful management strategies.

8.1.7.3 Additional Financial Assistance to Reduce Water Loss

8.1.7.3.1. Background Information

In 2003, the 78th Texas Legislature enacted House Bill 3338 which requires all retail water suppliers to submit water loss audits to the TWDB. TWDB collected water loss audits for the years of 2005 and 2010 with response rates that were slightly more than 50 percent. However, that response rate percentage represents at least 75 percent of the water volume usage in Texas. Based on information reported from 1,900 water loss audits for the year 2010, statewide water losses were estimated at 16.7 percent of municipal water system production.

Since HB 3338 was enacted, the 82nd Texas Legislature (2011) passed House Bill 3090 which requires annual water loss audits from all retail public utilities receiving financial assistance from the TWDB. The first of these annual reports were due May 1, 2013. The 83rd Texas Legislature enacted House Bill 857 (2013) which requires each retail public water utility with more than 3,300 connections to conduct a water audit annually to determine its water loss and to submit that audit to the Texas Water Development Board. The initial annual water audits were due May 1, 2014. A retail public water utility with 3,300 or less connections will continue to be required to conduct and submit a water audit once every five years computing the utility's system water loss during the preceding year.

Based on a response rate of 84 percent from the two categories required to report their water loss annually, the water losses for 2013 were estimated at 13.3 percent of municipal water system production.

The 83rd Texas Legislature also enacted House Bill 3605 (2013) that requires a retail public water utility that receives financial assistance from the Board to use a portion of that assistance—or any additional assistance provided by the Board—to mitigate the utility's system water loss if based on its water audit the water loss meets or exceeds a threshold to be established by Board rule.

8.1.7.3.2. Policy Statement

The LCRWPG recognizes that funding is now available through the SWIFT fund as well as the TWDB fund for loans for retail utility water loss projects.

8.1.7.3.3. Actions Needed

Texas Legislature and TWDB - should market the SWIFT funding for utility water loss projects. The funds would be used to replace aging or deteriorated pipe, to replace inaccurate or incorrectly sized water meters, to enhance leak detection efforts, or to implement a pressure reduction strategy if warranted.

8.1.7.4 Conservation Coordinators

8.1.7.4.1. Background Information

With the current state water plan depending so heavily on conservation to meet future water needs, it is essential that water conservation plans result in real water conservation. To that end requiring a designated water conservation coordinator would increase accountability for the implementation of water conservation measures and the tracking of water savings.

8.1.7.4.2. Policy Statement

The LCRWPG supports the designation of a conservation coordinator by all public water suppliers with the responsibility for the implementation and monitoring of the conservation plan, tracking and reporting water savings to the state, and recommending further improvements to the plan. Responsibility could be assigned to a newly created position for this purpose, an existing position or employee of the water provider, or a shared water conservation coordinator contracted through several small water providers.

8.1.7.4.3. Actions Needed

TCEQ - The LCRWPG encourages the TCEQ to amend Title 30, Texas Administrative Code (TAC) Chapter 288, so that all public water suppliers required to have a conservation plan also be required to have a designated water conservation coordinator with the duties before mentioned.

8.1.7.5 Dedicated Conservation Funding

8.1.7.5.1. Background Information

Water conservation programs offered by water providers are typically funded on an annual basis from revenues received from water use. Unfortunately, the funding can vary yearly because water use is impacted by the volatility of the weather from year-to-year. In particular, some providers have historically cut program funding during non-drought years, assuming that conservation is only needed for droughts. However, if conservation is to stretch existing water supply resources to meet future water demand, a reliable fund must be available to sustain and grow conservation programs.

Having a dedicated conservation fund would help water providers plan for multi-year conservation programs and pursue research opportunities to help further water conservation efforts. Dedicated financial support for conservation could be achieved by assessing a meter or account conservation fee, or through a set-aside of a certain percentage of the annual revenues, as seen with a number of water providers throughout Texas.

8.1.7.5.2. Policy Statement

LCRWPG supports water providers having the ability to set up a dedicated funding stream for water conservation programs and projects.

8.1.7.5.3. Actions Needed

Encourage the state to adopt legislation that would allow water providers to set up a dedicated funding stream for water conservation.

8.1.8 Reuse (including basin-specific assessment of reuse potential and impacts)

8.1.8.1 Background Information

Water reuse typically can be divided into two types, direct and indirect. Direct reuse is when reclaimed water or treated effluent is pumped directly from a wastewater treatment plant to a place of use. Direct reuse for non-potable purposes is typically delivered through a "purple pipe" distribution system. Another type of reuse or reuse that is garnering more attention is the direct reuse of treated effluent for potable purposes or Direct Potable Reuse (DPR.) Through DPR treated effluent is piped directly to a water treatment plant for further treatment of potable standard, without the benefit of attenuation and retention time offered by an environmental buffer like a river or reservoir. DPR may be viable where other supplies are scarce, such as in drought conditions, provided that there are sufficient barriers in place to ensure that the output is of appropriate quality to minimize and mitigate for environmental impacts or risk to human health and safety. The TCEQ administers water quality requirements for direct reuse through its Chapter 210 rules. Indirect reuse is a method by which discharged effluent is conveyed to a downstream point of use via the bed and banks of a watercourse.

Under most surface water rights, the full amount of water may be used and reused for the purposes and location of use provided for in the underlying water right without additional authorization. However, once this water is discharged to a stream, it becomes waters of the state, available for use by others. Specific authorization for indirect reuse must be obtained to convey discharged effluent for reuse at a downstream point of use.

In addition to the traditional protections against carriage losses, indirect reuse authorizations are subject to special conditions to protect downstream water rights that may have been granted in reliance on the flows remaining in the watercourse or to protect the environment.

Water reuse is an important water management strategy. TCEQ is the State's agency charged with regulatory processes related to this issue.

8.1.8.2 Policy Statement

LCRWPG supports reuse as a water management strategy, in accordance with State Law and SB 1. The Group recognizes that there are potentially complex issues associated with reuse. Therefore, LCRWPG will continue to examine reuse as a water management strategy in an effort to better understand potential long-term impacts. LCRWPG will continue to monitor legislative developments regarding reuse, and will incorporate those developments into its deliberations and planning.

8.1.8.3 Actions Needed

Texas Commission on Environmental Quality – LCRWPG encourages TCEQ to continue its thorough review and approval processes for indirect reuse applications. It is through this application process that potential impacts, including environmental and water rights impacts, should be addressed.

Region K encourages TCEQ to develop standards and best management practices for Direct Potable Reuse projects to minimize and mitigate for any risk to the environment and human health and safety.

8.1.8.4 Timing and/or Conflicts

Consideration of reuse should be an integral part of the ongoing regional water planning process.

8.1.9 Brush Control

8.1.9.1 Background Information

Brush control has been widely recognized as an effective means of increasing water availability through the thinning or elimination of certain brush species that would otherwise uptake and transpire significant amounts of water. Brush control has the potential to conserve water lost to evapotranspiration, increase recharge to groundwater and aquifers, enhance spring and stream flows, restore native wildlife habitat by improving rangeland, improve livestock grazing distribution, aid in wildfire suppression by reducing hazardous fuels, and manage invasive species.

In recognition of these facts the Texas Legislature initiated the Texas Brush Control Program in 1985. The Program developed its first State Brush Control Plan in 1987. According to the 1987 Plan there were approximately 105 million acres of rangeland infested by brush, 32 million of which were considered dense. The Plan points out that pre-settlement Texas offered broad expanses of open prairie grasslands with only modest tree and brush growth along water courses and rocky hills. Settlement brought fire control, fencing and intensive grazing practices that resulted in conditions that enabled the proliferation of brushy species suited to the barer, drier landscape that ensued.

In 2011 the 82nd Texas Legislature created the Water Supply Enhancement Program (WSEP) to replace the Texas Brush Control Program while furthering its objectives. The purpose of the WSEP is to increase available surface and ground water supplies through the selective control of brush species that are detrimental to water conservation. The WSEP is administered by the Texas State Soil and Water Conservation Board (TSSWCB). In July 2014, the TSSWCB adopted its first State Water Supply Enhancement Plan. The TSSWCB collaborates with a range of agencies to identify watersheds across the state where it is feasible to implement brush control in order to enhance public water supplies. A brush control feasibility study was published in 2000 by the LCRA for the Pedernales River above Lake Travis. The TSSWCB uses a competitive grant process to allocate WSEP cost-share funds, giving priority to projects that balance the most critical water conservation need of municipal water user groups with the highest projected water yield from brush control. The TSSWCB then works through local soil and water conservation districts to develop 10-year resource management plans on properties enrolled in the WSEP in order to assist landowners in implementing brush control activities. Cost-share assistance is provided through the WSEP to landowners implementing their resource management plans.

According to the 2013 and 2014 WSEP Annual Reports, under this State Water Supply Enhancement Plan, during fiscal years 2013 and 2014, 26,434 acres of brush control were incentivized across the state and are proposed to result in the conservation of 7,446 ac-ft of water at a cost of about $289.29 per ac-ft of water. In the Pedernales River watershed, since the Program started through fiscal year 2014, 74,718 acres of brush have been treated by landowners.

8.1.9.2 Policy Statement

The LCRWPG supports brush control as an effective means of enhancing water supplies and encourages that all feasible means be utilized to maximize and target brush control efforts in watersheds that are experiencing below normal inflows to water supplies and which offer the greatest opportunity for helping to meet identified water supply shortages.

8.1.9.3 Actions Needed

1. The LCRWPG encourages the TSSWCB to utilize its available WSEP brush control cost-share funding to accomplish the greatest water supply enhancement for areas that are experiencing the greatest percentage reduction from average of their water supply reservoir storage levels. The LCRWPG recognizes that the WSEP governing statute and agency rules currently limit the program to the Pedernales River watershed.
2. The LCRWPG encourages the Texas Legislature to fund the WSEP sufficiently to accomplish significant water supply enhancement throughout the areas most negatively impacted by the invasion of brushy plants and more specifically those areas experiencing significant reduction from average of their water supply reservoir storage levels. Based on the economic analysis included in the published brush control feasibility study, just for the Pedernales River watershed, $23.6 million is needed to fully implement brush control on all acres identified for treatment.
3. The LCRWPG encourages the TSSWCB to conduct brush control feasibility studies for the Lake Buchanan, Lake LBJ watersheds, and other watersheds in the region in order to estimate the potential water yield from brush control. Based on current WSEP governing statute and agency rules, completed feasibility studies for these watersheds would “open up” eligibility for WSEP cost-share funds to landowners in these watersheds.
4. The LCRWPG encourages the Texas Legislature to instruct the TSSWCB to allow funding for brush control projects, via the WSEP.

8.1.9.4 Timing and/or Conflicts

We encourage that the Legislature bi-annually assess the effectiveness of the WSEP and fund the program commensurate with its successes. We encourage the TSSWCB to annually prioritize its WSEP funding placement to target water supply concerns as noted above.

8.1.10 Inflows to Highland Lakes

8.1.10.1 Background Information

During the 2011-2016 planning cycle, the total volume of water stored in the Highland Lakes fell to very low levels and remained at 35-40% full until May 2015. In response to the low lake levels, LCRA requested, and TCEQ granted, several emergency amendments to LCRA's 2010 Water Management Plan. These TCEQ emergency orders curtailed releases of stored water from Lakes Buchanan and Travis for certain limited time periods in 2012 through 2015. Despite these efforts to protect the water in storage, the lakes did not return to normal levels and combined storage in Lakes Buchanan and Travis remained in the 35-40% range until May 2015. Although the region's water supply reservoirs benefited from significant rain events in the spring and fall of 2015, reservoir storage has not fully recovered. As of November 2015, combined lake storage is at 78%.

LCRA's records and reports between 2008 and 2014 show that the inflows to Lakes Buchanan and Travis have averaged 386,600 acre-feet (AF)/year, which is only 32% of the historical average of 1,216,300 AF/year for the years 1942 through 2014. After a few initial years of low inflows in 1999 and 2006, a period of historically low inflows began on a sustained basis in 2008.

A number of factors have been mentioned as possibly affecting inflows to the Highland Lakes and in the Highland Lakes watershed, including: naturally occurring climate cycles; evaporation rates; runoff coefficients for precipitation; frequency and intensity of rainfall; changes in soil moisture content and soil characteristics; higher atmospheric temperatures; changes in vegetative growth; proliferation of small impoundments or stock tanks; drops in river base flows due to changes in hydraulically connected aquifer conditions; and pumping from the underflow of the Colorado River and the major tributaries that feed the Highland Lakes.

In summary, to understand the current correlation between precipitation and runoff and the cause(s) for the diminished inflows over the last decade, a comprehensive hydrologic study needs to be conducted to address naturally occurring climate cycles related to drought; topographic changes down to the scale of minor impoundment development; natural and agricultural vegetation changes; and changes to the water tables in major and minor aquifers in proximity or hydraulic connection with the upper Colorado River.

8.1.10.2 Policy Statement

1. The LCRWPG recommends the State provide funding for performance of a comprehensive hydrologic study to identify and evaluate the factors that affect surface water runoff and inflows into Lakes Buchanan and Travis.
2. The LCRWPG recommends the State provide funding for performance of a study to quantify the number and volume of small impoundments within the watershed, including permit-exempt impoundments, and their impacts on inflows into the Highland Lakes.

8.1.10.3 Actions Needed

Data evidencing reduced inflows to Lakes Buchanan and Travis in recent years have shown that further investigation and analysis may be valuable in the Region K watersheds. Research focusing on the inflows to the lakes is needed to understand and quantify these observations, so that the results can provide meaningful input to regional water modeling and planning activities.

8.1.10.4 Timing and/or Conflicts

Given the magnitude of the diminished inflows to the lakes, analyses and evaluations should begin immediately to provide critical data for more accurate hydrologic modeling and planning.

8.1.11 Coordination of Planning Cycles for Determination of Desired Future Conditions by GCDs and Generation of the Regional Water Plan by RWPGs

8.1.11.1 Background Information

In 2005, Texas legislation required groundwater conservation districts (GCDs) to work together within their particular groundwater management areas (GMAs) to determine the desired future conditions (DFCs) of their shared aquifer. These conditions were to be reviewed every five years starting in 2010. The information compiled by the districts through this coordinated effort would be supplied to the appropriate regional water planning group which would in turn eventually be rolled into the state water plan.

Unfortunately, the five-year cycle for assessing desired future conditions by GCDs in a particular GMA is almost parallel to the regional water planning cycle. By the time DFCs are finalized, there is no time to include that information in the RWPG report. As a result, the RWPG must rely on potentially outdated information from GCDs during the assessment period. In 2013, legislation (SB 1282) pushed the DFC deadline back from September 2015 to May 2016; however, this did not remedy the timing problem.

8.1.11.2 Policy Statement

LCRWPG recommends staggering the five-year cycles for determination of DFCs by GCDs and the Regional Water Planning Group (RWPG) such that MAG estimates are available for consideration by RWPGs in advance of the deadline for the technical memorandum describing when determining projected water supplies, demands, and needs. Both cycles require the involved entities to undergo considerable technical evaluation and public review before final approval.

8.1.11.3 Actions Needed

State GMAs – Each of the 16 groundwater management areas should review this proposal and submit recommendations in favor of or in opposition to the proposal.

Texas Legislature – Introduce legislation to alter the planning cycle for GCDs to derive DFCs within their assigned GMA so that finalized data can go into the regional water planning process in a timely and useful fashion. GCDs should not be burdened with a compressed cycle in order to accomplish this action.

8.1.11.4 Timing and/or Conflicts

This should be addressed in the next legislative session so it can go into effect prior to the next planning cycle.

8.1.12 Recommended Improvements to the Regional Planning Process (SB 1 - 75th Legislature)

The following seven recommendations have been developed by the LCRWPG in order to improve the ongoing regional water planning process:

1. The LCRWPG continues to support action by the State to provide for the integration of water quantity (supply) and water quality planning. Improvements have been made but more coordination is needed between TWDB and TCEQ, especially in the area of permitting for new water supply projects, in order to facilitate the implementation of key water management strategies. TWDB, TCEQ and other state, local, and federal entities are doing a good job of providing a clearinghouse for infrastructure funding options through the Texas Water Infrastructure Coordination Committee (TWICC). TWDB and TCEQ should also work to coordinate the regional planning process with the Texas Clean Rivers Program, which is a partnership that uses a watershed management approach to identify and evaluate water quality issues. The RWPGs are considering water quality issues during this revision to the plan and continued coordination with the Texas Clean Rivers Program is desirable.
2. The LCRWPG supports action by the State to continue to fund programs for the collection of water data and groundwater availability information, which remains a critical need in the planning process. The State should provide adequate, continuous funding in order to improve the collection, development, monitoring, and dissemination of such water data.
3. The LCRWPG continues to support action by the State to provide assistance to the RWPGs with public information materials and administrative support.
4. The LCRWPG continues to support action by the State to provide for the opportunity to have improved representation of women and minorities on the RWPGs to ensure a true diversity of interests.
5. The LCRWPG supports action by the State to structure the planning process to include environmental needs in order to get a clear picture of the amount of available water resources for all users. Environmental needs and water supply strategies should be planned for just like Agricultural, Municipal, Industrial and other uses in the state.
6. The LCRWPG supports adequate and timely state funding for the regional water planning process. This funding is critical for the development of long-term, sustainable, environmentally protective and conservation-effective water management strategies as well as the collection of water data and groundwater availability information, including the refinement of modeling data, public information materials, and administrative assistance.
7. The LCRWPG recognizes the importance of the role of the GMA planning process in determining groundwater availability for planning purposes and supports providing the necessary resources and technical support to facilitate effective water planning.

8.1.13 Radionuclides in the Hickory and Marble Falls Aquifers

The ***Region "K" Water Supply Plan for the Lower Colorado Regional Water Planning Group, Volume I, December 2000*** provided background information and a policy recommendation on the issues surrounding radionuclides in the Hickory and Marble Falls aquifers. This is an update of the issues and policy recommendation.

EPA (U.S. Environmental Protection Agency) revised the federal radionuclides regulations, which had been in effect since 1977, effective in 2003. Radionuclides emit ionizing radiation, which can cause various kinds of cancers, depending on the type and concentration of radionuclide a person is exposed to via drinking water. These rules cover man-made and naturally occurring radionuclides in drinking water and include a first-time standard for uranium. EPA revised this regulation in accordance with the requirements of the 1986 Amendments to the SDWA (Safe Drinking Water Act) and the 1996 Amendments to SDWA. The statute calls for regulation of radionuclides and a review of regulations every six years. Additionally, according to the SDWA Amendments, the EPA must maintain or provide for greater protection of the health of persons when revising regulations. The EPA reviewed the most current health, occurrence, treatment, and analytical methods in revising these regulations to ensure that safe drinking water is protective of public health.

The TCEQ received an extension from EPA and then adopted the provisions of the Radionuclides Rule into the Texas Administrative Code in December 2004.

The concentration of radionuclide contaminants in the water entering the distribution system shall not exceed the following maximum contaminant levels: combined radium (radium isotopes No. 226 and No. 228) cannot exceed 5 picoCuries/liter (pCI/l); gross alpha-radiation emitters cannot exceed 15 pCI/l (not including radon and uranium); and effective December 8, 2003, 30 micrograms per liter (g/L) for uranium. The Texas rules states that MCLs (maximum contaminant levels) for beta particle and photon radioactivity from man-made radionuclides in drinking water in community water systems are equivalent to the MCLs under 40 Code of Federal Regulations (CFR) §141.66(d) as amended and adopted in the CFR through December 7, 2000, which was adopted by reference. The Texas Rule contains applicability, monitoring, reporting, and public notification requirements, and analytical requirements for radionuclide contaminants and compliance determination.

There are several water utilities currently providing water to the public from the Hickory and Marble Falls aquifers where radionuclide contaminates occur. These include San Saba County, within the Lower Colorado Region, as well as seven counties in Region F, Mason, Brown, Coleman, Concho, McCulloch, Menard, and Kimble. Safe drinking water is a concern of these utilities. With Commission approval, utilities may be able to continue to use the water and/or bottled water on a temporary basis while they seek a long-term solution. Efforts are underway to investigate the development of alternative water sources or effective treatment and radioactive waste disposal. These small towns and water utilities have limited financial resources with which to treat the groundwater for municipal uses.

The LCRWPG recommends the State should provide adequate funding for water treatment and radioactive waste disposal for those rural communities that may lose their water supply if such financial support is lacking. In addition, State agencies should develop disposal procedures to provide for the safe handling of the radioactive wastes derived from the treatment processes.

8.2 SUMMARY OF UNIQUE STREAM SEGMENT RECOMMENDATIONS

In accordance with the Texas Administrative Code 31 §357.8, RWPGs:

…may include in adopted regional water plans recommendations for all or parts of river and stream segments of unique ecological value located within the regional water planning area by preparing a recommendation package consisting of a physical description giving the location of the stream segment, maps, and photographs of the stream segment, and a site characterization of the stream segment documented by supporting literature and data.

No new unique ecological stream segments are recommended by the LCRWPG for this planning cycle. The unique stream segment recommendations from the 2006 Region K Plan, which the LCRWPG continues to recommend, can be found in *Appendix 8A*.

8.3 SUMMARY OF POTENTIAL SITES UNIQUELY SUITED FOR RESERVOIRS

In accordance with the Texas Administrative Code 31 §357.9, RWPGs:

…may recommend sites of unique value for construction of reservoirs by including descriptions of the sites, reasons for the unique designation, and expected beneficiaries of the water supply to be developed at the site.

No potential reservoir sites are recommended by the LCRWPG for this planning cycle.

APPENDIX 8A

Unique Stream Segment Recommendations from the 2006 Region K Plan

This section provides background information on the ***ten streams in the Lower Colorado Region identified and recommended by the Subcommittee (originally during the 2001 planning cycle) as warranting further study for consideration of designation as ecologically unique*** (*Table 8A.1*).

Table 8A.1 Stream Segments Identified for Further Study for Potential Designation as Ecologically Unique

Stream Segment	Location
Barton Springs segment of the Edwards Aquifer	Recharge stretches of Barton, Bear, Little Bear, Onion, Slaughter, and Williamson Creeks in Travis and Hays Counties
Bull Creek	From the confluence with Lake Austin upstream to its headwaters in Travis County
Colorado River	Within TCEQ classified Segments 1409 and 1410 including Gorman Creek in Burnet, Lampasas, and Mills Counties
Colorado River	TCEQ classified Segments 1428 and 1434 in Travis, Bastrop, and Fayette Counties
Colorado River	TCEQ classified Segment 1402 including Shaws Bend in Fayette, Colorado, Wharton, and Matagorda Counties
Cummins Creek	From the confluence with the Colorado River upstream to FM 159 in Fayette County
Llano River	TCEQ classified Segment 1415 from the confluence with Johnson Creek to CR 2768 near Castell in Llano County
Pedernales River	TCEQ classified Segment 1414 in Kimball, Gillespie, Blanco, and Travis Counties
Rocky Creek	From the confluence with the Lampasas River upstream to the union of North Rocky Creek and South Rocky Creek in Burnet County.
Hamilton Creek	From the outflow of Hamilton Springs to the confluence with the Colorado River.

8A.1 Barton Creek Within the TCEQ Classified Stream Segment 1430 From the Confluence With Town Lake in Travis County to FM 12 in Hays County

Barton Creek is the TCEQ classified stream Segment 1430 and extends from the confluence with Town Lake in Travis County to FM 12 in Hays County. The creek is in the Central Texas Plateau ecoregion and the watershed lies within the live oak-ashe juniper woods vegetation association. Water quality is generally good to exceptional, although coliform levels are occasionally elevated after storm events. Nitrite levels can also be high due to the influence of groundwater. Substrate is typically limestone bedrock with rubble, boulders, and gravel. The upper portions of the streams are generally intermittent, except in spring-fed reaches, which limits aquatic habitat. A comprehensive list of literature about the Barton Springs portion of the Edwards aquifer was prepared by the City of Austin in collaboration with the Austin History Center, and is available at http://www.ci.austin.tx.us/aquifer/. Barton Creek meets the following criteria for designation as ecologically unique:

- <u>Riparian Conservation Area</u>: the lower end of the stream is in the City of Austin's Zilker Park
- <u>High Water Quality/Exceptional Aquatic Life/High Aesthetic Value</u>: the stream was selected as an ecoregion stream based on its physical attributes, water quality, and biological assemblages; the

stream exhibits high dissolved oxygen (DO) concentrations and a diverse and complex benthic macroinvertebrate community

- Endangered/Threatened Species: the stream contains the only known population of the Barton Springs salamander (*Eurycea sosorum*), a federally listed endangered species

8A.2 Bull Creek From the Confluence With Lake Austin Upstream to its Headwaters

Bull Creek lies wholly within Travis County in the northwest portion of the City of Austin (*Figure 8.2*). The watershed for the stream is approximately 32 square miles in a rapidly developing area. The watershed is located on the eastern edge of the Texas Hill Country and immediately west of the Balcones Fault Zone. Numerous seeps and springs provide baseflow to Bull Creek. Water quality is generally good, although some degradation has occurred due to development. The Bull Creek watershed contains suitable habitat for a variety of rare and endangered species including the Golden-Cheeked Warbler (*Dendroica chrysoparia*), Black-Capped Vireo (*Vireo atricapillus*), Tooth Cave spider (*Neoleptoneta myopica*), Tooth Cave pseudoscorpion (*Tartarocreagris texana*), Bee Creek Cave harvestman (*Texella redelli*), Bone Cave harvestman (*Texella redelli*), Tooth Cave ground beetle (*Rhadine persephone*), Kretshcmarr Cave mold beetle (*Texamaurops reddeli*), and Jollyville Plateau salamander (*Eurycea* sp.). In addition, the watershed contains a very diverse flora. Bull Creek meets the following criteria for designation as ecologically unique:

- Biologic Function: nearly pristine stream with a largely intact riparian area
- Hydrologic Function: pervious cover and intact riparian zone reduce downstream flooding
- Riparian Conservation Area: Bull Creek Preserve
- High Water Quality/Exceptional Aquatic Life/High Aesthetic Value: overall pristine nature gives the stream a high aesthetic value; stream has a diverse and complex benthic macroinvertebrate community, and an abundance and diversity of amphibians
- Endangered/Threatened Species: the stream contains a population of the Jollyville Plateau salamander (*Eurycea* sp.), a federally listed endangered species

Figure 8A.1: Location and Map of Barton Creek Stream Segment 1430

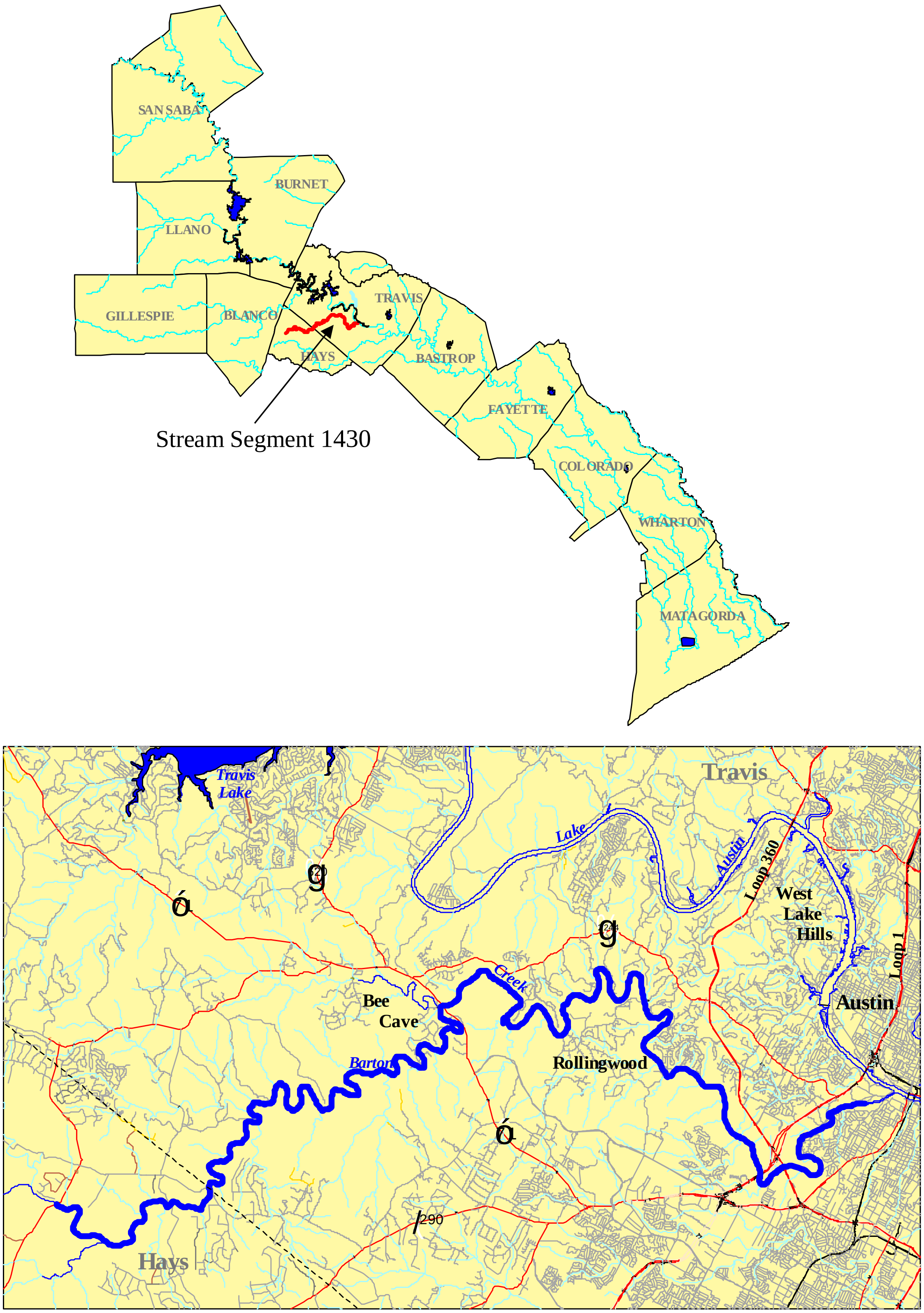
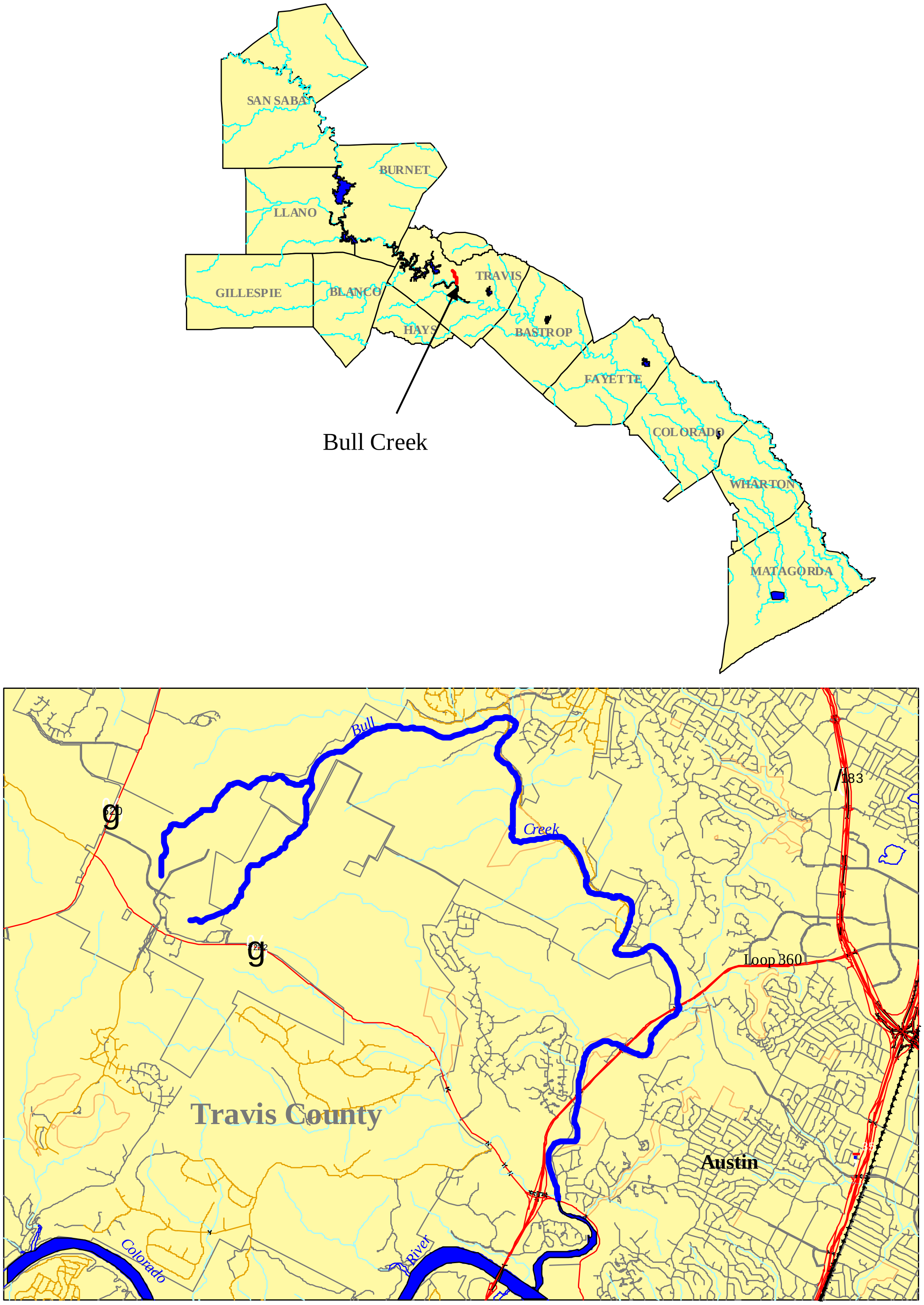


Figure 8A.2: Location of Bull Creek



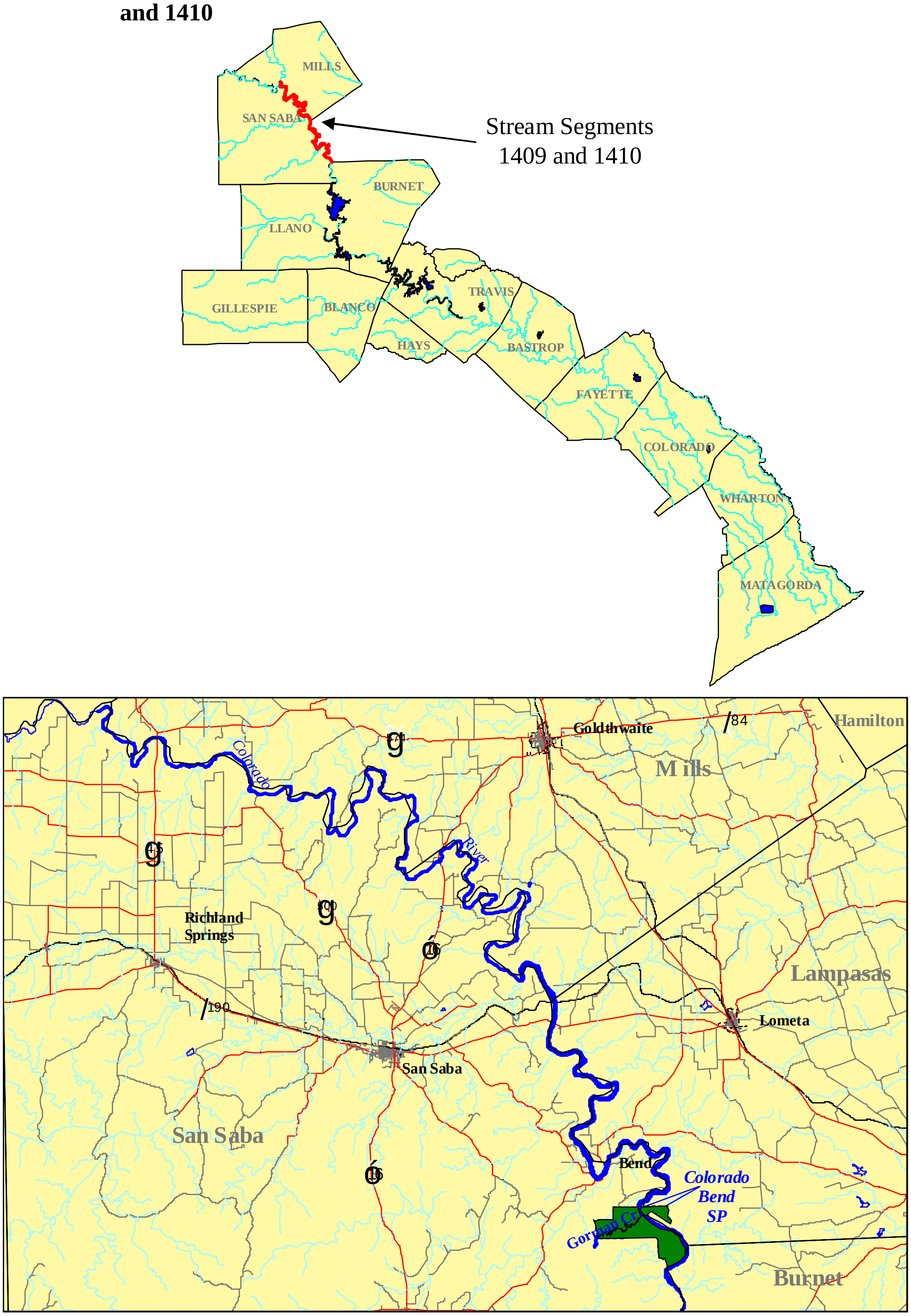
8A.3 Colorado River Within TCEQ Classified Stream Segments 1409 and 1410 Including Gorman Creek in Burnet, Lampasas, and Mills Counties

This segment consists primarily of the Colorado River upstream of Lake Buchanan to the Brown/San Saba/Mills county line, but also includes the Gorman Creek tributary (*Figure 8.3*). The stream segment is within the Central Texas Plateau ecoregion. Vegetation types common along the stream are mostly live oak-juniper parks. The river itself is wide and relatively shallow, flowing over a bed of limestone and gravel. A few stretches of small rapids exist on the upper part of this section down to the point where the backwaters of Lake Buchanan deepen the river and slow its flow.

Among the segment's scenic attributes are high limestone bluffs, vistas of rugged cedar-covered hills, and the existence of one of the most spectacular waterfalls in Texas. Gorman Falls is formed at the point where Gorman Creek tumbles into the Colorado River over a 75-foot-tall limestone bluff. The water coming from the creek is clear and cold, and many ferns and mosses grow on the slippery rocks and travertine deposits below the falls. The TCEQ identifies the segment as having a high aquatic life use. The National Park Service identified the segment for inclusion in the National Rivers Inventory based on the degree to which the river is free-flowing, the degree to which the river and corridor is undeveloped, and the outstanding natural and cultural characteristics of the river and its immediate environment. The segment meets the following criteria for designation as ecologically unique:

- Biologic Function: white bass spawning area
- Riparian Conservation Area: Colorado Bend State Park
- High Water Quality/Exceptional Aquatic Life/High Aesthetic Value: exceptional aesthetic value
- Endangered/Threatened Species: Concho water snake (Nerodia paucimaculata), a federal and state listed endangered species, as well as the rare and endemic mollusks, Texas fawnfoot and Texas pimpleback

Figure 8A.3: Location of the Colorado River Within TCEQ Classified Stream Segments 1409 and 1410

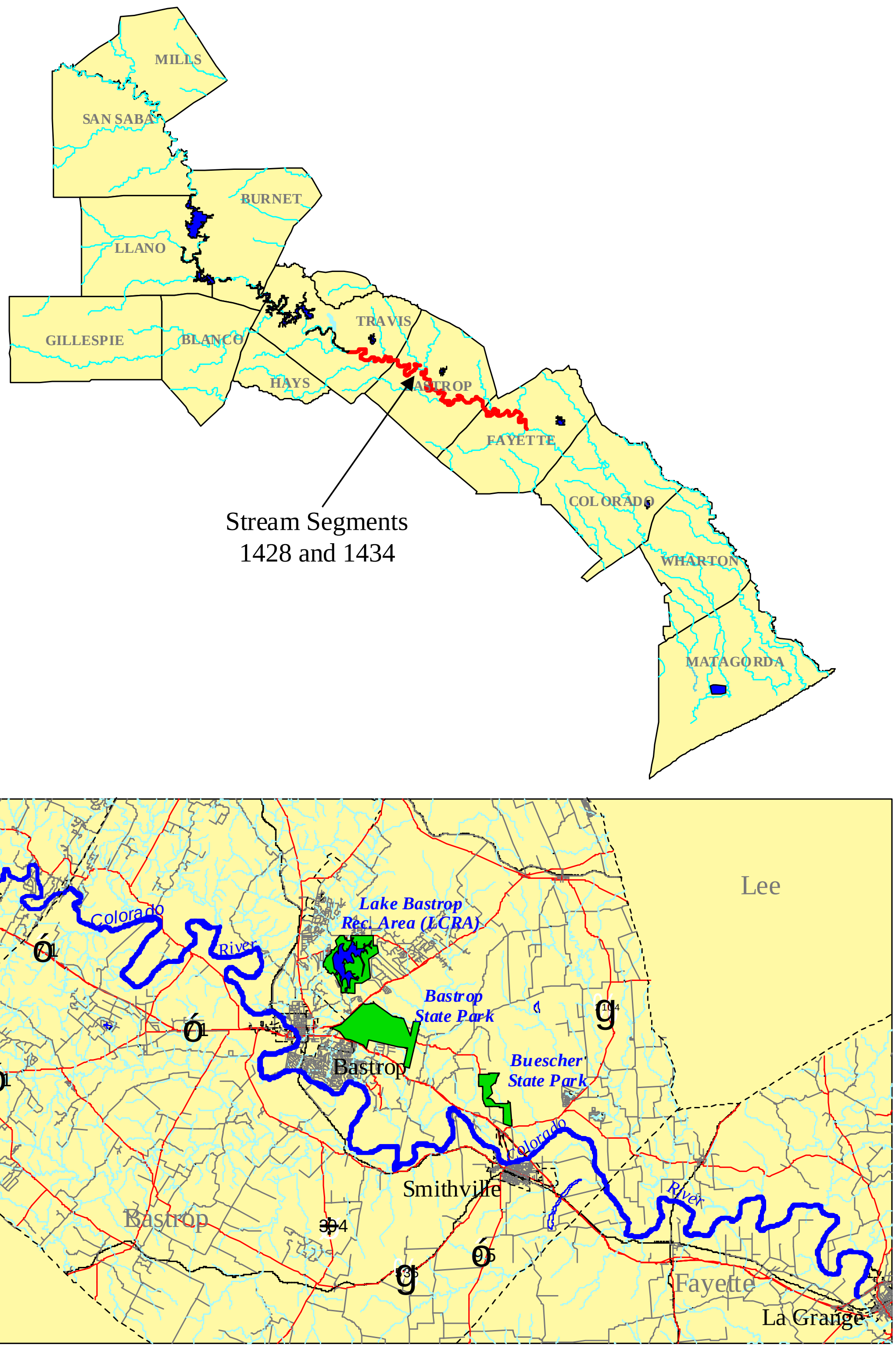


8A.4 Colorado River Within TCEQ Classified Stream Segments 1428 and 1434 in Travis, Bastrop, and Fayette Counties

The segment includes the Colorado River from a point 100 meters downstream of SH 71 in La Grange to Longhorn Dam in Austin and portions of Wilbarger, Big Sandy, Alum, and Cedar Creeks in Bastrop County (*Figure 8.4*). Extensive information about the segment in Bastrop County, submitted by the Bastrop County Environmental Network (BCEN), is presented in *Appendix 8B*. In general, water levels in the Colorado River are controlled by releases from Lake Travis and Lake Buchanan. The occurrences of low instream flows often depend on the discharge rate of return flows from the City of Austin. Instream flows in the smaller creeks within Bastrop County originate from diffuse surface water runoff, groundwater contributions, and springs. The segment lies within the Texas Blackland Prairies ecoregion. Substrate in the streams is typically sand and/or gravel. Several reaches of the segment are characterized by rubble and boulder fields. The TCEQ has classified the mainstem river as supportive of exceptional aquatic life uses. Water quality is generally good although nutrient levels are often elevated. Water quality in the creeks is typically good but influenced by flow levels, land use patterns, and wastewater discharges. Cedar Creek contains an exceptional macroinvertebrate community and, based on the ichthyofauna, a high Index of Biotic Integrity rating. This portion of the Colorado River has a diverse fish community, including the state listed threatened blue sucker (*Cycleptus elongatus*). In addition, the state and federally listed endangered Houston toad (*Bufo houstonensis*) occurs in the area. The segment meets the following criteria for designation as ecologically unique:

- Biologic Function: undeveloped riverine habitat, part of the Central Flyway of migratory birds
- Hydrologic Function: extensive riparian zone attenuates flooding and improves water quality via filtration and soil stabilization; riparian and stream channels hydrologically connected to an alluvial aquifer and the Carrizo-Wilcox aquifer
- Riparian Conservation Area: McKinney Roughs Environmental Learning Center
- High Water Quality/Exceptional Aquatic Life/High Aesthetic Value: exceptional aquatic life use
- Endangered/Threatened Species: blue sucker (*Cycleptus elongatus*), a state listed endangered species and the federal and state listed endangered Houston toad (*Bufo houstonensis)*

Figure 8A.4: Location of the Colorado River Within TCEQ Classified Stream Segments 1428 and 1434



8A.5 Colorado River Within the TCEQ Classified Stream Segment 1402 Including Shaws Bend in Fayette, Colorado, Wharton, and Matagorda Counties

The segment extends from just downstream of the Missouri-Pacific Railroad trestle in Matagorda County to a point 100 meters downstream of SH 71 in La Grange, a distance of 150 miles (*Figure 8.5*). The segment lies within the Texas Blackland Prairies ecoregion and flows into the East Central Texas Plains ecoregion. Substrate varies from primarily gravel in the upper reaches of the segment to gravel/cobble riffles and extensive sand-dominated reaches downstream. Instream flow is largely dependent on upstream releases for rice irrigation but also receives contributions from the intervening watershed. The water quality of the segment is typically good and supports a high aquatic life use designation. Nutrient levels are elevated, but DO concentrations are typically higher than the minimum required to maintain a high aquatic life use designation. The fish community is generally diverse and includes the blue sucker (*Cycleptus elongatus*), a state listed endangered species. Although not contained in this report, additional information about the segment is available in feasibility studies performed by ECS Technical Services for the U.S. Department of the Interior, which includes the Shaw's Bend Reservoir site. The segment meets the following criteria for designation as ecologically unique:

- <u>Biologic Function</u>: undeveloped riverine habitat, part of the Central Flyway of migratory birds
- <u>Endangered/Threatened Species</u>: blue sucker (*Cycleptus elongatus*), a state listed endangered species

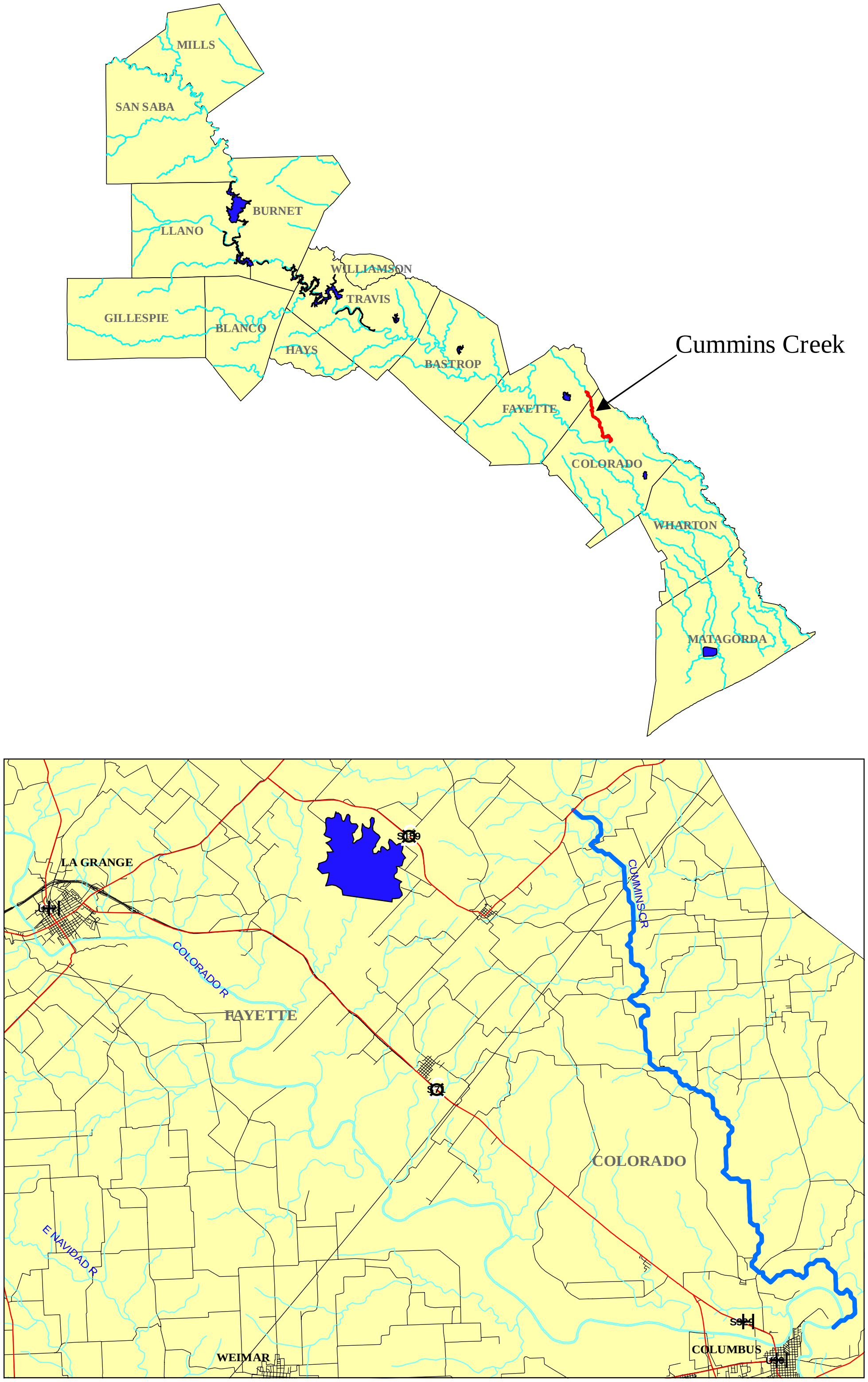
8A.6 Cummins Creek From the Confluence With the Colorado River in Colorado County Upstream to FM 159 in Fayette County

Cummins Creek lies within the Texas Blacklands Prairie ecoregion in Colorado and Fayette Counties (*Figure 8.6*). The stream is characterized by shallow to moderately deep pools, riffles, and occasional shallow runs. Substrate is predominantly fine sands with gravel and rubble in riffles and runs. Cummins Creek is within the post oak savannah vegetation region. The surrounding land use is mostly agricultural. Water quality is generally good, and the stream supports diverse macroinvertebrate and fish communities. The LCRA rated the creek, which has at least 27 species of fish as suitable for a high aquatic life use for fish. Among the fish species that have been collected in the stream is the Guadalupe bass (*Micropterus treculi*). Cummins Creek supports at least 28 species of aquatic macroinvertebrates. Several varieties of mayflies and caddisflies, which are considered intolerant of pollution, are present. Cummins Creek was rated an excellent aquatic life use category for macroinvertebrates based on work by the LCRA. The segment meets the following criteria for designation as ecologically unique:

- <u>High Water Quality/Exceptional Aquatic Life/High Aesthetic Value</u>: the stream was selected as an ecoregion stream based on its physical attributes, water quality, and biological assemblages the stream
- <u>Exhibits High Dissolved Oxygen Concentrations and a diverse and complex benthic macroinvertebrate community</u>

Figure 8A.5: Location of the Colorado River Within the TCEQ Classified Stream Segment 1402

Figure 8A.6: Location of Cummins Creek



8A.7 Llano River Within the TCEQ Classified Stream Segment 1415 From the Confluence With Johnson Creek to County Road 2768 Near Castell in Llano County

The Llano River between the confluence with Johnson Creek and County Road (CR) 2768 in Llano County is part of TCEQ classified stream Segment 1415 (*Figure 8.7*). The Llano River is a spring-fed stream of the Edwards Plateau and is widely known for its scenic beauty. It is in the Central Texas Plateau ecoregion and is characterized by the live oak-mesquite parks vegetation type. Riparian vegetation includes elm, willow, sycamore, and salt-cedar. The stream has designated water uses for contact recreation, as a public water supply, and for high aquatic life uses. Among the fish found in the stream is the Guadalupe bass (*Micropterus treculi*). The substrate is composed of limestone bedrock and gravel. In addition, large boulders and slabs of granite and gneiss occur in the river. This section of the Llano River is widely known for the one-billion-year-old igneous and metamorphic rocks, which form the riverbed. The area is a part of the Llano Uplift, which is one of the most unique geologic features in Texas. Land use along the stream is generally rural and includes ranching and agriculture. The segment meets the following criteria for designation as ecologically unique:

- <u>High Water Quality/Exceptional Aquatic Life/High Aesthetic Value</u>: exceptional aesthetic value

8A.8 Pedernales River Within the TCEQ Classified Stream Segment 1414 in Kimball, Gillespie, Blanco, and Travis Counties

The Pedernales River from a point immediately upstream of the confluence of Fall Creek in Travis County upstream to FM 385 in Kimble County makes up the TCEQ classified stream Segment 1415 (*Figure 8.8*). Most of this segment lies within the LCRWPA. The Pedernales River in general has high water quality and supports a high aquatic life use. The stream is within the Central Texas Plateau ecoregion. Surrounding vegetation is characteristic of the live oak-ashe juniper parks and live oak-mesquite-ashe juniper parks vegetation regions. The river is spring-fed and free flowing, with many limestone outcroppings. The National Park Service identified the segment for inclusion in the National Rivers Inventory based on the degree to which the river is free flowing, the degree to which the river and corridor is undeveloped, and the outstanding natural and cultural characteristics of the river and its immediate environment. Bald cypress, red columbine, and native orchids are found adjacent to the river. Among the fish species that occur in the stream is the Guadalupe bass (*Micropterus treculi*). Other aquatic species typical of Hill Country spring-fed streams also inhabit the Pedernales River. Along the river are several state and national parks including Pedernales Falls State Park, LBJ State Park, and LBJ National Park. The segment meets the following criteria for designation as ecologically unique:

- <u>Biologic Function</u>: significant natural area
- <u>Riparian Conservation Area</u>: Pedernales Falls State Park, LBJ State Park, LBJ National Park, and Stonewall Park
- <u>High Water Quality/Exceptional Aquatic Life/High Aesthetic Value</u>: exceptional aesthetic value

Figure 8A.7: Location of the Llano River From Johnson Creek Confluence to CR 2768

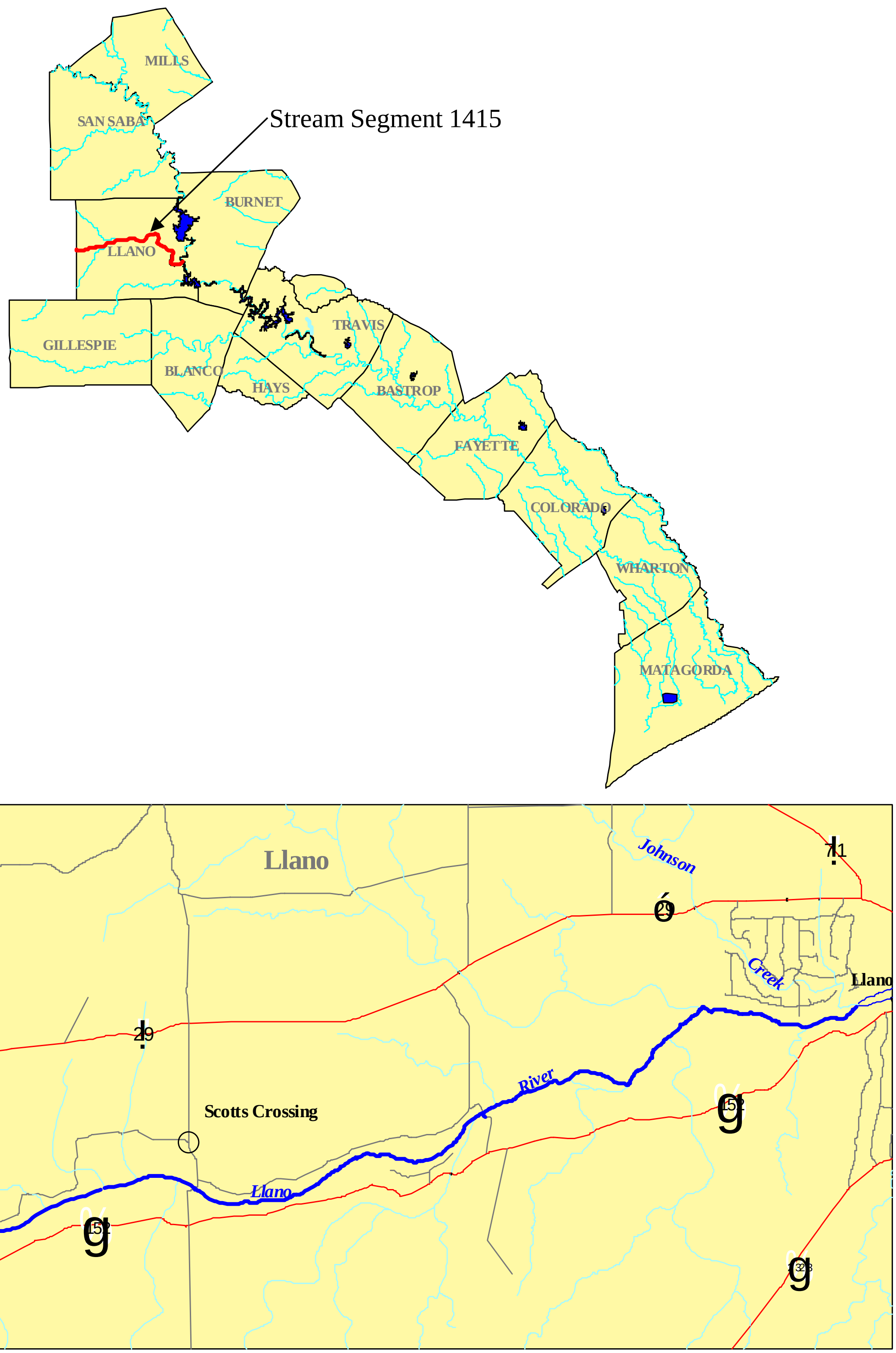
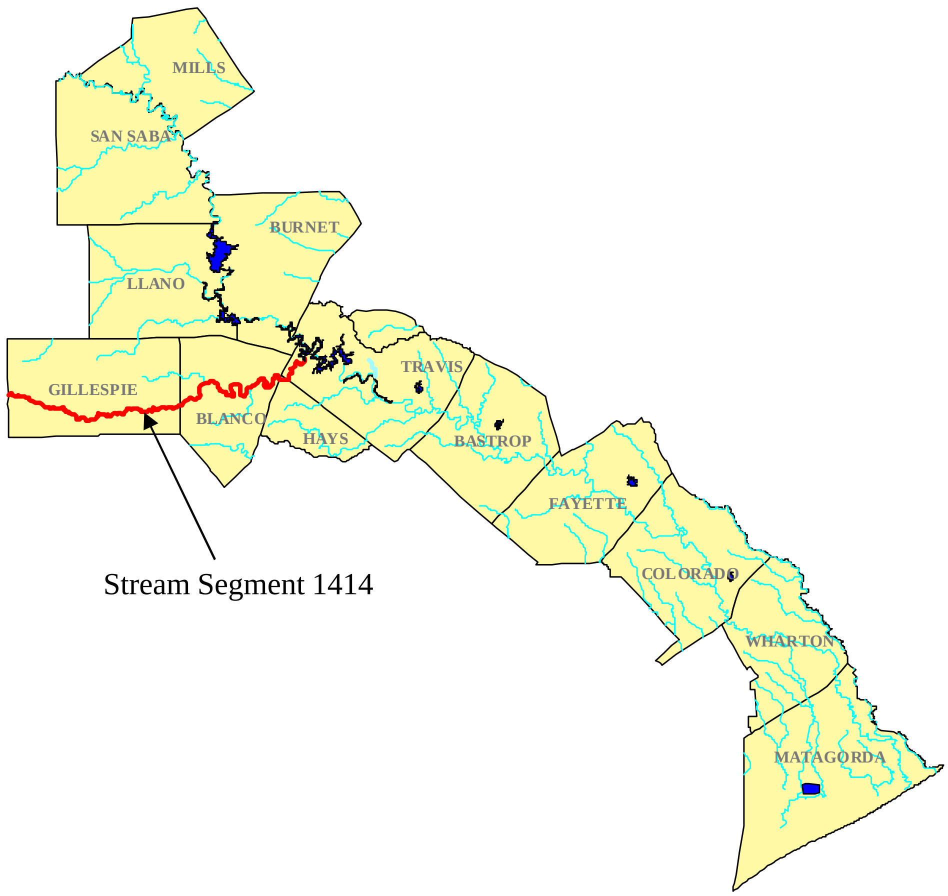
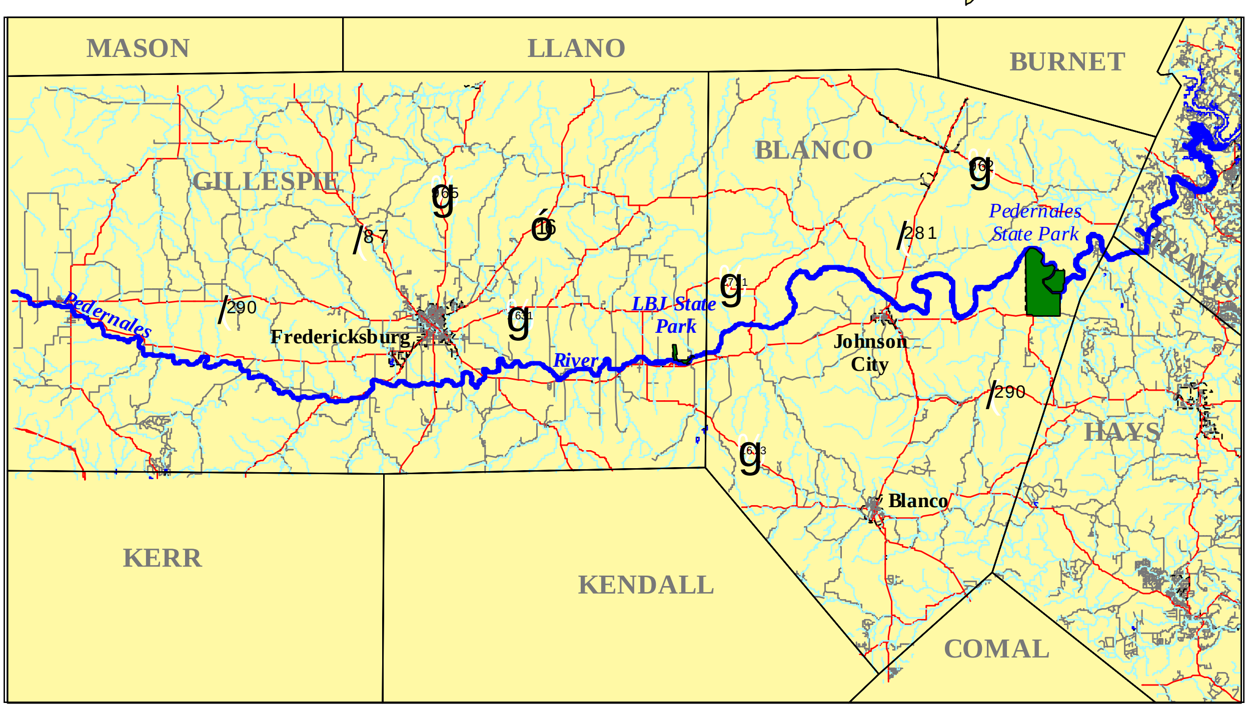


Figure 8A.8: Location of the Pedernales River Within the LCRWPA





8A.9 Rocky Creek From the Confluence With the Lampasas River Upstream to the Union of North Rocky Creek and South Rocky Creek in Burnet County

Rocky Creek lies within the Brazos River Basin in northeast Burnet County (*Figure 8.9*). The stream is approximately 6 miles long with a drainage area of 94 square miles. The stream is in the Central Texas Plateau ecoregion and within the oak-mesquite-juniper parks/woods vegetation association. The upper reach flows through the live oak-ashe juniper parks association. Long deep runs with numerous short riffles and occasional deep glides characterize the creek morphology. Limestone bedrock, gravel, and rubble are the dominant substrate types. In sampling for the Texas Aquatic Ecoregion Project, 54 species of aquatic invertebrates and 15 species of fish were collected. The segment meets the following criteria for designation as ecologically unique:

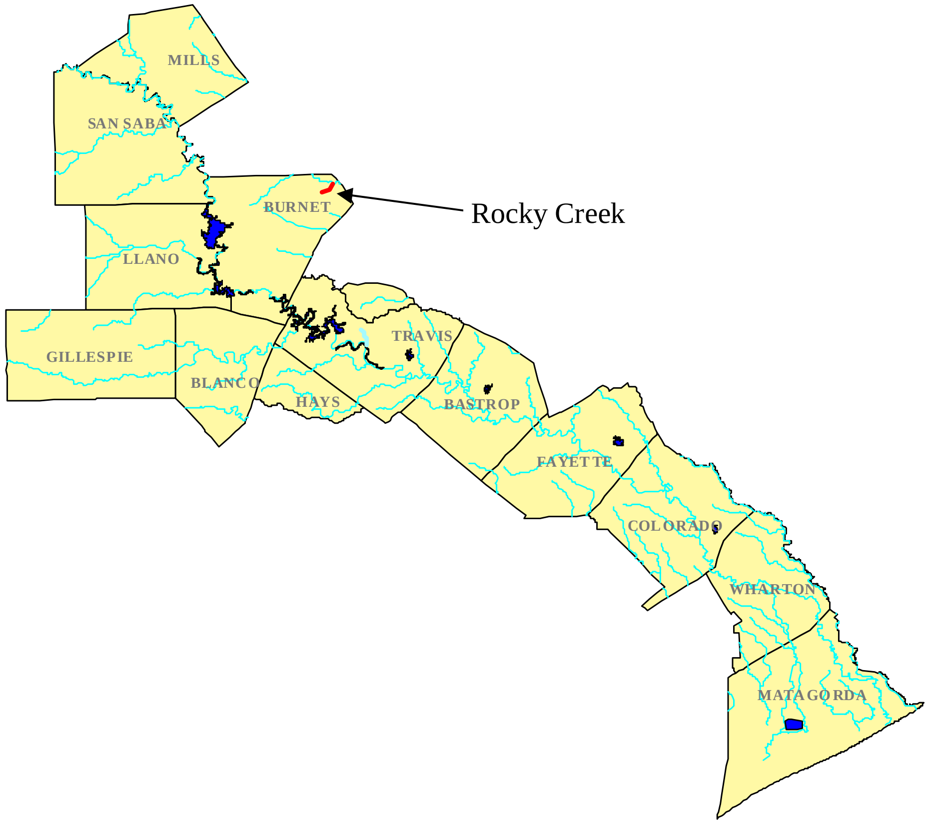
- High Water Quality/Exceptional Aquatic Life/High Aesthetic Value: the stream was selected as an ecoregion stream based on its physical attributes, water quality, and biological assemblages; the stream exhibits high DO concentrations and a diverse and complex fish and benthic macroinvertebrate community.

8A.10 Hamilton Creek From the Confluence With the Colorado River Upstream to the Outflow of Hamilton Springs in Burnet County

Hamilton Creek originates at Hamilton Springs in south central Burnet County 5 miles northwest of Burnet and flows south for 22 miles to its confluence with the Colorado River in TCEQ classified stream segment 1404 (*Figure 8.10*). The upper reaches of Hamilton Creek are intermittent with flow increasing downstream due to municipal discharges from the City of Burnet and other sources. The stream flows through the Edwards Plateau ecoregion, a region of limestone outcrops and a mixture of granitic and sandy soils. Throughout the Edwards Plateau live oak, shinnery oak, mesquite and juniper dominate the woody vegetation. There is a limited riparian cover adjacent to the stream. TCEQ identifies Hamilton Creek as Segment 1404A with water body uses for contact recreation and fish consumption with an intermediate aquatic life use.

Following the adoption of the Region K Water Supply Plan, the LCRWPG was made aware of a proposed open pit mine being considered in Burnet County adjacent to Hamilton Creek. Local residents in the area around Hamilton Creek came to the RWPG indicating that the pristine nature of the creek was unique and worthy of consideration as a Unique Steam Segment (USS). The hope was that such a designation would protect the creek from potential adverse impacts due to the proposed mining operation. The RWPG, on December 11, 2002, took action on this request by authorizing the issuance of a letter from the RWPG to the TCEQ and the LCRA expressing concerns about excessive water mining and non-point source pollution damage to the creek. At the February, 12, 2003, RWPG meeting, the group approved the recommendation that Hamilton Creek, from the outflow of Hamilton Springs to the Colorado River, be designated as a USS and that the recommendation be submitted to a local legislator for consideration during the 78th Legislative Session. The designation of Hamilton Creek as a USS was not passed during the 78th Texas Legislative Sessions.

Figure 8A.9: Location of Rocky Creek in Burnet County



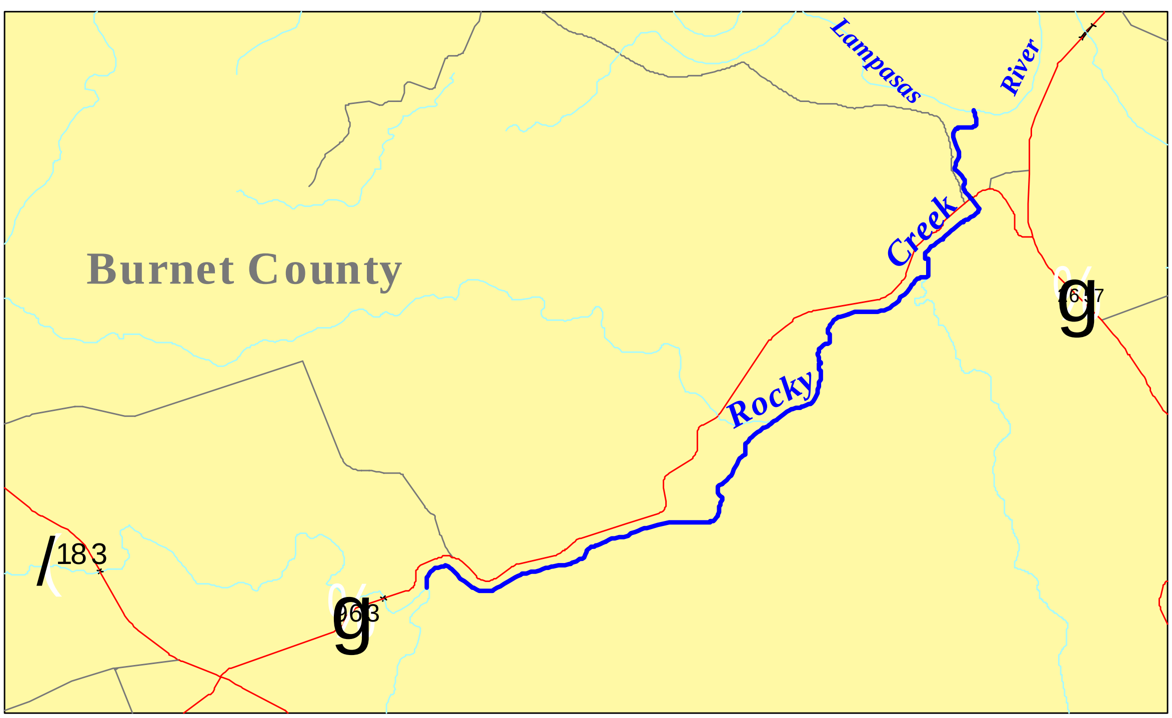
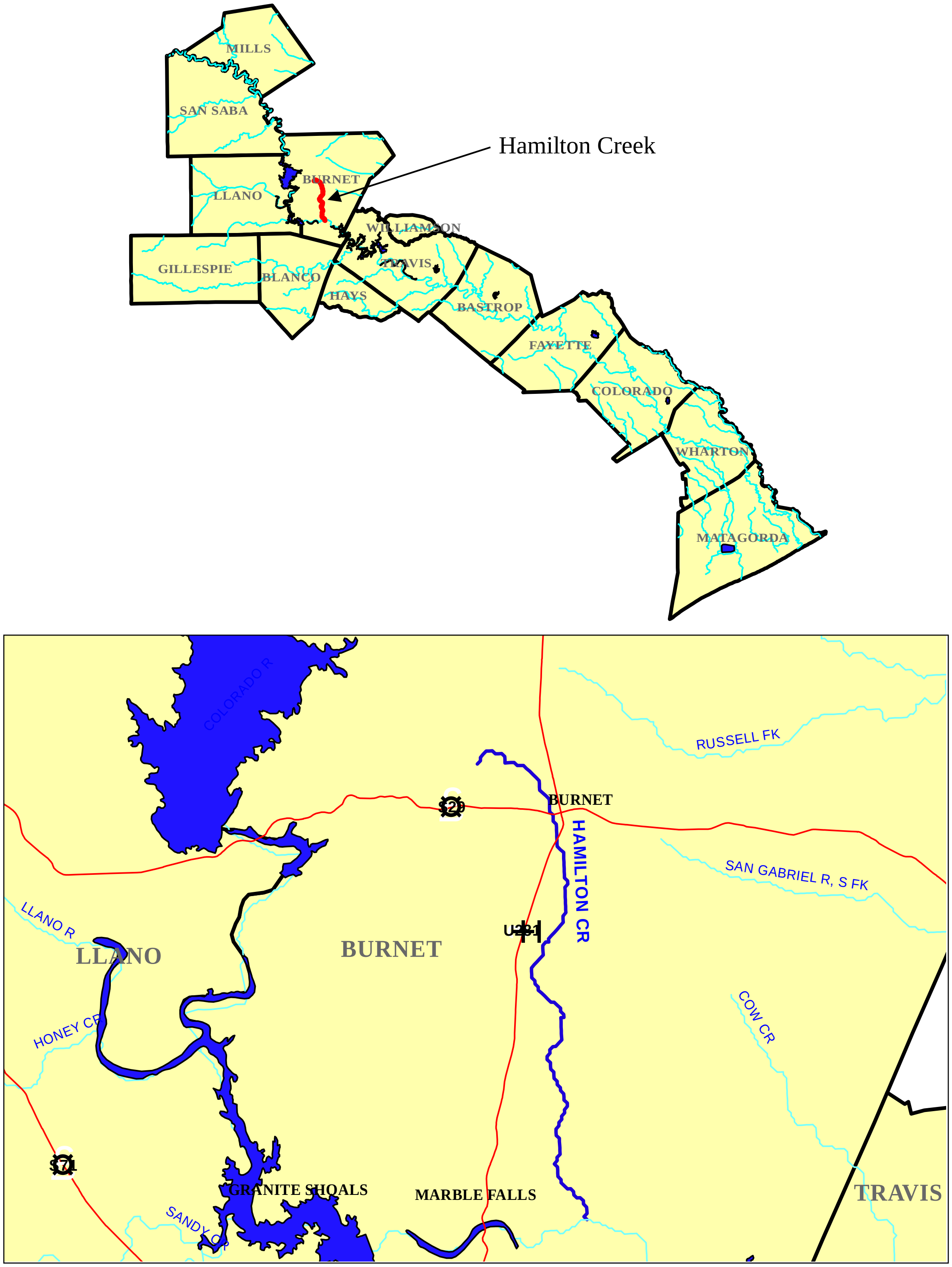


Figure 8A.10: Location of Hamilton Creek in Burnet County



8A.11 Conclusions and Recommendations

The protection intended to be provided by the designation of a river or stream segment as ecologically unique is to preclude a state agency or political subdivision of the state from financing the actual construction of a reservoir in a specific river or stream segment designated by the legislature as ecologically unique. In addition numerous programs presently exist to protect areas of special ecological significance. Since the LCRWPG currently has not recommended strategies for state financed reservoirs on any of the ten identified stream segments, and in the absence of additional environmental data, the LCRWPG takes no action at this time to designate these stream segments as ecologically unique. However, further study may be warranted in future Lower Colorado Regional Water Plans.

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APPENDICES

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CHAPTER 9.0: WATER INFRASTRUCTURE FINANCING RECOMMENDATIONS

9.1 INTRODUCTION

Infrastructure financing needs have long been a key concern of the Texas Water Development Board (TWDB) as it pursues its mission of providing adequate funding to timely meet local water needs. The 77th Legislature, in Senate Bill (SB) 2, added the formal preparation of an Infrastructure Financing Report (IFR) to the regional planning process. The purpose of the IFR is to determine the amount of funding needed from outside sources to implement Region K's management strategies as recommended in the 2016 Regional Plan. The intent of this portion of Chapter 9 is to present the following:

- The total capital cost of all the improvements recommended in the management strategies portion of the Plan.
- The results of the correspondence sent by the Regional Water Planning Group (RWPG) to each identified project sponsor that had a recommended water management strategy that required a capital cost.
- An estimate of the capital cost of the Plan improvements that cannot be funded out of local revenues and funding sources.
- A review of the Policy Statements in Chapter 8 that the RWPG adopted that dealt with funding issues.

9.2 CAPITAL COSTS FOR THE 2016 REGION K WATER PLAN

The total capital cost of the water management strategies (WMS) proposed by the 2016 Region K Water Plan is $2.865 billion over the 50-year planning period. This total cost includes project cost estimates for the major capital improvement strategies needed for the wholesale water providers in the region. The total cost also includes estimates associated with localized WUG costs for municipal conservation, irrigation conservation, direct reuse, expansion of existing groundwater and surface water capabilities for treatment and transmission systems, additional wells, and additional storage. Costs for major capital improvement projects for wholesale water providers are estimated at $2.281 billion. The WUG-level costs are estimated at $585 million. *Table 9.1* lists the capital costs for all recommended water management strategies in the 2016 Region K Water Plan. Capital costs include construction costs as well as costs for planning and design services.

Table 9.1 Region K Recommended Water Management Strategies with Capital Costs

WMS Project Sponsor Region	Project Name	Project Sponsor Entity	Capital Cost
K	Alternate Canal Delivery	STEAM ELECTRIC POWER, MATAGORDA	$ 7,669,000
K	Brush Control	COUNTY-OTHER, BLANCO	$ 2,137,000

WMS Project Sponsor Region	Project Name	Project Sponsor Entity	Capital Cost
K	Brush Control	COUNTY-OTHER, BURNET	$ 2,137,000
K	Brush Control	COUNTY-OTHER, GILLESPIE	$ 2,137,000
K	Brush Control	COUNTY-OTHER, HAYS	$ 2,137,000
K	Brush Control	COUNTY-OTHER, LLANO	$ 2,137,000
K	Brush Control	COUNTY-OTHER, MILLS	$ 2,137,000
K	Brush Control	COUNTY-OTHER, SAN SABA	$ 2,137,000
K	Brush Control	COUNTY-OTHER, TRAVIS	$ 2,137,000
K	BS/EACD Edwards / Middle Trinity ASR	BUDA	$ 6,818,182
K	BS/EACD Edwards / Middle Trinity ASR	COUNTY-OTHER, HAYS	$ 2,272,727
K	BS/EACD Edwards / Middle Trinity ASR	MINING, HAYS	$ 806,818
K	BS/EACD Edwards / Middle Trinity ASR	MOUNTAIN CITY	$ 500,000
K	BS/EACD Edwards / Middle Trinity ASR	SUNSET VALLEY	$ 2,272,727
K	BS/EACD Saline Edwards ASR	BUDA	$ 7,500,000
K	BS/EACD Saline Edwards ASR	COUNTY-OTHER, HAYS	$ 3,000,000
K	BS/EACD Saline Edwards ASR	CREEDMOOR-MAHA WSC	$ 4,500,000
K	Buena Vista Regional Project	BERTRAM	$ 3,176,843
K	Buena Vista Regional Project	BURNET	$ 7,187,428
K	Buena Vista Regional Project	COUNTY-OTHER, BURNET	$ 7,187,428
K	City of Austin - Aquifer Storage and Recovery	AUSTIN	$ 312,316,000
K	City of Austin - Capture Local Inflows to Lady Bird Lake	AUSTIN	$ 2,949,000
K	City of Austin - Direct Reuse	AUSTIN	$ 536,176,000
K	City of Austin - Indirect Potable Reuse through Lady Bird Lake	AUSTIN	$ 41,970,000
K	City of Austin - Lake Long Enhanced Storage	AUSTIN	$ 31,041,000
K	City of Austin - Longhorn Dam Operations Improvements	AUSTIN	$ 1,036,000
K	City of Austin - Other Reuse	AUSTIN	$ 21,772,000

WMS Project Sponsor Region	Project Name	Project Sponsor Entity	Capital Cost
K	City of Austin - Rainwater Harvesting	AUSTIN	$ 690,167,000
K	City of Austin Conservation	AUSTIN	$ 41,434,437
K	Development of New Carrizo-Wilcox Aquifer Supplies - Bastrop	BASTROP	$ 2,976,000
K	Development of New Carrizo-Wilcox Aquifer Supplies - Bastrop County Mining	MINING, BASTROP	$ 3,391,000
K	Development of New Gulf Coast Aquifer Supplies - Wharton County Steam-Electric	STEAM ELECTRIC POWER, WHARTON	$ 2,237,000
K	Development of New Hickory Aquifer Supplies - Llano	LLANO	$ 2,743,000
K	Development of New Queen City Aquifer Supplies - Bastrop County Mining	MINING, BASTROP	$ 2,446,000
K	Development of New Queen City Aquifer Supplies - Smithville	SMITHVILLE	$ 2,620,000
K	Development of New Trinity Aquifer Supplies - Sunset Valley	SUNSET VALLEY	$ 2,228,000
K	Direct Reuse - Bastrop	BASTROP	$ 4,625,000
K	Direct Reuse - Buda	BUDA	$ 6,075,000
K	Direct Reuse - Flatonia	FLATONIA	$ 1,226,000
K	Direct Reuse - Llano	LLANO	$ 689,000
K	Direct Reuse - Pflugerville	PFLUGERVILLE	$ 7,959,000
K	East Lake Buchanan Regional Project	COUNTY-OTHER, BURNET	$ 10,337,000
K	Expansion of Carrizo-Wilcox Aquifer Supplies - Aqua WSC	AQUA WSC	$ 9,777,000
K	Expansion of Carrizo-Wilcox Aquifer Supplies - Bastrop County Manufacturing	MANUFACTURING, BASTROP	$ 2,150,000
K	Expansion of Carrizo-Wilcox Aquifer Supplies - Bastrop County WCID #2	BASTROP COUNTY WCID #2	$ 2,150,000
K	Expansion of Carrizo-Wilcox Aquifer Supplies - Bastrop County-Other	COUNTY-OTHER, BASTROP	$ 2,150,000
K	Expansion of Carrizo-Wilcox Aquifer Supplies - Elgin	ELGIN	$ 2,150,000
K	Expansion of Carrizo-Wilcox Aquifer Supplies - LCRA	LOWER COLORADO RIVER AUTHORITY	$ 4,564,000

WMS Project Sponsor Region	Project Name	Project Sponsor Entity	Capital Cost
K	Expansion of Edwards (BFZ) Aquifer Supplies - Pflugerville	PFLUGERVILLE	$ 3,729,000
K	Expansion of Ellenburger-San Saba Aquifer Supplies - Bertram	BERTRAM	$ 2,031,000
K	Expansion of Ellenburger-San Saba Aquifer Supplies - Blanco County-Other	COUNTY-OTHER, BLANCO	$ 821,000
K	Expansion of Ellenburger-San Saba Aquifer Supplies - Burnet County Mining	MINING, BURNET	$ 13,418,000
K	Expansion of Ellenburger-San Saba Aquifer Supplies - Gillespie County Manufacturing	MANUFACTURING, GILLESPIE	$ 3,880,000
K	Expansion of Ellenburger-San Saba Aquifer Supplies - Johnson City	JOHNSON CITY	$ 1,505,000
K	Expansion of Gulf Coast Aquifer Supplies - Colorado County-Other	COUNTY-OTHER, COLORADO	$ 1,466,000
K	Expansion of Gulf Coast Aquifer Supplies - Fayette County Manufacturing	MANUFACTURING, FAYETTE	$ 2,279,000
K	Expansion of Gulf Coast Aquifer Supplies - Fayette County Mining	MINING, FAYETTE	$ 7,520,000
K	Expansion of Gulf Coast Aquifer Supplies - Fayette County-Other	COUNTY-OTHER, FAYETTE	$ 4,558,000
K	Expansion of Gulf Coast Aquifer Supplies - Flatonia	FLATONIA	$ 2,241,000
K	Expansion of Hickory Aquifer Supplies - Blanco County-Other	COUNTY-OTHER, BLANCO	$ 1,316,000
K	Expansion of Hickory Aquifer Supplies - Burnet County Mining	MINING, BURNET	$ 13,437,000
K	Expansion of Marble Falls Aquifer Supplies - Burnet County Mining	MINING, BURNET	$ 7,257,000
K	Expansion of Sparta Aquifer Supplies - Fayette County Mining	MINING, FAYETTE	$ 753,000
K	Expansion of Trinity Aquifer Supplies - Hays County Mining	MINING, HAYS	$ 4,652,000
K	Expansion of Trinity Aquifer Supplies - Lakeway	LAKEWAY	$ 2,985,000

WMS Project Sponsor Region	Project Name	Project Sponsor Entity	Capital Cost
K	Expansion of Trinity Aquifer Supplies - Manor	MANOR	$ 3,442,000
K	Expansion of Trinity Aquifer Supplies - Manville WSC	MANVILLE WSC	$ 5,431,000
K	Expansion of Trinity Aquifer Supplies - Mills County Irrigation	IRRIGATION, MILLS	$ 8,289,000
K	Hays County Pipeline - Region K Portion	COUNTY-OTHER, HAYS	$ 12,257,000
K	Hays County Pipeline - Region K Portion	DRIPPING SPRINGS WSC	$ 6,128,500
K	Hays County Pipeline - Region K Portion	WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	$ 6,128,500
K	Irrigation Conservation - On Farm	IRRIGATION, COLORADO	$ 14,210,709
K	Irrigation Conservation - On Farm	IRRIGATION, MATAGORDA	$ 52,428,108
K	Irrigation Conservation - On Farm	IRRIGATION, WHARTON	$ 30,939,183
K	Irrigation Conservation - Sprinkler	IRRIGATION, COLORADO	$ 882,039
K	Irrigation Conservation - Sprinkler	IRRIGATION, MATAGORDA	$ 2,878,654
K	Irrigation Conservation - Sprinkler	IRRIGATION, WHARTON	$ 1,780,556
K	Irrigation Operations Conveyance Improvements	IRRIGATION, COLORADO	$ 16,129,733
K	Irrigation Operations Conveyance Improvements	IRRIGATION, MATAGORDA	$ 59,508,036
K	Irrigation Operations Conveyance Improvements	IRRIGATION, WHARTON	$ 35,117,231
K	LCRA - Acquire additional water rights	LOWER COLORADO RIVER AUTHORITY	$ 125,000
K	LCRA - Enhanced Municipal and Industrial Conservation	LOWER COLORADO RIVER AUTHORITY	$ 64,099,000
K	LCRA - Excess Flows Permit Off-Channel Reservoir	LOWER COLORADO RIVER AUTHORITY	$ 298,000,000
K	LCRA - Groundwater Supply for FPP (Off-site)	LOWER COLORADO RIVER AUTHORITY	$ 20,107,000

WMS Project Sponsor Region	Project Name	Project Sponsor Entity	Capital Cost
K	LCRA - Groundwater Supply for FPP (On-site)	LOWER COLORADO RIVER AUTHORITY	$ 2,749,000
K	LCRA - Lane City Off-Channel Reservoir	LOWER COLORADO RIVER AUTHORITY	$ 218,593,000
K	LCRA - Mid-Basin Off-Channel Reservoir	LOWER COLORADO RIVER AUTHORITY	$ 298,000,000
K	LCRA - Prairie Site Off-Channel Reservoir	LOWER COLORADO RIVER AUTHORITY	$ 376,000,000
K	Marble Falls Regional Project	COTTONWOOD SHORES	$ 6,099,086
K	Marble Falls Regional Project	COUNTY-OTHER, BURNET	$ 7,649,996
K	Marble Falls Regional Project	MARBLE FALLS	$ 34,851,918
K	Municipal Conservation - Aqua WSC	AQUA WSC	$ 1,384,870
K	Municipal Conservation - Barton Creek West WSC	BARTON CREEK WEST WSC	$ 38,391
K	Municipal Conservation - Bastrop	BASTROP	$ 224,866
K	Municipal Conservation - Bay City	BAY CITY	$ 405,403
K	Municipal Conservation - Bee Cave Village	BEE CAVE	$ 137,097
K	Municipal Conservation - Bertram	BERTRAM	$ 41,421
K	Municipal Conservation - Blanco	BLANCO	$ 47,867
K	Municipal Conservation - Buda	BUDA	$ 221,686
K	Municipal Conservation - Burnet	BURNET	$ 184,386
K	Municipal Conservation - Burnet County-Other	COUNTY-OTHER, BURNET	$ 164,771
K	Municipal Conservation - Cedar Park	CEDAR PARK	$ 238,695
K	Municipal Conservation - Columbus	COLUMBUS	$ 100,974
K	Municipal Conservation - Cottonwood Shores	COTTONWOOD SHORES	$ 30,672
K	Municipal Conservation - County Other	COUNTY-OTHER, BASTROP	$ 232,736
K	Municipal Conservation - Dripping Springs	DRIPPING SPRINGS	$ $ 49,510
K	Municipal Conservation - Dripping Springs WSC	DRIPPING SPRINGS WSC	$ 68,043
K	Municipal Conservation - East Bernard	EAST BERNARD	$ 52,607

WMS Project Sponsor Region	Project Name	Project Sponsor Entity	Capital Cost
K	Municipal Conservation - Flatonia	FLATONIA	$ 37,553
K	Municipal Conservation - Fredericksburg	FREDERICKSBURG	$ 291,489
K	Municipal Conservation - Goldthwaite	GOLDTHWAITE	$ 41,809
K	Municipal Conservation - Horseshoe Bay	HORSESHOE BAY	$ 154,204
K	Municipal Conservation - Johnson City	JOHNSON CITY	$ 45,790
K	Municipal Conservation - Jonestown	JONESTOWN	$ 46,456
K	Municipal Conservation - La Grange	LA GRANGE	$ 117,647
K	Municipal Conservation - Lago Vista	LAGO VISTA	$ 187,406
K	Municipal Conservation - Lakeway	LAKEWAY	$ 544,773
K	Municipal Conservation - Llano	LLANO	$ 87,599
K	Municipal Conservation - Loop 360	LOOP 360 WSC	$ 71,683
K	Municipal Conservation - Lost Creek Mud	LOST CREEK MUD	$ 108,519
K	Municipal Conservation - Marble Falls	MARBLE FALLS	$ 221,276
K	Municipal Conservation - Meadowlakes	MEADOWLAKES	$ 64,541
K	Municipal Conservation - Pflugerville	PFLUGERVILLE	$ 1,701,900
K	Municipal Conservation - Point Venture	POINT VENTURE	$ 31,028
K	Municipal Conservation - Rollingwood	ROLLINGWOOD	$ 36,238
K	Municipal Conservation - Round Rock	ROUND ROCK	$ 36,147
K	Municipal Conservation - San Saba	SAN SABA	$ 91,823
K	Municipal Conservation - Schulenburg	SCHULENBURG	$ 78,947
K	Municipal Conservation - Shady Hollow Mud	SHADY HOLLOW MUD	$ 106,952
K	Municipal Conservation - Smithville	SMITHVILLE	$ 109,412
K	Municipal Conservation - Sunset Valley	SUNSET VALLEY	$ 31,520
K	Municipal Conservation - The Hills	THE HILLS	$ 97,374
K	Municipal Conservation - Travis County Mud #4	TRAVIS COUNTY MUD #4	$ 137,248
K	Municipal Conservation - Travis County WCID #10	TRAVIS COUNTY WCID #10	$ 171,890
K	Municipal Conservation - Travis County WCID #17	TRAVIS COUNTY WCID #17	$ 828,248
K	Municipal Conservation - Travis County WCID #18	TRAVIS COUNTY WCID #18	$ 147,665
K	Municipal Conservation - Travis County WCID #19	TRAVIS COUNTY WCID #19	$ 28,215

WMS Project Sponsor Region	Project Name	Project Sponsor Entity	Capital Cost
K	Municipal Conservation - Travis County WCID #20	TRAVIS COUNTY WCID #20	$ 38,290
K	Municipal Conservation - Weimar	WEIMAR	$ 55,778
K	Municipal Conservation - West Lake Hills	WEST LAKE HILLS	$ 112,784
K	Municipal Conservation - West Travis County PUA	WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	$ 461,454
K	Municipal Conservation - Wharton	WHARTON	$ 210,832
K	New Surface Water Infrastructure - Aqua WSC	AQUA WSC	$ 127,538,000
K	New Surface Water Infrastructure - Bastrop	BASTROP	$ 34,858,000
K	New Surface Water Infrastructure - Elgin	ELGIN	$ 61,623,000
K	New Surface Water Infrastructure - Volente	VOLENTE	$ 8,263,000

9.3 SUMMARY OF SURVEY RESPONSES

Infrastructure Financing Recommendation (IFR) surveys were generated by the Texas Water Development Board, using data provided by the individual regions. The surveys were provided to the regions for distribution, and state the following:

"As part of the state water planning process, regional water planning groups recommend water supply projects for each of their respective regions. The Texas Water Development Board (TWDB) has several funding programs for water projects that support the planning, design, and construction of water supply projects with several financing options including low-interest loans and deferral of principal and interest. Texas Water Code (TAC 16.053 (q)) requires the regional water planning groups to examine the financing needed to implement the water management strategies and projects recommended in their regional plan."

The IFR surveys were sent to each project sponsor with a recommended water management strategy containing capital costs, to gather information on how the project sponsor anticipates financing the projects recommended in the 2016 Region K Water Plan to meet current and future water demands. The survey requested contact information for the project sponsor, the amount of state funding anticipated for planning and design purposes, the amount of state funding anticipated for construction purposes, and the percent share, if any, of temporary state ownership the project sponsor anticipates.

Appendix 9A contains a table detailing the responses received as of November 12, 2015, which is the date the Region K Planning Group adopted the 2016 Region K Water Plan. The RWPG encourages project sponsors to submit their survey responses directly to the TWDB after November 12, 2015.

9.4 REGION K POLICY STATEMENTS FROM CHAPTER 8 THAT DISCUSS FUNDING

In this round of regional water planning, the RWPG has included several policy statements in Chapter 8 that discuss funding issues. These policy statements include the following:

- Support State funding for linking groundwater and surface water models by the TWDB during the development of the next generation of Groundwater Availability Models/Water Availability Models (GAMs/WAMs) with a priority for specific areas where groundwater and surface water closely relate and interact, such as concentrations of base-flow springs or stream-based recharge.

- The State should create a funding mechanism to assist with implementation of appropriate strategies to ensure environmental flows.

- Texas Legislature – Monitor the Environmental Flows Allocation Process set up by the 80th Texas Legislature through Senate Bill 3. Appropriate funding to support development of updated environmental flow standards and to support the purchase and conversion of pertinent water rights to environmental uses through voluntary transactions.

- Region K policy is to encourage new funding sources for GCDs specific to data collection and storage methods that emphasize ease of public accessibility. Region K policy is to support the funding needs of the TWDB for the maintenance and expansion of state-wide groundwater databases.

- It is Region K policy to encourage the TWDB to provide funding to facilitate GMA's role in determining groundwater availability estimates for Regional planning. Additionally, Region K supports funding for the TWDB to provide the technical assistance to the GMAs as required by SB 660.

- The LCRWPG encourages the Legislature to support funding for rural community infrastructure and water supply planning for regional planning, emergency water connections and redundant drinking supplies.

- The LCRWPG encourages the funding of research efforts to determine water savings and incorporate the information into an update of the 2004 Best Management Practices guide. This information should be aimed at providing water suppliers with useful information for developing and implementing conservation goals and successful management strategies.

- The LCRWPG encourages TWDB to aid the NRCS State Conservationist in targeting water conservation program funding to projects that offer the most water conservation benefit for the state. The TWDB should also offer expert testimony to the Agriculture Committees of both the Senate and the House regarding the need and effectiveness of water conservation accomplished through EQIP in order to highlight the ongoing need for adequate EQIP funding.

- Texas Legislature and TWDB – The LCRWPG encourages the funding of research efforts to determine water savings and incorporate the information into current and future BMPs found on the Council website.

- The LCRWPG supports the continuation and expansion of TWDB funding for retail utility water loss projects. Texas Legislature and TWDB - should market the SWIFT funding for utility water loss projects.

- LCRWPG supports water providers having the ability to set up a dedicated funding stream for water conservation programs and projects.

- The LCRWPG encourages the TSSWCB to utilize its available WSEP brush control cost-share funding to accomplish the greatest water supply enhancement for areas that are experiencing the greatest percentage reduction from average of their water supply reservoir storage levels. The LCRWPG encourages the Texas Legislature to instruct the TSSWCB to allow funding for brush control projects, via the WSEP.

- The LCRWPG recommends the State provide funding for performance of a comprehensive hydrologic study to identify and evaluate the factors that affect surface water runoff and inflows into Lakes Buchanan and Travis.

- The LCRWPG recommends the State provide funding for performance of a study to quantify the number and volume of small impoundments within the watershed, including permit-exempt impoundments, and their impacts on inflows into the Highland Lakes.

- The LCRWPG supports action by the State to continue to fund programs for the collection of water data and groundwater availability information, which remains a critical need in the planning process. The State should provide adequate, continuous funding in order to improve the collection, development, monitoring, and dissemination of such water data.

- The LCRWPG supports adequate and timely state funding for the regional water planning process. This funding is critical for the development of long-term, sustainable, environmentally protective and conservation-effective water management strategies as well as the collection of water data and groundwater availability information, including the refinement of modeling data, public information materials, and administrative assistance.

- The LCRWPG recommends the State should provide adequate funding for water treatment and radioactive waste disposal for those rural communities that may lose their water supply if such financial support is lacking.

APPENDIX 9A

TABULATED SURVEY RESULTS

Sponsor Entity Name	Sponsor Entity Primary Region	ProjectName	WMS Project Sponsor Region	IFRElementName	IFRElementValue	YearOfNeed	IFRProjectDataId	EntityRwpId	WMSProjectId	IFRProjectElementsId
AQUA WSC	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - AQUA WSC	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				184	1668	1
AQUA WSC	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - AQUA WSC	K	CONSTRUCTION FUNDING				184	1668	2
AQUA WSC	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - AQUA WSC	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				184	1668	3
AQUA WSC	K	MUNICIPAL CONSERVATION - AQUA WSC	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				184	1808	1
AQUA WSC	K	MUNICIPAL CONSERVATION - AQUA WSC	K	CONSTRUCTION FUNDING				184	1808	2
AQUA WSC	K	MUNICIPAL CONSERVATION - AQUA WSC	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				184	1808	3
AQUA WSC	K	NEW SURFACE WATER INFRASTRUCTURE - AQUA WSC	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				184	2317	1
AQUA WSC	K	NEW SURFACE WATER INFRASTRUCTURE - AQUA WSC	K	CONSTRUCTION FUNDING				184	2317	2
AQUA WSC	K	NEW SURFACE WATER INFRASTRUCTURE - AQUA WSC	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				184	2317	3
AUSTIN	K	CITY OF AUSTIN - AQUIFER STORAGE AND RECOVERY	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	87316000	2017		7	2135	1
AUSTIN	K	CITY OF AUSTIN - AQUIFER STORAGE AND RECOVERY	K	CONSTRUCTION FUNDING	225000000	2017		7	2135	2
AUSTIN	K	CITY OF AUSTIN - AQUIFER STORAGE AND RECOVERY	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			7	2135	3
AUSTIN	K	CITY OF AUSTIN - CAPTURE LOCAL INFLOWS TO LADY BIRD LAKE	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	541000	2017		7	2148	1
AUSTIN	K	CITY OF AUSTIN - CAPTURE LOCAL INFLOWS TO LADY BIRD LAKE	K	CONSTRUCTION FUNDING	2108000	2017		7	2148	2
AUSTIN	K	CITY OF AUSTIN - CAPTURE LOCAL INFLOWS TO LADY BIRD LAKE	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			7	2148	3
AUSTIN	K	CITY OF AUSTIN - DIRECT REUSE	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	155962000	2016		7	2132	1
AUSTIN	K	CITY OF AUSTIN - DIRECT REUSE	K	CONSTRUCTION FUNDING	380214000	2016		7	2132	2
AUSTIN	K	CITY OF AUSTIN - DIRECT REUSE	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			7	2132	3
AUSTIN	K	CITY OF AUSTIN - INDIRECT POTABLE REUSE THROUGH LADY BIRD LAKE	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	11970000	2020		7	2152	1
AUSTIN	K	CITY OF AUSTIN - INDIRECT POTABLE REUSE THROUGH LADY BIRD LAKE	K	CONSTRUCTION FUNDING	30000000	2020		7	2152	2
AUSTIN	K	CITY OF AUSTIN - INDIRECT POTABLE REUSE THROUGH LADY BIRD LAKE	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			7	2152	3
AUSTIN	K	CITY OF AUSTIN - LAKE LONG ENHANCED STORAGE	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	8721000	2017		7	2146	1
AUSTIN	K	CITY OF AUSTIN - LAKE LONG ENHANCED STORAGE	K	CONSTRUCTION FUNDING	22320000	2017		7	2146	2
AUSTIN	K	CITY OF AUSTIN - LAKE LONG ENHANCED STORAGE	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			7	2146	3
AUSTIN	K	CITY OF AUSTIN - LONGHORN DAM OPERATIONS IMPROVEMENTS	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	295000	2020		7	2144	1
AUSTIN	K	CITY OF AUSTIN - LONGHORN DAM OPERATIONS IMPROVEMENTS	K	CONSTRUCTION FUNDING	741000	2020		7	2144	2
AUSTIN	K	CITY OF AUSTIN - LONGHORN DAM OPERATIONS IMPROVEMENTS	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			7	2144	3
AUSTIN	K	CITY OF AUSTIN - OTHER REUSE	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	6254000	2016		7	2147	1
AUSTIN	K	CITY OF AUSTIN - OTHER REUSE	K	CONSTRUCTION FUNDING	15518000	2016		7	2147	2
AUSTIN	K	CITY OF AUSTIN - OTHER REUSE	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			7	2147	3
AUSTIN	K	CITY OF AUSTIN - RAINWATER HARVESTING	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	32929232	2020		7	2145	1
AUSTIN	K	CITY OF AUSTIN - RAINWATER HARVESTING	K	CONSTRUCTION FUNDING	84675168	2020		7	2145	2
AUSTIN	K	CITY OF AUSTIN - RAINWATER HARVESTING	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			7	2145	3
AUSTIN	K	CITY OF AUSTIN CONSERVATION	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	11798416	2016		7	2131	1
AUSTIN	K	CITY OF AUSTIN CONSERVATION	K	CONSTRUCTION FUNDING	29636021	2016		7	2131	2
AUSTIN	K	CITY OF AUSTIN CONSERVATION	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			7	2131	3
BARTON CREEK WEST WSC	K	MUNICIPAL CONSERVATION - BARTON CREEK WEST WSC	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				210	1925	1
BARTON CREEK WEST WSC	K	MUNICIPAL CONSERVATION - BARTON CREEK WEST WSC	K	CONSTRUCTION FUNDING				210	1925	2
BARTON CREEK WEST WSC	K	MUNICIPAL CONSERVATION - BARTON CREEK WEST WSC	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				210	1925	3
BASTROP	K	DEVELOPMENT OF NEW CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				213	1763	1
BASTROP	K	DEVELOPMENT OF NEW CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP	K	CONSTRUCTION FUNDING				213	1763	2
BASTROP	K	DEVELOPMENT OF NEW CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				213	1763	3
BASTROP	K	DIRECT REUSE - BASTROP	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				213	2319	1
BASTROP	K	DIRECT REUSE - BASTROP	K	CONSTRUCTION FUNDING				213	2319	2
BASTROP	K	DIRECT REUSE - BASTROP	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				213	2319	3
BASTROP	K	MUNICIPAL CONSERVATION - BASTROP	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				213	1852	1
BASTROP	K	MUNICIPAL CONSERVATION - BASTROP	K	CONSTRUCTION FUNDING				213	1852	2
BASTROP	K	MUNICIPAL CONSERVATION - BASTROP	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				213	1852	3
BASTROP	K	NEW SURFACE WATER INFRASTRUCTURE - BASTROP	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				213	2313	1
BASTROP	K	NEW SURFACE WATER INFRASTRUCTURE - BASTROP	K	CONSTRUCTION FUNDING				213	2313	2
BASTROP	K	NEW SURFACE WATER INFRASTRUCTURE - BASTROP	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				213	2313	3
BASTROP COUNTY WCID #2	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP COUNTY WCID #2	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				214	1669	1
BASTROP COUNTY WCID #2	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP COUNTY WCID #2	K	CONSTRUCTION FUNDING				214	1669	2
BASTROP COUNTY WCID #2	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP COUNTY WCID #2	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				214	1669	3
BAY CITY	K	MUNICIPAL CONSERVATION - BAY CITY	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				215	1919	1
BAY CITY	K	MUNICIPAL CONSERVATION - BAY CITY	K	CONSTRUCTION FUNDING				215	1919	2
BAY CITY	K	MUNICIPAL CONSERVATION - BAY CITY	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				215	1919	3
BEE CAVE	K	MUNICIPAL CONSERVATION - BEE CAVE VILLAGE	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2926	1929	1
BEE CAVE	K	MUNICIPAL CONSERVATION - BEE CAVE VILLAGE	K	CONSTRUCTION FUNDING				2926	1929	2
BEE CAVE	K	MUNICIPAL CONSERVATION - BEE CAVE VILLAGE	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2926	1929	3
BERTRAM	K	BUENA VISTA REGIONAL PROJECT	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				233	2258	1
BERTRAM	K	BUENA VISTA REGIONAL PROJECT	K	CONSTRUCTION FUNDING				233	2258	2
BERTRAM	K	BUENA VISTA REGIONAL PROJECT	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				233	2258	3

Sponsor Entity Name	Sponsor Entity Primary Region	ProjectName	WMS Project Sponsor Region	IFRElementName	IFRElementValue	YearOfNeed	IFRProjectDataId	EntityRwpId	WMSProjectId	IFRProjectElementsId
BERTRAM	K	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - BERTRAM	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				233	1705	1
BERTRAM	K	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - BERTRAM	K	CONSTRUCTION FUNDING				233	1705	2
BERTRAM	K	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - BERTRAM	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				233	1705	3
BERTRAM	K	MUNICIPAL CONSERVATION - BERTRAM	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				233	1872	1
BERTRAM	K	MUNICIPAL CONSERVATION - BERTRAM	K	CONSTRUCTION FUNDING				233	1872	2
BERTRAM	K	MUNICIPAL CONSERVATION - BERTRAM	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				233	1872	3
BLANCO	K	MUNICIPAL CONSERVATION - BLANCO	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				247	1869	1
BLANCO	K	MUNICIPAL CONSERVATION - BLANCO	K	CONSTRUCTION FUNDING				247	1869	2
BLANCO	K	MUNICIPAL CONSERVATION - BLANCO	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				247	1869	3
BUDA	K	BS/EACD EDWARDS / MIDDLE TRINITY ASR	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				285	2238	1
BUDA	K	BS/EACD EDWARDS / MIDDLE TRINITY ASR	K	CONSTRUCTION FUNDING				285	2238	2
BUDA	K	BS/EACD EDWARDS / MIDDLE TRINITY ASR	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				285	2238	3
BUDA	K	BS/EACD SALINE EDWARDS ASR	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				285	2241	1
BUDA	K	BS/EACD SALINE EDWARDS ASR	K	CONSTRUCTION FUNDING				285	2241	2
BUDA	K	BS/EACD SALINE EDWARDS ASR	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				285	2241	3
BUDA	K	DIRECT REUSE - BUDA	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				285	2321	1
BUDA	K	DIRECT REUSE - BUDA	K	CONSTRUCTION FUNDING				285	2321	2
BUDA	K	DIRECT REUSE - BUDA	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				285	2321	3
BUDA	K	MUNICIPAL CONSERVATION - BUDA	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				285	1908	1
BUDA	K	MUNICIPAL CONSERVATION - BUDA	K	CONSTRUCTION FUNDING				285	1908	2
BUDA	K	MUNICIPAL CONSERVATION - BUDA	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				285	1908	3
BURNET	K	BUENA VISTA REGIONAL PROJECT	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	1100000	2019		292	2258	1
BURNET	K	BUENA VISTA REGIONAL PROJECT	K	CONSTRUCTION FUNDING	6900000	2021		292	2258	2
BURNET	K	BUENA VISTA REGIONAL PROJECT	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			292	2258	3
BURNET	K	MUNICIPAL CONSERVATION - BURNET	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	150000	2020		292	1876	1
BURNET	K	MUNICIPAL CONSERVATION - BURNET	K	CONSTRUCTION FUNDING	34386	2022		292	1876	2
BURNET	K	MUNICIPAL CONSERVATION - BURNET	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			292	1876	3
COLUMBUS	K	MUNICIPAL CONSERVATION - COLUMBUS	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				348	1892	1
COLUMBUS	K	MUNICIPAL CONSERVATION - COLUMBUS	K	CONSTRUCTION FUNDING				348	1892	2
COLUMBUS	K	MUNICIPAL CONSERVATION - COLUMBUS	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				348	1892	3
COTTONWOOD SHORES	K	MARBLE FALLS REGIONAL PROJECT	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	50000	2015		364	2260	1
COTTONWOOD SHORES	K	MARBLE FALLS REGIONAL PROJECT	K	CONSTRUCTION FUNDING	650000	2015		364	2260	2
COTTONWOOD SHORES	K	MARBLE FALLS REGIONAL PROJECT	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			364	2260	3
COTTONWOOD SHORES	K	MUNICIPAL CONSERVATION - COTTONWOOD SHORES	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	0			364	1878	1
COTTONWOOD SHORES	K	MUNICIPAL CONSERVATION - COTTONWOOD SHORES	K	CONSTRUCTION FUNDING	0			364	1878	2
COTTONWOOD SHORES	K	MUNICIPAL CONSERVATION - COTTONWOOD SHORES	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			364	1878	3
COUNTY-OTHER, BASTROP	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP COUNTY-OTHER	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				377	1670	1
COUNTY-OTHER, BASTROP	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP COUNTY-OTHER	K	CONSTRUCTION FUNDING				377	1670	2
COUNTY-OTHER, BASTROP	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP COUNTY-OTHER	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				377	1670	3
COUNTY-OTHER, BASTROP	K	MUNICIPAL CONSERVATION - COUNTY OTHER	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				377	1861	1
COUNTY-OTHER, BASTROP	K	MUNICIPAL CONSERVATION - COUNTY OTHER	K	CONSTRUCTION FUNDING				377	1861	2
COUNTY-OTHER, BASTROP	K	MUNICIPAL CONSERVATION - COUNTY OTHER	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				377	1861	3
COUNTY-OTHER, BLANCO	K	BRUSH CONTROL	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				382	2255	1
COUNTY-OTHER, BLANCO	K	BRUSH CONTROL	K	CONSTRUCTION FUNDING				382	2255	2
COUNTY-OTHER, BLANCO	K	BRUSH CONTROL	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				382	2255	3
COUNTY-OTHER, BLANCO	K	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - BLANCO COUNTY-OTHER	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				382	1703	1
COUNTY-OTHER, BLANCO	K	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - BLANCO COUNTY-OTHER	K	CONSTRUCTION FUNDING				382	1703	2
COUNTY-OTHER, BLANCO	K	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - BLANCO COUNTY-OTHER	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				382	1703	3
COUNTY-OTHER, BLANCO	K	EXPANSION OF HICKORY AQUIFER SUPPLIES - BLANCO COUNTY-OTHER	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				382	1725	1
COUNTY-OTHER, BLANCO	K	EXPANSION OF HICKORY AQUIFER SUPPLIES - BLANCO COUNTY-OTHER	K	CONSTRUCTION FUNDING				382	1725	2
COUNTY-OTHER, BLANCO	K	EXPANSION OF HICKORY AQUIFER SUPPLIES - BLANCO COUNTY-OTHER	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				382	1725	3
COUNTY-OTHER, BURNET	K	BRUSH CONTROL	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				393	2255	1
COUNTY-OTHER, BURNET	K	BRUSH CONTROL	K	CONSTRUCTION FUNDING				393	2255	2
COUNTY-OTHER, BURNET	K	BRUSH CONTROL	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				393	2255	3
COUNTY-OTHER, BURNET	K	BUENA VISTA REGIONAL PROJECT	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				393	2258	1
COUNTY-OTHER, BURNET	K	BUENA VISTA REGIONAL PROJECT	K	CONSTRUCTION FUNDING				393	2258	2
COUNTY-OTHER, BURNET	K	BUENA VISTA REGIONAL PROJECT	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				393	2258	3
COUNTY-OTHER, BURNET	K	EAST LAKE BUCHANAN REGIONAL PROJECT	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				393	2259	1
COUNTY-OTHER, BURNET	K	EAST LAKE BUCHANAN REGIONAL PROJECT	K	CONSTRUCTION FUNDING				393	2259	2
COUNTY-OTHER, BURNET	K	EAST LAKE BUCHANAN REGIONAL PROJECT	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				393	2259	3

Sponsor Entity Name	Sponsor Entity Primary Region	ProjectName	WMS Project Sponsor Region	IFRElementName	IFRElementValue	YearOfNeed	IFRProjectDataId	EntityRwpId	WMSProjectId	IFRProjectElementsId
COUNTY-OTHER, BURNET	K	MARBLE FALLS REGIONAL PROJECT	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				393	2260	1
COUNTY-OTHER, BURNET	K	MARBLE FALLS REGIONAL PROJECT	K	CONSTRUCTION FUNDING				393	2260	2
COUNTY-OTHER, BURNET	K	MARBLE FALLS REGIONAL PROJECT	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				393	2260	3
COUNTY-OTHER, COLORADO	K	EXPANSION OF GULF COAST AQUIFER SUPPLIES - COLORADO COUNTY-OTHER	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				411	1719	1
COUNTY-OTHER, COLORADO	K	EXPANSION OF GULF COAST AQUIFER SUPPLIES - COLORADO COUNTY-OTHER	K	CONSTRUCTION FUNDING				411	1719	2
COUNTY-OTHER, COLORADO	K	EXPANSION OF GULF COAST AQUIFER SUPPLIES - COLORADO COUNTY-OTHER	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				411	1719	3
COUNTY-OTHER, FAYETTE	K	EXPANSION OF GULF COAST AQUIFER SUPPLIES - FAYETTE COUNTY-OTHER	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				441	1720	1
COUNTY-OTHER, FAYETTE	K	EXPANSION OF GULF COAST AQUIFER SUPPLIES - FAYETTE COUNTY-OTHER	K	CONSTRUCTION FUNDING				441	1720	2
COUNTY-OTHER, FAYETTE	K	EXPANSION OF GULF COAST AQUIFER SUPPLIES - FAYETTE COUNTY-OTHER	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				441	1720	3
COUNTY-OTHER, GILLESPIE	K	BRUSH CONTROL	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				452	2255	1
COUNTY-OTHER, GILLESPIE	K	BRUSH CONTROL	K	CONSTRUCTION FUNDING				452	2255	2
COUNTY-OTHER, GILLESPIE	K	BRUSH CONTROL	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				452	2255	3
COUNTY-OTHER, HAYS	K	BRUSH CONTROL	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				471	2255	1
COUNTY-OTHER, HAYS	K	BRUSH CONTROL	K	CONSTRUCTION FUNDING				471	2255	2
COUNTY-OTHER, HAYS	K	BRUSH CONTROL	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				471	2255	3
COUNTY-OTHER, HAYS	K	BS/EACD EDWARDS / MIDDLE TRINITY ASR	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	672727	2020		471	2238	1
COUNTY-OTHER, HAYS	K	BS/EACD EDWARDS / MIDDLE TRINITY ASR	K	CONSTRUCTION FUNDING	1600000	2030		471	2238	2
COUNTY-OTHER, HAYS	K	BS/EACD EDWARDS / MIDDLE TRINITY ASR	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			471	2238	3
COUNTY-OTHER, HAYS	K	BS/EACD SALINE EDWARDS ASR	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	900000	2020		471	2241	1
COUNTY-OTHER, HAYS	K	BS/EACD SALINE EDWARDS ASR	K	CONSTRUCTION FUNDING	2100000	2030		471	2241	2
COUNTY-OTHER, HAYS	K	BS/EACD SALINE EDWARDS ASR	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			471	2241	3
COUNTY-OTHER, HAYS	K	HAYS COUNTY FORESTAR PROJECT	L	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				471	2081	1
COUNTY-OTHER, HAYS	K	HAYS COUNTY FORESTAR PROJECT	L	CONSTRUCTION FUNDING				471	2081	2
COUNTY-OTHER, HAYS	K	HAYS COUNTY FORESTAR PROJECT	L	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				471	2081	3
COUNTY-OTHER, HAYS	K	HAYS COUNTY PIPELINE - REGION K PORTION	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	1056555	2020		471	1771	1
COUNTY-OTHER, HAYS	K	HAYS COUNTY PIPELINE - REGION K PORTION	K	CONSTRUCTION FUNDING	10682945	2030		471	1771	2
COUNTY-OTHER, HAYS	K	HAYS COUNTY PIPELINE - REGION K PORTION	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			471	1771	3
COUNTY-OTHER, LLANO	K	BRUSH CONTROL	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				516	2255	1
COUNTY-OTHER, LLANO	K	BRUSH CONTROL	K	CONSTRUCTION FUNDING				516	2255	2
COUNTY-OTHER, LLANO	K	BRUSH CONTROL	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				516	2255	3
COUNTY-OTHER, MILLS	K	BRUSH CONTROL	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				533	2255	1
COUNTY-OTHER, MILLS	K	BRUSH CONTROL	K	CONSTRUCTION FUNDING				533	2255	2
COUNTY-OTHER, MILLS	K	BRUSH CONTROL	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				533	2255	3
COUNTY-OTHER, SAN SABA	K	BRUSH CONTROL	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				572	2255	1
COUNTY-OTHER, SAN SABA	K	BRUSH CONTROL	K	CONSTRUCTION FUNDING				572	2255	2
COUNTY-OTHER, SAN SABA	K	BRUSH CONTROL	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				572	2255	3
COUNTY-OTHER, TRAVIS	K	BRUSH CONTROL	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				593	2255	1
COUNTY-OTHER, TRAVIS	K	BRUSH CONTROL	K	CONSTRUCTION FUNDING				593	2255	2
COUNTY-OTHER, TRAVIS	K	BRUSH CONTROL	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				593	2255	3
CREEDMOOR-MAHA WSC	K	BS/EACD SALINE EDWARDS ASR	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	100,000	2017		625	2241	1
CREEDMOOR-MAHA WSC	K	BS/EACD SALINE EDWARDS ASR	K	CONSTRUCTION FUNDING	3,000,000	2017		625	2241	2
CREEDMOOR-MAHA WSC	K	BS/EACD SALINE EDWARDS ASR	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			625	2241	3
DRIPPING SPRINGS	K	MUNICIPAL CONSERVATION - DRIPPING SPRINGS	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				668	1909	1
DRIPPING SPRINGS	K	MUNICIPAL CONSERVATION - DRIPPING SPRINGS	K	CONSTRUCTION FUNDING				668	1909	2
DRIPPING SPRINGS	K	MUNICIPAL CONSERVATION - DRIPPING SPRINGS	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				668	1909	3
DRIPPING SPRINGS WSC	K	HAYS COUNTY PIPELINE - REGION K PORTION	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				669	1771	1
DRIPPING SPRINGS WSC	K	HAYS COUNTY PIPELINE - REGION K PORTION	K	CONSTRUCTION FUNDING				669	1771	2
DRIPPING SPRINGS WSC	K	HAYS COUNTY PIPELINE - REGION K PORTION	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				669	1771	3
DRIPPING SPRINGS WSC	K	MUNICIPAL CONSERVATION - DRIPPING SPRINGS WSC	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				669	1912	1
DRIPPING SPRINGS WSC	K	MUNICIPAL CONSERVATION - DRIPPING SPRINGS WSC	K	CONSTRUCTION FUNDING				669	1912	2
DRIPPING SPRINGS WSC	K	MUNICIPAL CONSERVATION - DRIPPING SPRINGS WSC	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				669	1912	3
EAST BERNARD	K	MUNICIPAL CONSERVATION - EAST BERNARD	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2490	1975	1
EAST BERNARD	K	MUNICIPAL CONSERVATION - EAST BERNARD	K	CONSTRUCTION FUNDING				2490	1975	2
EAST BERNARD	K	MUNICIPAL CONSERVATION - EAST BERNARD	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2490	1975	3
ELGIN	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - ELGIN	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				698	1671	1
ELGIN	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - ELGIN	K	CONSTRUCTION FUNDING				698	1671	2
ELGIN	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - ELGIN	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				698	1671	3
ELGIN	K	NEW SURFACE WATER INFRASTRUCTURE - ELGIN	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				698	2316	1
ELGIN	K	NEW SURFACE WATER INFRASTRUCTURE - ELGIN	K	CONSTRUCTION FUNDING				698	2316	2
ELGIN	K	NEW SURFACE WATER INFRASTRUCTURE - ELGIN	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				698	2316	3
FLATONIA	K	DIRECT REUSE - FLATONIA	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				719	2320	1
FLATONIA	K	DIRECT REUSE - FLATONIA	K	CONSTRUCTION FUNDING				719	2320	2
FLATONIA	K	DIRECT REUSE - FLATONIA	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				719	2320	3
FLATONIA	K	EXPANSION OF GULF COAST AQUIFER SUPPLIES - FLATONIA	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				719	1722	1
FLATONIA	K	EXPANSION OF GULF COAST AQUIFER SUPPLIES - FLATONIA	K	CONSTRUCTION FUNDING				719	1722	2
FLATONIA	K	EXPANSION OF GULF COAST AQUIFER SUPPLIES - FLATONIA	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				719	1722	3

Sponsor Entity Name	Sponsor Entity Primary Region	ProjectName	WMS Project Sponsor Region	IFRElementName	IFRElementValue	YearOfNeed	IFRProjectDataId	EntityRwpId	WMSProjectId	IFRProjectElementsId
FLATONIA	K	MUNICIPAL CONSERVATION - FLATONIA	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				719	1900	1
FLATONIA	K	MUNICIPAL CONSERVATION - FLATONIA	K	CONSTRUCTION FUNDING				719	1900	2
FLATONIA	K	MUNICIPAL CONSERVATION - FLATONIA	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				719	1900	3
FREDERICKSBURG	K	MUNICIPAL CONSERVATION - FREDERICKSBURG	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				738	1906	1
FREDERICKSBURG	K	MUNICIPAL CONSERVATION - FREDERICKSBURG	K	CONSTRUCTION FUNDING				738	1906	2
FREDERICKSBURG	K	MUNICIPAL CONSERVATION - FREDERICKSBURG	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				738	1906	3
GOLDTHWAITE	K	GOLDTHWAITE - SAN SABA RAW WATER SUPPLY LINE	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				764	2269	1
GOLDTHWAITE	K	GOLDTHWAITE - SAN SABA RAW WATER SUPPLY LINE	K	CONSTRUCTION FUNDING				764	2269	2
GOLDTHWAITE	K	GOLDTHWAITE - SAN SABA RAW WATER SUPPLY LINE	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				764	2269	3
GOLDTHWAITE	K	GOLDTHWAITE CHANNEL DAM	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				764	2262	1
GOLDTHWAITE	K	GOLDTHWAITE CHANNEL DAM	K	CONSTRUCTION FUNDING				764	2262	2
GOLDTHWAITE	K	GOLDTHWAITE CHANNEL DAM	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				764	2262	3
GOLDTHWAITE	K	MUNICIPAL CONSERVATION - GOLDTHWAITE	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				764	1921	1
GOLDTHWAITE	K	MUNICIPAL CONSERVATION - GOLDTHWAITE	K	CONSTRUCTION FUNDING				764	1921	2
GOLDTHWAITE	K	MUNICIPAL CONSERVATION - GOLDTHWAITE	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				764	1921	3
HORSESHOE BAY	K	MUNICIPAL CONSERVATION - HORSESHOE BAY	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2939	1886	1
HORSESHOE BAY	K	MUNICIPAL CONSERVATION - HORSESHOE BAY	K	CONSTRUCTION FUNDING				2939	1886	2
HORSESHOE BAY	K	MUNICIPAL CONSERVATION - HORSESHOE BAY	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2939	1886	3
IRRIGATION, COLORADO	K	IRRIGATION CONSERVATION - ON FARM	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				922	1977	1
IRRIGATION, COLORADO	K	IRRIGATION CONSERVATION - ON FARM	K	CONSTRUCTION FUNDING				922	1977	2
IRRIGATION, COLORADO	K	IRRIGATION CONSERVATION - ON FARM	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				922	1977	3
IRRIGATION, COLORADO	K	IRRIGATION CONSERVATION - SPRINKLER	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				922	1988	1
IRRIGATION, COLORADO	K	IRRIGATION CONSERVATION - SPRINKLER	K	CONSTRUCTION FUNDING				922	1988	2
IRRIGATION, COLORADO	K	IRRIGATION CONSERVATION - SPRINKLER	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				922	1988	3
IRRIGATION, COLORADO	K	IRRIGATION OPERATIONS CONVEYANCE IMPROVEMENTS	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				922	1985	1
IRRIGATION, COLORADO	K	IRRIGATION OPERATIONS CONVEYANCE IMPROVEMENTS	K	CONSTRUCTION FUNDING				922	1985	2
IRRIGATION, COLORADO	K	IRRIGATION OPERATIONS CONVEYANCE IMPROVEMENTS	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				922	1985	3
IRRIGATION, MATAGORDA	K	IRRIGATION CONSERVATION - ON FARM	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1031	1977	1
IRRIGATION, MATAGORDA	K	IRRIGATION CONSERVATION - ON FARM	K	CONSTRUCTION FUNDING				1031	1977	2
IRRIGATION, MATAGORDA	K	IRRIGATION CONSERVATION - ON FARM	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1031	1977	3
IRRIGATION, MATAGORDA	K	IRRIGATION CONSERVATION - SPRINKLER	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1031	1988	1
IRRIGATION, MATAGORDA	K	IRRIGATION CONSERVATION - SPRINKLER	K	CONSTRUCTION FUNDING				1031	1988	2
IRRIGATION, MATAGORDA	K	IRRIGATION CONSERVATION - SPRINKLER	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1031	1988	3
IRRIGATION, MATAGORDA	K	IRRIGATION OPERATIONS CONVEYANCE IMPROVEMENTS	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1031	1985	1
IRRIGATION, MATAGORDA	K	IRRIGATION OPERATIONS CONVEYANCE IMPROVEMENTS	K	CONSTRUCTION FUNDING				1031	1985	2
IRRIGATION, MATAGORDA	K	IRRIGATION OPERATIONS CONVEYANCE IMPROVEMENTS	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1031	1985	3
IRRIGATION, MILLS	K	EXPANSION OF TRINITY AQUIFER SUPPLIES - MILLS COUNTY IRRIGATION	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1037	1733	1
IRRIGATION, MILLS	K	EXPANSION OF TRINITY AQUIFER SUPPLIES - MILLS COUNTY IRRIGATION	K	CONSTRUCTION FUNDING				1037	1733	2
IRRIGATION, MILLS	K	EXPANSION OF TRINITY AQUIFER SUPPLIES - MILLS COUNTY IRRIGATION	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1037	1733	3
IRRIGATION, WHARTON	K	IRRIGATION CONSERVATION - ON FARM	P	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1105	1273	1
IRRIGATION, WHARTON	K	IRRIGATION CONSERVATION - ON FARM	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1105	1977	1
IRRIGATION, WHARTON	K	IRRIGATION CONSERVATION - ON FARM	K	CONSTRUCTION FUNDING				1105	1977	2
IRRIGATION, WHARTON	K	IRRIGATION CONSERVATION - ON FARM	P	CONSTRUCTION FUNDING				1105	1273	2
IRRIGATION, WHARTON	K	IRRIGATION CONSERVATION - ON FARM	P	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1105	1273	3
IRRIGATION, WHARTON	K	IRRIGATION CONSERVATION - ON FARM	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1105	1977	3
IRRIGATION, WHARTON	K	IRRIGATION CONSERVATION - SPRINKLER	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1105	1988	1
IRRIGATION, WHARTON	K	IRRIGATION CONSERVATION - SPRINKLER	K	CONSTRUCTION FUNDING				1105	1988	2
IRRIGATION, WHARTON	K	IRRIGATION CONSERVATION - SPRINKLER	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1105	1988	3
IRRIGATION, WHARTON	K	IRRIGATION CONSERVATION - TAILWATER RECOVERY	P	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1105	1274	1
IRRIGATION, WHARTON	K	IRRIGATION CONSERVATION - TAILWATER RECOVERY	P	CONSTRUCTION FUNDING				1105	1274	2
IRRIGATION, WHARTON	K	IRRIGATION CONSERVATION - TAILWATER RECOVERY	P	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1105	1274	3
IRRIGATION, WHARTON	K	IRRIGATION OPERATIONS CONVEYANCE IMPROVEMENTS	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1105	1985	1
IRRIGATION, WHARTON	K	IRRIGATION OPERATIONS CONVEYANCE IMPROVEMENTS	K	CONSTRUCTION FUNDING				1105	1985	2
IRRIGATION, WHARTON	K	IRRIGATION OPERATIONS CONVEYANCE IMPROVEMENTS	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1105	1985	3
JOHNSON CITY	K	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - JOHNSON CITY	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1135	1704	1
JOHNSON CITY	K	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - JOHNSON CITY	K	CONSTRUCTION FUNDING				1135	1704	2
JOHNSON CITY	K	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - JOHNSON CITY	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1135	1704	3
JOHNSON CITY	K	MUNICIPAL CONSERVATION - JOHNSON CITY	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1135	1871	1
JOHNSON CITY	K	MUNICIPAL CONSERVATION - JOHNSON CITY	K	CONSTRUCTION FUNDING				1135	1871	2
JOHNSON CITY	K	MUNICIPAL CONSERVATION - JOHNSON CITY	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1135	1871	3
JONESTOWN	K	MUNICIPAL CONSERVATION - JONESTOWN	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1139	2213	1
JONESTOWN	K	MUNICIPAL CONSERVATION - JONESTOWN	K	CONSTRUCTION FUNDING				1139	2213	2
JONESTOWN	K	MUNICIPAL CONSERVATION - JONESTOWN	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1139	2213	3
LA GRANGE	K	MUNICIPAL CONSERVATION - LA GRANGE	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1173	1902	1
LA GRANGE	K	MUNICIPAL CONSERVATION - LA GRANGE	K	CONSTRUCTION FUNDING				1173	1902	2
LA GRANGE	K	MUNICIPAL CONSERVATION - LA GRANGE	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1173	1902	3

Sponsor Entity Name	Sponsor Entity Primary Region	ProjectName	WMS Project Sponsor Region	IFRElementName	IFRElementValue	YearOfNeed	IFRProjectDataId	EntityRwpId	WMSProjectId	IFRProjectElementsId
LAGO VISTA	K	MUNICIPAL CONSERVATION - LAGO VISTA	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1184	1950	1
LAGO VISTA	K	MUNICIPAL CONSERVATION - LAGO VISTA	K	CONSTRUCTION FUNDING				1184	1950	2
LAGO VISTA	K	MUNICIPAL CONSERVATION - LAGO VISTA	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1184	1950	3
LAKEWAY	K	EXPANSION OF TRINITY AQUIFER SUPPLIES - LAKEWAY	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1195	1734	1
LAKEWAY	K	EXPANSION OF TRINITY AQUIFER SUPPLIES - LAKEWAY	K	CONSTRUCTION FUNDING				1195	1734	2
LAKEWAY	K	EXPANSION OF TRINITY AQUIFER SUPPLIES - LAKEWAY	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1195	1734	3
LAKEWAY	K	MUNICIPAL CONSERVATION - LAKEWAY	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1195	1952	1
LAKEWAY	K	MUNICIPAL CONSERVATION - LAKEWAY	K	CONSTRUCTION FUNDING				1195	1952	2
LAKEWAY	K	MUNICIPAL CONSERVATION - LAKEWAY	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1195	1952	3
LLANO	K	DEVELOPMENT OF NEW HICKORY AQUIFER SUPPLIES - LLANO	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1476	1766	1
LLANO	K	DEVELOPMENT OF NEW HICKORY AQUIFER SUPPLIES - LLANO	K	CONSTRUCTION FUNDING				1476	1766	2
LLANO	K	DEVELOPMENT OF NEW HICKORY AQUIFER SUPPLIES - LLANO	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1476	1766	3
LLANO	K	DIRECT REUSE - LLANO	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1476	2322	1
LLANO	K	DIRECT REUSE - LLANO	K	CONSTRUCTION FUNDING				1476	2322	2
LLANO	K	DIRECT REUSE - LLANO	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1476	2322	3
LLANO	K	MUNICIPAL CONSERVATION - LLANO	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1476	1917	1
LLANO	K	MUNICIPAL CONSERVATION - LLANO	K	CONSTRUCTION FUNDING				1476	1917	2
LLANO	K	MUNICIPAL CONSERVATION - LLANO	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1476	1917	3
LOOP 360 WSC	K	MUNICIPAL CONSERVATION - LOOP 360	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1484	1955	1
LOOP 360 WSC	K	MUNICIPAL CONSERVATION - LOOP 360	K	CONSTRUCTION FUNDING				1484	1955	2
LOOP 360 WSC	K	MUNICIPAL CONSERVATION - LOOP 360	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1484	1955	3
LOST CREEK MUD	K	MUNICIPAL CONSERVATION - LOST CREEK MUD	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1490	1956	1
LOST CREEK MUD	K	MUNICIPAL CONSERVATION - LOST CREEK MUD	K	CONSTRUCTION FUNDING				1490	1956	2
LOST CREEK MUD	K	MUNICIPAL CONSERVATION - LOST CREEK MUD	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1490	1956	3
LOWER COLORADO RIVER AUTHORITY	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - LCRA	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	0			85	1673	1
LOWER COLORADO RIVER AUTHORITY	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - LCRA	K	CONSTRUCTION FUNDING	3307000	2018		85	1673	2
LOWER COLORADO RIVER AUTHORITY	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - LCRA	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			85	1673	3
LOWER COLORADO RIVER AUTHORITY	K	LCRA - ACQUIRE ADDITIONAL WATER RIGHTS	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	0			85	2129	1
LOWER COLORADO RIVER AUTHORITY	K	LCRA - ACQUIRE ADDITIONAL WATER RIGHTS	K	CONSTRUCTION FUNDING	0			85	2129	2
LOWER COLORADO RIVER AUTHORITY	K	LCRA - ACQUIRE ADDITIONAL WATER RIGHTS	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			85	2129	3
LOWER COLORADO RIVER AUTHORITY	K	LCRA - ENHANCED MUNICIPAL AND INDUSTRIAL CONSERVATION	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	0			85	2018	1
LOWER COLORADO RIVER AUTHORITY	K	LCRA - ENHANCED MUNICIPAL AND INDUSTRIAL CONSERVATION	K	CONSTRUCTION FUNDING	0			85	2018	2
LOWER COLORADO RIVER AUTHORITY	K	LCRA - ENHANCED MUNICIPAL AND INDUSTRIAL CONSERVATION	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			85	2018	3
LOWER COLORADO RIVER AUTHORITY	K	LCRA - EXCESS FLOWS PERMIT OFF-CHANNEL RESERVOIR	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	74679000	2021		85	2128	1
LOWER COLORADO RIVER AUTHORITY	K	LCRA - EXCESS FLOWS PERMIT OFF-CHANNEL RESERVOIR	K	CONSTRUCTION FUNDING	223070000	2023		85	2128	2
LOWER COLORADO RIVER AUTHORITY	K	LCRA - EXCESS FLOWS PERMIT OFF-CHANNEL RESERVOIR	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			85	2128	3
LOWER COLORADO RIVER AUTHORITY	K	LCRA - GROUNDWATER SUPPLY FOR FPP (OFF-SITE)	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	5952000	2021		85	2233	1
LOWER COLORADO RIVER AUTHORITY	K	LCRA - GROUNDWATER SUPPLY FOR FPP (OFF-SITE)	K	CONSTRUCTION FUNDING	14155000	2023		85	2233	2
LOWER COLORADO RIVER AUTHORITY	K	LCRA - GROUNDWATER SUPPLY FOR FPP (OFF-SITE)	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			85	2233	3
LOWER COLORADO RIVER AUTHORITY	K	LCRA - GROUNDWATER SUPPLY FOR FPP (ON-SITE)	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	702000	2019		85	2019	1
LOWER COLORADO RIVER AUTHORITY	K	LCRA - GROUNDWATER SUPPLY FOR FPP (ON-SITE)	K	CONSTRUCTION FUNDING	2047000	2020		85	2019	2
LOWER COLORADO RIVER AUTHORITY	K	LCRA - GROUNDWATER SUPPLY FOR FPP (ON-SITE)	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			85	2019	3
LOWER COLORADO RIVER AUTHORITY	K	LCRA - LANE CITY OFF-CHANNEL RESERVOIR	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	0			85	2090	1
LOWER COLORADO RIVER AUTHORITY	K	LCRA - LANE CITY OFF-CHANNEL RESERVOIR	K	CONSTRUCTION FUNDING	0			85	2090	2
LOWER COLORADO RIVER AUTHORITY	K	LCRA - LANE CITY OFF-CHANNEL RESERVOIR	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			85	2090	3
LOWER COLORADO RIVER AUTHORITY	K	LCRA - MID-BASIN OFF-CHANNEL RESERVOIR	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	0			85	2127	1
LOWER COLORADO RIVER AUTHORITY	K	LCRA - MID-BASIN OFF-CHANNEL RESERVOIR	K	CONSTRUCTION FUNDING	223070000	2018		85	2127	2
LOWER COLORADO RIVER AUTHORITY	K	LCRA - MID-BASIN OFF-CHANNEL RESERVOIR	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			85	2127	3
LOWER COLORADO RIVER AUTHORITY	K	LCRA - PRAIRIE SITE OFF-CHANNEL RESERVOIR	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	94279000	2021		85	2126	1
LOWER COLORADO RIVER AUTHORITY	K	LCRA - PRAIRIE SITE OFF-CHANNEL RESERVOIR	K	CONSTRUCTION FUNDING	281716000	2023		85	2126	2
LOWER COLORADO RIVER AUTHORITY	K	LCRA - PRAIRIE SITE OFF-CHANNEL RESERVOIR	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			85	2126	3
MANOR	K	EXPANSION OF TRINITY AQUIFER SUPPLIES - MANOR	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1507	1735	1
MANOR	K	EXPANSION OF TRINITY AQUIFER SUPPLIES - MANOR	K	CONSTRUCTION FUNDING				1507	1735	2
MANOR	K	EXPANSION OF TRINITY AQUIFER SUPPLIES - MANOR	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1507	1735	3
MANUFACTURING, BASTROP	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP COUNTY MANUFACTURING	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1513	1672	1
MANUFACTURING, BASTROP	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP COUNTY MANUFACTURING	K	CONSTRUCTION FUNDING				1513	1672	2
MANUFACTURING, BASTROP	K	EXPANSION OF CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP COUNTY MANUFACTURING	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1513	1672	3
MANUFACTURING, FAYETTE	K	EXPANSION OF GULF COAST AQUIFER SUPPLIES - FAYETTE COUNTY MANUFACTURING	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1555	1723	1
MANUFACTURING, FAYETTE	K	EXPANSION OF GULF COAST AQUIFER SUPPLIES - FAYETTE COUNTY MANUFACTURING	K	CONSTRUCTION FUNDING				1555	1723	2
MANUFACTURING, FAYETTE	K	EXPANSION OF GULF COAST AQUIFER SUPPLIES - FAYETTE COUNTY MANUFACTURING	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1555	1723	3

Sponsor Entity Name	Sponsor Entity Primary Region	ProjectName	WMS Project Sponsor Region	IFRElementName	IFRElementValue	YearOfNeed	IFRProjectDataId	EntityRwpId	WMSProjectId	IFRProjectElementsId
MANUFACTURING, GILLESPIE	K	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - GILLESPIE COUNTY MANUFACTURING	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1560	1707	1
MANUFACTURING, GILLESPIE	K	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - GILLESPIE COUNTY MANUFACTURING	K	CONSTRUCTION FUNDING				1560	1707	2
MANUFACTURING, GILLESPIE	K	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - GILLESPIE COUNTY MANUFACTURING	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1560	1707	3
MANVILLE WSC	K	EXPANSION OF TRINITY AQUIFER SUPPLIES - MANVILLE WSC	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1683	1736	1
MANVILLE WSC	K	EXPANSION OF TRINITY AQUIFER SUPPLIES - MANVILLE WSC	K	CONSTRUCTION FUNDING				1683	1736	2
MANVILLE WSC	K	EXPANSION OF TRINITY AQUIFER SUPPLIES - MANVILLE WSC	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1683	1736	3
MARBLE FALLS	K	MARBLE FALLS REGIONAL PROJECT	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1684	2260	1
MARBLE FALLS	K	MARBLE FALLS REGIONAL PROJECT	K	CONSTRUCTION FUNDING				1684	2260	2
MARBLE FALLS	K	MARBLE FALLS REGIONAL PROJECT	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1684	2260	3
MARBLE FALLS	K	MUNICIPAL CONSERVATION - MARBLE FALLS	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1684	1887	1
MARBLE FALLS	K	MUNICIPAL CONSERVATION - MARBLE FALLS	K	CONSTRUCTION FUNDING				1684	1887	2
MARBLE FALLS	K	MUNICIPAL CONSERVATION - MARBLE FALLS	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1684	1887	3
MEADOWLAKES	K	MUNICIPAL CONSERVATION - MEADOWLAKES	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1706	1889	1
MEADOWLAKES	K	MUNICIPAL CONSERVATION - MEADOWLAKES	K	CONSTRUCTION FUNDING				1706	1889	2
MEADOWLAKES	K	MUNICIPAL CONSERVATION - MEADOWLAKES	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1706	1889	3
MINING, BASTROP	K	DEVELOPMENT OF NEW CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP COUNTY MINING	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1734	1764	1
MINING, BASTROP	K	DEVELOPMENT OF NEW CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP COUNTY MINING	K	CONSTRUCTION FUNDING				1734	1764	2
MINING, BASTROP	K	DEVELOPMENT OF NEW CARRIZO-WILCOX AQUIFER SUPPLIES - BASTROP COUNTY MINING	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1734	1764	3
MINING, BASTROP	K	DEVELOPMENT OF NEW QUEEN CITY AQUIFER SUPPLIES - BASTROP COUNTY MINING	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1734	1768	1
MINING, BASTROP	K	DEVELOPMENT OF NEW QUEEN CITY AQUIFER SUPPLIES - BASTROP COUNTY MINING	K	CONSTRUCTION FUNDING				1734	1768	2
MINING, BASTROP	K	DEVELOPMENT OF NEW QUEEN CITY AQUIFER SUPPLIES - BASTROP COUNTY MINING	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1734	1768	3
MINING, BURNET	K	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - BURNET COUNTY MINING	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1749	1706	1
MINING, BURNET	K	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - BURNET COUNTY MINING	K	CONSTRUCTION FUNDING				1749	1706	2
MINING, BURNET	K	EXPANSION OF ELLENBURGER-SAN SABA AQUIFER SUPPLIES - BURNET COUNTY MINING	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1749	1706	3
MINING, BURNET	K	EXPANSION OF HICKORY AQUIFER SUPPLIES - BURNET COUNTY MINING	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1749	1726	1
MINING, BURNET	K	EXPANSION OF HICKORY AQUIFER SUPPLIES - BURNET COUNTY MINING	K	CONSTRUCTION FUNDING				1749	1726	2
MINING, BURNET	K	EXPANSION OF HICKORY AQUIFER SUPPLIES - BURNET COUNTY MINING	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1749	1726	3
MINING, BURNET	K	EXPANSION OF MARBLE FALLS AQUIFER SUPPLIES - BURNET COUNTY MINING	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1749	1729	1
MINING, BURNET	K	EXPANSION OF MARBLE FALLS AQUIFER SUPPLIES - BURNET COUNTY MINING	K	CONSTRUCTION FUNDING				1749	1729	2
MINING, BURNET	K	EXPANSION OF MARBLE FALLS AQUIFER SUPPLIES - BURNET COUNTY MINING	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1749	1729	3
MINING, FAYETTE	K	EXPANSION OF GULF COAST AQUIFER SUPPLIES - FAYETTE COUNTY MINING	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1790	1721	1
MINING, FAYETTE	K	EXPANSION OF GULF COAST AQUIFER SUPPLIES - FAYETTE COUNTY MINING	K	CONSTRUCTION FUNDING				1790	1721	2
MINING, FAYETTE	K	EXPANSION OF GULF COAST AQUIFER SUPPLIES - FAYETTE COUNTY MINING	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1790	1721	3
MINING, FAYETTE	K	EXPANSION OF SPARTA AQUIFER SUPPLIES - FAYETTE COUNTY MINING	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1790	1731	1
MINING, FAYETTE	K	EXPANSION OF SPARTA AQUIFER SUPPLIES - FAYETTE COUNTY MINING	K	CONSTRUCTION FUNDING				1790	1731	2
MINING, FAYETTE	K	EXPANSION OF SPARTA AQUIFER SUPPLIES - FAYETTE COUNTY MINING	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1790	1731	3
MINING, HAYS	K	BS/EACD EDWARDS / MIDDLE TRINITY ASR	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1817	2238	1
MINING, HAYS	K	BS/EACD EDWARDS / MIDDLE TRINITY ASR	K	CONSTRUCTION FUNDING				1817	2238	2
MINING, HAYS	K	BS/EACD EDWARDS / MIDDLE TRINITY ASR	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1817	2238	3
MINING, HAYS	K	EXPANSION OF TRINITY AQUIFER SUPPLIES - HAYS COUNTY MINING	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1817	1732	1
MINING, HAYS	K	EXPANSION OF TRINITY AQUIFER SUPPLIES - HAYS COUNTY MINING	K	CONSTRUCTION FUNDING				1817	1732	2
MINING, HAYS	K	EXPANSION OF TRINITY AQUIFER SUPPLIES - HAYS COUNTY MINING	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1817	1732	3
MOUNTAIN CITY	K	BS/EACD EDWARDS / MIDDLE TRINITY ASR	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				1969	2238	1
MOUNTAIN CITY	K	BS/EACD EDWARDS / MIDDLE TRINITY ASR	K	CONSTRUCTION FUNDING				1969	2238	2
MOUNTAIN CITY	K	BS/EACD EDWARDS / MIDDLE TRINITY ASR	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				1969	2238	3
PFLUGERVILLE	K	DIRECT REUSE - PFLUGERVILLE	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2066	2323	1
PFLUGERVILLE	K	DIRECT REUSE - PFLUGERVILLE	K	CONSTRUCTION FUNDING				2066	2323	2
PFLUGERVILLE	K	DIRECT REUSE - PFLUGERVILLE	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2066	2323	3
PFLUGERVILLE	K	EXPANSION OF EDWARDS (BFZ) AQUIFER SUPPLIES - PFLUGERVILLE	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2066	1708	1
PFLUGERVILLE	K	EXPANSION OF EDWARDS (BFZ) AQUIFER SUPPLIES - PFLUGERVILLE	K	CONSTRUCTION FUNDING				2066	1708	2
PFLUGERVILLE	K	EXPANSION OF EDWARDS (BFZ) AQUIFER SUPPLIES - PFLUGERVILLE	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2066	1708	3
PFLUGERVILLE	K	MUNICIPAL CONSERVATION - PFLUGERVILLE	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2066	1959	1
PFLUGERVILLE	K	MUNICIPAL CONSERVATION - PFLUGERVILLE	K	CONSTRUCTION FUNDING				2066	1959	2
PFLUGERVILLE	K	MUNICIPAL CONSERVATION - PFLUGERVILLE	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2066	1959	3

Sponsor Entity Name	Sponsor Entity Primary Region	ProjectName	WMS Project Sponsor Region	IFRElementName	IFRElementValue	YearOfNeed	IFRProjectDataId	EntityRwpId	WMSProjectId	IFRProjectElementsId
POINT VENTURE	K	MUNICIPAL CONSERVATION - POINT VENTURE	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2946	1961	1
POINT VENTURE	K	MUNICIPAL CONSERVATION - POINT VENTURE	K	CONSTRUCTION FUNDING				2946	1961	2
POINT VENTURE	K	MUNICIPAL CONSERVATION - POINT VENTURE	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2946	1961	3
ROLLINGWOOD	K	MUNICIPAL CONSERVATION - ROLLINGWOOD	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2155	1962	1
ROLLINGWOOD	K	MUNICIPAL CONSERVATION - ROLLINGWOOD	K	CONSTRUCTION FUNDING				2155	1962	2
ROLLINGWOOD	K	MUNICIPAL CONSERVATION - ROLLINGWOOD	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2155	1962	3
SAN SABA	K	MUNICIPAL CONSERVATION - SAN SABA	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	13775	2020		2182	1922	1
SAN SABA	K	MUNICIPAL CONSERVATION - SAN SABA	K	CONSTRUCTION FUNDING	78048	2021		2182	1922	2
SAN SABA	K	MUNICIPAL CONSERVATION - SAN SABA	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			2182	1922	3
SCHULENBURG	K	MUNICIPAL CONSERVATION - SCHULENBURG	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2192	1904	1
SCHULENBURG	K	MUNICIPAL CONSERVATION - SCHULENBURG	K	CONSTRUCTION FUNDING				2192	1904	2
SCHULENBURG	K	MUNICIPAL CONSERVATION - SCHULENBURG	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2192	1904	3
SHADY HOLLOW MUD	K	MUNICIPAL CONSERVATION - SHADY HOLLOW MUD	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2202	1964	1
SHADY HOLLOW MUD	K	MUNICIPAL CONSERVATION - SHADY HOLLOW MUD	K	CONSTRUCTION FUNDING				2202	1964	2
SHADY HOLLOW MUD	K	MUNICIPAL CONSERVATION - SHADY HOLLOW MUD	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2202	1964	3
SMITHVILLE	K	DEVELOPMENT OF NEW QUEEN CITY AQUIFER SUPPLIES - SMITHVILLE	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2219	2214	1
SMITHVILLE	K	DEVELOPMENT OF NEW QUEEN CITY AQUIFER SUPPLIES - SMITHVILLE	K	CONSTRUCTION FUNDING				2219	2214	2
SMITHVILLE	K	DEVELOPMENT OF NEW QUEEN CITY AQUIFER SUPPLIES - SMITHVILLE	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2219	2214	3
SMITHVILLE	K	MUNICIPAL CONSERVATION - SMITHVILLE	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2219	1865	1
SMITHVILLE	K	MUNICIPAL CONSERVATION - SMITHVILLE	K	CONSTRUCTION FUNDING				2219	1865	2
SMITHVILLE	K	MUNICIPAL CONSERVATION - SMITHVILLE	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2219	1865	3
STEAM ELECTRIC POWER, MATAGORDA	K	ALTERNATE CANAL DELIVERY - STPNOC	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2300	2324	1
STEAM ELECTRIC POWER, MATAGORDA	K	ALTERNATE CANAL DELIVERY - STPNOC	K	CONSTRUCTION FUNDING				2300	2324	2
STEAM ELECTRIC POWER, MATAGORDA	K	ALTERNATE CANAL DELIVERY - STPNOC	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2300	2324	3
STEAM ELECTRIC POWER, WHARTON	K	DEVELOPMENT OF NEW GULF COAST AQUIFER SUPPLIES - WHARTON COUNTY STEAM-ELECTRIC	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2325	1765	1
STEAM ELECTRIC POWER, WHARTON	K	DEVELOPMENT OF NEW GULF COAST AQUIFER SUPPLIES - WHARTON COUNTY STEAM-ELECTRIC	K	CONSTRUCTION FUNDING				2325	1765	2
STEAM ELECTRIC POWER, WHARTON	K	DEVELOPMENT OF NEW GULF COAST AQUIFER SUPPLIES - WHARTON COUNTY STEAM-ELECTRIC	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2325	1765	3
SUNSET VALLEY	K	BS/EACD EDWARDS / MIDDLE TRINITY ASR	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	0			2950	2238	1
SUNSET VALLEY	K	BS/EACD EDWARDS / MIDDLE TRINITY ASR	K	CONSTRUCTION FUNDING	800,000	2020		2950	2238	2
SUNSET VALLEY	K	BS/EACD EDWARDS / MIDDLE TRINITY ASR	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			2950	2238	3
SUNSET VALLEY	K	DEVELOPMENT OF NEW TRINITY AQUIFER SUPPLIES - SUNSET VALLEY	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	0			2950	1769	1
SUNSET VALLEY	K	DEVELOPMENT OF NEW TRINITY AQUIFER SUPPLIES - SUNSET VALLEY	K	CONSTRUCTION FUNDING	800,000	2025		2950	1769	2
SUNSET VALLEY	K	DEVELOPMENT OF NEW TRINITY AQUIFER SUPPLIES - SUNSET VALLEY	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			2950	1769	3
SUNSET VALLEY	K	MUNICIPAL CONSERVATION - SUNSET VALLEY	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	0			2950	1965	1
SUNSET VALLEY	K	MUNICIPAL CONSERVATION - SUNSET VALLEY	K	CONSTRUCTION FUNDING	0			2950	1965	2
SUNSET VALLEY	K	MUNICIPAL CONSERVATION - SUNSET VALLEY	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			2950	1965	3
THE HILLS	K	MUNICIPAL CONSERVATION - THE HILLS	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2364	1966	1
THE HILLS	K	MUNICIPAL CONSERVATION - THE HILLS	K	CONSTRUCTION FUNDING				2364	1966	2
THE HILLS	K	MUNICIPAL CONSERVATION - THE HILLS	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2364	1966	3
TRAVIS COUNTY MUD #4	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY MUD #4	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2854	1967	1
TRAVIS COUNTY MUD #4	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY MUD #4	K	CONSTRUCTION FUNDING				2854	1967	2
TRAVIS COUNTY MUD #4	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY MUD #4	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2854	1967	3
TRAVIS COUNTY WCID #10	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #10	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2855	1968	1
TRAVIS COUNTY WCID #10	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #10	K	CONSTRUCTION FUNDING				2855	1968	2
TRAVIS COUNTY WCID #10	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #10	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2855	1968	3
TRAVIS COUNTY WCID #17	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #17	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2379	1969	1
TRAVIS COUNTY WCID #17	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #17	K	CONSTRUCTION FUNDING				2379	1969	2
TRAVIS COUNTY WCID #17	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #17	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2379	1969	3
TRAVIS COUNTY WCID #18	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #18	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2380	1971	1
TRAVIS COUNTY WCID #18	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #18	K	CONSTRUCTION FUNDING				2380	1971	2
TRAVIS COUNTY WCID #18	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #18	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2380	1971	3
TRAVIS COUNTY WCID #19	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #19	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2381	1972	1
TRAVIS COUNTY WCID #19	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #19	K	CONSTRUCTION FUNDING				2381	1972	2
TRAVIS COUNTY WCID #19	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #19	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2381	1972	3
TRAVIS COUNTY WCID #20	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #20	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2382	1973	1
TRAVIS COUNTY WCID #20	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #20	K	CONSTRUCTION FUNDING				2382	1973	2
TRAVIS COUNTY WCID #20	K	MUNICIPAL CONSERVATION - TRAVIS COUNTY WCID #20	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2382	1973	3
VOLENTE	K	NEW SURFACE WATER INFRASTRUCTURE - VOLENTE	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2952	2311	1
VOLENTE	K	NEW SURFACE WATER INFRASTRUCTURE - VOLENTE	K	CONSTRUCTION FUNDING				2952	2311	2
VOLENTE	K	NEW SURFACE WATER INFRASTRUCTURE - VOLENTE	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2952	2311	3
WEIMAR	K	MUNICIPAL CONSERVATION - WEIMAR	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2424	1895	1
WEIMAR	K	MUNICIPAL CONSERVATION - WEIMAR	K	CONSTRUCTION FUNDING				2424	1895	2
WEIMAR	K	MUNICIPAL CONSERVATION - WEIMAR	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2424	1895	3

Sponsor Entity Name	Sponsor Entity Primary Region	ProjectName	WMS Project Sponsor Region	IFRElementName	IFRElementValue	YearOfNeed	IFRProjectDataId	EntityRwpId	WMSProjectId	IFRProjectElementsId
WEST LAKE HILLS	K	MUNICIPAL CONSERVATION - WEST LAKE HILLS	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2437	1974	1
WEST LAKE HILLS	K	MUNICIPAL CONSERVATION - WEST LAKE HILLS	K	CONSTRUCTION FUNDING				2437	1974	2
WEST LAKE HILLS	K	MUNICIPAL CONSERVATION - WEST LAKE HILLS	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2437	1974	3
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	K	HAYS COUNTY PIPELINE - REGION K PORTION	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2804	1771	1
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	K	HAYS COUNTY PIPELINE - REGION K PORTION	K	CONSTRUCTION FUNDING				2804	1771	2
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	K	HAYS COUNTY PIPELINE - REGION K PORTION	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2804	1771	3
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	K	MUNICIPAL CONSERVATION - WEST TRAVIS COUNTY PUA	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING				2804	1913	1
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	K	MUNICIPAL CONSERVATION - WEST TRAVIS COUNTY PUA	K	CONSTRUCTION FUNDING				2804	1913	2
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	K	MUNICIPAL CONSERVATION - WEST TRAVIS COUNTY PUA	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY				2804	1913	3
WHARTON	K	MUNICIPAL CONSERVATION - WHARTON	K	PLANNING, DESIGN, PERMITTING & ACQUISITION FUNDING	210832	2017		2444	1976	1
WHARTON	K	MUNICIPAL CONSERVATION - WHARTON	K	CONSTRUCTION FUNDING	0			2444	1976	2
WHARTON	K	MUNICIPAL CONSERVATION - WHARTON	K	PERCENT STATE PARTICIPATION IN OWNING EXCESS CAPACITY	0			2444	1976	3

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APPENDICES

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CHAPTER 10.0: PUBLIC INVOLVEMENT ACTIVITIES

10.1 OVERVIEW

The Lower Colorado Regional Water Planning Group (LCRWPG) made a commitment to conducting public outreach as a part of their duties as Planning Group members. The public involvement effort was led by Planning Group member Karen Haschke and a three-member Public Information and Participation Committee that she chaired. Committee members were Teresa Lutes, Haskell Simon, and Jennifer Walker.

Major aspects of this effort included:

- **Holding 18 open regular meetings of the Planning Group** for presentation of material, discussion, deliberation, voting on specific measures, and public comment between September 2011 and May 2015. Members of the public attended all of these meetings, which were posted on the Texas Secretary of State website and the Region K website in accordance with the Open Meetings Act. Every meeting included a scheduled time for public comment and questions. Nearly all of the meetings were held in Austin in Travis County, with two meetings being held at locations in Bastrop County, one meeting being held in Bay City in Matagorda County and one meeting in the City of Burnet in Burnet County.
- **Holding a public meeting to receive input by the public** on the scope of work for the 2016 Region K Water Plan. This meeting was held on April 13, 2011.
- **Serving as speakers at various civic and interest group meetings** representing a wide spectrum of interests and public opinion. These presentations took place throughout the planning period and in various counties of the region.
- **Conducting surveys** to obtain feedback on population and water demand projections and to obtain information regarding water supplies, water conservation activities, and drought management activities.
- **Maintaining a web page** with documentation and notices of meetings and discussions, with links from the LCRA home page and the Texas Water Development Board (TWDB) website.
- **Forming a Population and Water Demand Committee** in order to assist in the review, consideration, and determination of the methodology used to request revisions to the draft population and water demand projections developed by the TWDB in Chapter 2 of the Region K Plan.
- **Developing policy statements** through the Region K Legislative Committee regarding public involvement and education that have been adopted by Region K, and which are located in Chapter 8 of this report.

Once the Region K Initially Prepared Regional Water Plan was approved by the Planning Group, the Group continued required public involvement by:

- **Holding two public meetings throughout the region**, which were publicized through news releases and advertisements.
- **Holding a public hearing** to solicit public comments on the Initially Prepared Regional Water Plan.

- **Making the Initially Prepared Regional Water Plan** available to the public by placing a copy of the Initially Prepared Region K Water Plan in at least one public library in each county in the region and either the county courthouse's law library or the county clerk's office for each county in the region and counties outside the region involved in Region K recommended water management strategies. The Initially Prepared Region K Water Plan was also posted on the Region K and TWDB websites.

The activities of the Regional Water Planning Group (RWPG) members are discussed in more detail below.

10.2 PLANNING GROUP MEETINGS THROUGHOUT THE REGION

Regular Planning Group Meetings

Eighteen regular Planning Group meetings were held between September 2011 and May 2015 for presentation of material, discussion, deliberation, voting on specific measures, and public comment. These meetings were mainly held in Austin (in LCRA Dalchau Service Center), although four of the meetings were held in other locations throughout the region to enable a broader spectrum of the public to observe the work and to ask questions or comment. The LCRWPG approved the 2016 Region K Initially Prepared Plan for submittal to TWDB at the April 22, 2015 Region K meeting. *Table 10.1* provides information on the feedback and comments received at the meetings held throughout the region.

Table 10.1 LCRWPG Publicized "Local" Meetings Throughout the Region

Date	Meeting Type	Meeting Location	# Public Attending	Public Comments
9/14/2011	Lower Colorado Regional Water Planning Group Meeting	LCRA Riverside Conference Center, Bastrop	10	None
1/11/2012	Lower Colorado Regional Water Planning Group Meeting	LCRA McKinney Roughs Nature Park, Cedar Creek	16	None
4/11/2012	Lower Colorado Regional Water Planning Group Meeting	LCRA Dalchau Service Center, Austin	16	None
7/11/2012	Lower Colorado Regional Water Planning Group Meeting	LCRA Dalchau Service Center, Austin	37	Steve Box with Environmental Stewardship thanked the group for the website and posting information. Steve asked if the committee meetings could be posted and whether they are open to the public. John Burke indicated that committee meetings are not posted regular public meetings.
10/10/2012	Lower Colorado Regional Water Planning Group Meeting	LCRA Dalchau Service Center, Austin	33	None

Date	Meeting Type	Meeting Location	# Public Attending	Public Comments
1/9/2013	Lower Colorado Regional Water Planning Group Meeting	LCRA Dalchau Service Center, Austin	24	Dave Lindsay - Central Texas Water Coalition: noted a suggested clarification on Slide 6 (“Summary of Major Items from October 2012 Meeting”) as presented in AECOM’s January 9, 2013 meeting presentation. Mr. Lindsay requested that the bullet be broadened to more closely match the minutes reflecting a request for a new demand category, which was submitted, as part of the public input process, with a number of endorsements.
4/10/2013	Lower Colorado Regional Water Planning Group Meeting	LCRA Dalchau Service Center, Austin	16	None
7/10/2013	Lower Colorado Regional Water Planning Group Meeting	Burnet Community Center, Burnet	41	None
10/9/2013	Lower Colorado Regional Water Planning Group Meeting	The Center for Energy Development, Bay City	40	• Dave Lindsay reminded the group of Intera’s presentation at the last meeting and noted that it showed a dramatic drop in water availability. He stated there have been statistical studies on the significance of a disconnect in historical inflows since 2008. He encouraged the modeling committee to carefully consider recent inflows and include inflows since 2009. Jim Barho suggested David Lindsay review the guidelines for including a strategy with Jaime. • James Arnold expressed concern over not calculating changes in groundwater levels in the next 50 years, as his well has dropped dramatically, and he urges GMA representatives to include declines in groundwater levels in the plan.
1/8/2014	Lower Colorado Regional Water Planning Group Meeting	Texas State Capitol, Austin	38	None
4/9/2014	Lower Colorado Regional Water Planning Group Meeting	LCRA Dalchau Service Center, Austin	26	None
7/9/2014	Lower Colorado Regional Water Planning Group Meeting	LCRA Dalchau Service Center, Austin	22	None

Date	Meeting Type	Meeting Location	# Public Attending	Public Comments
10/8/2014	Lower Colorado Regional Water Planning Group Meeting	LCRA Dalchau Service Center, Austin	30	David Lindsay suggested studying inflows and how the drought inflows impact WAM modeling results.
1/14/2015	Lower Colorado Regional Water Planning Group Meeting	LCRA Dalchau Service Center, Austin	17	• Charlie Flatten, Hill Country Alliance, stated that the proposed Hays County WMS does not meet minimum criteria for the LCRWPG administrative procedural process, including no demonstrated specific demand, associated price, defined source, or route, stating that the Carrizo-Wilcox region is already strained. • Will Conley, Hays County Commissioner – noted that Hays County's population is rapidly growing, and there is a need to ensure long-term water sustainability. • Linda K Rodgers expressed concern about the proposal for a lack of communication and transparency, and that the purpose for it is to allow development. • Jim McMeans expressed concern over developing Central Hays County which the proposed pipeline would traverse, as it is an aquifer recharge area. He proposed an alternate pipeline route. • Stephen Ramirez, Save our Springs Alliance, encouraged a thorough discussion among the group.
2/18/2015	Lower Colorado Regional Water Planning Group Meeting	LCRA Dalchau Service Center, Austin	8	None
3/11/2015	Lower Colorado Regional Water Planning Group Meeting	LCRA Dalchau Service Center, Austin	11	None
4/8/2015	Lower Colorado Regional Water Planning Group Meeting	LCRA Dalchau Service Center, Austin	19	None
4/22/2015	Lower Colorado Regional Water Planning Group Meeting	LCRA Dalchau Service Center, Austin	11	None

Date	Meeting Type	Meeting Location	# Public Attending	Public Comments
7/8/2015	Lower Colorado Regional Water Planning Group Meeting	LCRA Dalchau Service Center, Austin	53	• Reagan Burnham expressed concerns about the proposed City of Goldthwaite channel dam project. • Dedra Reinert expressed concerns about the proposed City of Goldthwaite channel dam project.
10/14/2015	Lower Colorado Regional Water Planning Group Meeting	LCRA Dalchau Service Center, Austin	13	None
11/12/2015	Lower Colorado Regional Water Planning Group Meeting	LCRA Dalchau Service Center, Austin	N/A	None

10.3 PRESENTATION TO CIVIC AND SPECIAL-INTEREST GROUPS

Using their own materials and a standardized set of presentation materials, Planning Group members gave presentations to civic and special-interest groups. *Table 10.2* provides a summary of this outreach effort with a listing of the LCRWPG presentations to civic and special interest groups.

These presentations were made to groups composed of individuals from all types of general and special interests that were identified by the TWDB in the establishment of the RWPGs.

Table 10.2 LCRWPG Public Outreach: Presentations by Group Members to Community Groups

Presenter	Date	City	County	Community Group	Topic/Subject
Ronald Gertson	Monthly, throughout planning process		Wharton	Coastal Bend Groundwater	Update on Region K planning
John Burke	9/11/14	Fort Worth	Tarrant	H2O4Texas Conference	Region K Water Planning
Paul Tybor	3/2/15	Fredericksburg	Gillespie	Fredericksburg City Council	2016 Region K Plan Draft Chapters 2-4

10.4 REGION K ACTIVITIES

10.4.1 Population and Water Demand Committee

The Population and Water Demand Committee was formed in September 2011 in order to review the draft population and water demand projections developed by the TWDB for the 2016 regional water plans, determine whether any revisions should be requested to the TWDB for the non-municipal demand projections, and provide the projections to the municipal water user groups for their feedback on the projections. The Committee presented their recommended revision request to the RWPG for approval to submit to TWDB. TWDB then reviewed the revision requests and considered approval. More details on the revision process are provided in Chapter 2 of this report.

The committee met several times in 2012 and 2013 to review data that had been provided, and to suggest revisions to the draft TWDB demand projections, when the Committee felt the Region's demands were not being accurately quantified.

10.4.2 Advertising and Media

The LCRWPG advertised Region K regular meetings through the Secretary of State website, the Region K website, and mailouts to interested parties of meeting agendas and associated meeting materials.

10.4.3 Surveys

The Planning Group conducted two surveys to obtain feedback on population and water demand projections and to gain information regarding water supplies, water conservation, and drought management activities. These letters and surveys are summarized below, and examples of the survey letters and types of responses are contained in *Appendix 10A* and *10B*.

- The Regional Water Planning Population and Water Demand Projections survey was sent on April 24, 2013, to stakeholders in the Region K area soliciting feedback on the draft population and water demand projections developed by TWDB. The TWDB required certain types of information be submitted as support for any proposed changes to their projections. Forty responses were received from the survey. See *Appendix 10A* for an example of the survey letter and accompanying materials, and a summary of the responses.
- A survey to help identify the water supplies, and the water conservation and drought management activities used by water user groups was sent to Region K stakeholders on October 18, 2013, with a follow-up contact on October 31, 2013. Forty-one responses were received. See *Appendix 10B* for an example of the correspondence and the survey. Survey responses are available on the Region K website at http://www.regionk.org/third-regional-plannig-cycle/scope-of-work/.

10.4.4 Public Meetings and Hearing

In addition to the meetings shown earlier in *Table 10.1*, a meeting was held for the primary purpose of gaining input and answering questions from the public on Region K's grant application for the 4th cycle of regional water planning. This meeting was held on April 13, 2011.

Two public meetings and one public hearing were held to receive public comments on the Initially Prepared 2016 Region K Water Plan. The two public meetings were held in the City of Burnet and the City of Wharton, on June 25, 2015 and July 23, 2015, respectively. Comments were received at the meeting in Burnet and are provided in *Appendix 10E* along with comment responses, while no public comments were received at the meeting in Wharton.

The public hearing was held in the City of Austin on July 8, 2015, and both oral and written public comments were received. *Appendix 10C* contains the public hearing notice, the affidavits of publication, the presentation given at the public hearing, and the oral comments received.

Written comments from State agencies were received from both the TWDB and the Texas Parks & Wildlife Department. These comments, including the comment cover letter from TWDB that addresses what needs to be included in the final adopted plans, and their respective comment responses are provided in *Appendix 10D*.

Written comments were received from the public until September 15, 2015. Due to the volume of comments received, comments and comment responses from Region K are included as an electronic appendix in *Appendix 10E*. Comment response letters (included in *Attachment M* of *Appendix 10E*) were divided into two groups: letters in response to comments that generated changes to the 2016 Region K Water Plan; and letters in response to comments that were considered, but did not generate any changes.

The following is a summary of comment response letters where the comments generated a change to the 2016 Region K Water Plan:

1. Central Texas Water Coalition Comment Response – New Appendix on Highland Lakes in Chapter 1

2. City of Buda Comment Response – Direct Potable Reuse Strategy added as an alternative WMS in Chapter 5

3. City of Marble Falls Comment Response – Direct Reuse Strategy added as a recommended WMS with no capital costs in Chapter 5

4. Dave Lindsay Comment Response – New Section on Inflows to Highland Lakes in Chapter 8

5. Goldthwaite Channel Dam Comment Response (general) – Removal of Goldthwaite Channel Dam as a recommended water management strategy from Chapter 5

6. Hays County Pipeline Strategy (general) – Modification to recommended Hays County Pipeline strategy and removal of alternative version in Chapter 5

7. LCRA Comment Response – Multiple text changes throughout 2016 Region K Water Plan

8. Mary Cunningham Comment Response - New Appendix on Highland Lakes in Chapter 1 and removal of Goldthwaite Channel Dam as a recommended water management strategy

9. National Wildlife Federation Comment Response – Recommendation of Unique Stream Segments in Chapter 8

10. Sierra Club Comment Response – Recommendation of Unique Stream Segments in Chapter 8

11. STPNOC Comment Response – Water Right Permit Amendment as a recommended water management strategy in Chapter 5

10.5 RELATED OUTREACH ACTIVITIES WITHIN THE REGION K AREA BEYOND THE LCRWPG

There are several ongoing studies, workgroups, and legislative committees whose findings may affect the way water needs are met, what the requirements will be, and other factors. The following related studies are activities within the Region K area beyond the LCRWPG.

10.5.1 LCRA Water Management Plan

LCRA currently operates the Lower Colorado River under provisions of the 2010 Water Management Plan (WMP). This plan is approved by Texas Commission on Environmental Quality (TCEQ) as a condition of the LCRA's water rights permits for Lakes Buchanan and Travis, the two major water supply reservoirs in the Highland Lakes. Recommended amendments to the plan were developed through a stakeholder process that began prior to 2012 and are currently under review by TCEQ.

General information and a copy of the amendments can be found on the LCRA's website at www.lcra.org.

10.5.2 Environmental Flows Advisory Group

The 80th Texas Legislature established the Environmental Flows Advisory Group which is composed of nine members. This group is comprised of three Senate members, three House members and three public members. The public members are representatives of TCEQ, TWDB, and TPWD. This Advisory Group is tasked with balancing the demand placed on the State's water resources by the growing population and the requirements of the riverine, bay, and estuary systems. To assist them, the Advisory Group formed the Texas Environmental Flows Science Advisory Committee along with Basin and Bay Area Stakeholders Committees. Additional committee information, updates and activities can be found at TCEQ's website at: http://www.tceq.state.tx.us/permitting/water_supply/water_rights/eflows/group.html

In September 2009, the Texas Environmental Flows Advisory Group appointed members of the Colorado and Lavaca Rivers and Matagorda and Lavaca Bays Stakeholder Committee. The committee made recommendations to the TCEQ on the quantity of water needed to maintain the health of the named rivers and bays. TCEQ has adopted new environmental flow standards from the input they received from the Committee. The Committee continues to meet on a regular basis.

10.5.3 Irrigation District Advisory Panel

There are advisory panels for each of the three irrigation systems operated by LCRA: Garwood, Lakeside, and Gulf Coast. These groups are self-elected and are sponsored by LCRA. LCRA discusses with these groups anything related to LCRA's operations that is relevant to the customer groups. The discussions range from rate changes, changes in operations procedures, key projects impacting the irrigation districts, and other items that need to be communicated.

APPENDIX 10A

REGION K POPULATION AND WATER DEMAND PROJECTIONS SURVEY AND RESPONSE

Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

April 24, 2013

AUSTIN, CITY OF - AUSTIN WATER UTILITY
C/O TERESA LUTES
PO BOX 1088
AUSTIN, TX 78767-8859

**Re: Lower Colorado Regional Water Planning Area (Region K)
Draft Population and Water Demand Projections for the 2016 Regional Water Plan**

Action Required by May 31, 2013.
Please Review and Respond by mail or email:
AECOM
Attn: Jaime Burke
400 W. 15th Street, Suite 500
Austin, TX 78701

Jaime.burke@aecom.com

Dear Water User Group Representative:

The Texas Water Development Board (TWDB) has developed and released for review the **draft population and municipal water demand projections** intended for use in developing the 2016 Region K Water Plan. The Lower Colorado Regional Water Planning Group is currently reviewing the draft projections for Region K and is **seeking information from local entities** to either verify the projections appear accurate or request that the TWDB consider revising the numbers.

A map of Region K is attached your your reference. Region K comprises the following counties: Bastrop, Blanco, Burnet, Colorado, Fayette, Gillespie, Hays (partial), Llano, Matagorda, Mills, San Saba, Travis, Wharton (partial), and Williamson (partial). The 2016 Region K Water Plan will be submitted to the TWDB and will be used to compile the 2017 State Water Plan (SWP).

In support of this effort, we are asking that you review the attached draft population and demand projections for your Water User Group (WUG), coordinate with appropriate local entities, and notify Region K or the Consultant Team that either:

1. **The numbers represent reasonable projections and require no revision, or**

2. **That you would like to request revision to your projections, and you are able to *provide information to support your request*.**

As part of the 2016 RWP, the Consultant Team is currently performing tasks related to the allocation of water supply and demand for Water User Groups (WUGs) in our region to determine projected future water shortages. A WUG is associated with a demand center to which water resources can be allocated. Municipal WUGs are associated with populations and the projections of these populations are used to estimate future water demands. It is important to note that WUGs referred to as "County-Other" may include multiple, small systems that may need to be contacted regarding county-wide projections. **If you are a County Judge and have been asked to review "County-Other" projections, please coordinate with the smaller systems, municipalities and entities in your county.**

The development of representative demand projections for each WUG is crucial so that the planning process accurately reflects future demands and available water supplies, which will be utilized to develop an overview of future potential shortages. Once these potential shortages are identified, strategies will be assigned to meet needs. Identifying these needs is an essential step in properly allocating water management strategies that will eventually be included in the SWP. Projects must be consistent with the SWP to be eligible for State funding and permitting.

The draft population projections that have been provided by the TWDB and are attached to this letter for your review use the 2010 Census data as a base, which the State Demographer and TWDB staff have projected decadally through 2070. The associated municipal water demand projections rely on per capita water use as reported in the 2011 Water Use Survey to the TWDB, which was then projected and adjusted for anticipated plumbing code efficiency savings.

To assist you in reviewing the projection data, we have attached the following documents:

- Draft projected populations and water demands for all WUGs in the region (by county) for the planning period of 2020 through 2070, including each WUG's base dry year (2011) gallons per capita per day (GPCD.)
- A list of all Region K Planning Group members, their contact information, and their associated interest groups and geographic areas.
- A map of the Region K planning area.
- A document from the TWDB, titled "Projection Adjustment Criteria and Requirements", outlining the necessary data and standards that will be required when submitting projection revision requests to the TWDB.

Please note: If your WUG is located in more than one region, you will likely receive a similar request from each region. **If you have already submitted a response to another region, please let us know and we will coordinate with that region**

If no revisions are requested, please respond to confirm that so that we may document your preference.

You may contact the Consultant Team with any questions you have regarding the draft projections. In order to meet the timeline of this planning round, we would like to receive all responses with appropriate support data by **May 31, 2013.** Based on the information received, the LCRWPG will develop and consider their final revision request at the scheduled July 10th, 2013 Region K meeting. This request will then be submitted to the TWDB in August 2013.

The population and water demand projections are an important step in the regional water planning process. We appreciate your assistance in determining the most accurate numbers possible.

Consultant Team Contact Information:

AECOM
400 W. 15th Street, Suite 500
Austin, TX 78701

Ms. Jaime Burke, P.E.	Jaime.burke@aecom.com	512-457-7798
Ms. Virginia Wilkinson	Virginia.wilkinson@aecom.com	512-457-7742

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

Attachment

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Region K Draft Population and Municipal Demand (ac-ft/yr) Projections

RWPG	County	WUG Name	Census 2010	Population 2020	Population 2030	Population 2040	Population 2050	Population 2060	Population 2070	Base Dry-Year GPCD	Municipal Demands 2020	Municipal Demands 2030	Municipal Demands 2040	Municipal Demands 2050	Municipal Demands 2060	Municipal Demands 2070
K	BASTROP	AQUA WSC	43,650	56,194	73,892	96,896	128,063	170,160	226,129	156	9,228	11,837	15,313	20,116	26,683	35,432
K	BASTROP	BASTROP	7,218	9,653	13,088	17,553	23,603	31,775	42,640	191	1,957	2,598	3,446	4,612	6,201	8,317
K	BASTROP	BASTROP COUNTY WCID #2	2,579	3,943	5,867	8,368	11,757	16,334	22,420	94	378	544	765	1,069	1,482	2,033
K	BASTROP	COUNTY-OTHER	8,697	10,290	12,533	15,449	19,400	24,734	31,825	170	1,873	2,250	2,753	3,444	4,382	5,634
K	BASTROP	CREEDMOOR-MAHA WSC	170	208	262	333	429	559	732	110	24	28	35	44	57	74
K	BASTROP	ELGIN	7,226	9,247	12,099	15,806	20,828	27,612	36,631	135	1,298	1,651	2,125	2,782	3,681	4,880
K	BASTROP	LEE COUNTY WSC	627	807	1,061	1,391	1,839	2,444	3,248	93	77	97	124	161	213	283
K	BASTROP	POLONIA WSC	187	232	296	379	491	643	845	120	29	36	45	58	75	99
K	BASTROP	SMITHVILLE	3,817	4,913	6,461	8,473	11,198	14,879	19,774	164	842	1,074	1,385	1,817	2,410	3,201
K	BLANCO	BLANCO	1,739	2,156	2,563	2,802	2,927	3,010	3,060	161	365	423	456	473	486	494
K	BLANCO	CANYON LAKE WATER SERVICE COMPANY	823	1,020	1,213	1,326	1,385	1,424	1,448	119	128	150	163	169	174	177
K	BLANCO	COUNTY-OTHER	6,279	7,786	9,258	10,121	10,573	10,874	11,050	120	964	1,110	1,191	1,233	1,265	1,286
K	BLANCO	JOHNSON CITY	1,656	2,053	2,441	2,668	2,787	2,867	2,914	163	354	411	444	461	473	481
K	BURNET	BERTRAM	1,353	1,681	2,034	2,331	2,616	2,866	3,083	227	410	488	554	619	677	728
K	BURNET	BURNET	5,987	7,438	9,000	10,317	11,577	12,684	13,644	231	1,848	2,202	2,502	2,796	3,060	3,291
K	BURNET	CHISHOLM TRAIL SUD	300	372	451	517	580	635	683	174	70	83	95	106	116	124
K	BURNET	COTTONWOOD SHORES	1,123	1,395	1,688	1,935	2,171	2,379	2,559	154	227	269	304	339	371	399
K	BURNET	COUNTY-OTHER	19,530	23,991	28,787	32,833	36,701	40,099	43,048	146	3,675	4,302	4,839	5,371	5,858	6,285
K	BURNET	GRANITE SHOALS	4,910	6,100	7,381	8,461	9,494	10,402	11,189	103	653	768	868	967	1,056	1,136
K	BURNET	HORSESHOE BAY	736	1,192	1,683	2,097	2,493	2,841	3,142	569	747	1,049	1,302	1,545	1,760	1,946
K	BURNET	KEMPNER WSC	619	769	930	1,066	1,196	1,311	1,410	164	135	160	181	201	220	237
K	BURNET	KINGSLAND WSC	338	419	508	582	653	716	770	106	46	54	62	68	75	80
K	BURNET	MARBLE FALLS	6,077	7,550	9,135	10,472	11,751	12,874	13,849	250	2,031	2,419	2,748	3,070	3,360	3,613
K	BURNET	MEADOWLAKES	1,777	2,207	2,671	3,062	3,436	3,764	4,049	351	849	1,021	1,167	1,307	1,430	1,538
K	COLORADO	COLUMBUS	3,655	3,832	3,999	4,123	4,305	4,457	4,604	274	1,135	1,165	1,186	1,230	1,272	1,313
K	COLORADO	COUNTY-OTHER	11,429	11,980	12,501	12,889	13,457	13,932	14,395	119	1,475	1,485	1,489	1,530	1,579	1,631
K	COLORADO	EAGLE LAKE	3,639	3,816	3,982	4,105	4,286	4,437	4,584	132	523	527	528	543	561	579
K	COLORADO	WEIMAR	2,151	2,256	2,354	2,427	2,534	2,623	2,710	229	556	569	578	599	619	639
K	FAYETTE	AQUA WSC	21	24	27	30	31	33	34	156	4	5	5	5	6	6
K	FAYETTE	COUNTY-OTHER	9,359	10,817	12,347	13,385	14,241	14,914	15,431	112	1,236	1,352	1,425	1,495	1,561	1,615
K	FAYETTE	FAYETTE WSC	5,293	6,116	6,980	7,568	8,051	8,432	8,725	119	757	838	893	941	983	1,017
K	FAYETTE	FLATONIA	1,383	1,598	1,824	1,977	2,103	2,203	2,279	197	334	372	397	419	439	454
K	FAYETTE	LA GRANGE	4,641	5,362	6,120	6,635	7,059	7,393	7,650	154	865	959	1,020	1,075	1,123	1,162
K	FAYETTE	LEE COUNTY WSC	1,005	1,161	1,325	1,436	1,528	1,601	1,656	93	110	121	127	134	140	144
K	FAYETTE	SCHULENBURG	2,852	3,295	3,761	4,077	4,338	4,543	4,701	209	735	821	878	927	970	1,003
K	GILLESPIE	COUNTY-OTHER	14,307	15,477	16,706	17,719	18,906	19,998	21,059	114	1,823	1,898	1,962	2,065	2,177	2,291
K	GILLESPIE	FREDERICKSBURG	10,530	11,318	12,146	12,829	13,630	14,367	15,083	257	3,146	3,327	3,476	3,672	3,866	4,058
K	HAYS	AUSTIN	2	5	8	11	15	20	25	153	1	2	2	3	4	4
K	HAYS	BUDA	6,095	9,831	14,132	19,369	25,916	33,315	41,735	168	1,769	2,508	3,420	4,564	5,860	7,338
K	HAYS	CIMARRON PARK WATER COMPANY	2,055	2,216	2,402	2,628	2,911	3,230	3,593	112	256	267	284	310	343	381

Region K Draft Population and Municipal Demand (ac-ft/yr) Projections

RWPG	County	WUG Name	Census 2010	Population 2020	Population 2030	Population 2040	Population 2050	Population 2060	Population 2070	Base Dry-Year GPCD	Municipal Demands 2020	Municipal Demands 2030	Municipal Demands 2040	Municipal Demands 2050	Municipal Demands 2060	Municipal Demands 2070
K	HAYS	COUNTY-OTHER	20,249	26,343	33,544	42,361	53,384	65,839	80,016	118	3,237	4,013	4,976	6,224	7,661	9,304
K	HAYS	DRIPPING SPRINGS	1,788	2,031	2,311	2,652	3,078	3,560	4,108	219	479	537	610	704	813	938
K	HAYS	DRIPPING SPRINGS WSC	2,254	3,037	3,938	5,035	6,407	7,957	9,721	165	533	680	861	1,091	1,353	1,652
K	HAYS	GOFORTH SUD	392	789	1,246	1,803	2,499	3,285	4,180	105	85	130	185	255	334	425
K	HAYS	MOUNTAIN CITY	504	697	737	737	737	737	737	112	80	83	81	81	80	80
K	HAYS	PLUM CREEK WATER COMPANY	811	1,121	1,476	1,910	2,451	3,064	3,760	71	79	100	129	165	206	253
K	HAYS	WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	6,096	9,514	13,449	18,241	24,231	31,000	38,704	391	4,093	5,758	7,795	10,343	13,226	16,508
K	LLANO	COUNTY-OTHER	6,563	5,746	5,270	5,284	5,445	5,139	4,822	103	610	554	553	567	533	500
K	LLANO	HORSESHOE BAY	2,682	2,958	3,119	3,115	3,061	3,165	3,272	569	1,854	1,943	1,934	1,897	1,960	2,026
K	LLANO	KINGSLAND WSC	6,111	8,302	9,581	9,546	9,119	9,938	10,786	106	906	1,018	1,001	949	1,031	1,118
K	LLANO	LLANO	3,232	3,565	3,759	3,754	3,689	3,814	3,943	226	862	892	878	856	884	913
K	LLANO	SUNRISE BEACH VILLAGE	713	720	724	723	721	723	726	100	74	72	70	68	68	68
K	MATAGORDA	BAY CITY	17,614	18,797	19,786	20,420	20,911	21,259	21,508	145	2,843	2,895	2,910	2,955	2,997	3,032
K	MATAGORDA	COUNTY-OTHER	14,370	15,334	16,140	16,658	17,058	17,342	17,546	103	1,601	1,607	1,598	1,604	1,625	1,644
K	MATAGORDA	PALACIOS	4,718	5,035	5,300	5,470	5,601	5,695	5,761	130	679	691	694	700	710	718
K	MILLS	BROOKESMITH SUD	47	47	49	50	52	54	56	142	8	8	8	8	8	8
K	MILLS	COUNTY-OTHER	3,011	2,996	3,095	3,179	3,303	3,430	3,573	124	385	382	379	390	404	420
K	MILLS	GOLDTHWAITE	1,878	1,869	1,932	1,984	2,062	2,141	2,230	181	361	364	366	377	390	407
K	SAN SABA	COUNTY-OTHER	1,917	2,028	2,125	2,138	2,103	2,151	2,202	149	316	320	314	309	315	322
K	SAN SABA	RICHLAND SUD	1,115	1,179	1,235	1,242	1,222	1,251	1,280	135	168	172	169	165	168	172
K	SAN SABA	SAN SABA	3,099	3,277	3,433	3,453	3,397	3,477	3,557	319	1,138	1,178	1,174	1,149	1,175	1,202
K	TRAVIS	AQUA WSC	5,488	6,628	7,653	8,620	9,702	10,658	11,546	156	1,089	1,226	1,363	1,524	1,672	1,810
K	TRAVIS	AUSTIN	754,691	911,488	1,052,480	1,185,424	1,334,286	1,465,672	1,587,877	153	146,667	165,322	183,442	204,939	224,692	243,302
K	TRAVIS	BARTON CREEK WEST WSC	1,456	1,456	1,456	1,456	1,456	1,456	1,456	272	432	427	424	423	422	422
K	TRAVIS	BEE CAVE	3,925	4,740	5,473	6,165	6,939	7,622	8,258	340	1,777	2,043	2,297	2,582	2,834	3,070
K	TRAVIS	BRIARCLIFF	1,438	1,736	2,005	2,258	2,542	2,792	3,025	141	260	295	328	368	403	436
K	TRAVIS	CEDAR PARK	489	590	681	768	864	949	1,028	235	151	173	194	218	239	259
K	TRAVIS	COUNTY-OTHER	82,569	75,888	70,930	66,253	61,020	56,400	52,104	136	10,876	9,867	9,172	8,421	7,753	7,161
K	TRAVIS	CREEDMOOR-MAHA WSC	4,416	5,333	6,158	6,936	7,807	8,576	9,291	110	592	653	714	792	868	939
K	TRAVIS	ELGIN	909	1,788	2,578	3,323	4,157	4,893	5,578	135	251	352	447	556	653	744
K	TRAVIS	GOFORTH SUD	64	77	89	100	113	124	134	105	9	10	11	12	13	14
K	TRAVIS	JONESTOWN	1,834	1,987	2,125	2,255	2,400	2,528	2,647	192	408	428	448	473	497	521
K	TRAVIS	LAGO VISTA	6,041	7,580	8,964	10,269	11,730	13,020	14,220	228	1,868	2,185	2,488	2,832	3,140	3,428
K	TRAVIS	LAKEWAY	11,391	14,793	17,852	20,736	23,965	26,815	29,466	337	5,449	6,524	7,548	8,705	9,733	10,693
K	TRAVIS	LEANDER	1,077	2,158	3,130	4,046	5,072	5,977	6,819	114	258	368	473	591	696	793
K	TRAVIS	LOOP 360 WSC	1,900	1,998	2,086	2,169	2,262	2,344	2,420	532	1,174	1,220	1,264	1,316	1,363	1,407

Region K Draft Population and Municipal Demand (ac-ft/yr) Projections

RWPG	County	WUG Name	Census 2010	Population 2020	Population 2030	Population 2040	Population 2050	Population 2060	Population 2070	Base Dry-Year GPCD	Municipal Demands 2020	Municipal Demands 2030	Municipal Demands 2040	Municipal Demands 2050	Municipal Demands 2060	Municipal Demands 2070
K	TRAVIS	LOST CREEK MUD	3,726	4,369	4,369	4,369	4,369	4,369	4,369	234	1,092	1,072	1,057	1,056	1,054	1,054
K	TRAVIS	MANOR	5,037	8,884	12,343	15,605	19,258	22,482	25,480	122	1,141	1,559	1,959	2,410	2,810	3,183
K	TRAVIS	MANVILLE WSC	14,213	19,152	23,593	27,780	32,469	36,607	40,456	148	2,984	3,604	4,201	4,885	5,499	6,074
K	TRAVIS	MUSTANG RIDGE	434	459	481	502	525	546	565	129	62	63	64	66	69	71
K	TRAVIS	NORTH AUSTIN MUD #1	780	780	780	780	780	780	780	101	82	79	77	75	75	75
K	TRAVIS	NORTHTOWN MUD	8,505	10,272	11,860	13,359	15,036	16,517	17,894	60	691	798	898	1,011	1,111	1,203
K	TRAVIS	PFLUGERVILLE	46,636	77,054	104,405	130,195	159,073	184,561	208,268	155	12,775	17,105	21,243	25,896	30,012	33,851
K	TRAVIS	POINT VENTURE	800	1,181	1,524	1,847	2,209	2,528	2,825	270	347	443	534	638	729	815
K	TRAVIS	ROLLINGWOOD	1,412	1,421	1,429	1,436	1,444	1,451	1,458	250	384	379	376	375	376	378
K	TRAVIS	ROUND ROCK	1,362	1,649	1,907	2,150	2,422	2,662	2,885	152	265	301	336	377	414	448
K	TRAVIS	SHADY HOLLOW MUD	4,889	4,889	4,889	4,889	4,889	4,889	4,889	151	779	758	741	731	730	730
K	TRAVIS	SUNSET VALLEY	749	1,134	1,480	1,806	2,171	2,494	2,794	312	386	499	606	727	834	934
K	TRAVIS	THE HILLS	2,472	3,000	3,000	3,000	3,000	3,000	3,000	438	1,449	1,444	1,441	1,439	1,438	1,438
K	TRAVIS	TRAVIS COUNTY MUD #4	2,578	3,113	3,595	4,049	4,557	5,006	5,424	755	2,611	3,010	3,387	3,810	4,184	4,533
K	TRAVIS	TRAVIS COUNTY WCID #10	5,083	6,139	7,088	7,984	8,986	9,871	10,694	319	2,128	2,428	2,715	3,044	3,341	3,619
K	TRAVIS	TRAVIS COUNTY WCID #17	20,735	25,042	28,916	32,569	36,659	40,269	43,626	236	6,419	7,339	8,222	9,227	10,124	10,964
K	TRAVIS	TRAVIS COUNTY WCID #18	5,512	6,657	7,686	8,657	9,745	10,704	11,597	160	1,123	1,267	1,407	1,573	1,725	1,867
K	TRAVIS	TRAVIS COUNTY WCID #19	716	716	716	716	716	716	716	628	498	496	494	493	493	493
K	TRAVIS	TRAVIS COUNTY WCID #20	1,140	1,140	1,140	1,140	1,140	1,140	1,140	469	590	587	584	583	582	582
K	TRAVIS	VOLENTE	520	677	818	951	1,100	1,232	1,354	110	76	89	101	116	130	142
K	TRAVIS	WELLS BRANCH MUD	10,488	10,488	10,488	10,488	10,488	10,488	10,488	189	2,131	2,098	2,074	2,060	2,056	2,056
K	TRAVIS	WEST LAKE HILLS	3,063	3,699	4,271	4,811	5,415	5,948	6,444	388	1,564	1,786	1,998	2,241	2,460	2,665
K	TRAVIS	WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY	4,555	5,501	6,352	7,154	8,053	8,846	9,583	391	2,367	2,720	3,057	3,438	3,774	4,088
K	TRAVIS	WILLIAMSON-TRAVIS COUNTY MUD #1	1,173	1,416	1,635	1,842	2,073	2,278	2,468	126	185	208	231	258	283	307
K	WHARTON	COUNTY-OTHER	14,489	15,374	16,359	17,148	17,831	18,461	19,019	126	1,993	2,034	2,071	2,147	2,217	2,283
K	WHARTON	EAST BERNARD	2,272	2,411	2,566	2,690	2,797	2,896	2,983	149	380	395	406	418	432	445
K	WHARTON	EL CAMPO	25	27	29	30	31	32	33	178	6	6	6	6	6	6
K	WHARTON	WHARTON	8,832	9,372	9,974	10,454	10,870	11,254	11,594	169	1,671	1,728	1,772	1,827	1,888	1,944
K	WILLIAMSON	AUSTIN	35,697	45,505	57,164	70,943	85,781	102,609	121,072	153	7,323	8,980	10,979	13,176	15,731	18,552
K	WILLIAMSON	COUNTY-OTHER	12,306	17,731	24,181	24,181	24,181	24,181	24,181	148	2,736	3,658	3,623	3,605	3,599	3,597
K	WILLIAMSON	NORTH AUSTIN MUD #1	7,442	7,442	7,442	7,442	7,442	7,442	7,442	101	774	748	726	714	711	711

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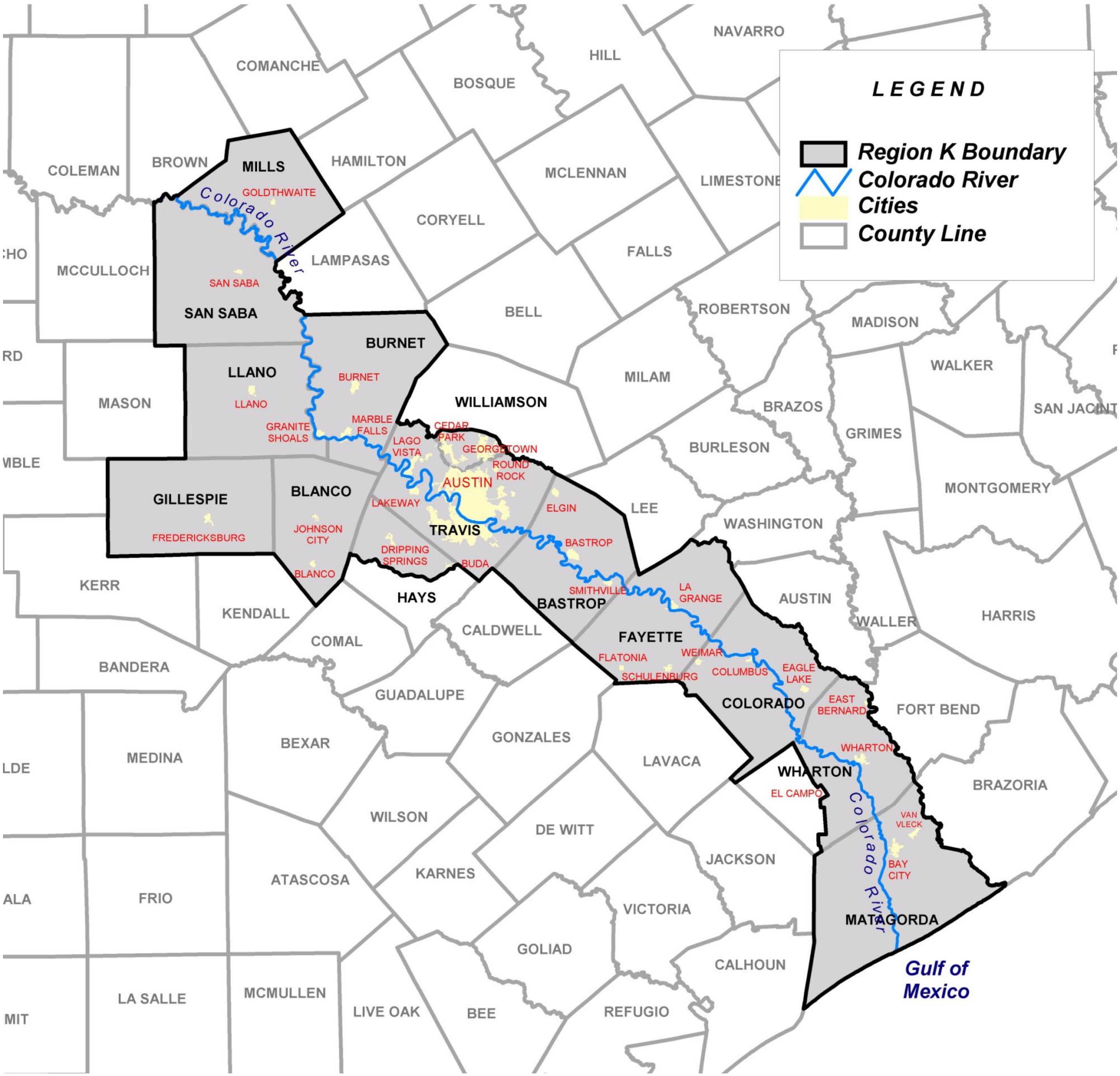
Member List for Lower Colorado Regional Planning Group (Region K)

Voting Member	Interest Group Represented	County	Email
John E. Burke (Chair)	Water Utilities	Bastrop	JohnEBurke@RegionK.org
Jim Barho (Vice-Chair)	Environmental (Protect Lakes Inks-Buchanan Association)	Burnet	JimBarho@RegionK.org
Teresa Lutes (Secretary)	Municipalities	Travis	TeresaLutes@RegionK.org
Jim Brasher	Groundwater Management Area 15	Colorado	JimBrasher@RegionK.org
Joe P. Cooper	Groundwater Management Area 12	Bastrop	JoePCooper@RegionK.org
John T. Dupnik	Groundwater Management Area 10	Travis	JohnDupnik@RegionK.org
Ronald G. Fieseler	Groundwater Management Area 9	Blanco	RonaldFieseler@RegionK.org
Ronald Gertson	Small Businesses	Wharton	RonaldGertson@RegionK.org
Karen Haschke	Public Interest	Travis	KarenHaschke@RegionK.org
Barbara Johnson	Industries	Travis	BarbaraJohnson@RegionK.org
Joe King	Electric Generating Utilities	Matagorda	JoeKing@RegionK.org
Bill Neve	County Interests	Burnet	BillNeve@RegionK.org
Doug Powell	Recreation	Travis	DougPowell@RegionK.org
Mike Reagor	Small Municipalities	Llano	MikeReagor@RegionK.org
W.A. (Billy) Roeder	County Interests	Gillespie	BillyRoeder@RegionK.org
Rob Ruggiero	Small Businesses	Travis	RobRuggiero@RegionK.org
Haskell Simon	Agriculture (Rice Industry Farmer)	Matagorda	HaskellSimon@RegionK.org
James Sultemeier	County Interests	Blanco	JamesSultemeier@RegionK.org
Bryon Theodosis	County Interests	San Saba	BryonTheodosis@RegionK.org
Paul Tybor	Groundwater Management Area 7	Gillespie	PaulTybor@RegionK.org
David VanDresar	Groundwater Districts	Fayette	DavidVanDresar@RegionK.org
Jennifer Walker	Environmental	Travis	JenniferWalker@RegionK.org
Brandon Wade	Small Municipalities	Williamson	BrandonWade@RegionK.org
Vacant	River Authority	N/A	N/A
Vacant	Groundwater Management Area 8	N/A	N/A

Non Voting Member	Agency		Email
David Bradsby	Texas Parks and Wildlife		DavidBradsby@RegionK.org
Richard Eyster	Texas Department of Agriculture		RichardEyster@RegionK.org
David Meesey	Texas Water Development Board		DavidMeesey@RegionK.org

Where is Region K (Lower Colorado Region)?



AECOM

Projection Adjustment Criteria and Requirements – Provided by Texas Water Development Board March 5, 2013

The following are criteria for adjusting population and water demand projections and the associated data requirements. Such criteria and requirements supersede criteria and data-requirement information previously described in the General Guidelines for Regional Water Plan Development (2011-2016).

Population Projections

County-Level Population
TWDB staff will project population by decade for each county in the State and then sum the county populations to a regional total. Any adjustments to a county-level population must involve a justifiable redistribution of projected county populations within the region so that the summed regional total remains the same.

Criteria for Adjustment
One or more of the following criteria must be verified by the Planning Group and the Executive Administrator for consideration of revising the county population projections:

a) A possible Census undercount took place in the county and action is currently being pursued to request a Census Bureau correction.
b) If there is evidence that the 2010-2020 net migration rate will be significantly different than the net migration rate used for the original projection.
c) There are statistically significant birth and survival rate differences (by appropriate cohorts) between the county and the State.

Data Requirements
The Planning Group must provide the following data associated with the identified criteria to the Executive Administrator for justifying any adjustments to the county-level population projections:

1. Documentation of an action requesting the Census Bureau correct an undercount of population within a county.
2. Projected in-migration and out-migration of a county, indicating that the net migration of a county will be significantly different than the net migration rates previously used.
3. Birth and/or survival rates for a county population between 2000-2010 by gender, race/ethnicity and single-year age cohorts.
4. Other data that the Planning Group believes is important to justify any changes to the population projections.

Water User Group Population
The projected population growth throughout the planning period for the cities, utilities and rural area (county-other) within a county is a function of a number of factors, including the entity's share of the county's growth between 2000 and 2010, as well as local information provided by Planning Groups. The total county population, as projected by TWDB (or through an acceptable redistribution as outlined in the above section) will act as a control total for the populations within the county. Any adjustments to a city,

utility or remaining County-Other population must involve a justifiable redistribution of projected populations within the county so that the county total remains the same.

Criteria for Adjustment

One or more of the following criteria must be verified by the Planning Group and the Executive Administrator for consideration of adjusting the WUG population projections:

a. Official adjustment to the census population for a city or an adjustment to the population estimate for non-city municipal WUGs (utilities or collective reporting units)
b. The population growth rate for a city, utility or county-other over the most recent five years is substantially greater than the growth rate between 2000 and 2010.
c. Identification of areas that have been annexed by a city since the 2010 Census.
d. Identification of the expansion of a utility's CCN or service area since April 2010
e. Identification of growth limitations or build-out conditions in a city or utility that would result in maximum population that is less than was originally projected.

Data Requirements

The Planning Group must provide the following data associated with the identified criteria to the Executive Administrator for justifying any adjustment to the Water User Group population projections:

1. Population estimates for cities developed and published by the State Data Center or by a regional council of governments will be used to verify criteria (b) for cities.
2. The verified number of residential connections and permanent population served will be used to verify criteria (a or b) for utilities.
3. The estimated population of an area that has been annexed by a city (for criteria c) or has become part of a CCN or service area for a water utility (for criteria d). In addition, the geographical boundary of the area must be presented in an acceptable map or ArcView shapefile.
4. Documentation from an official of a city or utility describing the conditions expected to limit population growth and estimating the maximum expected population will be used to verify criteria (d).
5. Other data that the Planning Group believes is important to justify any changes to the population projections.

Municipal Water Demand Projections

Criteria for Adjustment

One or more of the following criteria must be verified by the Planning Group and the Executive Administrator for consideration of revising the municipal water demand projections:

1. Errors identified in the reporting of 2011 municipal water use for an entity.
2. Evidence that the dry year water use was abnormal due to temporary physical infrastructure constraints.
3. Evidence that areas where rapid population growth and associated increasing commercial and institutional development are projected might require a higher GPCD in the future than in the base year. This option should be requested only in very limited circumstances and will be closely scrutinized.
4. Evidence that the number of fixture installations to water-efficient fixtures between 2000 and 2010 is different than the TWDB schedule.

Data Requirements

The Planning Group must provide the following data associated with the identified criteria to the Executive Administrator of the TWDB for justifying any adjustments to the municipal water demand projections:

1. Annual municipal water production (total surface water diversions and/or groundwater pumpage and water purchased from other entities) for an entity measured in acre-feet.
2. The volume of water sales by an entity to other water users (cities, industries, water districts, water supply corporations, etc.) measured in acre-feet.
3. Net annual municipal water use, defined as total water production less sales to other water users (cities, industries, water districts, water supply corporations, etc.) measured in acre feet.
4. Documentation of temporary physical infrastructure constraints.
5. Documentation of the number of water-efficient fixtures replaced between 1990 and 2010.
6. To justify a request for increasing per capita water use for a city or rural area of a county, the following data must be provided with the request from the Planning Group:
   a) Historical per capita water use estimates based on net annual municipal water use for the city, utility or rural area of a county, beginning in 2000.
   b) A trend analysis which must take into account the variation in annual rainfall.
   c) Revised projections of per capita water use for a city, utility or rural area of a county will be submitted by the Planning Group, where an increasing trend in per capita water use has been verified for a city or rural area of a county.
   d) Growth data in the residential, commercial and/or public sectors that would justify an increase in per capita water use.
7. Other data the Planning Group believes is important to justify any adjustments to the State Water Plan municipal water use projections.

Population and Water Demand Revision Requests
Responses received from Region K Water User Groups
July 5, 2013

WATER SYSTEM		Action requested	Response received
BAY CITY, CITY OF		No revisions requested	Email received from Barry Calhoun, Director of Public Works, on 5/31/13.
BERTRAM, CITY OF		No revisions requested	Email received May 31, 2013 from Evan Milliom.
BLANCO, CITY OF		No revisions requested	Email received 5/7/13 from Nathan Cantrell (Public Works Director.)
BROOKSMITH SUD		No revisions requested	Email received 4/26/2013 from Garrett Hager asking questions. No revisions were ever requested.
DRIPPING SPRINGS WATER SUPPLY CORP		No revisions requested	Email from Greg Perrin May 29, 2013.
EAGLE LAKE, CITY OF		No revisions requested	Email from Keith Webb May 23, 2013, no revisions requested but possible later year growth due to vicinity to Houston metro. No need for changes, no support data at this time.
FAYETTE W S C		No revisions requested	Response by email on 4/29/13, Jim Rebecek is GM and said the numbers look fine. No changes.
FREDERICKSBURG, CITY OF		No revisions requested	Kent Myers emailed April 30, 2013, also via Paul Tybor email on 3/14/13 they concur with projections as they are.
LA GRANGE, CITY OF		No revisions requested	Email received June 21 from Shawn Raborn, City Manager confirming "Numbers are reasonable and require no revision."
LOOP 360 WATER SUPPLY CORP		No revisions requested	Email received June 24 by Ronald Poe, numbers are okay.
MANVILLE WATER SUPPLY CORPORATION		No revisions requested	Email received on 5/31/13 from Rexanne Pilkenton.
PALACIOS, CITY OF		No revisions requested	Email received May 28, 2013 from David Kocurek, Acting City Manager.
PFLUGERVILLE, CITY OF	Received letter stating they wish to keep their projections as they are.	No revisions requested	Call from Tom Ray (LAN - 254-855-0880) and Gary Oradat, asking for more info on how projections were developed; will meet with TWDB May 9.
RICHLAND SPECIAL UTILITY DISTRICT		No revisions requested	Called on 4/29/13. Mentioned that all pumping for Richland SUD is from San Saba County, then piped over to McCulloch.
SAN SABA, CITY OF		No revisions requested	Confirmed by letter received May 8, 2013.
TRAVIS COUNTY		No revisions requested	Letter from Jon White, received on May 31 by email.
VILLAGE OF THE HILLS		No revisions requested	Dan Roark email reply April 25, 2013.
WEST TRAVIS COUNTY PUBLIC UTILITY AGENCY		No revisions requested	Response received by email May 25, 2013 Don Rauschuber emailed initially April 25, saying he will review and comment.
WILLIAMSON COUNTY		No revisions requested	Email received May 29, 2013 from Richard Semple confiming "projections are reasonable."
SCHULENBURG, CITY OF	Determined that no changes are needed for manufacturing.	No revisions requested, possible research needed for manufacturing	Email from Don Doering May 24, 2013 stating population projections. Noted several new manufacturing operations (shifts at backeries/food plan/muffler plant) and wastewater expansion. Appears to be included in manufacturing projections, but need confirmation.
BUDA, CITY OF	Sent email to LAN and City stating that demand revisions were unlikely without population changes, but to let us know if they had any issues with their population projections.	Demand revisions downward	Email received May 23 notes that demands compared to HCPUA are not significantly higher but raised concern about "double counting" between K and L.
CIMARRON PARK WATER COMPANY INC	Okay to reduce numbers, possibly put pop in Austin-Hays	Revisions downward	Response by letter received 5/23/2013, Population close to build out (so overestimated per TWDB); permitted historical pumpage is 363 acre-feet/year and no plans to reduce this.
KEMPNER WSC	Call or email to confirm, possibly reduce population and move to County Other or Horseshoe Bay.	Revision downward	Email received from Dolores Goode General Manager, "we only serve approximately 10 meters in Burnet County. We don't have any projected needs in your area."
MOUNTAIN CITY		Revisions downward	Received mark-up buildout by mail June 21, 2013. Scanned for folder. Buildout showing 680 total (Region K 490, Region L 190.)
WESTLAKE HILLS, CITY OF	Keep at 2020 population to indicate buildout	Revisions downward	Email from Robert Wood, city administrator, on May 31. City is nearly built out. 2020 populations should remain constant.
WILLIAMSON-TRAVIS CO MUD NO 1	Keep at 2010 population 1,173 to indicate buildout	Revisions downward	Email response from Hector Alanis on May 30, 2013, Population may be too high, MUD is built-out, currently serves 1950 water connections. 2010 Census population is 1,173. Coordinating with Region G.
AUSTIN, CITY OF - AUSTIN WATER UTILITY	Request higher population, possibly 1.0 scenario for Travis Co through 2040, transferring some population into COA; Teresa is looking at GPCD value changes - data not yet available	Revisions upward	Teresa Lutes in receipt and working on, Potential revisions to note higher GPCD for base year and more gradual decline in GPCD over time to reflect plumbing updates.
BASTROP COUNTY	Request higher population, possibly 1.0 scenario for Bastrop Co through 2040, as will be approved in CAMPO numbers	Revisions upward	Rachel Clampfer confirmed that higher projections are anticipated early in the planning horizon (based on SDC 1.0 scenario and anticipated values for CAMPO 2040 plan.) Ms. Clampfer is following up with Kevin Kluge and will draft appropriate letter to formalizing request. Did provide comparison including new CAMPO projections.
BASTROP, CITY OF		Revisions upward	Received letter from City requesting to grow at 1.0 scenario.
BEE CAVE, CITY OF	Received some data, but City did not provide specifics on what numbers they were asking for.	Revisions upward	Email received May 23, 2013 from Fank Salvato stating Census undercount possible. Requested Lindsey Withrow to send supporting documentation for population, but not yet received.
CEDAR PARK, CITY OF	Some Travis Co other population to be shifted to Cedar Park through 2040, then held constant to reflect buildout	Revisions upward	Email sent May 24 from Kenneth Wheeler, provided projections documentation. Suspects population included in Travis County-Other but needs to be incoproated in Cedar Park. Build out expected in 2040, past that population expected to be constant through 2070.
HORSESHOE BAY, CITY OF	Contacted Bill Neve and Jim Barho. Bill Neve spoke with Stan Farmer - said he would send backup data - have not yet received any.	Revisions upward	Email from Stan Farmer, May 23, 2013 requests revisions to reflect additional growth rate and increase in non-resident population during high season. Internal projections of water demand also provided.
JONESTOWN, CITY OF	No backup data received.	Revisions upward	Email received 5/22/2013 from Marilee Pfannstiel, requested we call to discuss results. Extensive phone converation 5/23/13…..waiting for support data to justify upward revision of population and/or demand.
LAGO VISTA, CITY OF	Based on information provided, suggest keeping projections as-is.	Revisions upward	Email communication from Frank Robbins, Lago Vista anticipates faster growth than shown. Lago Vista has 8000 vacant lots and 200 newly platted lots in new sudivision "Tessera", but no building permits yet. No specific growth scenario changes were requested.

Population and Water Demand Revision Requests
Responses received from Region K Water User Groups
July 5, 2013

WATER SYSTEM		Action requested	Response received
LAKEWAY, CITY OF	19,000 population by 2020. Buildout at 25,000 by 2030.	Revisions upward	Email from Steven Jones May 9 stating population is understated, project 2020 population of 19,000 vs. TWDB 14,793. Additional information provided in Chessie Zimmerman email on May 31.
LEANDER, CITY OF	Requested significant changes to population projections. Coordinated with Region G to determine possibly acceptable increases.	Revisions upward	Emailed May 31, 2013 asking to submit early the week of June 3.
MARBLE FALLS, CITY OF	Burnet-Llano County Study provides population projections in between TWDB projections and City's request.	Revisions upward	Email received from Ralph Hendricks on April 9, 2013. Provided data related to expected LUEs. Essentially, asking for 23,000 population by 2038.
PLUM CREEK WATER COMPANY	Area of PCWC within Region K is small - recommend keeping Region K numbers the same as TWDB projections.	Revisions upward	Primary location in Region L, conversation with Brian Perkins - Email from Tim Williford May 2, 2013 indicates population of 12,350 with 4,450 connections by 2020 - substantially higher than TWDB projections.
TRAVIS CO WCID NO 17	Recommend projections in between TWDB and requested.	Revisions upward	Response 5/20/2013 from Deborah S. Gernes via emal and mail requesting revisions, Extensive discussion regarding concerns that numbers are too low for population.
WELLS BRANCH MUD NO 1	Increased for 2020 based on incorrect Census (2010) numbers and current construction.	Revisions upward	Email received on 5/21/13 from Shirley Ross, Said numbers looked low…building new multifamily units…working with them to determine revisions…TWDB confirmed on 05/23/13 that this is NOT a split WUG with Region G and is wholey within Region K.
AQUA WATER SUPPLY CORPORATION		No response received	
BARTON CREEK WEST WATER SUPPLY CO		No response received	
BASTROP COUNTY WCID NO 2		No response received	
BLANCO COUNTY		No response received	
BURNET COUNTY		No response received	
BURNET, CITY OF		No response received	
CANYON LAKE WSC		No response received	
CHISHOLM TRAIL S U D		No response received	
COLORADO COUNTY		No response received	
COLUMBUS, CITY OF		No response received	
COTTONWOOD SHORES, CITY OF		No response received	
CREEDMOOR-MAHA WATER SUPPLY CORP		No response received	
DRIPPING SPRINGS , CITY OF		No response received	
EAST BERNARD, CITY OF		No response received	
EL CAMPO, CITY OF		No response received	
ELGIN, CITY OF		No response received	
FAYETTE COUNTY		No response received	
FLATONIA, CITY OF		No response received	
GILLESPIE COUNTY		No response received	
GOFORTH SUD		No response received	
GOLDTHWAITE, CITY OF		No response received	
GRANITE SHOALS, CITY OF		No response received	
HAYS COUNTY		No response received	
JOHNSON CITY, CITY OF		No response received	
KINGSLAND WATER SUPPLY		No response received	
LEE COUNTY WATER SUPPLY		No response received	
LLANO COUNTY		No response received	
LLANO, CITY OF		No response received	
LOST CREEK MUNICIPAL UTILITY DIST	No response, but possibly being annexed by COA prior to 2020. Consider shifting entire population/demand into COA.	No response received	
MANOR, CITY OF		No response received	
MATAGORDA COUNTY		No response received	
MEADOWLAKES MUD		No response received	
MILLS COUNTY		No response received	
MUSTANG RIDGE		No response received	
NORTH AUSTIN MUD NO 1		No response received	
NORTHTOWN MUD		No response received	
POINT VENTURE		No response received	
POLONIA WSC		No response received	
RIVER PLACE MUD		No response received	
ROLLINGWOOD, CITY OF		No response received	
ROUND ROCK, CITY OF		No response received	
SAN SABA COUNTY		No response received	
SHADY HOLLOW MUD		No response received	
SMITHVILLE, CITY OF		No response received	
SUNRISE BEACH VILLAGE		No response received	
SUNSET VALLEY, CITY OF		No response received	
TRAVIS CO WCID NO 18		No response received	
TRAVIS CO WCID NO 19		No response received	
TRAVIS CO WCID NO 20		No response received	
TRAVIS COUNTY MUD NO 4		No response received	
TRAVIS COUNTY WCID NO 10		No response received	
VILLAGE OF BRIARCLIFF		No response received	
VOLENTE, CITY OF		No response received	
WEIMAR, CITY OF		No response received	
WHARTON COUNTY		No response received	
WHARTON, CITY OF		No response received	

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APPENDIX 10B

REGION K WATER CONSERVATION AND DROUGHT SURVEY AND RESPONSE

Burke, Jaime

From:	Chrissy Flanigan <chrissy@raunpr.com>
Sent:	Friday, October 18, 2013 12:33 PM
To:	dmcmurry@aquawsc.com; patricia@bcwcid2.org; tjob@cityofbastrop.org; dprinz@ci.elgin.tx.us
Cc:	Burke, Jaime; Wilkinson, Virginia; laura@raunpr.com; chrissy@raunpr.com
Subject:	Action Requested: Region K Water Conservation and Drought Management
Attachments:	Region K Survey.pdf; Map of Region K.pdf; "Certification"

October 18, 2013

Re: Region K Water Conservation and Drought Survey

Action Requested by November 6, 2013. Please respond via email, postal mail, or fax.

Dear Water System Representative:

As you may know, the 2016 Regional Water Plans must include more information about drought preparations and responses than previous plans. To assist in the planning process, we are asking for more information from you, on behalf of the Lower Colorado Regional Water Planning Group
(Region K).

Attached is a Water Conservation and Drought Contingency Survey that requests the data required for inclusion in Region K's 2016 Regional Water Plan, which will become part of the 2017 State Water Plan. A map of Region K is attached for your reference.

Much of the information requested in the Survey is not readily available from other sources, therefore your response is critical to reliably assessing Region K's drought preparedness.

Assisting us in compiling responses is Laura Raun Public Relations (LRPR), a member of the AECOM team. LRPR will receive completed surveys on behalf of AECOM.

The survey typically takes 10-15 minutes and can be returned in several ways:

EMAIL ATTACHMENT
chrissy@raunpr.com

POSTAL MAIL
Laura Raun Public Relations
c/o Chrissy Flanigan
111 W 8th Street
Austin, TX 78701

FAX
(512) 238-8890

For optimal functionality, the survey should be opened using Adobe Reader. For a free copy you can download here:
get.adobe.com/reader

For help, please contact Chrissy Flanigan at (512) 583-0929.

Thank you in advance for your time!

Jaime Burke | Project Manager
AECOM Water
(512) 457-7798 | jaime.burke@aecom.com

Water Conservation and Drought Management Survey

Region K Water Planning Group | 2016 Regional Water Plan

This survey is designed to collect water conservation and drought information required for the 2016 Regional Water Plan.

- *Additional space is provided at the end of the survey for comments or extended answers.*
- *Water Conservation and Drought Contingency Plans may come in handy for answering questions.*
- *For optimal functionality, the survey should be opened using Adobe Reader. For a free copy you can download here: get.adobe.com/reader*
- *For help, call Chrissy Flanigan with Laura Raun Public Relations at (512) 583-0929.*

Please submit by November 6, 2013 via email, postal mail, or fax.

I. CONTACT INFORMATION

A. City/Water System:

B. Contact Name:

C. Title:

D. Telephone Number:

E. Fax Number:

F. Email Address:

G. Mailing Address:

II. WATER SUPPLIES

A. What is your water system's primary source of water? (Please select all that apply.)

☐ 1. Surface water

☐ 2. Groundwater

☐ 3. Purchased from

☐ 4. Other

B. What is the maximum volume of water for each of the above sources with regard to permits, contracts, pumping and treatment? Please specify units.

1. Surface water

   a. Permit/Contract amount

   b. Pumping/Intake capacity

   c. Treatment capacity

   d. Other

2. Groundwater

a. Permit/Contract amount

b. Pumping/Intake capacity

c. Treatment capacity

d. Other

3. Purchased from:

a. Permit/Contract amount

b. Pumping/Intake capacity

c. Treatment capacity

d. Other

C. Do you anticipate securing additional supply source(s) between now and 2070?

☐ 1. No

☐ 2. Yes (Please specify source and quantity if known)

☐ a. Surface water

☐ b. Groundwater

☐ c. Purchased from

☐ d. Other

D. Should your current source of water become unavailable, what is your emergency source of water?

☐ 1. Surface water

☐ 2. Groundwater

☐ 3. Purchased from

☐ 4. Other

☐ 5. No current plans for emergency water

III. WATER CONSERVATION EFFORTS

A. Water Conservation Measures - Current or Future

Water Conservation Measures	Is this Conservation Measure currently used?	Date implemented (or planned to be implemented)? MONTH/YEAR	Annual Water Savings: Amount*	Annual Water Savings: Units	If you have not implemented this strategy would you consider doing so?
1. Municipal (grand total)					
a. Water system					
1) Water system audits	Y ☐				Y ☐
2) Leak detection and repair	Y ☐				Y ☐
3) Prohibition on wasting water	Y ☐				Y ☐
4) Water conservation pricing/tiered pricing	Y ☐				Y ☐
5) Water conservation awareness campaign	Y ☐				Y ☐
6) School education	Y ☐				Y ☐
7) Water reuse	Y ☐				Y ☐
b. Outdoor water use (total)					
1) Permanant irrigation watering schedule	Y ☐				Y ☐
2) Landscape irrigation audit requirement	Y ☐				Y ☐
3) Landscape requirements for new development	Y ☐				Y ☐
4) Irrigation standards required for new development	Y ☐				Y ☐
5) Outdoor landscape incentives	Y ☐				Y ☐
c. Indoor water use (total)					
1) Incentive program for indoor plumbing retrofit	Y ☐				Y ☐
2) Other	Y ☐				Y ☐
2. Industrial (total)					
a. Industrial water audit	Y ☐				Y ☐
b. Industrial waste reduction	Y ☐				Y ☐
c. Alternative water sources of process reuse	Y ☐				Y ☐
d. Other	Y ☐				Y ☐
3. Other measures (please specify whether Outdoor, Indoor or Industrial)					
a.	Y ☐				Y ☐
b.	Y ☐				Y ☐

*Estimate if you don’t know.

B. What are your water system's 5-year and 10-year water conservation reduction goals?

1. 5-Year Goal (select one or more)
   a. Reduction of ☐ %
   b. Reduction of ☐ GPCD
   c. Reduction **to** ☐ GPCD
2. 10-Year Goal (select one or more)
   a. Reduction of ☐ %
   b. Reduction of ☐ GPCD
   c. Reduction **to** ☐ GPCD

C. Are you on track to meet your goals?

☐ 1. No

☐ 2. Yes

IV. DROUGHT MANAGEMENT EFFORTS

		2011 Water Savings			Annual Water Savings		Would you consider using this Measure if a water shortage is identified for your system in the 2016 Regional Water Plan?
Drought Management Measures	Was this Drought Management Measure used in **2011**? If so, what month(s)?	Amount	Units	Has this Measure been implemented since 2011?	Amount*	Units	
1. Voluntary Measures							
a. Discontinuation of monthly flushing of water mains				Y ☐			Y ☐
b. Public landscaping irrigation restrictions				Y ☐			Y ☐
c. Residential landscaping irrigation limits				Y ☐			Y ☐
d. Commercial irrigation limits				Y ☐			Y ☐
e. Other				Y ☐			Y ☐
2. Mandatory Measures							
a. Residential landscaping irrigation restrictions				Y ☐			Y ☐
1) Twice a week watering				Y ☐			Y ☐
2) Once a week watering				Y ☐			Y ☐
3) No outdoor spraying, drip application only				Y ☐			Y ☐
b. Limits on other outdoor water use				Y ☐			Y ☐
1) No water features, unless water is recycled				Y ☐			Y ☐
2) No water features				Y ☐			Y ☐
3) Golf course water use restrictions				Y ☐			Y ☐
4) Prohibition on watering golf courses unless from water source other than provided by the city				Y ☐			Y ☐
5) Prohibition of washing down sidewalks, parking lots and other hard-surface areas				Y ☐			Y ☐
6) Prohibition of flushing gutters				Y ☐			Y ☐
7) Prohibition of water use for washing vehicles				Y ☐			Y ☐
8) Prohibition of water use for pool maintenance				Y ☐			Y ☐
c. Prohibition of applications for new, additional, expanded, or increased-in-size water service connections, meters, service lines, pipeline extentions, mains, or water service facilities of any kind				Y ☐			Y ☐
3. Other							
a.				Y ☐			Y ☐
b.				Y ☐			Y ☐

*Estimate if you don't know.

V. WATER CONSERVATION/DROUGHT CONTINGENCY PLANS

A. Please submit a copy of your system's Water Conservation Plan and Drought Contingency Plan with your completed survey.

B. What is the drought management reduction goal associated with your Severe Trigger (Commonly Level III?)

C. Did the drought measures listed in Section IV achieve the reduction goals in your Drought Contingency Plan?

☐ 1. Yes

☐ 2. No

NOTES

If you have any additional comments or need to expand on a previous response, please do so here.

When you have completed the form, please return by November 6, 2013 to Laura Raun Public Relations c/o Chrissy Flanigan.

To submit via email, press SUBMIT FORM and the completed form will be automatically saved and set up to submit via email. You may also print a copy for your records by pressing PRINT FORM.

Please attach your Water Conservation/Drought Contingency Plans to your email.

Other ways of submitting the completed survey are shown below.

Thank you again for your participation!

PHONE
(512) 583-0929

EMAIL
chrissy@raunpr.com

POSTAL MAIL
Laura Raun Public Relations
c/o Chrissy Flanigan
111 W. 8th St.
Austin, TX 78701

FAX
(512) 236-8890

PRINT FORM

SUBMIT FORM BY EMAIL

APPENDIX 10C

REGION K IPP PUBLIC HEARING NOTICE, AFFIDAVITS OF PUBLICATION, PUBLIC HEARING PRESENTATION, AND RECEIVED ORAL COMMENTS

DATE: MAY 26, 2015

TO: Members of the Lower Colorado Regional Water Planning Group (Region K);
Persons who have requested notice in writing;
Each county clerk in counties outside the Region K water planning area where a water management strategy would be located;
Each mayor of a municipality with a population of 1,000 or more that is located in whole or in part in the Region K water planning area;
Each county judge of a county located in whole or in part of the Region K water planning area;
Each special or general law district or river authority with responsibility to manage or supply water in the Region K water planning area;
Each retail public utility that serves any part of the Region K water planning area;
Each holder of record permit of a permit, certified filing, or certificate of adjudication for the use of surface water of which occurs in the Region K planning area.

FROM: The Lower Colorado Regional Water Planning Group (Region K)

RE: Public Notice of Public Hearing and Public Meetings to accept comments on 2016 Initially Prepared 2016 Region K Water Plan for the Lower Colorado Regional Water Planning Group

PUBLIC NOTICE

Notice is hereby given that at its regional water planning group meeting on April 22, 2015, the Lower Colorado Regional Water Planning Group (Region K) certified completion and approved its Initially Prepared 2016 Region K Water Plan for the Lower Colorado *Regional* Water Planning Group (IPP); and, authorized the Lower Colorado River Authority's (LCRA) Region K Administrative Agent, to submit the IPP on or before May 1, 2015. Region K, along with LCRA, submitted the 2016 IPP to the Texas Water Development Board (TWDB) on May 1, 2015.

By issuance of this Public Notice, a 30 day pre-public hearing comment period is currently active until the date of the IPP Public Hearing. The public comment period will continue for no less than 60 days after the date of the IPP Public Hearing. Written comments may be submitted anytime from the date of this notice until September 15, 2015, and must be submitted to LCRA (details provided below).

Region K's IPP can be found at www.regionk.org. All comments and questions should be directed to the Region K Administrative Agent, Stacy Pandey, P.O. Box 220, Austin, TX 78767. You may also send email inquiries to stacy.pandey@lcra.org.

The IPP public hearing and meetings will take place at the following locations and at the specified dates and times:

Public Meeting: June 25, 2015 - 6:00 p.m.
Burnet Community Center
401 East Jackson Street
Burnet, Texas 78611

Public Hearing: July 8, 2015 - 10:00 a.m.
LCRA- Dalchau Service Center, Bldg. A
3505 Montopolis Drive
Austin, TX 78744

Public Meeting: July 23, 2015 - 1:30 p.m.
Duncan Auditorium at Wharton Civic Center
1924 North Fulton Street
Wharton, Texas 77488

Appendix 10C - Notice for Public Hearing

Times and locations for the Region K public meetings and public hearing are as follows:

Meeting/Hearing	Date and Time	City	Location*
Public Meeting	June 25, 2015 6:00 p.m.	Burnet, Texas	Burnet Community Center 401 East Jackson Street
Public Hearing	July 8, 2015 10:00 a.m.	Austin, Texas	Dalchau Service Center 3505 Montopolis Drive
Public Meeting	July 23, 2015 1:30p.m.	Wharton, Texas	Duncan Auditorium- Wharton Civic Center 1924 North Fulton Street

Written comments may be submitted until September 15, 2015, and must be submitted to LCRA (details provided below).

All comments and questions should be directed to the Region K administrative agent, LCRA, attention: Chris Hoelter, P.O. Box 220, Austin, TX 78767. You may also send email inquiries to chris.hoelter@lcra.org.

A digital copy of the Initially Prepared Water Plan is available for viewing on the Region K website at www.regionk.org.

Copies of the Draft Water Plan will be available for viewing by June 8, 2015 at the following locations:

Bastrop County
County Clerk's Office
803 Pine Street, Rm 112
Bastrop, TX 78602

Public Library
1100 Church Street
Bastrop, TX 78602

Colorado County
County Clerk's Office
318 Spring Street, Rm 103
Columbus, TX 78934

Nesbitt Memorial Library
529 Washington Street
Columbus, TX 78934

Hays County
County Clerk's Office
712 S. Stagecoach Trail
San Marcos, TX 78666

San Marcos Library
625 E Hopkins Street
San Marcos TX 78666

Mills County
County Clerk's Office
1003 Parker Street
Goldthwaite, TX 76844

Jenny Trent Dew Library
1113 Fisher
Goldthwaite, TX 76844

Wharton County
County Clerk's Office
309 E. Milam Street
Wharton, TX 77488

El Campo Public Library
200 W. Church,
El Campo, TX 77437

Blanco County
County Clerk's Office
101 E. Cypress
Johnson City, TX 78636

Public Library
1118 Main Street
Blanco, TX 78606

Fayette County
County Clerk's Office
246 W. Colorado Street
La Grange, TX 78945

Public Library
855 S. Jefferson Street
LaGrange TX 78945

Llano County
County Clerk's Office
107 W. Sandstone
Llano, TX 78643

Public Library
102 E. Haynie
Llano, TX 78643

San Saba County
County Clerk's Office
500 East Wallace Street
San Saba, TX 76877

Rylander Memorial Library
103 S Live Oak Street
San Saba, TX 76877

Williamson County
County Clerk's Office
405 Martin Luther King St.
Georgetown, TX 78626

City of Georgetown Public Library
402 W. 8th Street
Georgetown, TX 78626

Burnet County
County Clerk's Office
220 S. Pierce Street
Burnet, TX 78611

Marble Falls Library
101 Main Street
Marble Falls, TX 78654

Gillespie County
County Clerk's Office
101 West Main Street
Fredericksburg, TX 78624

Public Library
115 W. Main Street
Fredericksburg, TX 78624

Matagorda County
County Clerk's Office
1700 7th Street
Room 202
Bay City, TX 77414

Bay City Public Library
1100 7th Street
Bay City, TX 77414

Travis County
County Clerk's Office
5501 Airport Blvd.
Austin, TX 78751

Austin Public Library
800 Guadalupe Street
Austin, TX 78701

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Appendix 10C - Affidavits of Publication

AFFIDAVIT OF PUBLICATION

STATE OF TEXAS §

COUNTY OF Gonzales §

Before me, the undersigned authority, on this day personally appeared

Valerie Reddell, who being by me duly sworn,
(name of newspaper representative)

deposes and says that (s)he is the Publisher
(title of newspaper representative)

of the Gonzales Inquirer; that said newspaper is generally circulated
(name of newspaper)

in Gonzales, Texas;
(in the municipality or nearest municipality to the location of the facility or the proposed facility)

that the attached notice was published in said newspaper on the following date(s):

June 2, 2015.

Valerie Reddell
(newspaper representative's signature)

Subscribed and sworn to before me this the 9 day of June, 2015,

to certify which witness my hand and seal of office.

Notary Public in and for the State of Texas

(Seal)

Print or Type Name of Notary Public

My Commission Expires

STATE OF TEXAS
COUNTY OF BURLESON

Before me, the undersigned authority, on this day personally appeared Sam Preuss, Publisher of the Burleson County Tribune, a weekly newspaper published in Burleson County on Thursday of each week at Caldwell, Texas, who being duly sworn declared that the attached legal was published 1 time(s) in said newspaper, the date(s) of said publication being as follows: June 4, 2015, and that the attached clipping is a true copy of said publication.

Sam Preuss
Affiant

Witness my hand and seal this 8th day of June, 2015.

Dee A. Boedeker
Notary Public, State of Texas
Dee A. Boedeker
Expires 04/07/19

NOTARY PUBLIC STATE OF TEXAS
DEE A. BOEDEKER
MY COMMISSION EXPIRES
April 7, 2019

PUBLIC NOTICE

Notice is hereby given that at its regional water plan
group meeting on April 22, 2015, the Lower Colorado
gional Water Planning Group (Region K) certified com
tion and approved its Initially Prepared 2016 Regic
Water Plan for the Lower Colorado Regional Water P
ning Group (IPP); and, authorized the Lower Color
River Authority's (LCRA) Region K Administrative Ager
submit the IPP on or before May 1, 2015. Region K, al
with LCRA, submitted the 2016 IPP to the Texas W
Development Board (TWDB) on May 1, 2015.

By issuance of this Public Notice, a 30 day pre-pu
hearing comment period is currently active until the d
of the IPP Public Hearing. The public comment period
continue for no less than 60 days after the date of the
Public Hearing. Written comments may be submitted a
time from the date of this notice until September 15, 20
and must be submitted to LCRA (details provided belo

Region K's IPP can be found at www.regionk.org.
comments and questions should be directed to the F
gion K Administrative Agent, Chris Hoelter, P.O. Box 2
Austin, TX 78767. You may also send email inquiries
chris.hoelter@lcra.org

The IPP public hearing and meetings will take place
the following locations and specified dates and times:

Public Meeting: June 25, 2015
6:00 p.m.
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10:00 a.m.
LCRA- Dalchau Service Center, Bldg. A
3505 Montopolis Drive
Austin, Texas 78744

Public Meeting: July 23, 2015
1:30 p.m
Duncan Auditorium at Wharton Civic Center
1924 North Fulton Street
Wharton, Texas 77488

J4-1tp

THE GOLDTHWAITE EAGLE
1002 Fisher Street - PO Box 249 * Goldthwaite, Texas 76844
325/648-2244 * 800-254-2680 * Fax: 325/648-2024 * goldnews@centex.net

PUBLISHER'S AFFIDAVIT

I solemnly swear that the attached notice was published in the Goldthwaite Eagle, a newspaper printed in Mills County, Texas, and of general circulation in said county, as provided by The State of Texas for the service of citation or notice of publication, and the date the issue of said newspaper bore in which said notice was published was June 3, 2015.

A copy of this notice as published, clipped from the newspaper, is attached hereto.

Steven Bridges
Editor

SUBSCRIBED AND SWORN TO BEFORE ME by Steven Bridges, this 3rd day of June 2015, to certify which witness my hand and seal of office.

Bonita F Mackey
Notary Public
In and For Mills County, Texas

BONITA F. MACKEY
Notary Public
STATE OF TEXAS
My Comm. Exp. October 24, 2015

My Commission Expires:

PUBLISHER'S AFFIDAVIT

STATE OF TEXAS §
COUNTY OF WHARTON §

Before me, the undersigned authority, on this day personally appeared *Bill Wallace*, the *Publisher* of the *Wharton Journal-Spectator,* a newspaper having general circulation in Wharton County, Texas, who being by me duly sworn, deposes and says that the foregoing attached notice was published on: June 3, 2015.

Bill Wallace, publisher

Subscribed and sworn to before me this the 8th day of June 2015, to certify which witness my hand and seal of office.

HELEN F. SEVIER
Notary Public, State of Texas
My Commission Expires
January 10, 2019

Helen F. Sevier
Notary Public, State of Texas

Bldg. A

celular. Por tanto, debera certificar que ...
... recibe el servicio Lifeline

Austin American-Statesman
statesman.com | austin360.com

STATE OF TEXAS
COUNTY OF TRAVIS

Before me, the undersigned authority, a Notary Public in and for the County of Travis, State of Texas, on this day personally appeared Alejandro Cado. Advertising Agent of the Austin American-Statesman, a daily newspaper published in said County and State that is generally circulated in Bastrop, Bell, Blanco, Brazos, Burleson, Burnet, Caldwell, Colorado, Comal, Coryell, Fayette, Gillespie, Gonzales, Guadalupe, Hays, Kerr, Lampasas, Lee, Llano, Milam, Nueces, San Saba, Travis, Washington and Williamson Counties, who being duly sworn by me, states that the attached advertisement was published at the lowest published rate for Classified advertising in said newspaper on the following date(s), to wit:LCRA,,First date of Publication 06/03/2015,Last date of Publication 06/03/2015,Web and print times Published 2, Legal Notices, 1 X 63, and that the attached is a true copy of said advertisement.

MEETING APRIL 22
Ad ID: 821390
Ad Cost: 624.33

PUBLIC NOTICE

Notice is hereby given that at its regional water planning group meeting on April 22, 2015, the Lower Colorado Regional Water Planning Group (Region K) certified completion and approved its Initially Prepared 2016 Region K Water Plan for the Lower Colorado Regional Water Planning Group (IPP); and, authorized the Lower Colorado River Authority's (LCRA) Region K Administrative Agent, to submit the IPP on or before May 1, 2015. Region K, along with LCRA, submitted the 2016 IPP to the Texas Water Development Board (TWDB) on May 1, 2015.

By issuance of this Public Notice, a 30 day pre-public hearing comment period is currently active until the date of the IPP Public Hearing. The public comment period will continue for no less than 60 days after the date of the IPP Public Hearing. Written comments may be submitted anytime from the date of this notice until September 15, 2015, and must be submitted to LCRA (details provided below).

Region K's IPP can be found at www.regionk.org. All comments and questions should be directed to the Region K Administrative Agent, Chris Hoelter, P.O. Box 220, Austin, TX 78767. You may also send email inquiries to chris.hoelter@lcra.org.
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LCRA- Dalchau Service Center, Bldg. A
3505 Montopolis Drive
Austin, TX 78744

Public Meeting: July 23, 2015
1:30 p.m
Duncan Auditorium at Wharton Civic Center
1924 North Fulton Street
Wharton, Texas 77488
#428279 6-3/2015

SWORN AND SUBSCRIBED TO BEFORE ME, on 06/08/2015

Eloise Livingston

Notary Public

ELOISE LIVINGSTON
Notary Public, State of Texas
My Commission Expires
July 21, 2015

Affidavit of Publication

STATE OF TEXAS
COUNTY OF MATAGORDA

Before me, the undersigned authority, on this day personally appeared Christi Lara who on his/her oath stated: I am the Business Assistant of The Bay City Tribune, a newspaper of general circulation in Matagorda County, Texas, and know the facts herein stated to be true and correct: attached is a printed copy of publication of the notice/citation of which it purports to be a copy, as the same appeared in such newspaper in the respective issue:

3rd day of June 2015

Christi Lara, Business Assistant

Sworn to before me this

5th day of June 2015

Dena Matthews
Notary Public in and for Matagorda County, Texas

NOTARY PUBLIC
STATE OF TEXAS
DENA MATTHEWS
My Commission Expires
June 17, 2018

Highland Lakes Newspapers

The Highlander – Burnet Bulletin – Llano County Journal

304A Highlander Circle, PO Box 1000
Marble Falls, TX 78654-1000
(830) 693-4367

PUBLISHER'S AFFIDAVIT

STATE OF TEXAS

COUNTY OF BURNET

Before me, the undersigned authority, on this day personally appeared

Cheryl Michel who being by me duly sworn, deposes and
(name)
says that (s)he is a bona fide representative of the Highlander;
(name of newspaper)
that said newspaper is regularly published in Burnet County(ies)
and generally circulated in Burnet/Llano County(ies),
Texas, and that the attached public notice was published in said newspaper on the following date(s), to wit: 6-19-15,
and that the attached is a true copy of said notice.

Cheryl Michel
Newspaper Representative's Signature

Subscribed and sworn to before me this 19th day of June, 2015, to certify which witness my hand and seal of office.

Sharon J Pelky
Notary Public in and for the State of Texas

SHARON J. PELKY
Notary Public, State of Texas
My Commission Expires
February 23, 2016

NOTARY PUBLIC STATE OF TEXAS

Sharon J Pelky
Print or Type Name of Notary Public

My Commission Expires: 2-23-2016

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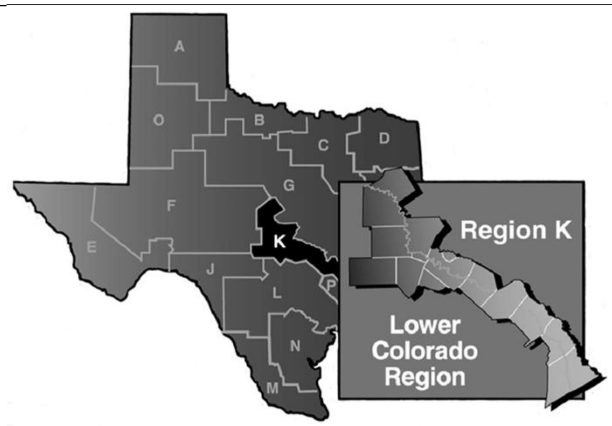


Public Hearing for 2016 Initially Prepared Plan
Lower Colorado Regional Water Planning Group

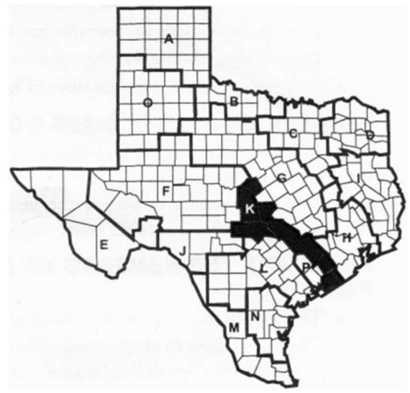
July 8, 2015

Presentation Outline

- Overview
- Elements of the 2016 Region K Water Plan
  - Population and water demand projections
  - Water availability/supply estimates
  - Water management strategies and their potential impacts
- Take public comments

Regional Water Planning Overview

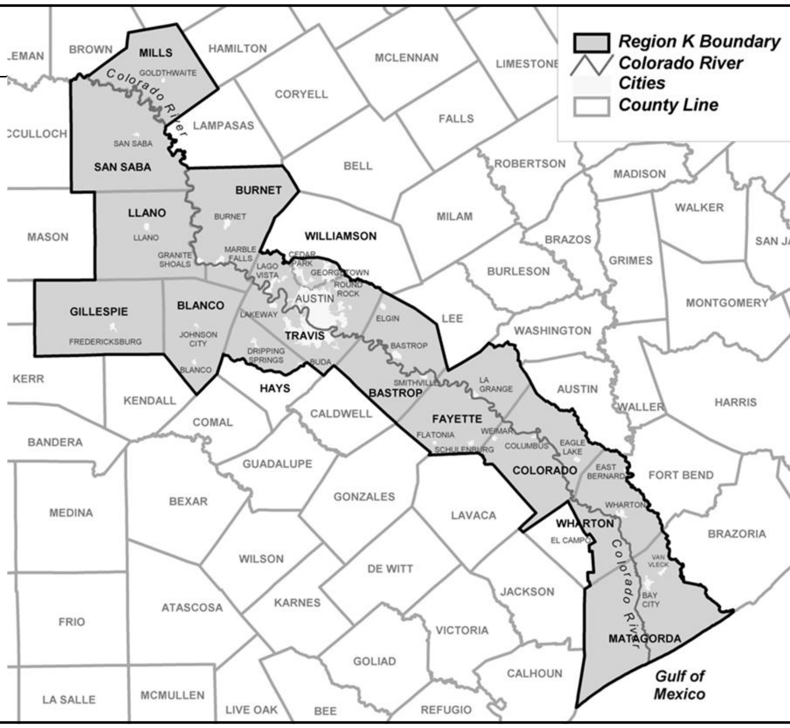
- SB1, 75th Legislature (1997)
- 16 planning regions
- Each region prepares a 50-year water plan, updated every five years
- State Water Plan created from the 16 regional plans
- Regional Water Plans:
  - First published in 2001
- State Water Plans:
  - First (from RWPs) published in 2002



Regional Water Planning Overview

About the Planning Groups…

- Volunteers with various levels of experience in the water industry
- Diverse backgrounds:
  - Public
  - Counties
  - Municipalities
  - Industries
  - Agriculture
  - Environment
  - Small Business
  - Power Generation
  - River Authorities
  - Water Districts
  - Water Utilities
  - Groundwater Management Area
- Assisted by teams of consultants



Regional Water Planning Overview

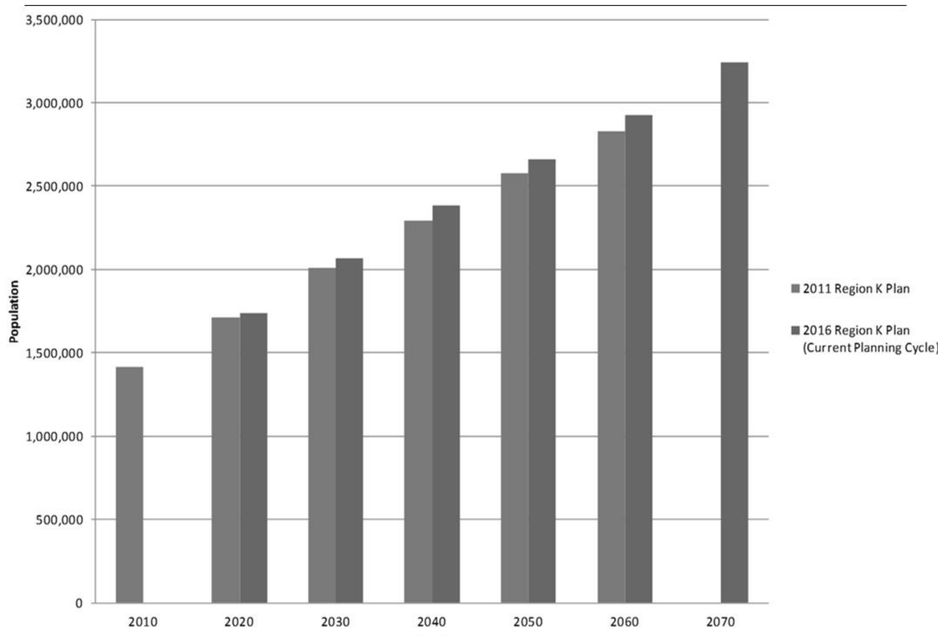
- Regional Planning <u>does</u> <u>not</u> replace the need for planning at the local level
- Regional Planning <u>does</u> build upon local planning efforts to provide long-term, regional direction
- Communication and feedback are essential to the process
- No requirement to implement strategies in the plans
- Consistency with the State Water Plan is required to:
  - Obtain TWDB funding for infrastructure
  - Obtain a water right permit

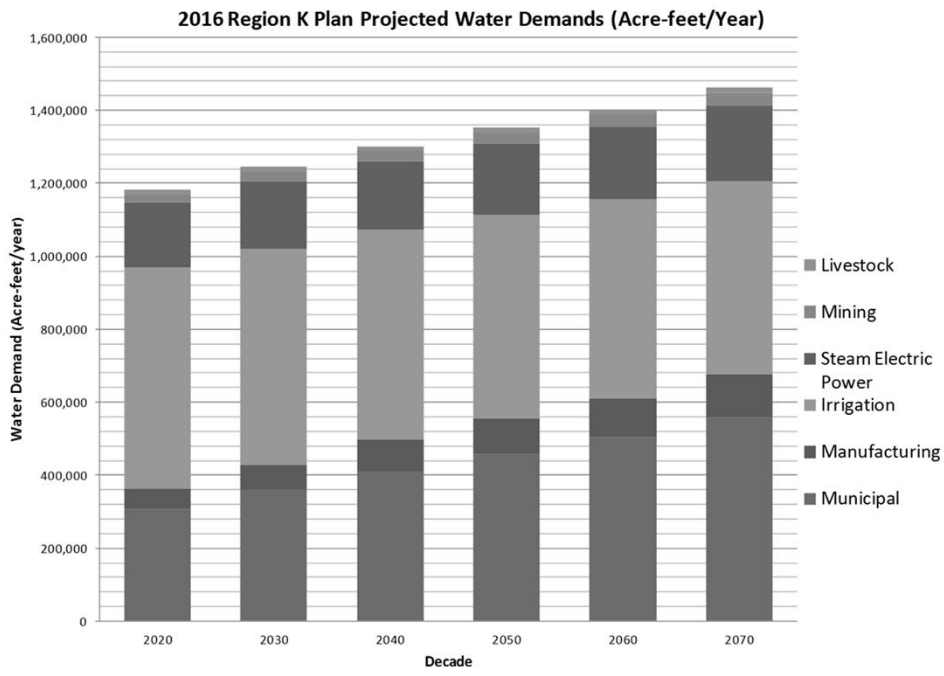
AECOM

Population and Water Demand Projections (Chapter 2)

Region K Population Projections

AECOM

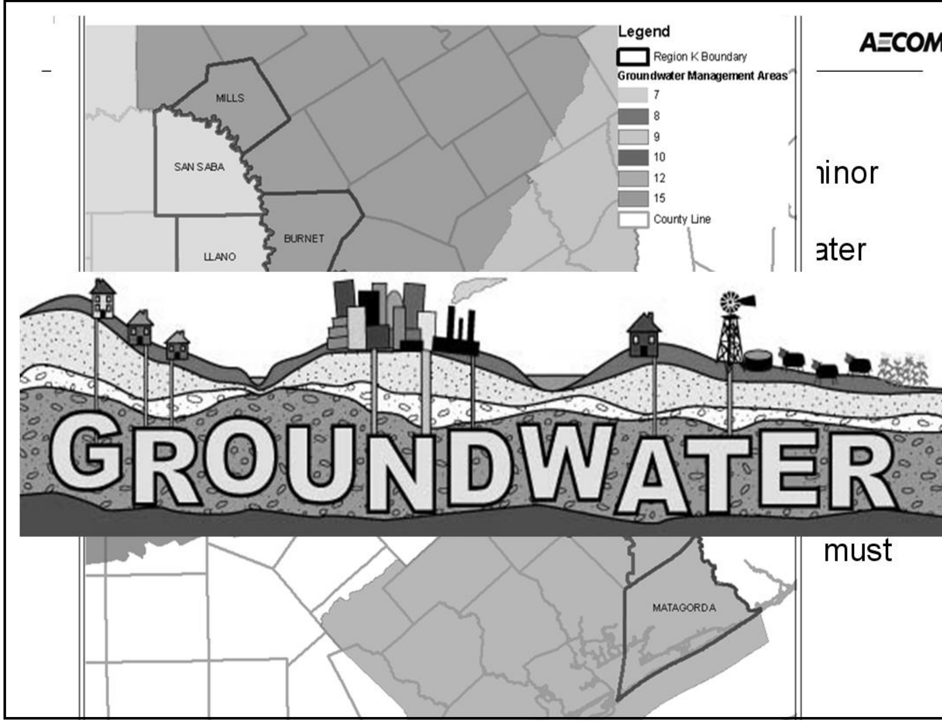




Water Availability/Supply Estimates (Chapter 3)

Available Water

- Total available water approximately 1.3 million acre-feet
  - 1 acre-foot = 325,851 gallons
- Over 900,000 acre-feet is surface water
- Surface water availability modeling used to determine decadal amounts.
- In general, it is the amount of water that is available yearly during a repeat of the conditions of the worst drought on record (1950s).
- New “critical” year of 2011 for run-of-river water rights.



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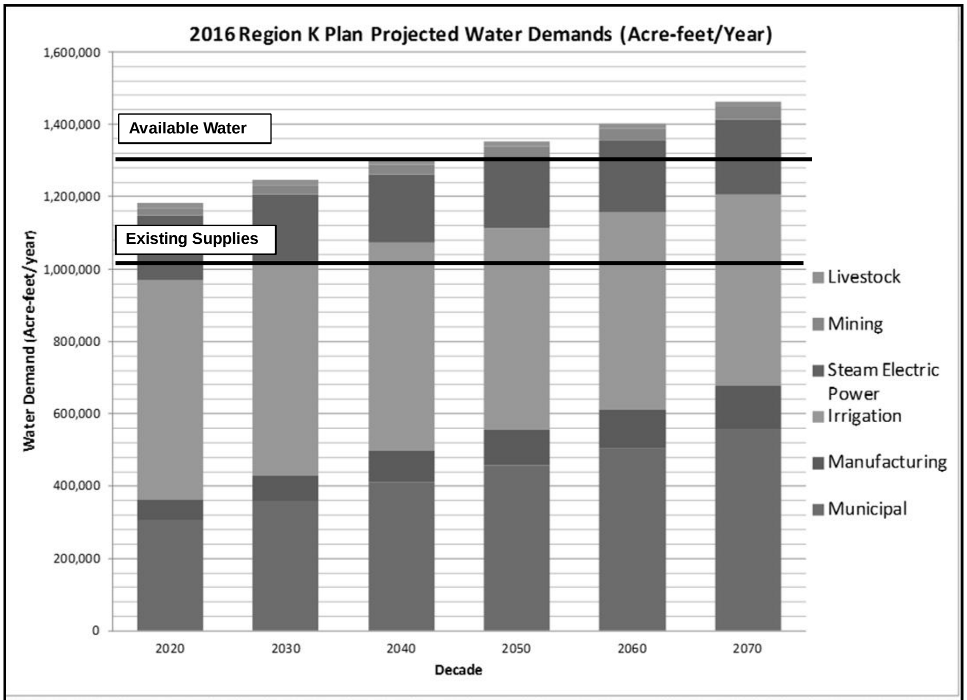
must

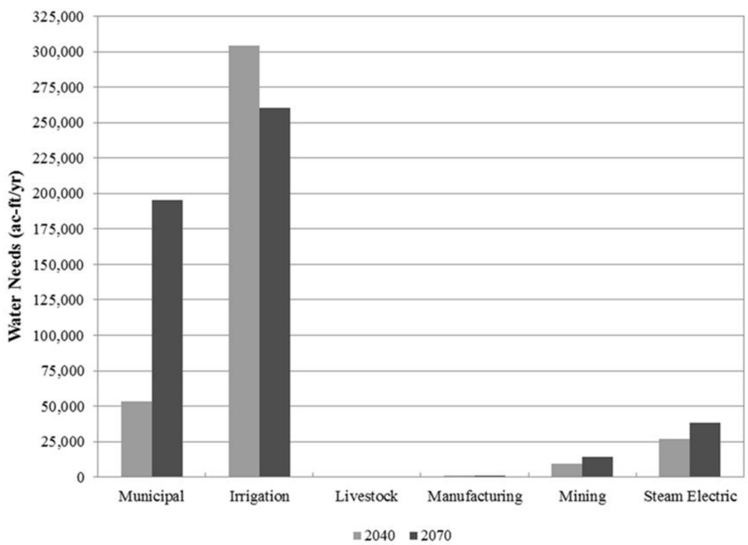
AECOM

Groundwater Availability

- Region K has five major aquifers and six or more minor aquifers.
- The majority of aquifers are managed by Groundwater Conservation Districts (GCDs).
- GCDs group together to form Groundwater Management Areas (GMAs).
- The GMAs determine a Desired Future Condition (DFC) drawdown for the aquifers that are used to calculate the availability of the aquifer (Modeled Available Groundwater = MAG).
- If no MAG is established for an aquifer, the Region must use the best data available.



Region K Water Shortages (Needs) by Category of Use



Shortage (Need) = Existing Supply - Demand

Water Management Strategies (Chapter 5)

How to Meet Water Needs?

- Drought Management
- Conservation
- Water Reuse and Reuse-sourced projects
- Development of Groundwater
  - Includes Fresh, Brackish, and Saline
- Aquifer Storage and Recovery (ASR)
- Irrigation On-Farm Conservation and Delivery Improvements
- New Reservoir Storage
- New Surface Water Infrastructure
- Water Purchase

Considered Impacts On:

AECOM

- Water quality
- Existing water rights
- Instream flows
- Bay and estuary freshwater inflows
- Aquifer yield
- Agricultural water resources
- Threatened and endangered species
- Wildlife habitat
- Public lands
- Recreation

Public Comment on the IPP

AECOM

- Initially Prepared Plan Available:
  - www.regionk.org
  - County Clerk's Offices
  - Libraries
- Taking written comments through:
  - September 15, 2015
- Please submit written comments to:
  - Chris Hoelter
    Administrative Agent for Region K
    LCRA
    P.O. Box 220
    Austin, TX 78767
    chris.hoelter@lcra.org

- IPP Public Meeting
  July 23rd, 2015
  1:30 p.m.
  Wharton Civic Center
  Wharton, TX

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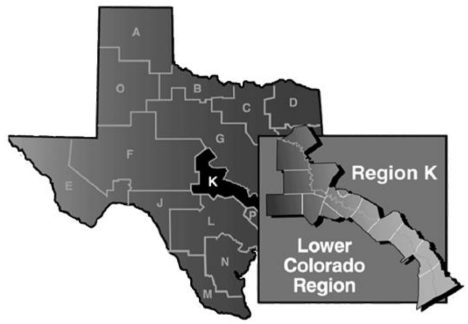

Public Comments

Summary of Public Comments on Region K 2016 Initially Prepared Plan
Lower Colorado Regional Water Planning Group
Public Hearing
July 8, 2015
LCRA Dalchau Service Center
3505 Montopolis Drive
Austin, Texas
10:00 a.m.

Summary of Public Comments

1. Lamar Johanson, a resident of Goldthwaite, said the City of Goldthwaite currently has enough water available to meet current needs as well as needs many years into the future. Mr. Johanson had questions about the funding of the dam. Mr. Johanson said he is therefore against the proposed Goldthwaite Channel Dam.

2. Reagan Burnham from Mills County said the Goldthwaite Channel Dam would result in lower flows downstream. Mr. Burnham said the largest benefactor from the dam would be Leonard's Big Valley Pecan Farms, an operation that uses flood irrigation.

3. Joe Petronis said flood irrigation is wasteful and the Goldthwaite Channel Dam would increase the water available for this type of irrigation. Mr. Petronis also indicated he is concerned about the height of the dam and about the effect the dam could have on downstream water users.

4. Ann McElroy said the City of Goldthwaite currently has all the water it currently needs. Additionally, Ms. McElroy said the population projections do not warrant a need for the Goldthwaite Channel Dam. Ms. McElroy also expressed concern that the Region K Plan does not include a projection for "domestic and livestock uses".

5. Henry Warren, a resident of San Saba County, expressed his opposition to the Goldthwaite Channel Dam due to concerns for downstream flows.

6. Patricia Warren, a resident of San Saba County, said the Goldthwaite Channel Dam would have a negative impact on downstream flow and impacts on white bass spawning as well as recreational uses of the river.

7. Dedra Reinert, a long-time resident of the City of Goldthwaite, claimed to have riparian rights to the river. Ms. Reinert said that the dam would be utilized by the OP Leonard Pecan Farm if built. Ms. Reinert said that Goldthwaite has other sources of water available.

8. Kellis Landrom expressed his disapproval of the City of Goldthwaite Channel Dam. Mr. Landrom said the dam is for the benefit of OP Leonard and would not help the City of Goldthwaite.

9. Peter Jones, Llano County Commissioner, spoke about conservation and progressive water usage pricing models in Australia. Mr. Jones recommended that the Central Texas Water Coalition look into progressive usage pricing similar to those used in Australia.

10. Mary Cunningham, Llano County Judge, spoke in support of a revision to Chapter 1 that discusses importance of the Highland Lakes to the region. Ms. Cunningham said the Goldthwaite Channel Dam could degrade the perception of the planning process in the eyes of the public.

11. Charlie Flatten asked the planning group to consider spring flows and healthy water catchment areas and to review recommendations in written comments from the Hill Country Alliance.

12. Ed Pope, a citizen of Hays County, asked the planning group to consider a resolution regarding the Hays County Pipeline which he read to the group and that is attached to the comment card.

13. David Lindsay spoke in support of funding and research of inflows into the Highland Lakes. Mr. Lindsay spoke in support of sections in Chapter 8 of the IPP regarding inflows into the Highland Lakes.

14. Richard Galloway expressed concern that there is no mention of using state of the art climatology in the regional planning process regarding drought cycles. Mr. Galloway encouraged Region K planning members to reach out to climatology experts to be involved in the water planning process.

15. Nan Marley expressed disapproval for the Goldthwaite Channel Dam due to concerns for downstream flow.

16. Jim McMeans read a resolution recommending that pipeline projects proposed from San Marcos to Wimberley Woodcreek and from Wimberley Woodcreek to Dripping Springs be removed from the Region K 2016 Plan.

17. Reagan Burnham said that freshwater mussels no longer exist at the mouth of the San Saba River because of the addition of Lake O.H, Ivie. Mr. Burnham indicated that these mussels used to serve a critical purpose to clean water that flows in the river.

18. Frank Cooley, a member of the Central Texas Water Coalition, expressed concern that the Draft Region K IPP does not include any discussion of water pricing. Mr. Cooley said the plan should include water pricing as a recommended water management strategy.

APPENDIX 10D

STATE AGENCY COMMENTS ON INITIALLY PREPARED PLAN WITH REGION K COMMENT RESPONSES

Texas Water Development Board
P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

August 6, 2015

Mr. John E. Burke, Chair
c/o John Burke & Associates
496 Shiloh Road
Bastrop, Texas 78602

Ms. Karen Bondy
Lower Colorado River Authority
P.O. Box 220, MC H107
Austin, Texas 78767

Re: Texas Water Development Board Comments on the Lower Colorado Regional Water Planning Group (Region K) Initially Prepared Plan, Contract No. 1148301322

Dear Mr. Burke and Ms. Bondy:

Texas Water Development Board (TWDB) staff completed a review of the Initially Prepared Plan (IPP) submitted by May 1, 2015 on behalf of the Region K Regional Water Planning Group. The attached comments follow this format:

- **Level 1:** Comments, questions, and online regional water planning database revisions that must be satisfactorily addressed in order to meet statutory, agency rule, and/or contract requirements; and,

- **Level 2:** Comments and suggestions for consideration that may improve the readability and overall understanding of the regional water plan.

The TWDB's statutory requirement for review of potential interregional conflicts under Title 31 Texas Administrative Code (TAC) §357.62 will not be completed until submittal and review of adopted regional water plans. However, as previously requested by our Executive Administrator, please inform TWDB in advance of your final plan if your planning group believes that an interregional conflict exists. Additionally, subsequent review will be performed as the planning group completes its data entry into the regional water planning database (DB17). If issues arise during our ongoing data review, they will be communicated promptly to the planning group to resolve.

Title 31 TAC§357.50(d) requires the regional water planning group to consider timely agency and public comment. Section 357.50(e) requires the final adopted plan include summaries of all timely written and oral comments received, along with a response explaining any resulting revisions or why changes are not warranted. Copies of TWDB's Level 1 and 2 written comments and the region's responses must be included in the final, adopted regional water plan. While the comments included in this letter represent TWDB's review to date, please anticipate the need to respond to additional comments regarding data integrity, including any water source overallocations, in the regional water planning database (DB17) once data entry is completed by the region.

Standard to all planning groups is the need to include certain content in the final regional water plans that was not yet available at the time that IPPs were prepared and submitted. In your final regional water plan, however please be sure to also incorporate the following:

a) Completed results from the regional planning group's infrastructure financing survey (IFR) for sponsors of recommended projects with capital costs *[31 TAC §357.44]*;
b) Completed results from the implementation survey *[31 TAC §357.45(a)]*;
c) The socioeconomic impact evaluation provided by TWDB at the request of the planning group *[31 TAC §357.33(c)]*;
d) Documentation that comments received on the IPP were considered in the development of the final plan *[31 TAC §357.50(d)]*;
e) Evidence, such as a certification, that the final, adopted regional water plan is complete and adopted by the planning group *[31 TAC §357.50(j)(1)]*; and,
f) The required DB17 reports, as made available by TWDB, in the executive summary or elsewhere in the plan as specified in the Contract *[31 TAC §357.50(e)(2)(B), Contract Scope of Work Task 4D(p), Contract Exhibit 'C', Table 2]*. Please ensure that the numerical values presented in the tables throughout the final, adopted regional water plan are consistent with the data provided in DB17. For the purpose of development of the 2017 State Water Plan, water management strategy and other data entered by the regional water group in DB17 (and as presented in the regional plan) shall take precedence over any conflicting data presented in the final regional water plan *[Contract Exhibit 'C', Sections 12.1.3. and 12.2.2]*.

The following items must accompany, separately, the submission of the final, adopted regional water plan:

- The prioritized list of all recommended projects in the regional water plan *[Texas Water Code 15.436(a), Contract Scope of Work Task 13]*; and,
- Any remaining hydrologic modeling files or GIS files that may not have been provided at the time of the submission of the IPP but that were used in developing the final plan. *[31 TAC §357.50(e)(2)(C), Contract Exhibit 'C', Section 12.2.1; Contract Scope of Work Task 3-III-13]*

Note that provision of certain content in an electronic-only form is permissible as follows: Internet links are permissible as a method for including model conservation and drought contingency plans within the final regional water plan; hydrologic modeling files may be submitted as electronic appendices, however all other regional water plan appendices should be incorporated in hard copy format within each plan *[31 TAC §357.50(e)(2)(C), Contract Scope of Work Task 5e, Contract Exhibit 'C', Section 12.2.1].*

The following general requirements that apply to recommended water management strategies must be adhered to in all final regional water plans including:

- Regional water plans must not include any strategies or costs that are associated with simply maintaining existing water supplies or replacing existing infrastructure. Plans may include only infrastructure costs that are associated with volumetric increases of treated water supplies delivered to water user groups or that result in more efficient use of existing supplies *[31 TAC §357.10(28), §357.34(d)(3)(A), Contract Exhibit 'C", Section 5.1.2.2, Section 5.1.2.3]*; and,
- Regional water plans must not include any retail distribution-level infrastructure costs (other than those costs related to conservation strategies such as water loss reduction) *[31 TAC §357.10(28), §357.34(d)(3)(A), Contract Exhibit 'C", Section 5.1.2.3].*

To facilitate efficient and timely completion, and Board approval, of your final regional water plan, please provide your TWDB project manager with early drafts of your responses to these IPP comments for preliminary review and feedback.

If you have any questions regarding these comments or would like to discuss your approach to addressing any of these comments, please do not hesitate to contact Temple McKinnon at (512) 475-2057. TWDB staff will be available to assist you in any way possible to ensure successful completion of your final regional water plan.

Sincerely,

Jeff Walker
Deputy Executive Administrator
Water Supply and Infrastructure

Attachments

cc w/att: Ms. Jaime Burke, AECOM, Inc.

TWDB Comments on the Initially Prepared 2016 Lower Colorado (Region K) Regional Water Plan

Level 1:	**Comments and questions must be satisfactorily addressed in order to meet statutory, agency/rule, and/or contract requirements.**

1. Please describe how publicly available plans of major agricultural, municipal, manufacturing and commercial water users were condsidered in the final, adopted regional water plan. *[31 Texas Administrative Code (TAC) §357.22(a)(4)]*

2. Please provide a statement regarding any water availability requirements promulgated by a county commissioners court pursuant to Texas Water Code (TWC) §35.019, which in Region K applies to the Blanco, Gillespie, Hays, and Travis County Priority Groundwater Management Areas. *[31 TAC §357.22(a)(6)]*

3. Please indicate how the planning group considered the regionalization of water and wastewater services in the final, adopted regional water plan. *[31 TAC §357.22(a)(10)]*

4. Section 1.2.4: Chapter 1 includes a general discussion of agricultural and natural resources and notes that the water supply needs of agriculture and natural resources are directly influenced by the quantity and quality of water, but does not appear to specifically identify each threat, if any, to agriculture and natural resources. The plan also does not appear to include a discussion of how each threat will be addressed or affected by the water management strategies evaluated in the plan. Please include a discussion of each threat to agricultural and natural resources and a discussion of how that threat will be addressed or affected by the water management strategies evaluated in the final, adopted regional water plan. *[31 TAC §357.30(12)]*

5. Please clarify how the run-of-river availabilities were calculated for municipal water users to ensure that all monthly demands are fully met for the entire simulation of the unmodified Texas Commission on Environmental Quality WAM Run 3 in the final, adopted regional water plan. *[Contract Exhibit 'C', Section 3.4]*

6. The plan does not appear to state whether water supplies based upon contracted agreements were assumed to renew upon contract termination or if the contract contemplates renewal or extensions. Please present contractual supply assumptions regarding contract renewals, extensions and or terms as they relate to a source of supply in the final, adopted regional water plan. *[31 TAC §357.32(f)]*

7. Chapter 7: Please indicate how the planning group considered relevant recommendations from the Drought Preparedness Council (a letter was provided to planning groups with relevant recommendations in November 2014) in the final, adopted regional water plan. *[31 TAC §357.42(h)]*

8. Volume II, Section 5.2, beginning page 5-2: The plan references environmental analyses performed for the development of the 2011 Region K regional water plan but does not include the information in the 2016 plan. Additionally, in some instances, the plan does not appear to include a quantitative reporting of environmental factors. For example,

strategy evaluations 5.2.2.4 (Irrigation Conservation), 5.2.3.1.10 (LCRA Off-Channel Reservoirs), and 5.2.5.2 (Construct Goldthwaite Channel Dam) do not appear to include quantified environmental factors. Additionally, Appendix 5A, Potentially Feasible Water Management Strategy Screening Table presents a qualitative numeric scale but it is unclear if the scale is based upon quantitative data. Please include quantitative reporting in the final, adopted regional water plan. *[31 TAC §357.34 (d)(3)(b)]*

9. Volume II, Section 5.2, beginning page 5-2: The plan in some instances, does not appear to include a quantitative reporting of impacts to agricultural resources. For example, strategy evaluations 5.2.5.2 (Construct Goldthwaite Channel Dam), 5.2.3.1.3 (LCRA Amendments to Run-of-River Rights), 5.2.3.1.10 (LCRA Off-Channel Reservoirs) do not appear to include quantified impacts to agricultural resources, even if there is no impact. Additionally, Table 5-2 presents a qualitative numeric scoring scale but it is unclear if the scale is based upon quantitative data. Please include quantitative reporting in the final, adopted regional water plan. *[31 TAC §357.34(d)(3)(C)]*

10. Volume II, Strategies 5.2.4.5.1 (Recommended WMS) and 5.3.1.2 (Alternative WMS): The plan does not include discussion of the provisions in TWC §11.085(k)(1) for the "Buena Vista Regional Project" and "Import Return Flows from Williamson County" water management strategies, which appear to require interbasin transfer permits. Please include discussion of these provisions, including a summation of the water needs in the basin of origin and receiving basin, or explain if not applicable, in the final, adopted regional water plan. *[31 TAC §357.34(d)(6)]*

11. Volume II, Strategies 5.2.4.5.1 (Recommended WMS) and 5.3.1.2 (Alternative WMS): The plan does not appear to include consideration given to the highest practicable level of water conservation achievable by water users as relates to interbasin transfer water management strategies. Please include this consideration and document in the final, adopted regional water plan. *[31 TAC §357.34(f)(2)(C)]*

12. Volume II, Sections 5.2.4.8, 7.6.2, and 7.63: The plan does not include associated triggers to initiate each of the recommended and alternative drought management strategies. Please include triggers for the associated strategies in the final, adopted regional water plan. *[31 TAC §357.42(f)(1)(2)]*

13. Volume II, Sections 5.3.1.3: The plan includes an alternative water management strategy entitled "Supplement Bay and Estuary Inflows with Brackish Groundwater" that is labeled as a drought management strategy but appears to produce a water volume instead of managing water demand. The alternative strategy is also not associated with a strategy providing water supply to, or demand management of, any water user group (WUGs) or wholesale water provider (WWPs) and does not appear to meet any WUG needs identified in the plan. Strategies and projects, considered and recommended, including any associated capital costs, must be for the purpose of providing water supply to WUGs and WWPs. Assuming these issues are not satisfactorily addressed and resolved, please remove this alternative strategy and the associated costs from the final, adopted regional water plan. *[31 TAC §357.10(9),(29), and (30); 31 TAC §357.31, §357.32, §357.33 (by reference); 31 TAC §357.34(a), (b), (d)(3)(A), (e); Contract Exhibit 'D', Section 5.3]*

14. Volume II, Section 5.3.1.3: It is unclear if this alternative water management strategy to supplement Bay and Estuary Inflows with Brackish Groundwater would rely on or mutually exclude another recommended strategy. If such relationships exist, please account for how the strategy interactions impact the estimated water availability and yield associated with each impacted water management strategy in the final, adopted regional water plan. *[Contract Exhibit 'C', Section 3.4.2]*

15. Volume II, Section 7.5: The plan does not identify the 'severe' and 'critical' conditions of triggers and stages in its recommended drought triggers and responses. Please associate 'severe' and 'critical' to the recommended triggers in the final, adopted regional water plan. *[Contract Exhibit 'C', Section 7.4]*

16. The technical evaluations of the water management strategies do not appear to estimate water losses from the associated strategies. Please include an estimate of water losses in the final, adopted regional water plan, for example as an estimated percent loss. *[31 TAC §357.34(d)(3)(A); Contract Exhibit 'C', Section 5.1.1]*

Level 2: Comments and suggestions for consideration that may improve the readability and overall understanding of the regional water plan.

1. Appendix 5A: Please consider numbering tables in Appendices and throughout the report in the final, adopted regional water plan.

2. Volume II, Page 5-13: Reference is provided to "Table xx" and "Section 5.xx." Please consider completing this reference in the final, adopted regional water plan.

3. Volume II, Page 8-19, Sections 8.2 and 8.3: The plan is unclear in stating that there are "no new" stream segments or potential reservoir sites recommended for unique designation. Please consider clarifying whether or not any stream segments or reservoir sites are recommended by the Region K planning group for designation in the final, adopted regional water plan.

TWDB Comments on the Initially Prepared 2016 Lower Colorado (Region K) Regional Water Plan

Level 1:	**Comments and questions must be satisfactorily addressed in order to meet statutory, agency/rule, and/or contract requirements.**

1. Please describe how publicly available plans of major agricultural, municipal, manufacturing and commercial water users were condsidered in the final, adopted regional water plan. *[31 Texas Administrative Code (TAC) §357.22(a)(4)]*

   Response: A paragraph has been added to Section 1.2.5 describing how publicly available plans of major agricultural, municipal, manufacturing, and commercial water users were considered in the final adopted RWP.

2. Please provide a statement regarding any water availability requirements promulgated by a county commissioners court pursuant to Texas Water Code (TWC) §35.019, which in Region K applies to the Blanco, Gillespie, Hays, and Travis County Priority Groundwater Management Areas. *[31 TAC §357.22(a)(6)]*

   Response: Language is provided in the second paragraph of Section 3.2.2 Groundwater Availability that discusses the Priority Groundwater Management Areas in Region K and discusses the domestic well requirements listed in the Hays County Development Regulations.

3. Please indicate how the planning group considered the regionalization of water and wastewater services in the final, adopted regional water plan. *[31 TAC §357.22(a)(10)]*

   Response: Language indicating how the planning group considered the regionalization of water and wastewater services has been included in the paragraph referenced above in the TWDB Comment #1 Response in Section 1.2.5 in the final adopted RWP.

4. Section 1.2.4: Chapter 1 includes a general discussion of agricultural and natural resources and notes that the water supply needs of agriculture and natural resources are directly influenced by the quantity and quality of water, but does not appear to specifically identify each threat, if any, to agriculture and natural resources. The plan also does not appear to include a discussion of how each threat will be addressed or affected by the water management strategies evaluated in the plan. Please include a discussion of each threat to agricultural and natural resources and a discussion of how that threat will be addressed or affected by the water management strategies evaluated in the final, adopted regional water plan. *[31 TAC §357.30(12)]*

   Response: Specific threats to agriculture and natural resources are identified and discussed in Sections 1.2.4.1 and 1.2.4.2. Additional language has been added to these sections discussing how the threat will be addressed or affected by the water management strategies in the plan.

5. Please clarify how the run-of-river availabilities were calculated for municipal water users to ensure that all monthly demands are fully met for the entire simulation of the

unmodified Texas Commission on Environmental Quality WAM Run 3 in the final, adopted regional water plan. *[Contract Exhibit 'C', Section 3.4]*

Response: Per Contract Exhibit 'C', Section 3.4.1.1, Region K requested to use a model other than the TCEQ WAM Run 3 when evaluating existing surface water supplies. Approval was given by the TWDB to use the Region K Cutoff Model for determining surface water availabilities in a letter dated August 9, 2012, which is included in Appendix 3B of the 2016 Region K Water Plan. A paragraph clarifying how the run-of-river availabilities were determined for municipal water users is provided in Section 3.2.1.1.2.3 of the final adopted plan.

6. The plan does not appear to state whether water supplies based upon contracted agreements were assumed to renew upon contract termination or if the contract contemplates renewal or extensions. Please present contractual supply assumptions regarding contract renewals, extensions and or terms as they relate to a source of supply in the final, adopted regional water plan. *[31 TAC §357.32(f)]*

   Response: Clarification statements have been added to Sections 3.3.1, 3.3.2, and 3.4 regarding which contracts were assumed to be renewed through the planning period. In general, contracts were assumed to be renewed, although a few of the contracts for customers of the City of Austin are shown as not being renewed in Table 3.28.

7. Chapter 7: Please indicate how the planning group considered relevant recommendations from the Drought Preparedness Council (a letter was provided to planning groups with relevant recommendations in November 2014) in the final, adopted regional water plan. *[31 TAC §357.42(h)]*

   Response: A paragraph has been added to Section 7.7 describing the recommendations from the Drought Preparedness Council, and how the planning group considered them.

8. Volume II, Section 5.2, beginning page 5-2: The plan references environmental analyses performed for the development of the 2011 Region K regional water plan but does not include the information in the 2016 plan. Additionally, in some instances, the plan does not appear to include a quantitative reporting of environmental factors. For example, strategy evaluations 5.2.2.4 (Irrigation Conservation), 5.2.3.1.10 (LCRA Off-Channel Reservoirs), and 5.2.5.2 (Construct Goldthwaite Channel Dam) do not appear to include quantified environmental factors. Additionally, Appendix 5A, Potentially Feasible Water Management Strategy Screening Table presents a qualitative numeric scale but it is unclear if the scale is based upon quantitative data. Please include quantitative reporting in the final, adopted regional water plan. *[31 TAC §357.34 (d)(3)(b)]*

   Response: Quantified impacts to the environment have been determined for all of the water management strategies in the plan, and have been added to both the text of Chapter 5, as well as Appendix 5A. An additional appendix has been added to Chapter 5 that includes the still applicable environmental flow analyses that were performed for the 2011 Plan.

9. Volume II, Section 5.2, beginning page 5-2: The plan in some instances, does not appear to include a quantitative reporting of impacts to agricultural resources. For example,

strategy evaluations 5.2.5.2 (Construct Goldthwaite Channel Dam), 5.2.3.1.3 (LCRA Amendments to Run-of-River Rights), 5.2.3.1.10 (LCRA Off-Channel Reservoirs) do not appear to include quantified impacts to agricultural resources, even if there is no impact. Additionally, Table 5-2 presents a qualitative numeric scoring scale but it is unclear if the scale is based upon quantitative data. Please include quantitative reporting in the final, adopted regional water plan. *[31 TAC §357.34(d)(3)(C)]*

Response: Quantified agricultural impacts have been determined for all of the water management strategies in the plan, and have been added to both the text of Chapter 5, as well as Appendix 5A.

10. Volume II, Strategies 5.2.4.5.1 (Recommended WMS) and 5.3.1.2 (Alternative WMS): The plan does not include discussion of the provisions in TWC §11.085(k)(1) for the "Buena Vista Regional Project" and "Import Return Flows from Williamson County" water management strategies, which appear to require interbasin transfer permits. Please include discussion of these provisions, including a summation of the water needs in the basin of origin and receiving basin, or explain if not applicable, in the final, adopted regional water plan. *[31 TAC §357.34(d)(6)]*

    Response: A discussion of the provisions in TWC §11.085(k)(1) have been added to the sections discussing the Buena Vista Regional Project and the Import Return Flows from Williamson County water management strategies.

11. Volume II, Strategies 5.2.4.5.1 (Recommended WMS) and 5.3.1.2 (Alternative WMS): The plan does not appear to include consideration given to the highest practicable level of water conservation achievable by water users as relates to interbasin transfer water management strategies. Please include this consideration and document in the final, adopted regional water plan. *[31 TAC §357.34(f)(2)(C)]*

    Response: Conservation has been recommended for the entities related to the interbasin transfer water management strategies. Language discussing this consideration and recommendation has been added to the sections discussing the particular IBT water management strategies.

12. Volume II, Sections 5.2.4.8, 7.6.2, and 7.6.3: The plan does not include associated triggers to initiate each of the recommended and alternative drought management strategies. Please include triggers for the associated strategies in the final, adopted regional water plan. *[31 TAC §357.42(f)(1)(2)]*

    Response: Language discussing and referencing drought contingency plan triggers, as well as the Palmer Drought Severity Index, have been added to Sections 5.2.4.8 and 7.6.2. The alternative strategy discussed in Section 7.6.3 has been determined to not be a drought management strategy, so that section no longer applies.

13. Volume II, Sections 5.3.1.3: The plan includes an alternative water management strategy entitled "Supplement Bay and Estuary Inflows with Brackish Groundwater" that is labeled as a drought management strategy but appears to produce a water volume instead of managing water demand. The alternative strategy is also not associated with a strategy providing water supply to, or demand management of, any water user group (WUGs) or

wholesale water provider (WWPs) and does not appear to meet any WUG needs identified in the plan. Strategies and projects, considered and recommended, including any associated capital costs, must be for the purpose of providing water supply to WUGs and WWPs. Assuming these issues are not satisfactorily addressed and resolved, please remove this alternative strategy and the associated costs from the final, adopted regional water plan. *[31 TAC §357.10(9),(29), and (30); 31 TAC §357.31, §357.32, §357.33 (by reference); 31 TAC §357.34(a), (b), (d)(3)(A), (e); Contract Exhibit 'D', Section 5.3]*

Response: Clarification that this strategy will increase firm water supplies in the Highland Lakes for wholesale water provider (WWP) LCRA has been added to the description of this strategy.

14. Volume II, Section 5.3.1.3: It is unclear if this alternative water management strategy to supplement Bay and Estuary Inflows with Brackish Groundwater would rely on or mutually exclude another recommended strategy. If such relationships exist, please account for how the strategy interactions impact the estimated water availability and yield associated with each impacted water management strategy in the final, adopted regional water plan. *[Contract Exhibit 'C', Section 3.4.2]*

    Response: The referenced alternative water management strategy would not rely on or mutually exclude another recommended strategy.

15. Volume II, Section 7.5: The plan does not identify the 'severe' and 'critical' conditions of triggers and stages in its recommended drought triggers and responses. Please associate 'severe' and 'critical' to the recommended triggers in the final, adopted regional water plan. *[Contract Exhibit 'C', Section 7.4]*

    Response: The identification of and/or reference to the severe and critical conditions of the drought triggers and responses has been included in Section 7.5.

16. The technical evaluations of the water management strategies do not appear to estimate water losses from the associated strategies. Please include an estimate of water losses in the final, adopted regional water plan, for example as an estimated percent loss. *[31 TAC §357.34(d)(3)(A); Contract Exhibit 'C', Section 5.1.1]*

    Response: Water losses are inherently included in the water demand projections that are used to determine water needs and volumes of water needed for water management strategies. A discussion and estimate of water losses is included in Chapter 5 of the final adopted plan.

Level 2: Comments and suggestions for consideration that may improve the readability and overall understanding of the regional water plan.

1. Appendix 5A: Please consider numbering tables in Appendices and throughout the report in the final, adopted regional water plan.

   Response: Consideration has been given to numbering tables in Appendices. An attempt was made to identify any un-numbered tables in a non-appendix portion of the report and number them.

2. Volume II, Page 5-13: Reference is provided to "Table xx" and "Section 5.xx." Please consider completing this reference in the final, adopted regional water plan.

   Response: Reference has been corrected.

3. Volume II, Page 8-19, Sections 8.2 and 8.3: The plan is unclear in stating that there are "no new" stream segments or potential reservoir sites recommended for unique designation. Please consider clarifying whether or not any stream segments or reservoir sites are recommended by the Region K planning group for designation in the final, adopted regional water plan.

   Response: Clarification has been provided in Section 8.2 and 8.3.

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TEXAS PARKS & WILDLIFE

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September 11, 2015

Mr. John Burke, Chairman
Lower Colorado Regional Water Planning Group
P.O. Drawer P
Bastrop, Texas 78602

Re: Review of Region K Lower Colorado Region Initially Prepared Water Plan

Dear Mr. Burke:

Thank you for seeking review and comment from the Texas Parks and Wildlife Department ("TPWD") on the 2016 Initially Prepared Regional Water Plan (IPP) for the Region K Lower Colorado River Region K. As you know, water impacts every aspect of TPWD's mission to manage and conserve the natural and cultural resources of Texas. As the agency charged with primary responsibility for protecting the state's fish and wildlife resources, TPWD is positioned to provide technical assistance during the water planning process. Although TPWD has limited regulatory authority over the use of state waters, TPWD is committed to working with stakeholders and others to provide science-based information during the water planning process intended to avoid or minimize impacts to state fish and wildlife resources.

TPWD understands that regional water planning groups are guided by 31 TAC §357 when preparing regional water plans. These water planning rules spell out requirements related to natural resource and environmental protection. Accordingly, TPWD staff reviewed the IPP with a focus on the following questions:

- Does the IPP include a quantitative reporting of environmental factors including the effects on environmental water needs and habitat?
- Does the IPP include a description of natural resources and threats to natural resources due to water quantity or quality problems?
- Does the IPP discuss how these threats will be addressed?
- Does the IPP describe how it is consistent with long-term protection of natural resources?
- Does the IPP include water conservation as a water management strategy?
- Does the IPP include Drought Contingency Plans?
- Does the IPP recommend any stream segments be nominated as ecologically unique?
- If the IPP includes strategies identified in the 2010 regional water plan, does it address concerns raised by TPWD in connection with the 2010 Water Plan.

4200 SMITH SCHOOL ROAD
AUSTIN, TEXAS 78744-3291
512.389.4800
www.tpwd.texas.gov

The population of the Region K Lower Colorado Water Planning Area (LCRWPA) is estimated to nearly double to over 3.2 million by 2070. Water needs are expected to increase by about 24 percent to 1.45 million acre-feet per year by 2070. Under current conditions, a total of approximately 1.25 million acre-feet of water is available annually to the LCRWPA under drought of record (DOR) conditions. Of this amount, approximately 74 percent is from surface water sources and 26 percent is from groundwater sources. Demands for municipal, manufacturing, and steam-electric generation are anticipated to increase due to population growth and economic activity while other water demand categories, including agriculture, are projected to decline.

The IPP includes a brief description of natural resources in the LCRWPA including vegetation areas and lists of species of special concern. In addition, information on environmental flows for the lower Colorado River as identified in the LCRA's Water Management Plan (WMP) and by the Colorado/Lavaca Basin and Bay Stakeholder Committee (BBASC) formed for the purpose of addressing environmental flow needs by Senate Bill 3 (2007) is discussed. The IPP includes limited information on characteristic fish and wildlife species, spring systems, and groundwater/surface water interactions in the region. Such information would be useful in understanding the impacts of selected water management strategies on fish and wildlife species, water quality, and water-based recreation in the region.

To meet the increasing demands, the Lower Colorado Regional Water Planning Group (LCRWPG) recommends a number of water management strategies that include reuse, new off-channel reservoirs, conservation, amendments to existing water rights and contracts, aquifer storage and recovery, drought management, and expanded use of groundwater. The identified strategies will have varying degrees of effect on fish and wildlife resources, environmental flows, and spring systems. The Lower Colorado Region IPP addresses quantitative reporting of environmental factors as required by 31 T.A.C. §357.7(a)(8)(A) by analyzing potential impacts from water management strategies to flow levels identified in the LCRA Water Management Plan and/or the newly adopted environmental flow standards for providing for environmental flow needs. However, the environmental analyses would benefit from more thorough explanation, quantification where appropriate, and interpretation to better explain potential flow impacts from the proposed strategies.

As pointed out in the IPP, many of the recommended water management strategies that will impact the Colorado River and Matagorda Bay utilize water under existing water rights, or utilize water such as wastewater effluent that was already assumed to be used 100 percent under the required surface water availability modeling guidelines, making it difficult to determine quantifiable impacts of those strategies on environmental flows. However, this difficulty should not be interpreted as meaning that there will be no impacts. Changing use patterns, increased and full use of existing water rights, and dependence on return flows as strategies will invariably affect hydrologic flow regimes, instream flows, and freshwater inflows into Matagorda Bay. Issues with use of Water Availability Model (WAM) Run3 in environmental analyses and water planning should be discussed during the next planning cycle.

Of the recommended water management strategies, use of return flows and additional off-channel reservoirs are likely to exert the largest influence on instream flows and bay and estuary inflows. While TPWD generally supports reuse of return flows as a water management strategy, these return flows do provide a consistent source of flow in the river. According to the IPP, "Return flows provide a positive impact to the instream flows as they travel downstream to a diversion point. A potential diversion point for LCRA for these downstream return flows is the proposed Mid-Basin Reservoir project diversion point. Environmental impacts beyond the diversion point would be minimal." Since these major strategies were identified late in the planning cycle, there was less time for full deliberation and assessment of potential environmental impacts. TPWD believes that the potential exists for environmental effects to Matagorda Bay from diminished flows in the river due to the exercise of individual and cumulative strategies. Though not always possible, sufficient time should be allocated in the future for consideration of major strategies.

On a positive note, some recommended strategies may aid in balancing peak demands for surface water and groundwater, allow for a more efficient use of water for all needs including environmental, and delay or eliminate the need for more environmentally damaging strategies. Aggressive water conservation strategies and goals are identified as a significant strategy for municipal, industrial, and agricultural users. TPWD agrees that conservation strategies must be a part of future water planning and are preferred alternatives to large-scale water development projects. It is noted that the RWPG is not following the state recommendation to reduce per capita consumption 1 percent per year until Texas Water Conservation Task Force goal of 140 gallons per capita per day (gpcd) is met as was done in the 2010 IPP. Instead the 2016 IPP recommends a 1 percent reduction per year for Water User Groups (WUGs) with over 200 gpcd and a 0.5 percent reduction per year for utilities with between 140 - 200 gpcd. TPWD supports retention of the 1 percent reduction for all WUGs with greater than 140 gpcd. TPWD commends the LCRWPG for including drought management as a strategy in the current IPP. Expansion of the use of drought contingency plans by all WUGs as a strategy in this plan is strongly supported by TPWD.

While a number of water supply strategies are evaluated for potential environmental impacts, several alternative strategies have been proposed for the region. For many of the alternative strategies sufficient detail is lacking to conduct a meaningful environmental assessment, even for planning purposes. TPWD recommends that more information be developed for the alternative strategies so that their true viability and environmental effects can be investigated. In addition, TPWD suggests that the LCRWPG have a rigorous discussion during the next planning cycle on the need and ramifications of 'over' planning to meet future water supply deficits. Deliberations during the current planning process were informative, but additional discussion is needed.

Although the IPP does not recommend nomination of any stream segments as ecologically unique, it does state that further study may be warranted in future Lower Colorado Regional Water Plans. If the LCRWPG decides to pursue designation of a stream segment as ecologically unique, TPWD would be willing to assist with the preparation of a recommendation packet as identified in T.A.C. §357.8.

TPWD agrees with many of the policy recommendations included in the IPP. The recommendations consistently recognize the importance of instream flows and freshwater inflows in planning for the management of water resources in Texas. The policies are not only explicitly related to environmental flows, but also to groundwater/surface water interaction and modeling, groundwater and conjunctive use, interbasin transfers, reuse, and education.

TPWD commends the LCRWPG for producing such a thorough and comprehensive IPP. The work to balance competing demands, users, and availability in development of a usable regional water plan should be lauded. TPWD also greatly appreciates the group's providing the TPWD representative opportunities to participate and engage the group at planning group and subcommittee meetings. Thank you for your consideration of these comments. TPWD looks forward to continuing to work with the planning group to develop water supply strategies that not only meet the future water supply needs of the region but also preserve the ecological health of the region's aquatic resources. Please contact Cindy Loeffler at (512) 389-8715 if you have any questions or comments.

Sincerely,

Ross Melinchuk,
Deputy Executive Director, Natural Resources

RM:DB:ms

cc: Robin Riechers, Division Director, Coastal Fisheries Division, TPWD
David Bradsby, Coastal Fisheries Division, TPWD

Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

November 12, 2015

Mr. Ross Melinchuk
Deputy Executive Director, Natural Resources
Texas Parks & Wildlife
4200 Smith School Road
Austin, TX 78744

Dear Mr. Melinchuk:

Thank you for your comments on the 2016 Region K Initially Prepared Water Plan (IPP). The Lower Colorado Regional Water Planning Group (LCRWPG) appreciates your concern for the development of comprehensive regional water plans and their role in Texas's future.

Per your comment regarding quantitative reporting of impacts to natural resources, the final adopted 2016 Region K Water Plan contains additional quantification of potential impacts to natural resources that may result from the recommended water management strategies.

The LCRWPG will further consider your comments during the pre-planning meeting for the 5th regional water planning cycle to develop the 2021 Region K Water Plan. This meeting will likely be held in early 2016.

We appreciate you taking the time to review and provide these comments on the 2016 Region K IPP. We look forward to working with you in future planning cycles.

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

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APPENDIX 10E

RECEIVED WRITTEN/ORAL PUBLIC COMMENTS ON INITIALLY PREPARED PLAN WITH REGION K COMMENT RESPONSES

Public Comment Table of Contents

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ATTACHMENT A

Comments from IPP Public Meeting in Burnet on June 25, 2015

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LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Reagan Burnham Date: 6-25 15

Representing: Self

Address: 839 E CR 427 Goldthwaite TX City, St., Zip: 76877

Phone Number: (325) 248-1413 Fax Number: ( )

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe:

Written Comments: Attached - Opposing Goldthwaite Channel Dam

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Tom Ankenbauer Date: 25 June 2015

Representing: Smith Ranch Estates - Colorado River

Address: 209 Landon Drive City, St., Zip: Lampasas, TX 76550

Phone Number: (512) 564-1728 Fax Number: ( )

Do you wish to make a statement? ☒ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments: Against the channel DAM on the Colorado R

- LCRA Hydrometer for Lake Buchanan currently sets at 52% capacity
- Region K still at a drought level
- Goldthwaite has yet to adequately address or fix their sub-surface well capacity — need to drill wells
- Colorado River levels need to support down stream requirements.
- O.P. Leonard is already diverting record levels of water for irrigation of Pecan Groves
- No confirmation as to what size the DAM (channel) will be or how much water will be diverted for storage.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: George J Anderson Date: 6/25/15

Representing: self

Address: PO Box 1466 City, St., Zip: Lampasas TX 76550

Phone Number: (512) 556-2268 Fax Number: ( ) NA

Do you wish to make a statement? ☒ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments: I am opposed to any channel dam on the Colorado River

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: [illegible] Date: 6/24/2015

Representing: Sulphur Springs Camp

Address: 1800 Austin Ave City, St., Zip: Brownwood TX 76801

Phone Number: (325) 646-7926 Fax Number: ( )

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe:

Written Comments: Landowner Down River from Proposed Dam site at Goldthwaite on Colorado River

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Henry V. Campbell IV Date: 6/26/2015

Representing: Self

Address: Ranch Baxter 1600 CR 440 City, St., Zip:

Phone Number: (214) 632 6795 Fax Number: (214) 522 6004

Do you wish to make a statement? ☒ Yes ☐ No ?

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments: Water in August stops flowing at Cow Crossing near Bend on our Ranch (on our ranch on Colorado River).

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Don McElroy Date: 6-25-15

Representing: Self

Address: 7483 CR 126 City, St., Zip: SS, TX 76877

Phone Number: (512) 968.4550 Fax Number: ( )

Do you wish to make a statement? ☒ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments: Against channel dam

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Ann McElroy Date: 6-25-15

Representing: Self

Address: 7483 CR 126 City, St., Zip: SS, TX 76877

Phone Number: (512) 658-5490 Fax Number: ( )

Do you wish to make a statement? ☒ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments: Against channel dam

Region K Public Meeting

June 25, 2015

PERSONAL

- Our family owns a small recreational ranch on the Colorado River downstream of the proposed dam. The Colorado River is our only source of drinking water.
- The wildlife on our property consists mostly of our 17 grandchildren.

TWO ISSUES

- The need of the City of Goldthwaite to have a plentiful, safe water supply
- The desire of a farmer to build a dam to irrigate at least 365 acres of pecan trees
- Although these two issues are different, they tend to get connected and confused.

GOLDTHWAITE'S WATER SUPPLY NEEDS

- After the awful drought in 2011, Goldthwaite decided to get serious about taking action to meet its water needs:
    - City Manager Rob Lindsey announced a three-pronged strategy:
        - Drill new wells
        - Purchase and transport water from the City of San Saba
        - Build an in-channel dam--this idea had been around since 2007 when SB 675 listed the Goldthwaite Channel Dam as one of 19 feasible sites for new reservoirs in Texas
    - Goldthwaite did a great job accomplishing the first two goals. Under the direction of Manager Lindsey and Mayor Mike McMahan, Goldthwaite drilled several wells.
        - In an October 12, 2011 edition of the Goldthwaite Eagle, Lindsay reported that the new wells were producing about 170 gpm (or about 274 acre-feet annually).
        - Next, Goldthwaite negotiated an agreement with the City of San Saba to purchase 245-acre feet of water each year for a 25-year period.
        - Then, Goldthwaite received funding of $1,480,000 from the Texas Water Development Board to help with pipeline costs. Goldthwaite also received "$620,000 in debt forgiveness" according to an article in the 2015 Mills County Visitor's Guide
        - With the new wells and the San Saba Water, Goldthwaite has about 519 acre-feet of water annually. This is in addition to the water Goldthwaite has historically taken from their existing Colorado River Pump Station.
        - For those of you who prefer gallons as a unit of measure instead of acre-feet , 519 acre-feet per year translates into about 247 gallons per day for every man, woman and child in Goldthwaite. The average in the U. S. is about 150 gallons per day per person.

- So, is 519 acre-feet per year enough for Goldthwaite? The current draft of the Region K Water Plan states that Goldthwaite's demands are about 361 acre-feet in 2020, rising to 407 acre-feet in 2070----well below the 519 acre-feet currently available.
- Based on this, it appears Goldthwaite's water needs are secured for a very long time and, in fact, the City acknowledged this in an article in its 2015 Visitors Guide.

- PECAN FARMER'S DESIRES
  - This issue is important because the farmer currently has an application pending at TCEQ, the City of Goldthwaite has stated an interest in collaborating with the farmer to build the dam and the farmer's project continues to be included in Region K draft plans.
  - The proposed in-channel dam will cost more than $3 million and could receive public funding IF the project (in any form with any name) remains in the Region K Plan.
  - The dam would benefit the farmer and 11 nearby landowners. It would also serve as back-up source for Goldthwaite which, based on the numbers previously discussed, is NOT needed now or in the foreseeable future.
  - Pecan farmer has an opportunity to implement effective conservation projects (such as subsurface drip irrigation, etc.) to minimize his water needs. Until this is done and all the other issues around this building the dam are resolved, it seems wasteful and unwise to dedicate any more public or private resources to this project.

Others will speak tonight about the damage this in-channel dam will do to our precious river, to the wildlife, to the downstream landowners who rely on the river for livestock and domestic purposes and to those with water rights, some of which are senior to the farmer's.

One final thought. The regional planning groups have a tradition of including all projects requested by any municipality. This seems reasonable if a project is justified and doesn't have a detrimental effect on other downstream municipalities. In this case, however, Goldthwaite's needs appear to be more than adequately met. And, the proposed dam will reduce downstream flows for everyone, including the millions on people living downstream who rely on municipal water sources.

For all these reasons, I encourage the Planning Group to exclude this dam from its final plan.

Ann McElroy

7483 CR 126

San Saba, Texas 76877

City of Goldthwaite Secures Plentiful, Safe Water Supply

The $2.1 million water supply line project, stretching from Mill Creek near San Saba to Goldthwaite is now nearly complete, providing an ample backup water supply to Goldthwaite.

Whitney Underground Utilities, out of Valley Mills, installed about 68,000 linear feet of the 10-inch pipe that will bring raw (untreated) water into the City of Goldthwaite's water system, Lindsey said.

The project is part of a three-prong approach that City Council decided to move forward with in 2011, after water supply in the city got dangerously low following a record drought year.

"In 2011, Council started to pursue longer term solutions to meet the water supply needs of the City of Goldthwaite," Lindsey said.

At that time, Council also decided to drill two more groundwater wells, and start the ball rolling on an in-channel dam project. The wells have been completed and in operation for years; Lindsey said progress on the dam is moving slowly.

The water line project is made possible, in part, with a Texas Water Development Board loan. Lindsey said the loan agreement calls for $620,000 in debt forgiveness, which means the city's final cost is $1.48 million. The loan will be repaid with water revenues, he added.

The water line project involves a long-term contract with the City of San Saba, with the line starting at a pump station on Mill Creek. The City of Goldthwaite will own and operate the water line, which will tie into the Goldthwaite system at the Colorado River pump station.

Workers lay the line for the San Saba to Goldthwaite water supply line.

The City will be responsible for the maintenance and operation of the new line, he said. No new staff or headcount will be required.

When the river isn't flowing, this will provide an alternative water supply for city residents. The water supply contract provides for 245 acre feet per year if needed by the City of Goldthwaite.

The project has to be done by March of 2015 per the city's agreement with the TWDB, but Lindsey said it could be done as early as the end of this year.

Lindsey commended the Council for taking action as quickly as they did regarding the city's water supply. In other places where the governments have not acted as quickly, cities are finding themselves competing for water supplies.

Mayor Mike McMahan said that when Council set out to do something about the water supply in the city, the thought was to pursue projects that would ensure water supply for 50 to 100 years into the future. There is a tradition of these legacy projects in the city, McMahan said, with those who served on Council in years past providing for the needs for future generations, and the current Council wants to continue that history of improvement at a minimum burden to the city's residents.

McMahan also went on to thank Ken Jordan, Mayor of the City of San Saba, their City Council and the residents of San Saba for their cooperation and willingness in working with the City of Goldthwaite to help meet the water supply needs of its residents.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Catherine Ankenbauer Date: 6/2/15

Representing: Smith Ranch

Address: 209 Landon City, St., Zip: Lampasas Texas 76550

Phone Number: (512) 564-1487 Fax Number: ( )

Do you wish to make a statement? ☒ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments: against the Dam

Would Like to Speak

LOWER COLORADO REGIONAL
WATER PLANNING GROUP

PASSED

Public Meeting Registration Card

Name: Harry Ransier Date: 6-25-2015

Representing: Cassie POA

Address: 700 N Chaparral City, St., Zip: Burnet, TX 7861

Phone Number: (512) 793-2027 Fax Number: ( )

Do you wish to make a statement? ☒ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments:

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: FREDDIE CHAPPELL Date: 6-25-15

Representing: COTTONWOOD COVE

Address: 161 ALEXANDER DR City, St., Zip: TBW TX 78672

Phone Number: (325) 379-2681 email: FJCHAPPELL@VERIZON.COM

Do you wish to make a statement? ☒ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe: ____________________

Written Comments: ____________________

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: DEDRA REINERT Date: 6/25/15

Representing: myself

Address: ____________ City, St., Zip: GOLDTHWAITE, TX 76844

Phone Number: ( ) ____________ Fax Number: ( ) ____________

Do you wish to make a statement? ☒ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe: ____________

Written Comments:

Cleaned dam – against

Region K Water Meeting 2015.06.25 Texas Water Development Board Determines Water Projects for the State of Texas

Subject: Goldthwaite Channel Dam: Original request by O.P. Leonard for 10 ft tall dam=485 acre ft.
New request by City of Goldthwaite for 20 ft tall dam=to impound 1100 acre ft.

Additional water sources available to City of Goldthwaite-Improved water wells, already access water from Colorado River to Water reservoirs, and, Most recently, have an agreement to access water direct from San Saba, via water line currently in place to Provide "live water" to the City of Goldthwaite.

I, my sister and our Mother, own property that has transcended down through my father's family dating back over 120 years, which has been recognized by the Texas Family Land Heritage and acknowledged by Rick Perry, as Commisioner of Agricultural for the State of Texas during the early 1990's. Our property is strategically located downstream from the proposed project, in a bend of the Colorado River, with approximately 1 mile of river frontage...which sounds wonderful, but in fact, a few years ago, due to the river bed being dry in so many places, we were forced with the heartbreaking decision, and financial decision, to have to construct fencing along the riverside, where there had Never-Ever been a fence before! Just to be able to maintain cattle on our side, to keep them from travelling to the property on the other side of the river. And, now there is quite a bit of property that cattle are kept from being able to graze, due to the fencing. This also limits the process in which cattle have access to drinking water.

O.P. Leonard properties are located several miles up the Colorado River. They have at least 3 huge pumps placed down in the river, which remove massive amounts of water to water all of their pecan trees, in which they profits millions of dollars each year. When the river water level goes down, they just drop their pumps further down! All while...We are lucky to have water trickling at the point at which our property is located, and that is no joke!!! Their pumping creates severe dry pockets, and then what water is in the river, is held up in little pools before it gets to us!

We have "riparian water rights" which gives us the right to reasonable use of the water in the Colorado River, as I'm sure many other property owners also have. It also gives the right to have the water in its natural course of flow, But do to the extreme pumping, this would be futile for us, as the water table has already been significantly lowered, therefore also causing us difficulty in having a decent water well. Riparian rights require that the use must be balanced with other riparian owners' reasonable uses,, without a focus on guaranteeing any specific volume to any riparian owner.
The current flow of water is already constricted, so therefore, ***If***, the projects mentioned before are approved, this will basically cut off all water supply to our property, and will create a hardship, as we would no longer be able to raise anything. This would also decrease the value of our property basically to zero, and make it unsellable to anyone-which selling is not what we would want either!!!
Properties below us **also** already significantly suffer from reduced water levels, due to O.P. Leonard-Leonard's Pecan Farm's over-pumping water from the Colorado River just for pecan trees! Which I feel should rate far less, than individuals actually farming, or raising livestock, and having water to live on! In the past, Leonard's Pecan Farms have received hundreds of thousands, of dollars, from Subsidy programs for any losses they have on their pecans and pecan trees, while others that own property on the Colorado River receive nothing from having to reduce their farming and ranching due to no viable way to provide water! I cannot believe that this massive water flooding of pecan trees is what would be considered "reasonable water usage"!
Any consideration of restricting the natural flow of the Colorado should include needs of other riparian owners, suitability and fairness of the use in relation to the cost the use will impose on other riparian owners downstream from the location of any deterrent, size, place, and method of diversion. With the past number of years of severe drought, and histories of long droughts, I propose that any additional diversion of water in the Colorado River at this time, is unnecessary, and will be a severe hardship, more so, than is already being experienced.

I am adamantly asking that the project requested by O.P. Leonard, and the City of Goldthwaite, being the in channel dam previously referred to, not be granted into your plan for Water Projects for the State of Texas.

Thank You for your consideration,
Dedra Reinert

RIPARIAN RIGHTS
by Ben Gutshall, ATG Law Clerk

What Does the Term "Riparian Rights" Mean?

The term "riparian rights" is neither simple to define nor clearly explained in any statutory provisions. The concept finds its origins in common law and has evolved over time to create a variety of implications for property owners whose property borders water and who want to make use of that water. As most commonly used, riparian rights refer to the rights associated with the use of the water for various purposes. These uses include water consumption by people or animals, irrigation of agricultural crops, and a multitude of industrial uses. Relatively recently, recreational use of water has also been included within the scope of riparian rights. If a property owner owns land that borders water, the concept of riparian rights will likely affect the owner's use of the water at some point. To clarify the sometimes murky ideas surrounding riparian rights, one first must determine which property owners have riparian rights.

Who Has Riparian Rights?

Generally, a property owner has riparian rights if the property borders a body of water or water flows through the property. For the most part, this includes property owners with property that either contains or borders a pond, lake, stream, or river. In most situations even artificial bodies of water, such as reservoirs and drainage canals, are included. Regardless of the nature of the water, it is critical that the property actually "touch" water. Owners of such property are commonly referred to as "riparian owners." If the property is in proximity to water, but doesn't actually come into contact with water, no riparian rights are associated with it. Usually, if a body of water borders a lot or property, the property rights extend up to the boundary of the water and sometimes into the middle of the body of water, especially in the cases of running water (e.g., streams, drainage canals, rivers, etc.).

For example, in Illinois, it is a rule that "a grant of land bounded on a stream will convey the land to the middle thread of the stream." *Rowland v Shoreline Boat & Ski Club*, 187 Ill App 3d 144, 544 NE2d 5 (3rd D 1989). Also, in Illinois, "riparian rights apply to all flowing streams whether navigable or non-navigable . . ." *Beidler v Sanitary District*, 211 Ill 628, 71 NE 1118 (1904). In Indiana, a riparian owner acquires riparian rights to the water from the fee title to the shore. *Brown v Heidersbach*, 172 Ind App 434, 360 NE2d 614 (1977). Indiana recognizes that riparian rights are traditionally associated with owners of land abutting a river or stream but also includes land bordering a lake or pond. *Hutner v Kellog*, Ind App 563, NE2d 1338 (Ind Ct App 1990).

An important distinction in Indiana is that while riparian owners still have rights conveyed "to the middle of the stream" in the instance of riparian rights bordering a river or stream, the same does not apply to riparian owners along a lake. Indiana has clearly denied protection of a riparian right to the middle of a lake. *Bath v Courts* 459 NE2d 72 (Ind Ct App 1984). In *Bath*, riparian owners had built a pier that encroached upon the riparian rights of neighboring owners. In response, the neighboring owners built a pier within two feet of the first pier and effectively limited its use. Each owner suggested that his or her respective riparian rights extended to the middle of the lake and allowed the construction of the piers. The court held that the riparian owners did not own rights into the middle of the lake and that each owner was entitled to extend their riparian right "only so far out as not to interfere with the use of the lake by others." Id at 76.

Similarly, in Wisconsin, riparian owners are those who have title to the ownership of land on the bank of a body of water. *Ellingsworth v Swiggum*, 195 Wis 2d 142, 536 NW2d 112 (Wis App Ct 1995). Also, a riparian owner is accorded certain rights based upon title to the ownership of shorefront property. *Sea View Estates Beach Club, Inc v Wisconsin Department of Natural Resources*, 223 Wis 2d 138, 588 NW2d 667 (1998). Wisconsin also provides that riparian rights include the right to use the shoreline, have access to the waters, the right to reasonable use of the waters for domestic, agricultural, and recreational purposes, the right to construct a pier or similar structure in aid of navigation, and exclusive possession to the extent necessary to reach navigable water. *Id.*

What Happens if the Body of Water Changes Shape or Recedes?

A common problem or controversy involving riparian rights arises in situations where the boundary of the body of water changes. For example, during dry years, a lake or pond may recede from its banks or a stream may diminish in size. Other changes can result from floods that increase the size of the body of water or forever alter its physical boundary. Generally, if a body of water recedes and reveals new land, then the original owner's riparian property rights extend to the new water line and the property owner gains title to the newly exposed land (often termed "rights of accretion").

A case from Illinois, *Linn Farms, Inc v Edlen*, 111 Ill App 2d 294, 250 NE2d 681 (4th D 1969), illustrates the concept of rights of accretion. In *Linn Farms, Inc*, two property owners owned land in a subdivision near Meredosia Lake, an Illinois River lake, and sought to settle a dispute over land exposed by a change in the lake's water level. Due to a series of lock constructions on the Illinois River, the lake receded and thus "created" new land. Relying on the theory of accretion, and the decision in the earlier case of *City of Peoria v Central National Bank*, 224 Ill 43, 79 NE 296 (1906), the court held that the riparian owner on whose property the new land was exposed gained title to the "new" land. The court also stated that the accretion doctrine applied to lakes and ponds, "regardless of how large or small they may be." Indiana also recognizes rights of accretion and has provided that, "the increase in land caused by earth, sand, or sediment deposits, generates a source of title which usually vests in the riparian owners of the land." *Longabaugh v Johnson*, 163 Ind App 108, 321 NE2d 865 (Ind Ct App 1975).

Some Wisconsin cases have also addressed the theory of accretion and provide an example of how the rights of accretion relate to the adherence of that state to the public trust doctrine. In one case, the court held that a coal company's riparian rights entitled it to a parcel of land that was created from accretion along the shores of Lake Michigan, even though the state held title to the beds of the lake under the public trust doctrine. *WH Pugh Coal Company v State of Wisconsin*, 157 Wis 2d 620, 460 NW2d 787 (1990).

What Do Riparian Rights Allow a Property Owner to Do?

Historically, riparian rights were determined by the *natural flow theory*. Under this theory, riparian owners had a right that ensured the water would continue in its natural course of flow or natural existence. The riparian owners were allowed use of the water, as long as it did not hinder other riparian owners' rights to maintain the water in its natural course of flow or natural existence. Essentially, each riparian owner was guaranteed the water would be maintained in its natural integrity or, in other words, would continue to remain as the owners had found it, specifically in the quantity of water present. The focus of this theory was that the riparian owners were guaranteed that the volume of water available to them would remain the same.

Most jurisdictions have moved away from the natural flow theory, especially in the eastern half of the country, and have adopted the *reasonable use theory*. Under this theory, a riparian owner is guaranteed the reasonable use of the water. The focus of this theory is not the guarantee of water volume, but rather that the riparian owner is guaranteed the reasonable use of the water. A use is reasonable if it doesn't substantially interfere with the use of another riparian owner. Basically, each riparian owner's use must be balanced with the other riparian owners' reasonable uses, without a focus on guaranteeing any specific volume to any riparian owner. The basic premise and underlying goal of this theory is to encourage and promote the beneficial use and allocation of water resources. Illinois, Indiana, and Wisconsin have all adopted some form of the reasonable use theory, with various minor modifications.

(NOTE: Western states, because of the aridness of the region and the problems stemming from the struggle to secure adequate access to water, have adopted some form of the *prior appropriation theory*. This theory grants the first riparian owner to make a beneficial use of the water, a right superior to the riparian rights of subsequent users. This theory has very different implications for riparian owners, but is relevant only in the western half of the country.)

Ultimately, a riparian right allows riparian owner to make *reasonable use* of the water. A question still remains, however, and brings us to the next section.

What is a Reasonable Use of Water by a Riparian Owner?

As stated above, under the reasonable use theory, a use is reasonable if it doesn't interfere with the reasonable use by another riparian owner. Of course, that definition sheds no light on what exactly a reasonable use is. Unfortunately, there are very few, if any, concrete rules that dictate what constitutes a reasonable use. In most situations, the determination of reasonable use requires a careful analysis of the fact pattern to determine whether the use is reasonable in light of the circumstances.

Factors that are considered are many, and include custom, climate, the size of the water body, the season of the year, the size of the diversion, the place and method of diversion, the type of use and its importance to society, the needs of other riparian owners, the suitability of the use of the stream, and the fairness of the use in relation to the cost the use will impose on other riparian owners. The preceding list is by no means exhaustive and the factors considered vary in each jurisdiction and case.

Access to water is often a key concern of riparian owners. In Illinois, a riparian owner's right of access to the water attaches to the entire shoreline of the property. *Gibbons v Clarkson Grain Company*, 281 Ill App 3d 529, 667 NE2d 126 (4th D 1996). Illinois also allows each owner of riparian rights to a private non-navigable lake the right to the reasonable use and enjoyment of the surface water of the entire lake. *Beacham v Lake Zurich Property Owners Ass'n*, 123 Ill 2d 227, 526 NE2d 154 (1988).

Indiana places some limits on riparian owners of lakeshore when it limits riparian owners rights to build a pier within the extension of his shore boundaries only so far out as not to interfere with the use of the lake by others. *Bath v Courts*, 459 NE2d 72 (Ind Ct App 1984). Illinois guarantees that the flow of water cannot be diverted, increased, diminished, or polluted against the owner's consent. *Leitch v Sanitary Dist of Chicago*, 17 NE2d 34 (Ill 1938).

Wisconsin provides that riparian rights in Wisconsin are subject to and limited by the public trust doctrine. *RW. Docks & Slips v State of Wisconsin and Wisconsin Department of Natural Resources*, 244 Wis 2d 497, 628 NW2d 781 (2001). The public trust doctrine gives title of the beds of all lakes and ponds, and of rivers navigable in fact, within the state, up to the line of the ordinary high-water mark, to the state to hold in trust to preserve the rights of the people to enjoy the use of the water. *Id.* Essentially, the public trust doctrine gives title of the beds of the water to the state to ensure that the public is guaranteed "reasonable use" of the water, including recreational purposes such as boating, swimming, fishing, hunting, and to preserve scenic beauty. *State v Bleck*, 114 Wis 2d 454, 338 NW2d 492 (1983).

Recreational Use of Water

Currently, a common dispute involving riparian rights is associated with the recreational use of water. Due to the recent surge in outdoor recreation, many states have passed legislation aimed at encouraging riparian owners to allow the public access to water under their control for recreation purposes by eliminating the liability that riparian owners might face to recreational users of their water resources.

Illinois and Wisconsin have both passed statutes that address recreational use of water and the liability associated with it. In Illinois, The Recreational Use of Land and Water Areas Act, 745 ILCS 65/1 *et seq.*, is an example of legislation intended to encourage riparian owners to allow public access to the water they own riparian rights to. Wisconsin has a similar statutory provision, W.S.A. 895.52- Recreation activities; limitation of property owner's liability.

Are Riparian Rights Transferable?

Again, grounded mostly in common law doctrine, riparian rights can be granted, prescribed, and licensed to other owners, especially fellow riparian owners. However, in some jurisdictions, statutes limit the full transferability of riparian rights. The *ABKA Limited Partnership* (ABKA) case from Wisconsin illustrates one type of limit on transferability of riparian rights. In that case, ABKA had purchased a marina on Lake Geneva and planned to convert the marina into the condominium form of property ownership. ABKA intended to create 407 "units" or "dockominiums," each unit consisting of a four-by-five-by-six inch "lock box" to be located in an office with the configuration of the office similar to a set of small post-office boxes. When someone purchased one of these "units," the purchaser was entitled to "standard riparian rights of owners of waterfront real estate, under Wisconsin law . . ."

Essentially, the purchaser of one of the "lock box units" would be entitled to the same riparian rights to use Lake Geneva as a riparian owner who owned an actual land lot bordering the lake. The Supreme Court held that such a transfer of riparian rights violated Wis Stat § 30.133 that limits the conveyance of riparian rights for purposes other than the right to cross the land to have access to the navigable water. *ABKA Limited Partnership v Wisconsin Department of Natural Resources*, 255 Wis

2d 486, 648 NW 2d 854. (2002).

Another common illustration of transferring of riparian rights involves riparian owners forming contracts or agreements amongst themselves to build dams, levees, embankments, or flood gates to manage the water. Sometimes this also involves granting a riparian right in the form of an easement. Also, just as with other property rights, a riparian owner can divest all of his or her riparian rights, subject to whatever statutory limitations may apply, if the owner so desires.

What Is the Remedy for Violation of Riparian Rights?

In most situations, the favored remedy for violation of a riparian right is an injunction to halt the violating use. Usually, the injunction will restore the riparian right to the owner. In some situations, if the violation has severely diminished the value of the riparian right or completely eliminated it, as in the case of draining a lake, compensatory damages will be awarded.

So, What Is the Bottom Line?

Reasonableness. As evidenced in the discussion above, the topic of riparian rights is not one that can be summarized in an entirely clear fashion. The underlying emphasis of a riparian right is to allow reasonable use of water. In many situations, the most difficulty stems from the decision of which property owners have riparian rights. Generally, if the land or property borders water, the owner of that land is entitled to riparian rights. Next, the determination of what use qualifies as "reasonable" is also debatable, especially when dealing with multiple riparian owners or riparian owners with conflicting desires. In many instances, a court will base its decision on dated common law precedent or on a few of the statutes that directly address riparian rights concerns. Laws directly addressing riparian rights are increasing, however, as demand for water use increases, especially for recreational purposes. State legislatures are starting to pass statutes that encourage public use of water, always with the underlying goal that the use be reasonable.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Homer Johanson Date: 6/25/15

Representing: Self

Address: P.O. Box 757 City, St., Zip: Goldthwaite 76844

Phone Number: (325) 938-5275 Fax Number: ( )

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe:

Written Comments: ~~In~~ My Family has lived on Colorado River since 1902 - Each yrs. seems to be more pressure on Colorado River H_2O

In last H_2O Plan - I understand that City of Goldwaite was approved for a 10 ft. instream dam to impound approx. 500 A/ft of H_2O

Now Asking for a 20 ft in-stream dam to impound some 1100 A/ft of H_2O. Asking for over two times increase

What studies have been made, that merit doubling the H_2O needs of Goldthwaite

Are there any data available to merit this doubling increase?

If data is available - where can these data be obtained?

Is Goldthwaite's Request the same as Leonard's Pecan Request?

I'm concerned about the type of in-stream dam?

In order for H_2O to come down stream, does it have to spill over the 20 ft dam? Or is there some type of H_2O gate to let H_2O out if someone down stream needs Dah H_2O. If one needs Dah H_2O what will be the procedure [illegible] receiving Dah H_2O?

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Joe Petronis Date: 6/25/15

Representing:

Address: Lampasas City, St., Zip: 76550

Phone Number: (512) 556-2102 email:

Do you wish to make a statement? ☐ Yes ✓ ☐ No	
Are you an elected official? ☐Yes ☑No Describe:	

Written Comments:

What is going on ?

Against dam

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: ROGER WHATLEY Date: Jun 25

Representing: Self.

Address: 1142 CR121 City, St., Zip: San Saba, TX 76877

Phone Number: (512) 635-4468 Fax Number: ( )

Do you wish to make a statement? ☒ Yes ~~☒ No~~ (decided to speak)

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments:

Goldthwaite should no ~~[illegible]~~ longer have need of an in-channel dam on the Colorado River on account of the fact they are purchasing water from city of San Saba.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Donald Orr Date: 25 June 2014

Representing: Cottonwood Shores

Address: 3808 Cottonwood Dr. City, St., Zip: 78657

Phone Number: (830) 693-3808 Fax Number: ( )

Do you wish to make a statement? ☐ Yes ☐ No

Are you an elected official? ☒ Yes ☐ No Describe: Mayor

Written Comments: Must include 1991 Ban on ww effluent in surface water in plan.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Bill NEVE Date: 6-25-15

Representing: Burnet County

Address: 220 S. Pierce Burnet City, St., Zip: 78611

Phone Number: (512) 715-4112 Fax Number: ( )

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☑ Yes ☐ No Describe:

Written Comments: Drought of Record

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Charlie Flatten Date: 6/25/25

Representing: Hill Country Alliance

Address: 15315 Hwy 71 west City, St., Zip: ~~[illegible]~~ Bee Cave 78738

Phone Number: (512) 694 1121 Fax Number: ( )

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe:

Written Comments: General Comments.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Jo Karr Tedder Date: ____________

Representing: CTWC - Lake Buchanan

Address: 1017 CR 130 City, St., Zip: ____________

Phone Number: (512) 715-0015 email: jokarrtedder.ctwc@gmail

Do you wish to make a statement? ☒ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe: ____________

Written Comments: ____________

Leonard Han - feasibility?

List of Potential Comments to be Made at Region K Public Meetings/Hearing

CHAPTER 1

1. Need to recognize diversity of Regional Planning Area

   - west to east, I-35, Balcones Escarpment climatology

   - drying trend across state

   - need to include discussion of AMOs and PDOs

2. Need to include thorough discussion of impacts of low reservoir levels on economy, public health and safety, and recreation uses. An appendix regarding the significance of the Highland Lakes should be added.

3. Need to include water loss auditing and reporting requirements for agricultural irrigation users. Water losses should be monitored and quantified for *all* water distribution systems.

4. Add statements regarding the universal need for conservation, across all user groups. Metrics are needed to monitor and measure the efficacy of conservation measures taken by all users.

- Jo Karr Tedder
1017 CR 130
Burnet TX
512-755-4805

Recreation =
Recreational Industry

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: KEVIN KLEIN Date: 6/25

Representing: CTWC

Address: 10612 GALSWORTHY City, St., Zip: AUSTIN TX 78739

Phone Number: (512) 288 6703 Fax Number: ( )

Do you wish to make a statement? ☒ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments:

Conservation - rice farming

Chp 2 & 5 need to be up dated

will email written comments

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Jim Maury Date: 6-25-2015

Representing: ~~[illegible]~~ Self

Address: 126 Suzann City, St., Zip: Burnet Tx 78611

Phone Number: (281) 682 3669 email: jimbmaury@gmail.com

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe: ______

Written Comments: LCRA Water Price

will email comments

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: FRANK CLOSNER Date: 6-23-15

Representing: BONANZA BEACH POA

Address: 19722 ENCINO KNOLL City, St., Zip: SAN ANTONIO, TX 78259

Phone Number: (210) 497-3321 Fax Number: ( )

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe:

Written Comments:

WATER SHOULD BE PRICED TO AGRICULTURE CUSTOMERS TO ENCOURAGE CONSERVATION. ALL WATER SHOULD HAVE A COST.

Chapter 5 -

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: FRANK COOLEY Date:

Representing: MYSELF & CENTRAL TEXAS WATER COALITION

Address: 103 RARE EAGLE CT City, St., Zip: LAKEWAY, TX 78734

Phone Number: (818) 404-2541 Fax Number: ( )

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe: ATTACHED

Written Comments:

Pricing of water -

Good Evening. My name is Frank Cooley. I am a resident of Lakeway, in Travis County and a member of the board of the Central Texas Water Coalition.

The Initially Prepared Region K Water Plan is an impressive and comprehensive review of issues regarding the region's water supplies. Water is critical to our future and the Plan justifiably raises numerous policy concerns that should be addressed. Unfortunately, there is a gaping hole in the Plan. There is virtually no mention of perhaps the most important and certainly the most cost-effective way to increase conservation of our most precious resource. The Plan utterly fails to deal with or make any substantive recommendations regarding the pricing of water by the entity that holds the vast majority of the surface water rights in the Lower Colorado Regional Water Planning Area: the Lower Colorado River Authority. As a result, the most critical tool for addressing the efficient use of our water is missing from the Plan. The Region K Planning Group should take the opportunity to fill this gaping hole in the Plan before it is finalized.

Because water pricing influences water demands and thus the shortages the Regional Water Plan is intended to address, water pricing by the largest wholesale water provider in the Region must be included. Under the current pricing policies of the Lower Colorado River Authority, LCRA's firm customers pay high rates and bear nearly all of the cost of operating the LCRA system. This pricing policy creates a significant incentive for firm customers to conserve water, which they have done. On the other hand, LCRA's interruptible customers pay very low rates. But what is ironic and incomprehensible to me, is that the water conserved and unused by the firm customers eventually ends up being available for interruptible customers to use. So we have a situation where firm customers pay lets say $75 or $100 per acre foot to conserve water that if purchased, would cost $175 per acre foot of water diverted, plus $87.50 per acre-foot of water reserved under their firm water contracts, but not diverted or used. Firm customers rationally invest in conservation because the price of conservation is less than the purchase price of their water. However, this water that is conserved and unused by firm customers is then sold by LCRA to interruptible customers, who pay only $6.50 per acre foot, or, in the case of Garwood Irrigation Company, who pay NOTHING per acre foot. Not only is there very little if any incentive for interruptible customers to conserve water at those low rates, they are getting water that cost firm customers $75 or $100 to make it available for interruptible customers to use. In my view this situation is economic insanity.

I recommend the Initially Prepared Plan include water pricing in every relevant portion of the Plan, including a thorough discussion of water pricing as a water conservation recommendation and recommended water management strategy. Experience has shown that the price of water has a significant impact on water conservation. Water for all users should be priced in a fair and reasonable manner, and water pricing should be recognized in the Region K Plan as a water management strategy to encourage conservation. In my view, proper pricing of our region's water will lead to better and more rational outcomes for all water users. We should not sweep this major issue under the rug for another five years.

Thank you for your consideration of my comments.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: John + Leslie Johnston Date: 6-25-15

Representing: Resident + Stakeholder

Address: 119 Harvest Trail City, St., Zip: Tow, Tx 78672

Phone Number: (325) 379-1245 Fax Number: ( )

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe:

Written Comments:

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: John Johnston Date: 6/25/2015

Representing: Self

Address: 119 Harvest Trail City, St., Zip: Tow, Tx 78672

Phone Number: (512) 415-3101 Fax Number: ( )

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments:

Concern with growth and silt in Buchanan Dam.

Conservation but rates increased.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Trudy & Milton Gage Date: 6/26/15

Representing: self

Address: 7205 CR 124 City, St., Zip: San Saba TX 76877

Phone Number: (325) 372-4023 Fax Number: ( )

Do you wish to make a statement? ☐ Yes ☑ No

Are you an elected official? ☐ Yes ☑ No Describe:

Written Comments: Against O. P. Leonard Channel Dam

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Sue + Wayne McCombs Date: 6-26-15

Representing: Self

Address: 502 Island Lodges City, St., Zip: Buchanan Dam, TX 78609

Phone Number: (512) 755-0620 Fax Number: ( )

Do you wish to make a statement? ☐ Yes ☑ No

Are you an elected official? ☐ Yes ☑ No Describe:

Written Comments: against O.P. Lenard Channel Dam

LOWER COLORADO REGIONAL
WATER PLANNING GROUP

Public Meeting Registration Card

Name: Nena Hoover Date: 6/25/2015

Representing: Myself & Una Oliver Property Owners

Address: 4815 CR 340 Burnet City, St., Zip: TX 78611

Phone Number: (512) 636-3524 Fax Number: ( )

Do you wish to make a statement? ☐ Yes ☒ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments: See attached

Region K Administrative Agent
Chris Hoelter
P.O. Box 220
Austin, TX 78767

Burnet, TX Meeting
June 25, 2015

Dear Chris,

I am against creating a new reservoir on the Colorado River near Goldthwaite, Texas. As I understand the facts, the reservoir is not needed for flood control and the City of Goldthwaite has made arrangements for acquiring water during times of emergency. So it seems that the main purpose of the reservoir then would be to satisfy agricultural water requirements. I understand how hard the landowners were hit during the drought the past 5 years because my family owns a pecan orchard in San Saba County and we lost many pecan trees. However, irrigation from the river is not the answer. The predominant irrigation method involves flooding whole river bottoms which is very wasteful. Much of the water doesn't even reach the trees. If the proposal is truly based on agricultural needs, then this proposal seems to be in conflict with the Region K Water Plan's statements about Agricultural Water Conservation.

So my question to you is whether the Region K Water Planning board has researched the true reasons for the proposal of the new reservoir on the Colorado River near Goldthwaite, Texas? If not, then will the planning board do additional research prior to including the proposal? Also, if the proposal is included in the plan and eventually gets approval for construction, who will monitor how much water is taken out of the reservoir for City or agricultural use?

Thank you for allowing public comments and I look forward to hearing from you.

Sincerely,

Nena Hoover

Nena Hoover
4815 CR 340, Burnet, TX 78611
nhoover@hamiltonvalley.com

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Rodney Rudnick Date: 6/25/15

Representing: ____________________

Address: 1800 Hooten ST City, St., Zip: Killeen, TX 76543

Phone Number: (254) 699-2598 Fax Number: ( ) ____________

Do you wish to make a statement? ☐ Yes ☒ No

Are you an elected official? ☐ Yes ☐ No Describe: ____________

Written Comments: Smith Ranch Property Owners

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Dorothy A. Rudnick Date: 6/25/15

Representing:

Address: 1800 Hooten St. City, St., Zip: Killeen, TX 76543

Phone Number: (254) 699-2598 Fax Number: ( )

Do you wish to make a statement? ☐ Yes ☒ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments: Smith Ranch property owner.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: AMY CAMPBELL Date: 6-25-15

Representing:

Address: P.O. BOX 1557 City, St., Zip: LAMPASAS TX 7655[illegible]

Phone Number: ( ) Fax Number: ( )

Do you wish to make a statement? ☐ Yes ☒ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments: I AM OPPOSSED TO THE PROPOSED GOLDTHWAITE CHANNEL DAM ON THE COLORADO RIVER

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Jeri lynn Millican Date: 06-25-15

Representing: Sulpher Springs Camp Inc.

Address: PO Box 44 City, St., Zip: Bend, Tx 76824

Phone Number: (325) 628-3252 Fax Number: ( )

Do you wish to make a statement? ☐ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments: landower down river from proposed dam site at Goldthwaite on Colorado River

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Kay Thompson Date: 6-25-16

Representing: Sulphur Spring Camp Inc

Address: P.O Box 44 City, St., Zip: Bend, Tex 76824

Phone Number: (325) 628-3252 Fax Number: ( )

Do you wish to make a statement? ☐ Yes ☑ No

Are you an elected official? ☐ Yes ☑ No Describe:

Written Comments: Land owner down river from proposed dam site at Goldwaite on Colorado River

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: W. T. Campbell Date: 6/25/2015

Representing: Campbell Ranches

Address: 1557 P.O. Box City, St., Zip: Lampasas, Texas

Phone Number: (214) 437-5829 Fax Number: (—) — N/A

Do you wish to make a statement? ☐ Yes ☒ No

Are you an elected official? ☐ Yes ☒ No Describe: — N/A

Written Comments: I am attending in opposition to the proposed ~~dams~~ dams along the Colorado River along near Goldthwaite.

We have experienced NO surface water on our ~2 mile stretch of the Colorado River every summer since 2010.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Dennis Scroggins Date: 6-25-2015

Representing: Myself & Bend Community

Address: P.O. Box 101 Bend City, St., Zip: TX 76824

Phone Number: (512) 626-5702 Fax Number: ( )

Do you wish to make a statement? ☐ Yes ☒ No

Are you an elected official? ☒ Yes ☐ No Describe: Prent & Voting Chair

Written Comments: Take the Goldthwaite plan off the TX plan.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: James McElroy Date: 6-25-15

Representing: Self

Address: P.O. Box 163 City, St., Zip: Bend, TX 76824

Phone Number: (325) 628-3204 Fax Number: ( )

Do you wish to make a statement? ☐ Yes ☒ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments: 10 or 20 ft dam in Goldwaithe should be elimited from plan — such is determental to downstream users

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: David Glenn Date: 6/25/15

Representing:

Address: 500 Outback Trail City, St., Zip: Wimberley 78676

Phone Number: (512) 557-3595 Fax Number: ( )

Do you wish to make a statement? ☐ Yes ☒ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments: Will submit them later

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: WAYNE BROWN Date: ____________

Representing: Central Tx Groundwater Conservation District

Address: P.O. BOX 538 BURNET City, St., Zip: 78611

Phone Number: ( ) ____________ email: scennymock@wildblue.net

Do you wish to make a statement?	☐ Yes	☑ No

Are you an elected official?	☑ Yes	☐ No	Describe: ____________

Written Comments: ____________

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Mike Morgan Date: 6-25-15

Representing: Lake Buchanan resident

Address: 111 Point Loop City, St., Zip: Burnet

Phone Number: (432) 413-6556 email: Mike.Morgan@freemanmills ~~Bro~~ pc.com

Do you wish to make a statement? ☐ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe:

Written Comments:

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: NIKKI BRYANT Date: 6/25/15

Representing: LAKE Buchanan Resident

Address: 705 CR 140 City, St., Zip: Burnet 78611

Phone Number: (972) 679 9915 email: nikki.bryant@sbcglobal.net

Do you wish to make a statement? ☐ Yes ☒ No

Are you an elected official? ☐ Yes ☒ No Describe: ______

Written Comments: ______

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Bettie Oliver Date: 6-25-2015

Representing: self

Address: 3715 CR 126 City, St., Zip: San Saba

Phone Number: (325) 372-3618 Fax Number: ( )

Do you wish to make a statement? ☐ Yes ☑ No

Are you an elected official? ☐ Yes ☑ No Describe:

Written Comments:

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: JOHN J. "BUDDIE" OLIVER Date: 8/25/2015

Representing: SELF

Address: 3715 County Rd 126 City, St., Zip: SAN SABA, TX 76877

Phone Number: (325) 372-3618 Fax Number: ( )

Do you wish to make a statement? ☐ Yes ☒ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments:

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Kathy Jones Date: ____________

Representing: Senator Fraser

Address: ____________ City, St., Zip: ____________

Phone Number: (830) 693-9900 email: ____________

Do you wish to make a statement? ☐ Yes ☒ No

Are you an elected official? ☐ Yes ☒ No Describe: ____________

Written Comments: ____________

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Bob Savage Date: 6/25/15

Representing: —

Address: 2442 E. FM 501 City, St., Zip: Cherokee, TX 76832

Phone Number: (325) 622-4464 email: twosavages@centex.net

Do you wish to make a statement? ☐ Yes ☒ No

Are you an elected official? ☐ Yes ☒ No Describe: ______

Written Comments: ______

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Meeting Registration Card

Name: Frances Morgan Date: 6-

Representing:

Address: 111 Point Loop City, St., Zip: Burnet 78611

Phone Number: (432) 924-6556 email:

Do you wish to make a statement? ☐ Yes ☑ No

Are you an elected official? ☐ Yes ☑ No Describe:

Written Comments:

Public Meeting of the Lower Colorado Regional Water Planning Group

Sign In

June 25, 2015

Burnet Community Center

Name:	Affiliation:	Phone Number:	Email Address:
Dorothy Taylor			
Charley Cassey		325-379-2068	
Mary Cunningham		325-247-7730	llanocountyjudge@co.llano.tx.us
Cindy Smiley		512.394.7121	cindy@smileylawfirm.com
JOHN FRANKLIN		512-422-9551	johnf3506@gmail.com
Tom Koch		830-833-4133	tomkoch@[illegible].net
GREG PERRIN		512-858-7897	gperrin@drippingspringswater.com
Charles Flatten		512/694.1121	Charlie@hillcountryalliance.org

June 25, 2015 Region K Public Meeting: Initially Prepared Plan
Burnet Community Center, Burnet, TX
Speakers:

1	Reagan	Burnham
2	Tom	Ankenbauer
3	George	Anderson
4	Donald	Orr
5	Mike	Millican
6	Henry	Campbell
7	Don	McElroy
8	Ann	McElroy
9	Kathy	Ankenbauer
10	Harry	Ransier
11	Freddie	Chappell
12	Dedra	Reinert
13	Lamar	Johanson
14	Joe	Petronis
15	Roger	Whatley
16	Bill	Neve
17	Charlie	Flatten
18	Jo Karr	Tedder
19	Kevin	Klein
20	Jim	Maury
21	Frank	Closner
22	Frank	Cooley
23	John	Johnston

Burke, Jaime

From:	John Burke <johnburke41@gmail.com>
Sent:	Friday, June 26, 2015 7:06 PM
To:	Burke, Jaime
Subject:	Fwd: Region K Comments 6 25 2015 Jim Maury

FYI
---------- Forwarded message ----------
From: **Jim** <jimbmaury@gmail.com>
Date: Fri, Jun 26, 2015 at 6:50 PM
Subject: Region K Comments 6 25 2015 Jim Maury
To: chris.hoelter@lcra.org
Cc: JohnEBurke@regionk.org, TeresaLutes@regionk.org

I respectfully request that the Water Demand projections in the Plan utilize

full-cost-recovery water rates for each type of customer. The LCRA should be required to post the estimated rates that are developed by allocating their costs on water usage by customer.

At the May Board meeting, the LCRA approved Run of River water rates and canal Water Delivery rates for customers in the Gulf Coast and Lakeside Irrigation Divisions that appeared to be far less than full cost recovery.

If true, firm customers continue to subsidize purchases by other customers which should be prohibited.

When the new WMP is approved, all parties should know what water volumes are available. A full-cost recovery rate, calculated as described, provides the final tool customers need to estimate water costs and plan and track their conservation efforts.

A plot of Water Rates vs. Consumption over time for the FIRM and Interruptible customers will demonstrate why this is so critical to managing this important resource.

Comments of Kevin Klein
Austin, Texas
Presented at Public Meeting of Region K in Burnet, Texas
Thursday, June 25, 2015

Good evening, I am Kevin Klein, and I have property in Travis and Llano Counties. Our regional water supply is important to me as a water customer of the City of Austin and of the LCRA.

I realize that Region K is charged with tremendous responsibilities to develop and approve the best Regional Water Plan that we can develop, and that there are huge volumes of information and data to review in that effort. I would like to focus my comments on a key issue with region-wide implications for the Lower Colorado Region: **conservation**.

The municipalities of Central Texas have made and continue to make excellent progress in water conservation.

In order to realize meaningful conservation targets it is necessary to apply the same sorts of conservation targets to the major users, specifically rice farming. In the absence of real conservation savings by the largest Region K water users the conservation efforts of the municipalities are futile and we will likely never have enough water even if we build additional new reservoirs.

Chapters 2 and 5 of the Initially Prepared Plan (IPP) need to be updated with appropriate conservation measures and corresponding forecasted demands.

For example, in Chapter 5 specific targets are put in place for municipal per capita water conservation. And cities have conserved, Austin has reduced its per capita use by 30% over the past decade.

Similar conservation targets must be put in place for per acre usage for rice farming. Many rice farmers have made excellent progress, however some still use in excess of the 5.25 af per acre which TCEQ considers a waste of water. Between 2007 and 2011 an average of 7.1% of the total water used by customers in the Lakeside and Gulf Coast irrigation districts was in excess of the 5.25 af maximum. The current baseline numbers need to be immediately adjusted downward to compensate for this overuse of water.

In the 1989 TWC order approving LCRA's Water Management Plan, it was expected that on-farm water usage would be reduced by 25-30% as time went by. And yet 25 years later, despite millions of dollars being spent on conservation programs, no progress has been made. According to LCRA records, the average usage per acre, including canal losses, actually <u>increased</u> from 5.3 af/acre to 5.5 af/acre from 1990 to 2011. Meaningful actual reductions in per acre water usage, similar to the per capita reductions applied to municipalities, need to be included in the demand forecasts going forward. In addition, the canal distribution systems used to provide water to the rice farmers are inefficient. Typical losses of 15-30% are seen between the diversion point and the farm. This is also an opportunity to achieve significant conservation.

Historically a great deal of water has been ordered from the Highland Lakes and sent downstream to the rice farmer customers, only to not be used. Between 2008 and 2011 an average of 90,000 af of water was ordered and not used. This is a waste of water and should not be included in the forecast baseline.

Finally, for decades there has been a historic trend towards decreasing acreage being planted with rice in Texas. From 2001 to 2011 there was an 18% decrease in acreage planted. Other parts of the country and world are more efficient producers of rice and have ready access to abundant water supplies, so there is no reason, short of increased government subsidies, not to expect that this trend will continue. Water demand forecasts going forward need to include an appropriate forecast for decreasing acreage.

To provide a more realistic water demand forecast and to drive conservation in the small number of major agricultural users in line with that expected from the millions of municipal customers, the following changes should be made to forecasted usage (demand) in the IPP:

- The baseline should be reduced by 7.1% to compensate for the historical usage exceeding 5.25 acre-feet/acre for growing rice that was used as a basis for calculating the demand in the 3 rice-producing counties near the Texas coast.
- The average of 90,000 af/year of water sent downstream and not used should be deducted from the baseline.
- A per acre reduction of 10% per decade should be implemented to enable agricultural users to at least start to catch up to the decades of progress in conservation made by municipal users.
- Canal losses should be forecasted to decrease by 10% per decade as well.
- The forecasted total acreage planted with rice should be reduced by 18% per decade.

In my view, these adjustments to water demand numbers for this water user group are reasonable, achievable, and long overdue. Implementing these changes alone to the Plan for the 3 major rice producing counties in Region K will reduce the forecasted 2070 irrigation demand by **400,000 af.** That's a significant amount of water.

Recent comments from the Texas agriculture commissioner indicate that Texas agriculture is using on average 1.5 af/acre at a 98% efficiency level. Using this as a target the irrigators of Region K have a massive opportunity to improve their conservation record. The suggestions above are only a small step towards catching up with the rest of Texas agriculture.

Thank you for your time and attention to these important issues. If I can be of assistance in your efforts, please let me know.

Good Evening. My name is Frank Cooley. I am a resident of Lakeway, in Travis County and a member of the board of the Central Texas Water Coalition.

The Initially Prepared Region K Water Plan is an impressive and comprehensive review of issues regarding the region's water supplies. Water is critical to our future and the Plan justifiably raises numerous policy concerns that should be addressed. Unfortunately, there is a gaping hole in the Plan. There is virtually no mention of perhaps the most important and certainly the most cost-effective way to increase conservation of our most precious resource. The Plan utterly fails to deal with or make any substantive recommendations regarding the pricing of water by the entity that holds the vast majority of the surface water rights in the Lower Colorado Regional Water Planning Area: the Lower Colorado River Authority. As a result, the most critical tool for addressing the efficient use of our water is missing from the Plan. The Region K Planning Group should take the opportunity to fill this gaping hole in the Plan before it is finalized.

Because water pricing influences water demands and thus the shortages the Regional Water Plan is intended to address, water pricing by the largest wholesale water provider in the Region must be included. Under the current pricing policies of the Lower Colorado River Authority, LCRA's firm customers pay high rates and bear nearly all of the cost of operating the LCRA system. This pricing policy creates a significant incentive for firm customers to conserve water, which they have done. On the other hand, LCRA's interruptible customers pay very low rates. But what is ironic and incomprehensible to me, is that the water conserved and unused by the firm customers eventually ends up being available for interruptible customers to use. So we have a situation where firm customers pay lets say $75 or $100 per acre foot to conserve water that if purchased, would cost $175 per acre foot of water diverted, plus $87.50 per acre-foot of water reserved under their firm water contracts, but not diverted or used. Firm customers rationally invest in conservation because the price of conservation is less than the purchase price of their water. However, this water that is conserved and unused by firm customers is then sold by LCRA to interruptible customers, who pay only $6.50 per acre foot, or, in the case of Garwood Irrigation Company, who pay NOTHING per acre foot. Not only is there very little if any incentive for interruptible customers to conserve water at those low rates, they are getting water that cost firm customers $75 or $100 to make it available for interruptible customers to use. In my view this situation is economic insanity.

I recommend the Initially Prepared Plan include water pricing in every relevant portion of the Plan, including a thorough discussion of water pricing as a water conservation recommendation and recommended water management strategy. Experience has shown that the price of water has a significant impact on water conservation. Water for all users should be priced in a fair and reasonable manner, and water pricing should be recognized in the Region K Plan as a water management strategy to encourage conservation. In my view, proper pricing of our region's water will lead to better and more rational outcomes for all water users. We should not sweep this major issue under the rug for another five years.

Thank you for your consideration of my comments.

ATTACHMENT B

Comments from IPP Public Hearing in Austin on July 8, 2015

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Summary of Public Comments on Region K 2016 Initially Prepared Plan
Lower Colorado Regional Water Planning Group
Public Hearing
July 8, 2015
LCRA Dalchau Service Center
3505 Montopolis Drive
Austin, Texas
10:00 a.m.

<u>Summary of Public Comments</u>

1. Lamar Johanson, a resident of Goldthwaite, said the City of Goldthwaite currently has enough water available to meet current needs as well as needs many years into the future. Mr. Johanson had questions about the funding of the dam. Mr. Johanson said he is therefore against the proposed Goldthwaite Channel Dam.

2. Reagan Burnham from Mills County said the Goldthwaite Channel Dam would result in lower flows downstream. Mr. Burnham said the largest benefactor from the dam would be Leonard's Big Valley Pecan Farms, an operation that uses flood irrigation.

3. Joe Petronis said flood irrigation is wasteful and the Goldthwaite Channel Dam would increase the water available for this type of irrigation. Mr. Petronis also indicated he is concerned about the height of the dam and about the effect the dam could have on downstream water users.

4. Ann McElroy said the City of Goldthwaite currently has all the water it currently needs. Additionally, Ms. McElroy said the population projections do not warrant a need for the Goldthwaite Channel Dam. Ms. McElroy also expressed concern that the Region K Plan does not include a projection for "domestic and livestock uses".

5. Henry Warren, a resident of San Saba County, expressed his opposition to the Goldthwaite Channel Dam due to concerns for downstream flows.

6. Patricia Warren, a resident of San Saba County, said the Goldthwaite Channel Dam would have a negative impact on downstream flow and impacts on white bass spawning as well as recreational uses of the river.

7. Dedra Reinert, a long-time resident of the City of Goldthwaite, claimed to have riparian rights to the river. Ms. Reinert said that the dam would be utilized by the OP Leonard Pecan Farm if built. Ms. Reinert said that Goldthwaite has other sources of water available.

8. Kellis Landrom expressed his disapproval of the City of Goldthwaite Channel Dam. Mr. Landrom said the dam is for the benefit of OP Leonard and would not help the City of Goldthwaite.

9. Peter Jones, Llano County Commissioner, spoke about conservation and progressive water usage pricing models in Australia. Mr. Jones recommended that the Central Texas Water Coalition look into progressive usage pricing similar to those used in Australia.

10. Mary Cunningham, Llano County Judge, spoke in support of a revision to Chapter 1 that discusses importance of the Highland Lakes to the region. Ms. Cunningham said the Goldthwaite Channel Dam could degrade the perception of the planning process in the eyes of the public.

11. Charlie Flatten asked the planning group to consider spring flows and healthy water catchment areas and to review recommendations in written comments from the Hill Country Alliance.

12. Ed Pope, a citizen of Hays County, asked the planning group to consider a resolution regarding the Hays County Pipeline which he read to the group and that is attached to the comment card.

13. David Lindsay spoke in support of funding and research of inflows into the Highland Lakes. Mr. Lindsay spoke in support of sections in Chapter 8 of the IPP regarding inflows into the Highland Lakes.

14. Richard Galloway expressed concern that there is no mention of using state of the art climatology in the regional planning process regarding drought cycles. Mr. Galloway encouraged Region K planning members to reach out to climatology experts to be involved in the water planning process.

15. Nan Marley expressed disapproval for the Goldthwaite Channel Dam due to concerns for downstream flow.

16. Jim McMeans read a resolution recommending that pipeline projects proposed from San Marcos to Wimberley Woodcreek and from Wimberley Woodcreek to Dripping Springs be removed from the Region K 2016 Plan.

17. Reagan Burnham said that freshwater mussels no longer exist at the mouth of the San Saba River because of the addition of Lake O.H, Ivie. Mr. Burnham indicated that these mussels used to serve a critical purpose to clean water that flows in the river.

18. Frank Cooley, a member of the Central Texas Water Coalition, expressed concern that the Draft Region K IPP does not include any discussion of water pricing. Mr. Cooley said the plan should include water pricing as a recommended water management strategy.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Russell Johnson Date: 7/8/15

Representing: City of Goldthwaite

Address: 600 Congress City, St., Zip: Austin Tx 78701

Phone Number: (512) 495 6074 email: rjohnson@mcginnislaw.com

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe: ______

Written Comments:

Regular Agenda

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: JIM MCMEANS Date: 7/8/15

Representing: MYSELF

Address: 2000 FISCHER STORE RD City, St., Zip: WIMBERLEY 78676

Phone Number: (512) 847-6578 email: JRMCMEANS@MSN.COM

Do you wish to make a statement? ☒ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe: ______

Written Comments: ______

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: BARBARA HOPSON Date: JULY 8, 2015

Representing: Self & Citizens for Responsible Development (CARD)

Address: P.O. Box 1753 City, St., Zip: Wimberley, TX 78676-1753

Phone Number: (512) 842-2882 email: hopsonbarbara@yahoo.com

Do you wish to make a statement?	☐ Yes ☒ No
Are you an elected official?	☐ Yes ☒ No Describe:

Written Comments:

Please route NO water pipelines through central and western Hays County. We do not need them, do not want them, and do not want our taxes used to pay for them!

Thank you! Sincerely, Barbara Hopson

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: David M. Lindsay Date: July 8, 2015

Representing: myself ; also serve as Alternate on Region K

Address: 2509 Sailpoint Dr. City, St., Zip: Spicewood, Tx 78669

Phone Number: (713) 854-9317 email: davelindsay02@gmail.com

Do you wish to make a statement? ☒ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments: see attached comments in support of hydrology studies of watershed, as recommended in revised proposed Section 8.1.10 of Draft 2016 Water Plan for Region K

Public Comment on Region K IPP

David Lindsay; July 8, 2015

My name is David Lindsay, and I live in Spicewood, Texas. I am a retired engineer, and serve as an Alternate for Doug Powell on the Region K Planning Group.

My comments today are offered in strong support for the recommendations presented in the revised Chapter 8, Section 8.1.10, on Inflows into the Highland Lakes. This new section recommends the funding and performance of comprehensive hydrologic studies on Inflows into the Highland Lakes. This work is needed to identify and evaluate the key factors that are driving the observed extended low inflows into the lakes to help ensure accurate regional water modeling and planning.

Even though we have recently experienced heavy rainfall in the State and region, Lake Buchanan and Lake Ivie above it, have remained at low levels, and the proposed hydrologic studies will help better understand, and potentially help address, the nature of the changes and issues with inflows that are contributing to this adverse water supply situation.

I ask you to support the addition of this important proposed section in Chapter 8 into the Region K 2016 Water Plan.
Thank you.

David M. Lindsay
2509 Sailpoint Drive
Spicewood, Texas 78669
davelindsay02@gmail.com

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Nan Marley Date: 7-8-15

Representing: self

Address: P.O. Box 114 City, St., Zip: Bend, TX 76824

Phone Number: (325) 628-3322 email: none

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe: ______

Written Comments:

There is not one drop of extra water in the Colorado River most of the time. The flow has greatly diminished. Any time any amount has been taken away, it has never come back. That which is allowed to come down now must be protected for those of us who have lived on the river and depended on it to water livestock and support our wells.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Charlie Flatter Date: 7/8/15

Representing: Hill Country Alliance

Address: ______ City, St., Zip: ______

Phone Number: ( ) ______ email: Charlie@HillCountryAlliance.org

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe: ______

Written Comments: General

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: MARY CUNNINGHAM Date: 7/8/15

Representing: LLANO COUNTY

Address: 801 FORD ST. City, St., Zip: Llano, TX 78643

Phone Number: (325) 247-7730 email: llanocountyjudge@co.llano.tx.us

Do you wish to make a statement? ☒ Yes ☐ No

Are you an elected official? ☒ Yes ☐ No Describe: LLANO COUNTY JUDGE

Written Comments: support of Lake Travis Chamber of Commerce position & observation on political landscape

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Kellis Landrum Date: 7-8-15

Representing: ______

Address: P.O. Box 430 City, St., Zip: Goldthwaite TX

Phone Number: (512) 413-3000 email: MEME@Centex.net

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe: ______

Written Comments: ______

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Dedra Reinert Date: 7-8-15

Representing: Self

Address: Box 874 City, St., Zip: Goldthwaite Tx 76844

Phone Number: (254) 216-9379 email: dedrareinert@yahoo.com

Do you wish to make a statement? ☒ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe: ____

Written Comments:

Goldthwaite Channel Dam

Oral Comments

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: James McElroy Date: 7-8-15

Representing: Self

Address: P.O. Box 163 City, St., Zip: Bend, TX 76824

Phone Number: (830) 385-9348 email: jpmcelroy43@gmail.com

Do you wish to make a statement? ☐ Yes ☒ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments: Please eliminate the 10' or 20' dam proposal for Goldthwaite! Such proposal is harmful to all users downstream.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Steve Jones Date: 7-8-15

Representing: self

Address: Goldthwaite City, St., Zip: Tx

Phone Number: ( ) email:

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☐ No Describe:

Written Comments: Channel Dam

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Patricia Warren Date: 7/8/15

Representing: Myself

Address: 1108 W Commerce City, St., Zip: San Saba, TX 76877

Phone Number: (325) 372-3166 email: twarren@centex.net

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe: ____________

Written Comments:

– oppose channel dam - Goldthwaite/Leonard

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: HENRY WARREN Date: 8 JULY 15

Representing: SELF

Address: 1108 W. COMMERCE City, St., Zip: SAN SABA, TX 76877

Phone Number: (325) 372-3166 email:

Do you wish to make a statement? ☐ ~~Yes~~ ☐ No

Are you an elected official? ☐ Yes ☐ ~~No~~ Describe:

Written Comments: OPPOSE PROPOSED LEONARD/ GOLDTHWAITE DAM.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Marilynn Johanson Date: 7/8/15

Representing: Self

Address: P.O. Box 757, Goldthwaite City, St., Zip: 76844

Phone Number: (325) 938-5275 email: johanson@centex.net

Do you wish to make a statement? ☐ Yes ☑ No

Are you an elected official? ☐ Yes ☑ No Describe: ____________

Written Comments: ____________

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Reagan Burnham Date: 7-8-15

Representing: Self

Address: P.O. Box 486 City, St., Zip: San Saba Tx 76877

Phone Number: (325) 248-1413 email: rivercitypaintss@gmail.com

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe:

Written Comments: Goldthwaite Channel Dam
Oral Comments written to be sent in by email.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: JOHN J. (BUDDIE) & BETTIE OLIVER Date: July 8, 2015

Representing: SELF

Address: 3715 COUNTY ROAD 126 City, St., Zip: SAN SABA, TX 76877

Phone Number: (325) 372-3618 email: Buddie1 @ CENTEX.NET

Do you wish to make a statement? ☐ Yes ☒ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments: A CHANNEL DAM WOULD ALLOW FOR MORE WATER TO BE PUMPED FROM THE COLORADO RIVER. THIS WOULD BE A DETRIMENT TO EVERONE BELOW THE PROPOSED DAM. WE ARE OPPOSED TO THIS DAM.

John J. Oliver

Bettie L. Oliver

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Ann McElroy Date: 7-8-15

Representing: Self

Address: 7483 CR 126 City, St., Zip: SS, TX 76877

Phone Number: (512) 658.5490 email: ann.mcelroy@yahoo.com

Do you wish to make a statement? ☒ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe: ______

Written Comments:

- Oppose Leonard/Goldthwaite Dam
- Demand estimates low for livestock & domestic water right holders.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Joe Petronis Date: 7/8/15

Representing: Self

Address: LAMPASAS, TX City, St., Zip: TX 76550

Phone Number: ( ) email:

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe:

Written Comments: what is going on ?

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Stacy Oliver Date: 7/8/15

Representing: Oliver Family

Address: 508 Honeycomb Ridge City, St., Zip: Austin 78746

Phone Number: ( ) email: soliver@vsaustin.com

Do you wish to make a statement? ☒ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments:

channel Dam

Lamar Johanson
P.O. Box 757
Goldthwaite, Texas 76844
(325) 938-5275
johanson@centex.net

In the last water plan, the City of Goldthwaite was approved for a ten (10) foot in-channel dam to impound less than five hundred (500) A/ft. of water. Now, the City of Goldthwaite is asking for a twenty (20) foot in-channel dam that will impound over one thousand (1,000) A/ft. of water. This more than doubles their previous request. What data exists to support this huge increase? Was a study done that will substantiate the need for this huge increase?

In the Burnet meeting, definitive data was presented which showed that the City of Goldthwaite presently has much more water available than it presently uses. These data also suggest that the City of Goldthwaite has enough available water to meet its needs for many years in the future.

This leads to a rhetorical question. If the City of Goldthwaite's request is approved, how will the in-channel dam be funded? Obliviously the in-channel dam will be funded through state and federal grants or other public monies. Thus, a huge private lake will be created that the City of Goldthwaite can pump water from that data shows that it does not presently need. Also, an enormous private agriculture operation will also be pumping water from the same private lake. The rhetorical question; does this mean that public monies will used to impound water that will be used for agricultural purposes and profit for private individuals? JUST A THOUGHT.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Patrick Oliver Date: 7/8/15

Representing: Oliver family

Address: 13008 Drift Dr City, St., Zip: 78756

Phone Number: (512) 799-4607 email: pboventures@gmail.com

Do you wish to make a statement? ☒ Yes ☐ No

Are you an elected official? ☐ Yes ☒ No Describe:

Written Comments:

Channel Dam

EOM

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Reagan Burnham Date: 7-7-15

Representing: Self

Address: P.O. Box 486 City, St., Zip: San Saba Tx 76877

Phone Number: (325) 248-1413 email: rivercitypaintss@gmail.com

Do you wish to make a statement? ☑ ~~Yes~~ ☐ No

Are you an elected official? ☐ Yes ☐ No Describe:

Written Comments:

Channel Dam against

Regular agenda

EOM

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Dedra Reinert Date: 7-8-15

Representing: Self

Address: Box 874 City, St., Zip: Goldthwaite

Phone Number: ( ) email: dedrareinert@yahoo.com

Do you wish to make a statement? [X] Yes [ ] No

Are you an elected official? [ ] Yes [X] No Describe:

Written Comments: channel dam - against

Regular agenda

EOM

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Steve Jones Date: 7-8-15

Representing: self

Address: City, St., Zip: Goldthwaite

Phone Number: ( ) email:

Do you wish to make a statement? ☐ Yes ☐ No

Are you an elected official? ☐ Yes ☐ No Describe:

Written Comments: channel dam

Regular agenda

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Richard Golladay Date: ____________

Representing: self - retired

Address: P.O. Box 1927 City, St., Zip: Marble Falls, TX

Phone Number: (830) 265-0538 email: rgolladay@zeecon.com

Do you wish to make a statement?	☑ Yes ☐ No
Are you an elected official?	☐ Yes ☑ No Describe: retired

Written Comments: attached

Public Comment on Region K IPP - July 8, 2015

My names is Richard Golladay, and I'm a retired engineer living near Marble Falls. In reviewing Chapter 1 of the Region K plan, one notices that no mention is made of bringing state-of-the-art Climatology into the decision-making process for TWDB planning purposes.

A lot has been learned by our Climatologists regarding drought cycles in the last few years, the most noteworthy of which is the influence of long term cycles such as the Pacific Decadal Oscillation (or PDO), the Atlantic Multi-decadal Oscillation (or AMO), and the relationship between these multi-decadal cyclical patterns, probability of strong or weak El-Ninos, and probability of periods of extreme drought - which negatively affect inflows into the Highland Lakes.

We all know how difficult it is to predict the weather. However, climate modeling is getting more sophisticated all the time - and a visit some of us made a few months ago with our State Climatologist, Dr. Nielsen-Gammon and Dr. Andrew Dessler (both over at Texas A&M), communicated several things:

1) We learned that these major oscillations (some patterns of which create extreme drought) are not broken by the presence of an El-Nino.

El-Ninos don't necessarily end droughts.

2) We learned that the current science of Climate modeling has accurately reproduced some aspects of past climate change and temperature profiles going back many decades.

3) We learned that Climate modeling is becoming more sophisticated all the time.

Given this, I would like to encourage Region K to reach out to experts like LCRA's Bob Rose to prepare a a brief summary, for inclusion in Chapter 1, of these key climatology factors and their influence on long-term drought cycles and water availability in Region K. It is also suggested that Region K and the TWDB forge a working relationship with our State Climatologists office with the goal of incorporating climatology into a more forward-looking water planning and modeling process. This is very important given the projections of water shortages and needs in this draft Water Plan for Region K.

Thanks

Richard Golladay

P.O. Box 1927

Marble Falls,, Texas 78654

rgolladay@zeecon.com

BARRETT
& ASSOCIATES, PLLC
3300 Bee Cave Road Suite 650 #189
Austin, Texas 78746
Phone: 512.600.3800 Fax: 512.330-0499
June 30, 2015

Mr. John Burke, Chairman
Region K Planning Group
496 Shiloh Road
Bastrop, Texas 78602

Re: Application by Tol. S. Higginbotham IV to Barton Springs/Edwards Aquifer Conservation District for permit to pump and sell water from Edwards Aquifer

Dear Mr. Burke:

This letter is to notify you as Chairman of Region K that Mr. Higginbotham has applied to the Barton Springs/Edwards Aquifer Conservation District (the District) for a permit to pump and sell Edwards Aquifer water. Mr. Higginbotham does not yet have a contract to sell any water, however; several entities have expressed interest in purchasing water once the well is permitted. These entities include Creedmoor-Maha WSC and Aqua Texas.

The application requests approval to sell up to 270 MGY. The well is located on Mr. Higginbotham's property at 720 RR 967, Buda, Texas.

For your convenience, I am attaching a copy of Mr. Higginbotham's draft User Conservation Plan for your review. We are happy to consider any comments that you might have. Please contact me with any questions.

Very truly yours,

Andy Barrett

Andrew N. Barrett

User Conservation Plan for Tol. S. Higginbotham IV

1. Wholesaler's Service Area

The applicant ("wholesale provider"), Taliaferro S. Higginbotham IV, is currently negotiating a wholesale water contract with the Creedmoor Maha Water Supply Corporation and has initiated discussions with the City of Buda for consideration as an additional customer. Once specific wholesale contracts have been executed, the wholesale provider will prepare appropriate maps delineating the extent of the respective wholesale service areas.

2. Water Metering

Metering equipment and related facilities including a meter loop, a meter house or pit, and standard-type devices required for properly measuring the quantity of water derived from the permitted well will be installed at or near the well head. The specific location will depend on the final design of the initial pumping/delivery facilities at the well head site.

It is envisioned that groundwater will be pumped from the well directly into a ground storage reservoir for minimal treatment or water quality adjustment prior to delivery to wholesale customers via a pump station and transmission facilities. The metering loop will be located either at the well head upstream of the ground storage reservoir or immediately downstream of the delivery pump discharge head.

The wholesale provider will be responsible for the operation and maintenance of the metering equipment and related facilities and will conduct a calibration test on the meter loop at least once annually and immediately upon suspicion of inaccurate water flow rate measurements. The meter will be assumed to read accurately if the meter registers not more than two percent above or below the test result.

In addition, metering will be provided at the delivery point. The two readings will be compared on a monthly basis to determine any loss.

3. Monitoring and Record Management

Metering equipment and related facilities including a meter loop, a meter house or pit, and standard-type devices required for measuring the quantity of water delivered will be installed at or near the well head and at each point of delivery of wholesale water. The wholesale supplier at the purchaser's expense, will provide and install the meter and related facilities at the point of delivery. The wholesale provider, at its expense, will operate and maintain the metering equipment and related facilities, and will conduct a calibration test of the meter loop at least once annually and immediately upon suspicion of inaccurate water flow rate measurements.

All wholesale master meters will be read and recorded for billing purposes on a monthly basis. The well head or groundwater diversion meter will also be read and recorded on a monthly basis. All field meters will be read and recorded at essentially the same time, or within a four hour period, to allow for an immediate assessment of a potential water loss or inaccurate meter readings. A deviation in excess of four percent of total water sold versus total water diverted form the well site will constitute either a water loss or metering accuracy concern.

Monthly meter readings and records will be maintained by the wholesale provider to monitor historical water sales versus water diversion deviations. This monthly data will be used to develop seasonal trends and observations to assist in assessing water loss or meter accuracy concerns and scheduling remedial actions.

4. Operational Efficiency Goals

Unaccounted for water in excess of five percent for the wholesale provider will be considered excessive primarily for economic or business reasons and will be sufficient incentive to initiate an investigation of possible water loss or metering equipment inaccuracies. In the absence of catastrophic facilities failure water losses in water pumping and transmission are anticipated to be relatively small. For retail water suppliers the State of Texas typically expects water loss of eight to ten percent. Unaccounted for water up to 15 percent can be tolerated but this level suggests the implementation of an investigation with remedial action for both health and safety and economic concerns.

The wholesale provider will continually monitor operational efficiency to minimize water loss or metering inaccuracies. The wholesale provider considers persistent unaccounted for water in excess of five percent justification for initiating investigation and possible remedial action.

5. Leak Detention Program

The periodic and monthly meter readings of the wholesale customer meters on the water well diversion meter will be used to assess and determine the extent of unaccounted for water. Persistently unaccounted for water over three months in excess of five percent will initiate an investigation for water accountability. In the absence of visible observance of water leaks, a meter calibration program will first be completed to ensure meter accuracy. If the various meters are determined to be relatively accurate, i.e. within two percent of the test result, a water loss program will be scheduled.

The water loss investigation program may include several progressive steps. First, the water storage tank may be isolated to determine if it consistently holds water. Second, the transmission main can be pressure tested quickly and any water loss calculated.

Finally, a field leak detection program can be initiated to specifically locate any leak. This program utilizes strategically placed data loggers along the transmission main and measures "noise levels" of fugitive flows generally over extended periods of low or no flow. With known pipe sizes and types of pipe material, the location of pipe leaks can be accurately located generally within a few feet.

6. Wholesale Contract Requirements

Any wholesale contract executed will require provisions that the wholesale customer develop and implement a water conservation plan or water conservation measures. The wholesale customer will also be required to adopt the wholesale supplier's water conservation plan as submitted and approved by the Texas Water Development Board and/or the Texas Commission on Environmental Quality. In addition, the wholesale customer will be required to impose the accepted water conservation plan or water conservation measures on any subsequent sub-customer upon the resale of water.

7. Contractual Adoption and Enforcement of Water Conservation Plan

The water purchase contract between the wholesale supplier and the wholesale customer will include provisions requiring that the wholesale customer adopt a water conservation plan with water conservation measures as prepared, submitted, and adopted by the wholesale supplier. Failure of the wholesale customer to comply with the provisions of the water conservation plan could result in termination or suspension of water delivery until such time that compliance is confirmed and/or restored.

8. Coordination with Regional Water Planning Groups K and L

The Taliaferro S. Higginbotham IV well is situated in the Region K water planning area and is proposed to serve the Creedmoor Maha Water Supply Corporation ("CMWSC") water service area. The CMWSC water service area is situated in both the Region K and Region L water planning areas. Based on discussions with representatives of both Planning Regions, it was concluded that relatively small internal water suppliers are not specifically addressed in the Regional Plans and this proposed application is considered neither consistent nor inconsistent with the approved regional water plans. It was suggested that coordination with the Regional Water Planning Group be documented with the submittal of this application to the Chairs of both Regional Water Planning Group K and L. Copies of the transmittal letters are attached.

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: Lamar Johanson Date:

Representing: Self

Address: P.O. Box 757 City, St., Zip: Goldthwaite, Tx 76844

Phone Number: (325) 938-5275 email: johanson@centex.net

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe:

Written Comments: Numbers for H_2O Demand are not accurate

Numbers for Livestock H_2O needs are terribly low

There are No numbers for domestic use, for people on River

Five (5) neighbors including me, Totally depend on

River H_2O for Domestic Use.

Numbers for D+L H_2O Needs - Must be ~~revised~~ readdressed for people ~~on the~~ that depend on River H_2O

Will Hand In Typed Remarks at presentation

(Channel DAM Comments)

Pub. Comnt's given by Frank Cooley in

"Good morning. My name is Frank Cooley. I am a resident of Lakeway, in Travis County and a member of the board of the Central Texas Water Coalition. As you may recall, I made comments at the recent public meeting on the draft IPP regarding water pricing. I appreciated Chairman Burke's comments regarding the relationship of water pricing to regional planning. Using that feedback, I reconsidered my comments and hope to clarify today how my concerns align with the draft IPP under consideration.

My concern is that the draft IPP contains no consideration whatsoever of water pricing. Perhaps more than any other factor, the price paid for water influences people's choices to either consume or conserve. One of the main charges of a Regional Water Planning Group is to "consider water conservation practices, including potentially applicable best management practices, for each identified water need." (31 Texas Administrative Code Section 357.34(f)). Water conservation measures include "practices, techniques, and technologies that will reduce the consumption of water, reduce the loss or waste of water, or improve the efficiency in the use of water." (31 Texas Administrative Code Section 357.10(26)). Appropriate water pricing incentivizes attainment of all three of these goals.

While the Region K Water Planning Group has no authority to require LCRA or any other water provider to set water rates, it does have the authority and, in fact, the duty to recommend strategies for water conservation. Because it is a proven, efficient method to modify behavior and leads to significant water savings, water pricing should be included in the IPP as a recommended water conservation measure for all water suppliers and all types of water uses.

If water suppliers follow the fundamental pricing principle that no customer pays less than the highest cost to either conserve water or obtain new water supplies, water conservation will be a matter of simple economics. And, by adopting conservation water pricing, water suppliers will collect the additional capital necessary to fund the much more expensive conservation measures currently included in the IPP," but without a sufficient funding source.

"Several other Regional Water Plans, including those for Regions C, M, and N, currently include consideration of water pricing as a conservation measure. Why not Region K's Plan one might ask?"

I believe and strongly recommend that the Plan affirmatively state that water pricing is an extremely important conservation tool. Pricing policies that encourage water conservation should be adopted by all water providers in Region K and encouraged by this Regional Water Planning Group.

Thank you very much for the opportunity to clarify and focus my concerns and thank you again for your consideration of these comments.

Public Comment on Region K IPP

David Lindsay; July 8, 2015

My name is David Lindsay, and I live in Spicewood, Texas. I am a retired engineer, and serve as an Alternate for Doug Powell on the Region K Planning Group.

My comments today are offered in strong support for the recommendations presented in the revised Chapter 8, Section 8.1.10, on Inflows into the Highland Lakes. This new section recommends the funding and performance of comprehensive hydrologic studies on Inflows into the Highland Lakes. This work is needed to identify and evaluate the key factors that are driving the observed extended low inflows into the lakes to help ensure accurate regional water modeling and planning.

Even though we have recently experienced heavy rainfall in the State and region, Lake Buchanan and Lake Ivie above it, have remained at low levels, and the proposed hydrologic studies will help better understand, and potentially help address, the nature of the changes and issues with inflows that are contributing to this adverse water supply situation.

I ask you to support the addition of this important proposed section in Chapter 8 into the Region K 2016 Water Plan.
Thank you.

David M. Lindsay
2509 Sailpoint Drive
Spicewood, Texas 78669
davelindsay02@gmail.com

LOWER COLORADO REGIONAL WATER PLANNING GROUP

Public Hearing Registration Card

Name: ED POPE Date: 7-8-15

Representing: CITIZEN ALLIANCE FOR RESPONSIBLE DEVELOPMENT (CARD)

Address: 2259 SANDY PT RD City, St., Zip: WIMBERLEY 78676

Phone Number: (512) 468-8191 email: EDWARDPOPE@GMAIL.COM

Do you wish to make a statement? ☑ Yes ☐ No

Are you an elected official? ☐ Yes ☑ No Describe: ____

Written Comments: SEE ATTACHED RESOLUTION & POSITION STMT

CITIZENS ALLIANCE FOR RESPONSIBLE DEVELOPMENT

A RESOLUTION

OPPOSING CERTAIN PIPELINES IN THE REGION L AND K IPP's

AND RECOMMENDING CHANGES

WHEREAS, TWDB Region L and K planning groups have released their Initially Prepared Plans for 2016, and;

WHEREAS, comments are invited from the public that will be considered before final adoption of the 2016 plans, and:

WHEREAS, the Citizens Alliance for Responsible Development (CARD) is a citizen group actively involved in community affairs and planning in Hays County, and;

WHEREAS, CARD has adopted and recommended a *Growth Corridors Plan* that calls for higher density development along major regional highway corridors and lower rural density development within Central and Western Hays County where the recharge zone of the Trinity Aquifer is located, and;

WHEREAS, the Region L and K IPP's recommend pipelines that would be routed through the low density rural development areas of Hays County where pipelines would encourage and stimulate intense development, and;

WHEREAS, an alternate pipeline routing within Northern Hays County would be consistent with the recommended *Growth Corridors Plan*, and;

WHEREAS, CARD has prepared a Position Statement on the Region L and K IPP's that is attached as a supplement to this Resolution;

NOW THEREFORE BE IT RESOLVED THAT:

1. Pipelines proposed to extend from San Marcos into Wimberley/Woodcreek and from Wimberley/Woodcreek into Dripping Springs be removed from the Region L and K IPP's.
2. To satisfy the growth needs of the US 290 corridor a pipeline be recommended to extend along a route in Northern Hays County to Dripping Springs.
3. The Region L and K planning groups recognize and utilize the *Growth Corridors Plan* in all current and future planning for Hays County infrastructure.

ADOPTED THIS 7th DAY OF JULY 2015

Steering Committee of the Citizens Alliance for Responsible Development

Louis Parks, Chair

Citizens Alliance for Responsible Development

POSITION STATEMENT ON PROPOSED REGION L AND REGION K PIPELINE PLANS

Following the approval of the SWIFT water fund proposition in 2012, the Texas Water Development Board undertook an extensive regional planning process that will integrate into the state water plan and provide funding for highly rated projects identified in the planning process. These comments relate to a small segment of the overall plan, but these elements are extremely critical to our area – Central and Western Hays County.

BACKGROUND

Citizens Alliance for Responsible Development (CARD) is a citizen group active in Hays County organized as a non-partisan political action committee. CARD works with issues related to transportation, water/wastewater, development, and community outreach. Our website is: www.hayscard.org. We periodically send out an issue oriented e-newsletter – *CARDtalk* – to subscribers. We communicate regularly with citizens and with elected officials at city, county, state, and special district levels.

In 2012 CARD adopted a development plan for Hays County described as the *"Growth Corridors Plan."* Recognizing that growth will impact Hays County, it recommends that infrastructure be oriented to certain growth corridors that can logically accommodate the population increases expected over the next few decades. Those corridors are US 290, IH 35, the 130 Toll Road, FM 46, and US 281 with the corridors including all land approximately five miles either side of these arterial highways.

Additionally, CARD has recommended that the interior of Central and Western Hays County and northern Comal County remain at rural density that would not require the introduction of major roadways or water/sewer infrastructure. This area of Hays County/Comal County is the recharge zone of the Trinity Aquifer that is the lifeline and economic engine for thousands of property owners and businesses in Hays and Comal counties. The Trinity Aquifer is also the source of the many springs that feed the area creeks and rivers and support the local tourist economy and property values.

CURRENT ADOPTED INFRASTRUCTURE PLAN

In 2011 Hays County adopted a comprehensive Water and Wastewater Plan for Western Hays County prepared by HDR Engineering Inc., using state grant funds. This plan calls for supplemental water supply pipelines extending into Wimberley /Woodcreek from Comal County and from San Marcos. These facilities are:

1) A 12" pipeline from Comal County served by Texas Water Alliance until 2030;

2) A 16" pipeline from San Marcos after 2030;

3) The US 290 corridor is to be served by extending the former LCRA (now West Travis County PUA) pipeline and connecting a 20" pipeline along Hamilton Pool Road;

4) The plan also encourages the use of rainwater collection to reduce the drain on the limited groundwater resource – the Trinity Aquifer.

PROPOSED REGION L AND REGION K PLAN RECOMMENDATIONS

The planning process for Regions L and K ~~are~~ is driven by these population estimates that are unrealistic for Central and Western Hays County. These population estimates create perceived water needs to serve that population. We believe that population growth should be located where roadway and utility infrastructure can be accommodated. It is highly undesirable to plan for growth to be stimulated in areas of Central and Western Hays/Comal counties, where rural-style development is the desired pattern.

The proposed plans for Region K and L call for a 36" pipeline to extend from San Marcos into Wimberley/Woodcreek along RR 12 or an alternate alignment. Then that pipeline would be upsized to serve needs in Dripping Springs and routed from Wimberley/Woodcreek along RR 12 into Dripping Springs. These pipelines would move about 13 million gallons per day into an area that is designated to remain at rural density. Introducing such a large pipeline would require major new subdivision development in direct conflict with the *Growth Corridors Plan*.

CARD strongly opposes such a plan as ill-suited for Central and Western Hays County.

We have approved a Resolution opposing these RR 12 pipeline plans as contained in the proposed Region L and K plans.

RECOMMENDED REVISION TO PROPOSED REGION L AND K PIPELINE PLANS

CARD recommends that the TWDB and the Region L and K planning groups reject any pipeline projects into the Wimberley/Woodcreek rural density planning area. Our recommendation is for a pipeline to extend along a route in Northern Hays County to serve the Dripping Springs/US 290 growth corridor, where subdivision growth is desired and higher population density is expected.

"CARD promotes sensible growth in the Wimberley Valley and western Hays County..."

from CARD Mission Statement

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HAYS COUNTY TRANSPORTATION
Growth Corridor Plan

Since early 2012, Citizens Alliance for Responsible Development has gone on record several times in support of a Hays County Transportation Growth Corridor Plan that would greatly benefit business, growth and development, while preserving some of the natural heritage and beauty that has drawn people to Hays County for more than 200 years. The plan recognizes the reality of citizen's inability and unwillingness to pay ever higher taxes for unneeded, unwanted and unsustainable road development. It would also help prevent a potential water calamity that would certainly occur if the already water-stressed central Hays area is rapidly over-developed.

The plan is based on recognizing and encouraging focused development where there is already existing infrastructure and natural as well as growth-based resources. A combination of factors have already established four Growth Corridors, which roughly form a square of vigorous business, residential and highway development around the still essentially natural center of the county.

This square is formed by;

- On the east, Interstate 35, running from Austin through Buda, Kyle, San Marcos and New Braunfels, then on south to San Antonio, which will be further reinforced by growth along the new Texas Highway 130 Toll Road that parallels I-35 on the east;
- On the north, by US 290 going west from South Austin to Dripping Springs and ultimately on toward Johnson City and Fredericksburg;
- On the west by US 281, running south from Johnson City through Blanco and on past State Hwy 46 to San Antonio and;
- On the south by Texas 46, going east-west from New Braunfels to US 281, above the booming north edge of San Antonio.

Many factors, some long-established and some recently created by growth, have made this plan both practical and essential:

1. The cost of transportation is rising dramatically with gas and diesel approaching $4 per gallon. Energy costs will continue to rise
2. The cost of land for Right of Way is very high in the scenic Hill Country of central Texas.
3. Citizens, feeling the pinch of a troubled economy, are fighting back against more taxes.
4. The county's economy cannot support a huge road infrastructure with the ever-growing cost of tax-supported bonds floated to pay for roads. What roads are planned must be designed and built to serve only the expected need, not grossly overbuilt for projections that burden the actual taxpayers present today.

Read more...

CARDtalk: CAMPO Open House April 2, 2014 (3/26/14)

CARDtalk: TXDot RR12 Parkway Project Open House (12/5/13)

CARDtalk: Alert –Hays County Transportation Plan Impacts Your Neighborhood (11/8/12)

Here's MUD in Your Eye: Massive Development for 5,000 Acres...

CARDtalk: MUD meeting report (4/26/13)

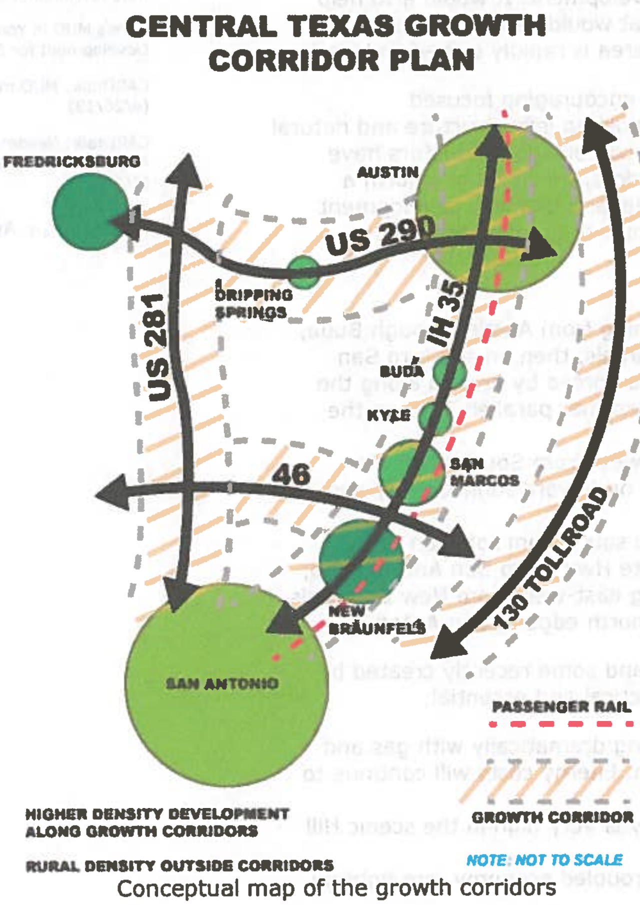
CARDtalk: Needmore Ranch MUD Approved with Amendments (5/10/13)

More in our Archives...

5. In many areas of central Texas the population is aging, which will result in fewer vehicle miles traveled. This trend is occurring nationwide with a steady reduction in vehicle miles traveled overall.
6. Younger people and families are tending to move away from the suburbs to more affordable urban environments with more amenities, where travel distances are shorter and housing is closer to jobs, friends, and activities.

Any plan for Hays County should look beyond the borders of the county to consider the larger region. We believe that the cities, the counties, and the state should focus their limited transportation resources on growth corridors where current infrastructure can be expanded, where mobility is most needed, and where high-capacity transportation networks already exist. In the Hays County area of central Texas the growth corridors, based on the previously mentioned routes, are:

1. IH 35, approximately five miles on both sides of the freeway.
2. US 281, approximately three miles on both sides of the highway.
3. US 290, approximately five miles on both sides of the highway.
4. Texas State 46, in Comal County, approximately three miles on both sides of the highway.
5. Hwy (Toll Road) 130 approximately five miles on both sides of the highway.



Conceptual map of the growth corridors

Those growth corridors and the roads within these corridors should be apportioned the bulk of the transportation dollars. That is where growth can be accommodated efficiently and transportation costs kept within the means of the already over-burdened taxpayer. For years the Texas legislature has refused to raise gas taxes, while the operators of cars and trucks have contributed less per mile to the road fund.

Taxpayers are going to be very hesitant to approve any additional road bonds for transportation projects. Area officials must learn to live within their means by using existing or even reduced funds in their transportation planning. This means that grand plans for major roads outside the growth corridors must be shelved. Plans for new road bonds and tax increases must also be dropped.

Within the Hill Country portion of Hays County and northern Comal County the terrain is rocky and hilly, creek and river crossings are numerous, and road building costs are excessive. Therefore the existing roads will have to do for now and into the future with only needed safety improvements and intersection widening, where justified.

Fortunately, that is what many visitors to and residents of central Hays and northern Comal Counties find so attractive – roads with slower speeds and beautiful scenery that provide adequate access for daily trips and commerce. Within these central areas of the counties the primary expenditure of roadway dollars should be on proper maintenance of the roads and early acquisition of Right of Way where selective intersection widening may be expected in the future.

This approach to transportation planning for our collective future recognizes the reality that growth projected for central Texas will be attracted to areas where water, sewer, and transportation infrastructure is already in place and where mobility improvements can be efficiently and economically developed – the growth corridors. It also recognizes that with changing demographics, higher energy costs, resistance to new taxes, and new trends in urban-oriented housing, the conditions that led to successful rapid growth in the past are not likely in our future. Additionally, in central Hays and northern Comal Counties the primary water supply source, the Trinity Aquifer, will be unable to provide adequate drinking water for intensive development; thus, maintaining a rural development density will be essential to the area's future.

PO Box 2905, Wimberley, TX 78676 Email: info@hayscard.org

LOWER COLORADO REGIONAL
WATER PLANNING GROUP

Public Hearing Registration Card

Name: PETER JONES Date: 7/8/15

Representing: LLANO COUNTY

Address: PO Box 8759 HORSESHOE BAY City, St., Zip: TX 78657

Phone Number: (830) 598-2296 email: commpct1@co.llano.tx.us

Do you wish to make a statement? [x] Yes [ ] No

Are you an elected official? [x] Yes [ ] No Describe: ______

Written Comments:

Conservation is a critical element of a water management plan - but there is no revenue generated by conservation.

One approach that is tried + tested in Australia is to employ progressive usage pricing models to financially encourage wise water use.

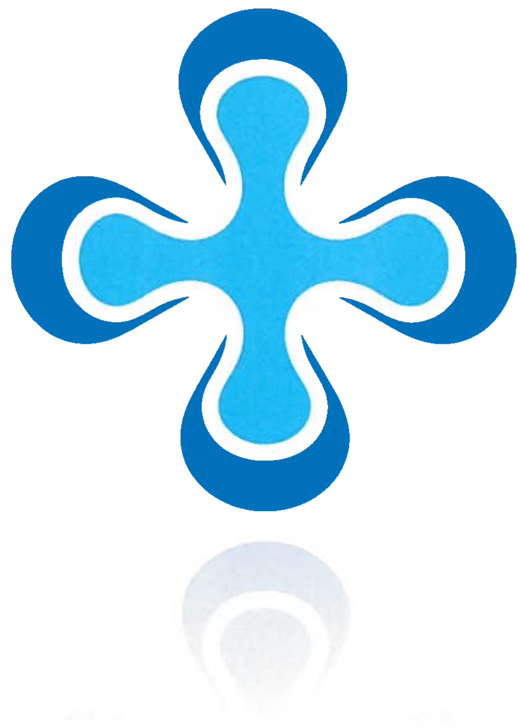
This approach is also consistent with CTWC plan of how conservation can be encouraged.

I encourage CTWC to ~~dest devoto~~ develop a recommendation of progressive pricing for both firm + interruptible customers.

by James Fletcher & Robert Cunningham, PhD

LESSONS FROM THE AUSTRALIAN DROUGHT

Does the Answer to Texas' Water Policy Problems Lie Down Under?



Texas has serious water problems.

This has become all too clear as prolonged drought has gripped most of Texas. Unfortunately, when drought conditions eventually break, Texas businesses and citizens will still be saddled with our antiquated Water Code and associated dysfunctional governance and regulations.

Recently, some business and political leaders started to realize that a bold and comprehensive new Texas water policy is needed for the 21st century. But exactly what kind of modern policy and new regulations will deliver proven results for our rapidly growing population and wide array of expanding businesses while preserving the environment?

Early in 2014, a small group started to research possible long-term water policy solutions being utilized elsewhere in the world. While it was easy to find innovative new water-related technologies, it was difficult to find the kind of visionary water management framework needed in Texas. Then one of us had the good fortune to attend an Australian professor's presentation at the Texas A&M Law School titled "Is Texas Missing an Opportunity? Lessons from Australia."

Professor Mike D. Young, Research Chair for Water Economics and Management at the University of Adelaide and Chair in Australian Studies at the Harvard University School of Engineering and Applied Sciences, is one of the architects of the highly successful Australian Water Initiative that has been developed and implemented over the last 15 years. This new water management model was developed in a time of dire necessity when an approximately 20-year drought gripped all of eastern Australia, the country's agricultural breadbasket and home of over 85 percent of its population.

How Bad Did It Get During the 20-Year Australian Drought?

The Australian drought began in 1991 in Queensland and quickly engulfed all of Eastern Australia. It officially ended in 2011, but at its zenith in 2001 – 2009, the so-called "Millennium" Drought period – it was considered the worst drought since Australia was settled.

In the latter half of the drought, rivers in the Murray-Darling Basin (Australia's version of the Mississippi River Basin) were barely flowing in multiple locations and a multi-state region had to impose draconian water use restrictions on citizens and businesses. Even more dramatic, the Australian government was preparing plans to cease all agricultural surface water use in the Basin, which would have financially devastated massive numbers of businesses, including farms and ranches that produce over $30 billion (USD) in exports as well as most of the food for Domestic Markets.

What Needed To Change In Australia's Water Management Policy?

Australia's previous water management system was almost totally controlled by state governments and various political subdivisions. Similar to Texas, government or pseudo-government agencies essentially picked and funded almost all water investments and effectively backstopped any losing investments. Australian leaders decided this was clearly not an effective investment and management model with the prospect of long-term droughts and the country's fast growing 21st century economy.

The solution that emerged was a hybrid government and free market approach to water management. The government would guarantee affordable water for cities and citizens, but additional water allocations would be allowed to be traded and water transported where needed. By permitting supply and demand to determine the monetized value of water, the balance between water conservation and consumption was dramatically enhanced.

The major components of the successful Australian water management model that can work in Texas are amazingly straightforward and commonsense:

- An appropriate and workable role for government is still significant but primarily at the base of the water management pyramid. Most importantly, government makes certain the water needs of all cities, citizens and businesses are met and that water is set at affordable rates under long-term contracts. However, city water rates systems employ progressive usage pricing models to financially encourage wise water use.
- The connectivity between surface and groundwater resources is recognized and scientifically managed as a single resource through comprehensive hydrology involving modeling and continuous monitoring basin-wide – not in small isolated locales.
- Government guarantees that water management policy and available usage is totally based on hydrologic and other scientific and legal analysis conducted by nominated practicing and credentialed experts. In other words, politics, conflicting interests, and cronyism are eliminated from water governance.
- Government ensures that all existing pollution and environmental regulations are rigorously enforced.
- Scientifically established and available water supplies exceeding the needs for cities and citizens are monetized and allowed to be traded through free open water markets that provide buyers and sellers fair market value. These markets primarily involve industry, agriculture, ranching, and forestry.
- Embolden and assist engineers, technologists, entrepreneurs and water owners to develop innovative methods and technologies that use less water and produce new water resources and containment.
- Open the water infrastructure system and overall water market to private capital to fund projects for the development of water resources and transportation that government cannot afford, has chosen not to undertake, or would not risk funding. This capital can either be public-private partnerships or purely private investments. But such ventures must be driven by entrepreneurs and investors risking their capital – not primarily by old-fashion government decision making.

What Were Some of the Results Australia Obtained?

First, it's working. Additionally, the results have been better and developed faster than the architects ever expected.

Water has become a valuable marketable asset for Australian water rights and allocation owners, which financially incentivizes both acceptable resource development and conservation. Once water had "real" asset value, large and moderate water users found new and innovative ways to use far less water. Examples were widespread and include farms that have installed microprocessor control irrigation systems that allowed them to use one-third the water previously utilized for irrigation. New technologies have reduced water loss during containment and transportation, and the rapid pace of innovation has been absolutely astounding.

Texas Needs Bold Action and Leadership

In summary, a form of the truly science-based, highly successful Australian water management model is the answer to Texas water policy needs for the 21st century rather than our current policies that primarily date from the 19th and 20th centuries. Just as important, this can be done while protecting Texans' Constitutional property rights while safeguarding our environment and assuring needed water supplies for the future of our state.

In a January 2015 presentation for the Texas CEO Magazine Speaker Series, the Chairman of the Texas Water Board noted that by 2060 the population of Texas is estimated to grow by 82 percent or to 46.3 million people, and that $231 billion will be needed for water infrastructure and development projects, including $53B for new water containment and sourcing.

With the potential of ongoing droughts and this level of needed water infrastructure investment, it is obvious the current Texas water management system – almost completely government funded and operated – is not sustainable.

Now is the time for decisive action – not after droughts and systematic water shortages do possibly irreversible harm to our citizens, environment, and economy. Or do we need to wait for businesses to start bypassing and leaving Texas because of water availability concerns to act?

Texas Water Future is a not-for-profit and nonpartisan organization dictated to bring a form of the successful Australian water management model to Texas. Professor Mike D. Young is a consultant to Texas Water Future.

James Fletcher is the Chairman and a founder of Texas Water Future. His prior business career was primarily with KPMG and Deloitte serving as a senior business strategy and technology advisor to numerous multinational corporations and government agencies around the world. He can be reached at 512-470-7769 or j.fletcher@outlook.com.

Robert Cunningham, PhD, is Vice President of Scientific Research of Texas Water Future. He holds a PhD in Geosciences (Biogeochemistry) from the University of Texas-Dallas. He retired from ExxonMobil after leading research teams and conducting exploration throughout the world, finishing with several years in Australia during the Millennium drought. He can be reached at 325-248-5392 or rcunningham.cs@gmail.com.

City of Goldthwaite Secures Plentiful, Safe Water Supply

The $2.1 million water supply line project, stretching from Mill Creek near San Saba to Goldthwaite is now nearly complete, providing an ample backup water supply to Goldthwaite.

Whitney Underground Utilities, out of Valley Mills, installed about 68,000 linear feet of the 10-inch pipe that will bring raw (untreated) water into the City of Goldthwaite's water system, Lindsey said.

The project is part of a three-prong approach that City Council decided to move forward with in 2011, after water supply in the city got dangerously low following a record drought year.

"In 2011, Council started to pursue longer term solutions to meet the water supply needs of the City of Goldthwaite," Lindsey said.

At that time, Council also decided to drill two more groundwater wells, and start the ball rolling on an in-channel dam project. The wells have been completed and in operation for years; Lindsey said progress on the dam is moving slowly.

The water line project is made possible, in part, with a Texas Water Development Board loan. Lindsey said the loan agreement calls for $620,000 in debt forgiveness, which means the city's final cost is $1.48 million. The loan will be repaid with water revenues, he added.

The water line project involves a long-term contract with the City of San Saba, with the line starting at a pump station on Mill Creek. The City of Goldthwaite will own and operate the water line, which will tie into the Goldthwaite system at the Colorado River pump station.

Workers lay the line for the San Saba to Goldthwaite water supply line.

The City will be responsible for the maintenance and operation of the new line, he said. No new staff or headcount will be required.

When the river isn't flowing, this will provide an alternative water supply for city residents. The water supply contract provides for 245 acre feet per year if needed by the City of Goldthwaite.

The project has to be done by March of 2015 per the city's agreement with the TWDB, but Lindsey said it could be done as early as the end of this year.

Lindsey commended the Council for taking action as quickly as they did regarding the city's water supply. In other places where the governments have not acted as quickly, cities are finding themselves competing for water supplies.

Mayor Mike McMahan said that when Council set out to do something about the water supply in the city, the thought was to pursue projects that would ensure water supply for 50 to 100 years into the future. There is a tradition of these legacy projects in the city, McMahan said, with those who served on Council in years past providing for the needs for future generations, and the current Council wants to continue that history of improvement at a minimum burden to the city's residents.

McMahan also went on to thank Ken Jordan, Mayor of the City of San Saba, their City Council and the residents of San Saba for their cooperation and willingness in working with the City of Goldthwaite to help meet the water supply needs of its residents.

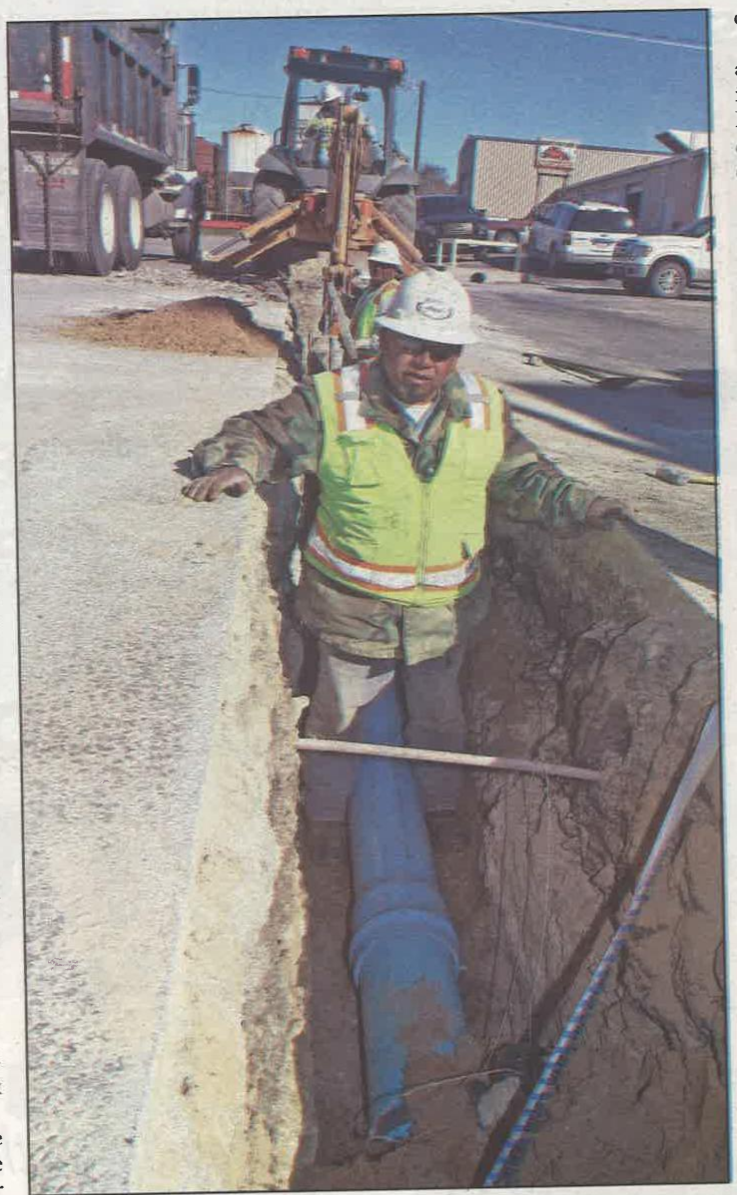
City of Goldthwaite Builds Infrastructure for Growth

Water

The City of Goldthwaite is in the midst of improving their water distribution system. Work crews have been working in downtown Goldthwaite to work on the project focused on replacing aged City of Goldthwaite cast iron water lines with new eight inch water line (C900 PVC line). The project will also encompass replacing and adding fire hydrants along the route. The crews will also migrate and re-establish service lines from old lines to new lines while they are at it.

Funding is provided by Texas Department of Agriculture and the Community Development Block Grant Program. Housley Communications of San Angelo contracted to do the work for the City of Goldthwaite.

Thanks to investment in infrastructure improvements, the City now has multiple ways of accessing water based on needs and drought conditions: the Colorado River, three reservoirs, the water tower, three wells, and now a water line from the ever-flowing Mills Creek in San Saba to the Goldthwaite pumping station at the Colorado River, which separates Mills and San Saba counties.



Humberto Ollazobal of Housley Communications installs one of the new eight inch water lines just north of City hall Tuesday afternoon.
Photo by Steven bridges

Airport

The Goldthwaite Municipal Airport hangars are now complete, the last of the asphalt having been poured in April 2015.

Council have approved a number of hanger rental options, offering discounts for longer use, including a $150 per month rate for long-term commitments of three years, paying at least six months in advance at a time.

Of the 10 hangars at the city, six have firm rental commitments, leaving three open hangars and one set aside for business development as of this printing.

Standard rate for the hangars is $200 per month, or $183 per month on a one-year commitment.

The business hangar is used to attract a business like a flying school, mechanic or fuel operator to use the hangar to house aircraft or use in a fashion that complies with City ordinance to develop additional business at the location.

The business hangar can also be used for emergency purposes.

Quiet Zone

The City is exploring ways to increase safety at its train crossings and reduce noise by way of eliminating the need for trains to whistle when coming into town.

City staff is working with representatives of the Nothern Santa Fe Railroad, the Federal Railroad Administration, and the Texas Department of Transportation to meet, review, and walk every railroad crossing in the city. They will discuss requirements to go to a quiet zone, and what options exist.

On-channel Reservoir

Council has given its unanimous approval of the proposed Leonard's On-channel Reservoir on the Colorado River.

The reservoir will help preserve a portion of the water that flows through Mills County to serve the Leonard's pecan farm, which lost thousands of pecan trees during recent drought.

This reserve of water could also benefit the city in an emergency drought situation. The city's primary source of water is from pumping the Colorado River.

"What this project does for us is it tries to alleviate the lack of reliability on the river," City Manager Rob Lindsey said.

"We produce water from the Colorado River, and we struggle continually to avail ourselves of the water we hold within our rights due to intermittent flow on the river."

Burke, Jaime

From:	John Burke <johnburke41@gmail.com>
Sent:	Tuesday, July 14, 2015 6:22 PM
To:	Jeff Fox; Burke, Jaime
Subject:	Fwd: Region K meeting comments

Include these comments.

---------- Forwarded message ----------
From: **Peter Jones** <commpct1@co.llano.tx.us>
Date: Tue, Jul 14, 2015 at 2:32 PM
Subject: Region K meeting comments
To: johnburke41@gmail.com
Cc: dklaeger@gmail.com

Hi John

Thank you for the opportunity to speak at the Region K Water Group meeting.

My comments addressed the need for Region K to develop recommendations to encourage water conservation. Since no revenue is generated from water conservation having a progressive use cost matrix would encourage conservation by users, particularly high water users, to determine and implement water conservation methods. If there is no significant reduction in the cost of using water verse the cost to establish water saving technology many large users may not see a net benefit of a decision to implement these conservation methods. In other words as long as water is cheap why spend money on conservation. This applies to both firm and interruptible customers.

Australia has experience severe drought and had successful implemented this approach with great success as well as many other initiatives. In essence Australia established water as an asset to be conserved.

I did leave an article with you on these initiatives that Australia implemented for Region K Water Group consideration.

In my comments I had referred to the Central Texas Water Coalition in error and should have referred to Region K. I apologize for this oversight but the content on my message does not change.

Thank you for the work you and Region K Water Group are doing to ensure adequate water for our Region now and in the future.

Sincerely

Peter Jones

Peter Jones

Llano County Commissioner, Pct 1

PO Box 4084

101 Ferguson Rd

Horseshoe Bay, TX 78657

Phn: (830) 598-2296

Fax: (830) 598-5231

Email: commpct1@co.llano.tx.us

ATTACHMENT C

Additional Goldthwaite Channel Dam Comments

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NO COLORADO RIVER DAM
110 North High Street
San Saba, Texas 76877

September 15, 2015

Mr. John Burke, Chair
Region K Planning Group
Texas Water Development Board
Austin, TX

Dear John:

Thanks for taking time to work with us regarding the proposed in-channel dam on the Colorado River. We appreciate the time Jim Barho, Jaime Burke and the Water Management Strategies Committee spent evaluating this project. We also appreciate your role in assuring that all parties have a fair chance to participate in the process.

The purpose of this letter is to outline the major issues which justify excluding the dam from Region K's 2016 Water Plan. We respectfully request that this letter and Region K's response be included in the final version of the Plan.

The main reasons this dam should be excluded from the Plan are:

I. *The City of Goldthwaite has ample water for municipal purposes.*
II. *The River does not have enough water for the dam and downstream users.*
III. *The public opposes the dam and has clearly communicated its concerns.*
IV. *Texas Parks and Wildlife, LCRA and the City of Austin have serious concerns.*
V. *Senior downstream water rights holders (including those with D&L rights) would be harmed.*
VI. *The dam will waste water and perpetuate poor irrigation practices.*

Details about each of the issues are provided below:

I. *The City of Goldthwaite has ample water for municipal purposes.*

After the 2010-2011 drought, the City of Goldthwaite took steps to increase its supply. In addition to R-O-R, the City drilled several wells and negotiated a contract with the City of San Saba to purchase 245 acre-feet of water annually. This contract is for an initial 25-year term with extensions on an annual basis in perpetuity upon agreement of the parties.

All told, Goldthwaite has at least 296 acre-feet from R-O-R (the amount diverted during the worst of the 2010-2011 drought), 245 acre-feet from the City of San Saba and additional water from the wells (estimated to be at least 75 acre-feet) or a combined total of 616 acre-feet.

Based on its population of 1,869 and using TWDB's standard of 140 gpdc, Goldthwaite's demand should be approximately 293 acre-feet resulting in a surplus of 323 acre-feet.

Goldthwaite has two reservoirs with combined storage of 550 acre-feet. These reservoirs allow Goldthwaite to capture water during peak flows and hold it until needed.

Regarding future needs, the State Demographer projects Goldthwaite will grow by about 8 people per year over the next 50 years. Existing supply will clearly support this growth.

II. *The River doesn't have enough water for the dam and downstream users.*

An application to build a dam in the Goldthwaite area is currently being considered by TCEQ. The applicants are O.P. and Nancy Leonard, pecan farmers. The proposed dam will be 20' high, impound 1,000 acre-feet of water, cover 109 acres and extend about nine miles.

In its application to TCEQ, the Leonards list four water rights totaling 5,562 acre-feet. Presumably, they need the dam to be able to fully exercise these rights. Once the dam is built, not only will the Leonards have the potential to exercise all their water rights, but so will the City of Goldthwaite, and the four adjacent landowners who have water rights in addition to their D&L rights. If all the adjudicated rights were fully exercised, the total would be 7,573 acre-feet or 2,467,495,000 gallons per year. No one knows exactly how much water these users currently take. We can be certain, however, that the incremental amount they expect to take is enough to justify the expense of building and operating the dam.

The TCEQ file contains a report prepared by Jones and Ridenour, the applicant's environmental consultant. The report describes the condition of the river near the proposed dam. Among other things, the report says:

- "Upstream migration of fish and other aquatic organisms is already significantly hampered."
- The area is "comprised of mostly bare (dry or muddy) river bed, a few well vegetated bars comprised of accumulated sediment and apparently intermittent and perennial pools."
- The apparent intermittent nature of some pools was further supported by an observed "lack of aquatic life within these pools. Reportedly, the river bed currently dries up often."
- "Overall, for the lower one-fourth of the subject reach of river, approximately 50 percent of the river bed was found to be dry or muddy, and approximately 50 percent of the river bed was found to be pooled/ponded. Approximately one-third of the way up the subject reach of river, flow within the river was encountered for the first time. This flow was evident where the river necked down to approximately ten feet wide…."

Does this sound like enough flow to meet the intended purposes of the dam AND the needs of the downstream users, many of whom cannot get enough water now?

III. *The public opposes the dam and has clearly communicated its concerns.*

When the TCEQ invited public comment on the proposed dam in February 2015, it received 347 comments, all but a few of which opposed the dam. Many people wrote passionately and eloquently about how the proposed dam would worsen their already dire circumstances. Here are three typical comments:

- On 2/22/2015: "My family owns property on the river within 8 miles downstream of the proposed site. We have water rights to irrigate our pecans. We have chosen not to do so, much to the detriment of the trees…because we felt it would be a selfish and irresponsible act…."
- On 2/21/2015: "My wife and I have 10 acres of land at Lake Buchanan….We have not had useable lake in 4 or 5 years….Our well runs dry and requires prolonged recharge….We fear proposal ADJ 2472 will result in less water for all the downstream Highland Lakes."
- On 2/22/2015: "It is my understanding that the O.P. Leonard, Jr…has certain water rights and has filed a request for permission to build a dam on the Colorado River for the express purpose of securing an abundance of river water in order to guarantee such a supply as to freely exercise their water rights year-round. Presumably, this is in furtherance of their commercial pecan orchard-farming interests. The Colorado River has seasonably low flows in a normal year and virtually no flow at many times in drought years. It seems reasonably clear to me that if the TCEQ allows one commercial entity…to build a dam to guarantee THEIR access to water, there will be multiple interests downstream that will suffer LESS access to their own water rights."

In addition to these comments, there are 344 more! Please take a look at the TCEQ web site for more examples of the public's opposition to this dam.

Beyond this expression of outrage, more than 1000 people signed a petition opposing the dam and asking the City of Goldthwaite to cease supporting the project. The City Council failed to grant this request.

IV. Texas Parks and Wildlife, LCRA and the City of Austin have serious concerns.

- TPWD lists several issues in its letter to TCEQ. Specifically, it states that "the impoundment of the Colorado River and the transformation from a riverine ecosystem to a lacustrine ecosystem may affect the aquatic community at the project site including the fish and freshwater mussel assemblage." Further, TPWD expresses concern about the conditions at the Colorado Bend State Park, which is located 50 miles downstream of the proposed dam site. TPWD is concerned that the White Bass upstream spawning migration into the area of the Colorado Bend State Park is dependent upon adequate instream flows which may be affected by the dam. TPWD also notes that for state listed threatened mussel species that are also candidates for federal endangered or threatened listing have known or potential presence within San Saba County.

- LCRA's letter to the TCEQ focuses on its general concern about water rights, particularly LCRA's senior water rights. LCRA notes that it owns "very senior water rights downstream of the Highland Lakes, including the Garwood water right with a priority date of November 1, 1900. In dry years, this water right relies on flows upstream of the Highland Lakes."
- The City of Austin notes that the application by the Leonards does not list any other water right holders as co-owners. The City of Austin also suggests a number of special conditions to help minimize the negative impact of the dam if the permit is granted.

The letters from TPWD, the City of Austin and LCRA are in the Public Comments section of TCEQ's web site.

V. *Senior downstream water rights holders (including those with D&L rights) would be harmed by the dam.*

The application currently under consideration by TCEQ is based on water right ADJ 2472 owned by O. P. Leonard Jr. and Nancy Leonard. It has a priority date of 12/31/1961. This date is relatively junior and a quick look at the priority dates of other water rights holders in Mills and San Saba Counties shows more than 140 with priority dates senior to ADJ 2472. Extrapolating this to all the counties in Region K would likely reveal many more water right holders senior to ADJ 2472.

In addition, Texas law provides that "domestic and livestock uses are always senior to any kind of appropriated water right." All downstream D&L water right holders are senior to ADJ 2472 and it is doubtful their superior needs will be met if the dam is built.

It is indisputable that the proposed dam which will cost more than $3.6mm will provide a substantial benefit to the Leonards, the sole owners of the dam. Therefore, it seems clear that hundreds, or maybe thousands, of downstream water right holders which are senior to ADJ 2472 will have substantially less water after the dam is built.

VI. *The dam will waste water and perpetuate poor irrigation practices.*

If this dam is built, environmental consultants Jones and Ridenour project the reservoir will lose up to 552.7 acre-feet annually due to evaporation. This is water that will be diverted from the river, stored and allowed to evaporate.

As part of the Leonards application to TCEQ, they were required to provide a description of the alternatives that were examined to meet the water needs the dam is intended to fill. Jones and Ridenour answered the question this way:

- "Not improving the present-day system…would result in a continued shortage of water for both Big Valley Farms and citizens relying on the City of Goldthwaite for fresh water. Not improving the present-day system would also result in an unrealized opportunity for the landowner, whose property fronts and/or contains over nine miles of the Colorado River."

- Alternatives that were considered included constructing multiple dams and building a higher dam.
- The alternative of constructing a smaller dam was "proved not to be feasible, as a smaller dam will not hold enough water to increase the probability of meeting needs significantly enough to make the project worthwhile."

Clearly, this analysis considered only the landowner's sole interest and failed to consider conservation---the one alternative that could truly benefit the river, the downstream landowners, the Leonards and the people of Texas.

Thank you again for the opportunity to provide input on this important project. Please let us know if there's any additional information we can provide. Along with the members of the Region K Planning Group, we are committed to protecting the Colorado River for our generation and for those who come after us.

Sincerely,

Reagan Burnham

Reagan Burnham

Burke, Jaime

From:	John Burke <johnburke41@gmail.com>
Sent:	Tuesday, June 09, 2015 10:28 AM
To:	Jeff Fox; Burke, Jaime
Subject:	Fwd: Channel dam

Jeff

Forward this to the group.

John

---------- Forwarded message ----------
From: **River City Paint** <rivercitypaintss@gmail.com>
Date: Tue, Jun 9, 2015 at 9:57 AM
Subject: Channel dam
To: JohnEBurke@regionk.org

Mr. Burke, After speaking with Jamie yesterday I feel that I am going to have issue on additions to size specifications becoming part of final draft. She made these changes based on the request by Goldthwaite that they still wished to have channel dam project included in new plan. In Goldthwaite's latest request they conveniently incorporated the size specification from the Leonard Big Valley Pecan application with TCEQ, that would double the size of the project. I feel that she was instructed in April to remove the reference to the Leonard application from the draft but by incorporating the specifications from there application she has indirectly still included Big Valley Pecan in the draft. I realize that if the B V P application were to make it through TCEQ it would serve the supposed need of Goldthwaite but the city of Goldthwaite has no pending application with TCEQ. I also find it strange that the city of Goldthwaite, after securing a pipeline from San Saba and drilling two new wells now feels like they still need a channel dam and want it twice as big as they have ever requested since the proposal was first introduced to the water plan??? I would like to ask in advance of June public hearing that if Region K intends to leave channel dam in the draft that they return size specification to what was originally reqested by the city of Goldthwaite not Big Valley Pecan. Thank You. Reagan Burnham 325-248-1413

ATTACHMENT D

Additional Hays County Pipeline Comments

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From: Fox, Jeff <Jeff.Fox@austintexas.gov>
Sent: Monday, June 15, 2015 4:44 PM
To: ''John Burke' (johnburke41@gmail.com)'; Lutes, Teresa; ''Barbara Johnson' (bjohnson@aaroregion.com)'; 'info@fayettecountygroundwater.com'; 'David Van Dresar (david@fayettecountygroundwater.com)'; 'dklaeger@gmail.com'; ''Doug Powell ' (dpowell@flagshipmarinas.com)'; ''Haskell Simon ' (aquainfo@sbcglobal.net)'; ''Jennifer Walker' (jennifermwalker@earthlink.net)'; 'jimbarho@gmail.com'; 'laurig@pflugervilletx.gov'; ''Karen Haschke' (karenhaschke@sbcglobal.net)'; 'jphoffman@stpegs.com'; ''Pansy Benedict(Billy Roeder)' (pbenedict@gillespiecounty.org)'; 'Ptybor@gmail.com'; ''Rob Ruggiero ' (RobRuggiero@aol.com)'; ''Ronald G. Fieseler' (manager@blancocountygroundwater.org)'; 'judge@co.san-saba.tx.us'; 'Ronaldg59 @gmail.com'; 'Blewis@cityofllano.com'; ''David Bradsby' (david.bradsby@tpwd.state.tx.us)'; 'Temple McKinnon (Temple.McKinnon@twdb.texas.gov)'; 'blcomm2@co.blanco.tx.us'; 'lpgcd@lostpineswater.org'; 'jim@ccgcd.net'; 'john@bseacd.org'; ''Bill Luedecke'; 'david.wheelock@LCRA.ORG'; 'jtotten@lostpineswater.org'; 'David Villarreal (David.Villarreal@texasagriculture.gov)'; Burke, Jaime; Martin, Danielle; 'Chris.Hoelter@LCRA.ORG'
Subject: Another Hays Commissioners Court resolution

Forwarded from John:

---------- Forwarded message ----------
From: **Barbara Hopson** <hopsonbarbara@yahoo.com>
Date: Mon, Jun 15, 2015 at 9:35 AM
Subject: Another Hays Commissioners Court resolution
To: John Burke <johnburke41@gmail.com>, The Honorable Bert Cobb <bert.cobb@co.hays.tx.us>, The Honorable Will Conley <will.conley@co.hays.tx.us>, The Honorable Ray Whisenant <ray.whisenant@co.hays.tx.us>, The Honorable Debbie Ingalsbe <debbiei@co.hays.tx.us>, The Honorable Mark Jones <mark.jones@co.hays.tx.us>, Mark Kennedy <mark.kennedy@co.hays.tx.us>

Below is a link to a January 6, 2015 letter from Judge Bert Cobb to John Burke (Chair, Region K), requesting that both Regions K and L
include in their IPPs "a compatible plan to import non-Trinity, non-Edwards water sources into and through [emphasis mine] Hays
County in order to address the forecast water shortages of the County."

Why does Judge Cobb want the importing pipeline to go through Hays County?

http://www.regionk.org/wp-content/uploads/2012/02/WEST-HAYS-Letter-from-Judge-Cobb-to-John-Burke-requesting-agenda-item.pdf

The Resolution adopted by Hays County Commissioners Court follows the request. In the Resolution the Court appoints Commissioner
Will Conley to represent it before both Regions K and L. Commissioner Conley had influential input into the IPPs for both Regions K

and L.

Barbara Hopson
Wimberley

From:	John Burke
To:	Burke, Jaime
Subject:	Fwd: Map of Options for Hays County Pipeline Project
Date:	Sunday, September 13, 2015 7:06:18 AM

FYI
---------- Forwarded message ----------
From: **Barbara Hopson** <hopsonbarbara@yahoo.com>
Date: Fri, Sep 11, 2015 at 3:33 PM
Subject: Map of Options for Hays County Pipeline Project
To: Con Mims <cmims@nueces-ra.org>, "Steven J. Raabe" <sraabe@sara-tx.org>, Cole Ruiz <cruiz@sara-tx.org>, David Carter <david.carter@twdb.texas.gov>, Dianne Wassenich <wassenich@grandecom.net>, The Honorable Will Conley <will.conley@co.hays.tx.us>, John Dupnik <jdupnik@bseacd.org>, "tandruss@RegionLTexas.org" <tandruss@regionltexas.org>, John Burke <johnburke41@gmail.com>
Cc: The Honorable Ray Whisenant <ray.whisenant@co.hays.tx.us>, The Honorable Debbie Ingalsbe <debbiei@co.hays.tx.us>, The Honorable Mark Jones <mark.jones@co.hays.tx.us>, Mark Kennedy <mark.kennedy@co.hays.tx.us>, Steve Thurber <thurbercpa@sthurber.com>, Bob Dussler <mrdussler@gmail.com>, Cindy Anderson <cindy@cqcintl.com>, Mac McCullough <libbysales@austin.rr.com>, Pam Showalter <pam.showalter@gmail.com>, John White <place5@cityofwimberley.com>, Don Ferguson <dferguson@cityofwimberley.com>, Mike Steinert <mtsteinert@gmail.com>, Eric Eskelund <dunthaat@austin.rr.com>, Bill Scheel <wscheel@s-sm.org>

You can read more information about the Regions-K&L-proposed Hays County Pipeline Project in the 2010-11
Hays County Water and Wastewater plan. Here is a link to the Plan:

https://www.twdb.texas.gov/publications/reports/contracted_reports/doc/0804830842_WaterWastewaterplan_HaysCnty.pdf

See pages 45-47 for a description of the Project. The costs shown are in 2010 dollars (use Long Term Chart). Change them to reflect
2015 prices (from Region L estimates) of about $2.8 million dollars per mile. (Option A is 19 miles, Option B is 18 miles, and
Option C is 10 miles.)

On page 48 is a **map** showing the routes of the 3 options. Note that Option A would require additional cost to cross the Blanco River
to bring water to Wimberley. And Options B & C would require additional cost to cross the Blanco to serve Woodcreek. Which means
the costs to serve **both** cities would be higher than shown in the Plan costs.

Barbara Hopson
Wimberley

From: John Burke
To: Burke, Jaime
Subject: Fwd: The Unequal Burden Argument
Date: Sunday, September 13, 2015 7:05:02 AM

FYI
---------- Forwarded message ----------
From: **Barbara Hopson** <hopsonbarbara@yahoo.com>
Date: Fri, Sep 11, 2015 at 1:26 PM
Subject: The Unequal Burden Argument
To: Con Mims <cmims@nueces-ra.org>, "Steven J. Raabe" <sraabe@sara-tx.org>, Cole Ruiz <cruiz@sara-tx.org>, "tandruss@RegionLTexas.org" <tandruss@regionltexas.org>, John Dupnik <jdupnik@bseacd.org>, John Burke <johnburke41@gmail.com>, The Honorable Will Conley <will.conley@co.hays.tx.us>, "dwassenich@RegionLTexas.org" <dwassenich@regionltexas.org>, David Carter <david.carter@twdb.texas.gov>
Cc: The Honorable Ray Whisenant <ray.whisenant@co.hays.tx.us>, The Honorable Mark Jones <mark.jones@co.hays.tx.us>, The Honorable Debbie Ingalsbe <debbiei@co.hays.tx.us>, The Honorable Bert Cobb <bert.cobb@co.hays.tx.us>, Mark Kennedy <mark.kennedy@co.hays.tx.us>

THE UNEQUAL BURDEN ARGUMENT

Lately citizens and groups across the nation are presenting what I call to myself "The Unequal Burden Argument." In a nutshell, the argument states that current ratepayers for water, electricity, natural gas, and the infrastructure for them pay an unfairly higher per cent of the cost of new facilities than will the eventual new users -- especially when the new facilities will not be needed until decades in the future.

To cite an example close to home (to SW Hays County):

A Hays County Pipeline Project is included in the 2016 Initially Prepared Plans (IPP) of both Regions K and L. The project calls for an unbelievably expensive pipeline from Gonzales County to Kyle to Wimberley/Woodcreek, with a spur going off to Dripping Springs. This is a project that, by Hays County's and Regions K and L's own estimates, will not be needed by Wimberley until 2030 or later -- if even then. Yet Wimberley citizens will start paying for it the minute funding of the project begins. That means that folks who are already here will pay for years on a pipeline that they don't even need. On the other hand, the eventual users for whom the pipeline would be built won't be using or paying on the pipeline until they move here -- in the distant future. That is the unequal burden which is placed on current ratepayers and residents.

The City of Austin, especially, is wrestling with this problem, because homeowners there are being driven out of their homes by higher utility bills and taxes, the money from which will be used to provide facilities for newcomers. Austin hasn't yet figured out how to solve this problem, but officials are keenly aware of it.

Let's not burden our current population now with bills for infrastructure that will not be needed for decades. I can hear the cry of, "We need to plan ahead!" And I agree. But let's build costly infrastructure more closely to the time it will be needed, when the added population (which is WHY it will be needed) can help pay for it.

Barbara Hopson
Wimberley

From: John Burke <johnburke41@gmail.com>
Sent: Tuesday, June 30, 2015 6:30 PM
To: Teresa Lutes; Burke, Jaime
Subject: Fwd: Region K IPP

Include this in the comments.

John

---------- Forwarded message ----------
From: **Barbara Hopson** <hopsonbarbara@yahoo.com>
Date: Tue, Jun 30, 2015 at 5:56 PM
Subject: Region K IPP
To: John Burke <johnburke41@gmail.com>

Dear Mr. Burke,

I just sent you a copy of an email I sent to Charlie Flatten asking about maps at the Burnet public presentation of the
Region K IPP.

My question to him was whether there were any maps showing proposed pipelines in Hays County. I did not see a single
one in Chapter 5 (WMS) of the Region K IPP, although Chapter 5 of the Region L IPP had many. Please see that there
are maps available for the public to be able to see the pipelines that may affect us.

Also, Hays County Commissioners Court has voted 4-1 not to renew its contract with Forestar to supply us water from Lee
County to the San Marcos area. Since Hays County was Forestar's only potential customer, I think you can remove the
Forestar project from the Region K IPP.

Sincerely,
Barbara Hopson
Wimberley

From: Michael Hanson [mailto:hansonics@gmail.com]
Sent: Sunday, September 06, 2015 1:01 PM
To: BoardMembers
Subject: Proposed Pipeline

Our family opposes the 36" pipeline through the Wimberley Valley, and it should be dropped from the state's 2016 water plan proposal. Water to Dripping Springs and the US 290 growth corridor should be routed through northern Hays County, not through the Wimberley Valley. Thank you.

Michael & Marti Hanson
Wimberley, Texas
(512) 842-1409

From: Will Conley [mailto:will.conley@co.hays.tx.us]
Sent: Monday, August 24, 2015 10:37 AM
To: Perkins, Brian
Subject: forestar/k and l plans

Brian,

Thank you for the phone call this morning. As we discussed I would request the following.
First, that we address the plans and connection from region L to region K. These lines should reflect the Hays County Water and Waste water study that show lines running to Wimberley from rm 12, from fm150 splitting off to Wimberley down fm 3237, and from hwy 32. The line from fm 150 needs to continue to Dripping Springs down fm 150 and coming out of Buda up fm 967. We don't support a Wimberley hub/wheeling situation where there is a line running through Wimberley ,across western Hays County and over to Dripping Springs.
Second, Hays County is no longer in an agreement with Forestar. Therefore, I see no reason for it to remain in our plan.
Thank you again for the efforts. I would appreciate a letter/email reflecting these request.
Thank you,
W

ATTACHMENT E

Additional Water Management Strategy Request Comments

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Burke, Jaime

From:	Hoffman, John <jphoffman@STPEGS.COM>
Sent:	Monday, September 14, 2015 4:22 PM
To:	Stacy Pandey (Stacy.Pandey@LCRA.ORG)
Cc:	Burke, Jaime; ''John Burke' (johnburke41@gmail.com)'; David Wheelock (David.Wheelock@LCRA.ORG)
Subject:	Chapter 5 IPP addition
Importance:	High
Follow Up Flag:	Follow up
Flag Status:	Flagged

Stacy/Jaime,

We (STP) met with LCRA today and wanted to make sure we put the below in our IPP under Chapter 5 (in the STP section). The 5 year joint application between STP and LCRA was filed in 2010 with TCEQ. This is a 5-Year Joint Application (14-5437C). The application is to amend our water right to allow an average diversion of 102,000 AF over any 5 consecutive years with a single year cap not to exceed 245,000 AF. There is no impact to existing water rights. The joint application was filed with TCEQ in 2010 and remains under "technical review" for now.

We wanted to make sure it was in the plan so TCEQ doesn't question it when we pursue approval.

If you have any questions, please feel free to call.

Thanks,
John Hoffman
STPNOC
361-972-4507
jphoffman@stpegs.com

P.S. Sorry about the last minute notice, but we wanted to meet before we took any action.

P. O. Box 1218 ⧫ 121 Main Street
Buda, TX 78610
(512) 312-0084

September 9, 2015

Attn: John Burke, Chairman
Region K Water Planning Group
JohnEBurke@RegionK.org

Dear Mr. Burke,

This letter is to provide the City of Buda's comments on the Region K Initially Prepared 2016 Regional Water Plan (IPP) during the Public comment period.

The Region K IPP currently includes proposed and potential non-potable effluent reuse strategies planned by the City of Buda (pp. 5-130 – 5-131). The City of Buda requests that the IPP be updated prior to adoption to additionally include potential Direct Potable Reuse projects planned by the City of Buda.

In order to provide accurate and current information in the adopted 2016 Region K Water Plan, the City of Buda requests that the IPP be updated during the incorporation of Public comments, as follows:

At the end of the introductory narrative, following the first paragraph on page 5-131, add the following:

"The City of Buda (City) also contracted with the consulting engineer responsible for design of the Buda WWTP Phase III Expansion project to perform a Feasibility Study for evaluation of direct potable water reuse (DPR) alternatives. A draft Feasibility Study Report was submitted in May, 2015 defining feasibility, anticipated treatment process, proposed improvements, regulatory requirements, and planning-level cost estimates for a potential 1.5 MGD to 2 MGD Direct Potable Reuse project. As part of the feasibility study phase, the City of Buda met with all TCEQ staff involved in approval of DPR projects. This meeting confirmed the regulatory feasibility of the proposed DPR project and provided definition of the procedures required by TCEQ for implementation. The City of Buda plans to conduct 12 months of detailed effluent water quality sampling in 2016 in accordance with TCEQ's requirements, in order to finalize the Feasibility Study Report for the City's use in a decision on whether to proceed with DPR. If this decision (anticipated in 2017) is to proceed with development of a potential DPR project, the City will then proceed with pilot study design and pilot testing, to be followed by full scale design and construction of DPR facilities. Pilot testing through construction would take place over a 5 year period. "

At the end of the subheading "*Cost Implications of Proposed Strategy*", following the third paragraph on page 5-131, add the following:

"Based on the Feasibility Study Report assumptions and preliminary findings, the conceptual estimated probable cost for the City of Buda to implement a DPR project would be approximately

$21,561,000. This cost estimate includes a DPR WTP with 2.0 MGD capacity; modifications at the Buda WWTP site including effluent transfer pumping facilities and biological denitrification process; facilities for treatment and disposal of wastes from the DPR WTP treatment process under a TPDES permit; and offsite finished water pipeline, storage, and blending facilities. This cost estimate does not include easements or land acquisition, permits, laboratory analyses, pilot testing, or professional services.
The conceptual estimated annual O&M cost for contract operation of a potential City of Buda DPR WTP by a qualified agency with 24/7 staffing by a 'B' licensed surface water treatment plant operator is $611,000 per year. These estimated annual O&M costs are for operation and maintenance of a DPR WTP only and do not include Energy costs, Chemical costs, Analytical Laboratory fees, periodic replacement of expendable equipment; or additional O&M costs for offsite Finished Water Transmission and Blending Facilities. These additional costs will be defined following the 12-month period of effluent water quality sampling planned to be performed during 2016. The opinion of probable unit cost of DPR potable water will be estimated once these additional costs are defined through water quality data.

At the end of the subheading "*Environmental Considerations*", following the fifth paragraph on page 5-131, add the following:

"If the City of Buda decides to proceed with implementation of Direct Potable Reuse, it is anticipated that residuals from the DPR WTP treatment process would be further treated, then co-disposed with the Buda WWTP effluent under a TPDES permit. As a result, the Total Dissolved Solids (TDS) concentration of the WWTP effluent return flow to the Plum Creek watershed would be increased, but would remain within water-quality based limits authorized by TCEQ through the TPDES permitting process. Regulated constituents (chloride, sulfate) concentrations in the return flow to Plum Creek would also be increased, subject to TPDES permit limits. For discharge to Andrews Branch, TCEQ's water quality modeling method is based on existing ambient segment concentrations of 867.8 mg/L TDS, 117.5 mg/L chloride, and 88 mg/L sulfate, and segment criteria of 1,120 mg/L TDS, 350 mg/L chloride, and 150 mg/L sulfate. Preliminary evaluations done for the DPR Feasibility Study indicated that TPDES limits of 1,314 to 1,324 mg/L TDS and 178 mg/L sulfate may be needed for disposal of residuals from a proposed 2 MGD DPR WTP treatment process through co-discharge with 1.5 MGD of WWTP effluent. TPDES limits did not appear to be required for chloride. These anticipated discharge parameters will be better defined through the 12-month period of effluent water quality sampling planned to be performed during 2016. The required post-treatment for DPR WTP residuals and resulting blended discharge water quality parameters will be estimated based on the effluent water quality data."

No changes are proposed to the remainder of the narrative on page 5-131.

Thank you for considering these comments requesting updating the IPP during response to Public comments. If you have any questions please do not hesitate to contact me at 512-312-0084.

Sincerely,

Brian Lillibridge

Brian Lillibridge

Water Specialist
City of Buda

Cc: Stacy Pandey, Region K Administrative Agent (stacy.pandey@lcra.org)

Burke, Jaime

From:	Christopher Hoelter <Chris.Hoelter@LCRA.ORG>
Sent:	Wednesday, June 03, 2015 2:01 PM
To:	Jeff Fox (External); David Wheelock; John Burke; Burke, Jaime; TeresaLutes@regionk.org
Subject:	FW: [External] Region K WMP comment
Attachments:	Region K comment.docx

Please review the comments provided by Mike Hodge, City Manager of Marble Falls, in regards to chapter 5.2.5.6 of the IPP.

Christopher Hoelter
Water Contracts and Conservation
512-730-6751

From: Lisa Ward [mailto:lward@ci.marble-falls.tx.us] On Behalf Of Mike Hodge
Sent: Wednesday, June 03, 2015 11:58 AM
To: Christopher Hoelter
Cc: Mike Hodge
Subject: [External] Region K WMP comment

Mr. Hoelter,

It has been recommended to us to provide comment on the 2016 Region K Initially Prepared Plan regarding inclusion of our future re-use strategy, specifically Chapter 5.2.5.6.

Attached please find the information for your consideration.

Please do not hesitate to contact Mike Hodge, City Manager, for any additional information that may be required.

Thank you.

Lisa Ward
Administrative Assistant
City of Marble Falls – 800 Third Street - Marble Falls, TX 78654
Office: 830-798-7050
Visit us on the web at www.marblefallstx.gov

The Capital Improvement Plan for the City of Marble Falls includes an expansion of the existing reclaimed water irrigation system. The City's wastewater treatment plant currently supplies treated Type I effluent to four city parks and one athletic field for the purpose of irrigation. The city has recently completed improvements to the transmission capability and plans to add 2700' of purple pipe in order to irrigate additional athletic fields.

Estimated projections for reuse yields generated by the expansion would be 11 acre feet annually.

5-105

Marble Falls	Burnet	Colorado	11	11	11	11	11	11

5-106

Marble Falls	Burnet	Colorado		158,827	158,827	

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ATTACHMENT F

Additional Individual Stakeholder Comments

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From:	Danny Watts
To:	Christopher Hoelter
Subject:	[External] Water release from Lake Travis
Date:	Monday, June 29, 2015 8:39:14 PM

Please any more water from Lake Travis until a new plan is in place . The old plan has had major effects on the economy and the real estate values of the Lake Travis area. Please do not resend to emergency that put in place after 2011 severe drought that devastated the LT water level. Submitted by Dr. Danny Watts

Sent from my iPhone

From:	FRank Roche
To:	Christopher Hoelter
Subject:	[External] Highland Lakes--Lake Travis and Lake Buchanan
Date:	Monday, June 29, 2015 12:01:59 PM

To whom it may concern,

After 5 years of drought and extremely low lake levels, recent rains have brought Lake Buchanan & Lake Travis up.

Lake Travis water level is now at the historical lake level for July.

Please make a water plan

- that does NOT allow Lake Travis to be drained for down stream financial interests of farmers and duck hunters. The financial impact on property owners and business owners on and around Lake Travis & Lake Buchanan has been devastating the last 5 years. Property owners and business owners depend on maintaining lake levels that are at historical average levels.
- Assumes that drought conditions may continue for many years.

Don't give preferential treatment to down stream users.

Regards,

Frank Roche
133 Sailfish Lakeway, Texas 78734
713-628-3965

From: Martin Boyer
To: Christopher Hoelter
Subject: [External] Lake Travis
Date: Monday, June 29, 2015 11:29:45 AM
Attachments: image001.jpg

Good Morning,

Don't make the same mistake made in 2011 when 50% of Lake Travis was sold downstream in the midst of our state's worst drought on record! You must employ balanced and fair management of central Texas' water resources. We all understand that Lake Travis was built originally to serve as a flood control reservoir. Clearly we can all agree that much has changed since the 40's. The strain on our water supply from the growing population as well as the undeniable detrimental economic impact (as documented in a reputable economic impact study several years ago) has to be fully considered.

Please do not release our water downstream to subsidized farmers. You are putting small business owners out of business (Café Blue, Johnny Fin's, Carlos 'n Charlies, Hurst Harbor).

Mandate the agriculture industry in the Houston and coastal bend area to construct off channel storage and retention tanks that they can use to irrigate from during times when water cannot be sensibly released from the highland lakes.

It's common knowledge now that rice farmers receive highland lakes water at a fractional cost and yet are still subsidized with government money. This is NOT fair or balanced.

I implore you to fairly consider all sides of this issue!

email-sig-Martin (1)

The bitterness of poor quality remains long after the sweetness of low price is forgotten.

From: Robyn Hess
To: Christopher Hoelter; JohnEBurke@regionk.org; TeresaLutes@RegionK.org
Subject: [External] WATER REFORM FOR REGION K
Date: Monday, June 29, 2015 10:39:25 AM

Good Morning,

Much like the growth of the Lake Travis area, which has changed (exploded) in recent years so should the handling of something so Important to our local economy. It isn't about denying those downstream. It's about finding a balance. What was once built as a reservoir now has much more surrounding it with many more demands on it!

Please do not release our water downstream to subsidized farmers with big pocket books. You are hurting small business owners who employee thousands from the area. This article states that the area's financial output has overtaken what the farmers put back in: http://stateimpact.npr.org/texas/2012/04/16/rice-farmers-used-more-than-three-times-as-much-water-as-austin-last-year/

So the farmers are getting our water for pennies, government money, and putting less into the economy than the small businesses being hurt by low lakes!!!

Please consider all sides, not just the well funded ones! It is madness to consider releasing water from Lake Travis downstream when the drought is NOT over! One week of rain to semi-restore the lake to average levels could be followed by another three years of NO rain!

Please think ahead, farther ahead the ONE RICE CROP!

THE REGIONS K PLAN MUST:

• Must include impact of low reservoir levels on economy and on public health and safety.
• Must include water pricing and how it affects conservation and water management strategies.
• Must review available water supplies to determine whether these supplies are adequate for current and future demands.
• All water users must have ways to assess the success of their conservation efforts and enforce conservation.
• Plan must emphasize drought planning for all water users.
• Revenue from water sales should cover the expenses of providing water.
• Water management strategies must include developing new water supplies based on new technology and sustainable methods.

Please let Region K know your concerns. Your voice makes a difference!!

--
Best,
Robyn P. Hess

From: Ron Del Principe
To: Christopher Hoelter
Subject: [External] water management
Date: Monday, June 29, 2015 8:54:44 PM

Chris, I am only an homeowner the LCRA area but I am very concerned that the management of our water resources do not seem to recognize reality. There so many more people moving here who need water. This has not been abated. Then, having served it the Far East where a great deal of rice is grown it is unrealistic to believe that rice, with all its water needs, should be grown in TX. What a difference between my experience in the Far East and the drought prone TX as a venue for rice farming!!! It is time to "get real". Ron Del Principe

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ATTACHMENT G

LCRA Comments

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LCRA
ENERGY • WATER • COMMUNITY SERVICES

August 6, 2015

Mr. John Burke, Chairman
Lower Colorado Regional Planning Group
Region K
P.O. Box 220
Austin, TX 78767

Re: Comments on the Region K 2016 Initially Prepared Plan

Dear Mr. Burke:

The Lower Colorado River Authority (LCRA) has reviewed the Lower Colorado Regional Water Planning Group 2016 Initially Prepared Plan and offer the following comments.

Chapter 3 – Identification of Currently Available Water Supplies
Section 3.2.1.1.2.1, Highland Lakes System, page 3-5; and Section 4.3.1, Lower Colorado River Authority, page 4-15 – these sections discuss supplies available from the Highland Lakes firm yield and the suggested edit is to add a paragraph which is developed from the text used in the City of Austin section on page 4-17:

> *It should be noted that the current drought in the Colorado River Basin is on-going and historical in proportion. At the time of the development of this plan's information, preliminary analysis indicates that firm yields have been reduced below the values shown. The LCRA is working to develop drought response strategies to assure that the water supply remains reliable taking into consideration the on-going drought. LCRA's water management strategies and drought response strategies are referenced in Chapter 5.*

Chapter 5- Identification, Evaluation, and Selection of Water Management Strategies Based on Need
Section 5.1.1.1, LCRA Conservation, page 5-7 and 5-8- This section is an update LCRA's water conservation section and LCRA asks that paragraphs 2 and 3 be removed and replaced with edits shown on the attachment to this letter. The current language (which is carried over from the last plan) does not acknowledge that LCRA has a cost share program, which is an important and successful part of LCRA's water conservation program. The condensate capture and reuse information is not associated with LCRA and is out of place and should be moved to the description of conservation strategies later in Chapter 5. Pages 7 and 8 of Chapter 5 have been edited in the word document and are attached.
Section 5.2.2.3 Municipal Conservation, Page 5-13- Clarify sentence in the smart meters paragraph- 3rd line from bottom of page- change "customer" to "water utility". Customer is being used in two different ways in this paragraph, which may be confusing.

Section 5.2.2.3 Municipal Conservation Page 5-14- Clarify sentence in the TCEQ 344 landscape standards paragraph: change 3rd sentence to: "Some of the requirements include requiring licensed irrigators to properly design and install the irrigation system, including proper pressure and zoning for plant requirements…."

Section 5.2.2.4.1, On-Farm Conservation, Page 5-19, 3rd paragraph: The first sentence should be edited as follows to clarify information sources and correct a date typo: "The conservation estimate was based on updated estimates of total rice acreage in each of LCRA's irrigation operations, developed from an LCRA-SAWS water project study in 2008. These acreage and adoption rates are the same as those used in the 2011 Region K Water Plan."

Section 5.2.2.4.2, Irrigation Operations Conveyance Improvements, Page 5-25: Add the following sentence to the opinion of probable cost section- "The unit cost contained in Table 5-13 represents an average of more expensive strategies such as balancing reservoirs and less expensive options, such as automated canal gates."

Section 5.2.2.4.3 Conservation through Sprinkler Irrigation, Page 5-27: Based on farmer surveys conducted as part of the UT savings verification study (referenced on page 5-22), only 26 percent of Lakeside farmers flush as a standard practice before holding a permanent flood. The savings figures developed for this practice assume that all farmers practice flushing three times every season. Even assuming that more flushing is needed in the Gulf Coast irrigation division, it seems unlikely that every conversion to sprinkler irrigation would save 15-inches of water. We think it would be more reasonable to assume three flushes in Gulf Coast and 1.5 flushes per season in Lakeside and Garwood, which is half of the savings originally assumed.

Section 5.2.3 Wholesale Water Provider Management Strategies, Page 5-117- East Bay MUD is not a good example of the cost implications of this particular strategy. They were not enforcing permanent watering restrictions and were doing more of a targeted approach for high users as well as implementing a behavioral software program for a subset of customers. Please delete this reference, and if possible, gather cost information from local communities that have enforced drought restrictions, preferably in Region K.

Section 5.2.3.1.4, LCRA Contract Amendments, page 5-37 - in Table 5-18, it recommends that City of Austin obtain an amendment in 2020 for steam-electric power at the Fayette Power Project. However, in Table 4.5 – Fayette County shortages, Steam Electric only shows a shortage starting in 2060; suggest is made to delay the need for the contract amendment until 2060.

Section 5.2.3.1.5, page 5-39, Table 5-19, Recommended New LCRA Contracts - this section recommends that Marble Falls obtain a new contract with LCRA, however City of Marble Falls already has a contract with LCRA and this strategy should be moved to Table 5-18 – *Recommended LCRA Contract Amendments.*

Section 5.2.4.5.1, page 5-98, Burnet County Regional Projects - the recommended strategy provides water to the City of Bertram which is located in the Brazos River basin. The project write-up should be augmented to include a statement that an interbasin transfer permit will be needed to allow delivery of Colorado River basin water into the Brazos River basin.

Section 5.2.5.6 Reuse, Page 5-129 - The following WUGs are LCRA water customers which have active reuse programs but are not listed in this section. Please add the following to recognize their reuse programs: City of Burnet (expanding reuse program), City of Cedar Park, City of Lago Vista, Lakeway MUD, City of Marble Falls, Travis County MUD 4, Travis County WCID 17, and West Travis County PUA.

Chapter 6 – Impacts of Regional Water Plan

Section 6.3.2.3, Page 6-4, 4th paragraph – For clarity, suggest editing the paragraph as follows: "New contracts and contract commitments may decrease total flow ~~and concentrate chemical constituents~~ due to decreased availability to agricultural irrigation and may result in higher concentrations of effluent in the river below wastewater discharges in certain areas during low flow periods."

Section 6.3.2.3, Page 6-4, 7th paragraph – For clarity, suggest editing the paragraph as follows: "Conservation practices for irrigation will reduce the demand for stored surface water and thereby result in reduced streamflow, although sediment and nutrient loads from irrigation tail water would be reduced as well."

Section 6.3.2.3, Page 6-4, 8th paragraph, 2nd sentence – For clarity, suggest editing the sentence as follows: "All surface water sources in these areas are associated with local supplies or stored water from the Highland Lakes."

Section 6.4.6, Page 6-18, 2nd paragraph – For clarity, suggest that a definition of "scalping reservoir" be added – perhaps add the phrase ". . . such that diversions are made to the reservoir only when flows in the river are sufficient to meet higher priority needs."

Section 6.6, Page 6-19, 1st sentence, top of page – The statement is made that the limiting factor for water management strategies that can be recommended for Irrigation is cost. An editorial comment is that a limiting factor also appears to be availability (unless a source such as seawater desalination is considered). Regarding the cost statement, there is no criteria provided for what the cost limit is for a feasible strategy to supply irrigation and the suggestion is made that such criteria could be added.

Chapter 7 – Drought Response Information, Activities and Recommendations

Section 7.1.2, Page 7-4, 2nd paragraph, last sentence – To recognize current conditions in the Highland Lakes, suggestion is made to edit the sentence as follows: "It should be noted that this plan includes additional new water management strategies including strategies aimed at managing and responding to the on-going drought, especially in light of its severity, even though it has diminished somewhat with recent inflows to the Highland Lakes."

Section 7.1.2, Page 7-5, 1st paragraph – To recognize beneficial inflows to the Highland Lakes that occurred in May and June, suggest editing as follows: "Until recently, when rains have come, they have been in large part downstream of the watersheds needed to provide inflows to Lake Travis and Lake Buchanan."

Section 7.1.2, Page 7-5, 2nd paragraph – The completion date of the off-channel reservoir in Wharton County has been changed to 2018 and LCRA requests the text be updated.

Section 7.1.2, Page 7-5, 3rd paragraph – The text discusses the severity of the on-going drought, although the storage in the Highland Lakes has now improved. Suggest the paragraph could be edited as follows: "~~The combined storage of the Highland Lakes has not recovered from 2011 due to the continued low inflows~~. The current drought began in 2008 and resulted in persistently low lake levels from 2011 to mid-2015. Figure 7.2 shows how the combined storage in the last several years compares to historical storage levels dating back to 1940. From March 2014 to March 2015, combined storage levels ~~have~~ remained relatively low, ~~constant~~ between 700,000 and 800,000 acre-feet (35 to 40 percent combined storage capacity). ~~Figure 7.3 shows how future combined storage levels through September 2015 could be affected by different types of weather conditions.~~ (update Figure 7.2 to show recent rebound of combined storage and suggest delete Figure 7.3, or update to a current projection).

Section 7.5 Region-specific drought response recommendations and model drought contingency plans, Page 7-16- Table 7.3- LCRA's sample municipal drought contingency plan is no longer online. Include this statement somewhere on this page: "LCRA provides sample drought contingency plans (DCP), and requires all customer DCPs to state the specific combined storage triggers located in its water management plan, and requires customers to update their plans every five years."

Section 7.6.2 Recommended Drought management water management strategies, Page 7-18- LCRA asks to remove the word "severe" from the first sentence on water restrictions during 2011. Please add this sentence: "Most LCRA customers were in no more than twice per week watering, and the City of Austin and a few other LCRA customers were in no more than once weekly watering.

Section 7.7 Other Drought Recommendations, Page 7-19, last bullet- Suggest editing the last bullet as follows to clearly distinguish between voluntary and mandatory drought measures: "Communication with customers upon reaching a voluntary drought stage level to raise public awareness and facilitate potential implementation of drought measures." And consider adding a second bullet: "Communication with customers upon reaching a mandatory drought stage level to reinforce the importance of compliance with mandatory drought measures, and emphasize heightened need for public awareness."

<u>Chapter 11 – Implementation and Comparison to the Previous Regional Water Plan</u>
Section 11.2.5, Page 11-6, last paragraph – To the list of water management strategies that are new, please add the *Expand Use of Groundwater in Bastrop County* strategy to be consistent with Section 5.2.3.1.9.

Sincerely,

David Wheelock

David Wheelock, PE
Manager, Water Supply Planning

Attachment

Issues and Considerations

Issues related to ownership of treated wastewater effluent are discussed in Chapter 8 (Section 8.1.7).

5.2.2 **Conservation**

The LCRWPG supports conservation as an important component of water planning. It is more effective and less costly to use less water than to develop new sources. Conservation can be implemented at the municipal, industrial, and agricultural levels.

All entities applying for a new water right or an amendment to an existing water right are required to prepare and implement a water conservation plan. The plan is to be submitted to TCEQ along with the application.

Additional entities that are required to prepare and submit conservation plans include municipal, industrial, and other non-agricultural water right holders of 1,000 acre-feet per year or greater; and agricultural water right holders of 10,000 acre-feet per year or greater.

Online model water conservation plans are available at the following link:

https://www.tceq.texas.gov/permitting/water_rights/conserve.html/#plans

As a new requirement by TWDB for the 2011-2016 Planning Cycle, this section of the report consolidates the recommended conservation-related strategies.

5.2.2.1 LCRA Conservation

5.2.2.1.1. Enhanced Municipal and Industrial Conservation

~~This water management strategy assumes water savings beyond municipal conservation strategies discussed in *Section 5.2.2.3*. This strategy includes accelerated industrial and municipal conservations. Current projected municipal per capita use by county is between 125 gpcd and 214 gpcd in 2020, and 111 gpcd and 207 gpcd in 2100. In comparison, projected municipal per capita use when implementing accelerated conservation is between 118 gpcd and 204 gpcd in 2020, and between 111 gpcd and 175 gpcd in 2100. The percent reduction of projected per capita use in this strategy is approximately 0.5 percent per year for 40 years.~~

~~As a wholesale water provider, any conservation program implemented would rely on, and require coordination with, water user groups within the LCRA's service area, as well as other stakeholders. It is anticipated that the LCRA's role in an enhanced conservation program would primarily be to provide education, enforce regulations, or fund incentives for its firm water customers (e.g. wholesale customers, utilities, and industrial and power customers).~~

LCRA recently completed its 2014 Water Conservation Plan that addresses water conservation practices for its firm water customers (municipal, industrial, power generation and recreational). These efforts include five-year and 10-year implementation plans that will guide effective water conservation throughout communities in LCRA's rapidly growing service area. More details on the 2014 Water Conservation Plan can be found online at:
http://www.lcra.org/water/save-water/Documents/2014-Water-Conservation-Plan.pdf

P~~otential conservation measures include education, regulations, rebates and other incentives to promote water efficiency. These measures focus on the municipal, commercial and industrial sectors. Because landscape irrigation represents the largest water use in the residential and commercial sectors, several of the measures are geared toward irrigation water use reduction, e.g., rain and freeze sensors, irrigation standards, and no-waste ordinances.~~

~~Leak detection, typically associated with a municipal water system audit, is a useful tool in eliminating water loss, and can be considered as part of an enhanced conservation program by LCRA. LCRA could encourage customers to use the leak detection and audit assistance programs offered by the Texas Water Development Board. In addition, LCRA could develop a conservation loan, grant or rebate program to encourage leak detection and repair within the planning area. In this program, customers would receive loans, grants, rebates or other incentives to implement leak detection and repair programs. Alternately, LCRA could assist their customers with system leak detection programs, by providing staff to conduct the audits and/or aid in leak repair.~~

~~Another potential conservation measure is condensate capture and reuse. Machines that process air for humidity and temperature control (including air conditioners, dehumidifiers, and refrigeration units) remove water from the air in the form of condensate. This condensate can be captured and stored for later use. Condensate is relatively free of minerals and other contaminants, making it suitable for industrial applications such as cooling water. It also has the potential to be used for potable water after minimal treatment. This measure would require the installation of condensate recovery systems, either as retrofits to existing buildings or included in the design of new buildings.~~
Conservation measures include regulations, financial incentives and education for water efficiency. All customers with new or renewing contracts must develop and implement water conservation plans. Along with the basic requirements, staff actively encourages customers to adopt additional measures such as a permanent watering schedule limiting use to twice per week and irrigation standards for new development. Financial incentives include providing cost-share grants to firm water customers and offering financial incentives for landscape irrigation technologies. Education efforts include providing irrigation evaluation training and assistance for wholesale customers' staff, community outreach presentations and participating in the coordination of the Central Texas Water Efficiency Network annual water conservation symposium.

Table 5-4 below shows the expected additional water savings from the enhanced municipal and industrial conservation strategy.

Table 5-4: Additional Water Savings from Enhanced Conservation (ac-ft/yr)

Decade	Water Savings (ac-ft/yr)
2020	4,500
2030	10,000
2040	15,000
2050	20,000
2060	20,000
2070	20,000

ATTACHMENT H

Hill Country Alliance Comments

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education
conservation
cooperation

hill country alliance

August 10, 2015

Mr. John Burke, Chairman
P.O. Box 220
Austin, TX 78767

Mr. Burke,

Please find below the Hill Country Alliance's Public Comments to the Lower Colorado Regional Water Planning Group (Region K) *2016 Initially Prepared Plan* submittal to the *2017 State Water Plan*.

HCA appreciates the good work that the Lower Colorado Regional Water Planning Group does to protect and preserve the natural resources that make the Hill Country a self-sustaining gift to future generations. We respectfully request that the Lower Colorado Regional Water Planning Group address, and to the extent possible, incorporate these recommendations into policy and practice.

Thank you,
Charlie Flatten
Water Policy Program Manager
Hill Country Alliance
512/694.1121

CC: Chris Hoelter, LCRA; Jamie Burke, AECOM; Temple McKinnon, TWDB

Hill Country Alliance Public Comment
Region J 2016 Initially Prepared Regional Water Plan (IPP)

The Regional Water Planning Groups (RWPGs) play a critical role in our state's water planning process, and the Hill Country Alliance is appreciative of the huge effort that is involved in drafting the initially prepared *Regional Water Plans* (IPPs). Our comments reflect the collective vision of our Hill Country supporters, stakeholders, businesses and elected officials for a state water plan that recognizes the need to protect long-term spring-flow, healthy water catchment areas and sustained groundwater resources for current and future generations. Our comments include broad recommendations for the improvement of the regional planning process, specific policy commendations drawn from policies outlined in the IPPs, recommendations for additional study and research, and comments on specific Water Management Strategies. Hill Country Alliance acknowledges that some of our recommendations may require action by the Texas Water Development Board and/or the Legislature, and may not be the sole responsibility of this Regional Planning Group; however, this planning group should press for the incorporation of these recommended concepts, as they are able.

Broad Recommendations: Only by constantly seeking improvements to the regional water planning process can we ensure that the State Water Plan continues to improve in its ability to ensure water supply for future generations.

- In order to provide water for future generations, Hill Country Alliance recommends that the RWPGs adopt and apply a set of **guiding principles** that will serve as a blueprint for long-term water sustainability. For example: *The economy and land values of Texas depend on meeting its water needs in a way that does no harm to rivers, streams, springs, and aquifers.*

- Considering the challenge and cost of providing surging numbers of new water customers with finite water supplies, outdated infrastructure-intensive water management strategies need to be minimized in favor of innovative localized modern ***water neutral*** **solutions** that have been proven around the country. The RWPGs should prioritize and encourage decentralized systems and new technologies that capture, use, and reuse water in place. Where this is not practicable, priority should be given to a water neutral growth policy that requires offsetting the projected water demand of new development with water efficiency measures to create a "Net Zero" or neutral impact on overall service area demands.

- Additional definition is needed for Water Management Strategies (WMS). The Regional and State Water Plan is being criticized as less a planning document and more a **'wish list'** beset with duplicative and expensive over-planning. In 2013, the Texas Legislature provided for requirements that WMS be prioritized in order to better manage the growing list of strategies. Better definition of WMS categories and vigorous prioritization will help control the redundant and exceedingly lengthy lists.

- The two-tier system of **WMS categorization needs to be revisited** and strengthened in such a way that *Recommended Strategies* promote healthy sustainable watersheds, fulfill all of the TWDB's minimum prioritization criteria, and are not duplicated by a similar strategy that would fulfill the same need. The *Alternate Strategy* category should be reserved for those strategies that are duplicate or do not fulfill the TWDB's minimum criteria.

- The RWPG **consulting firms** are excellent, and provide a valuable service in the planning process. However, to avoid the perception or temptation of **conflict of interest**, the RWPGs, like other agencies, should create and enact a conflict of interest policy.

Specific Policy Recommendations: The IPPs have numerous Specific Policy Recommendations that HCA supports. We would like to commend the RWPGs for the inclusion of these policies, and encourage their adoption as part of the Regional Water Plans.

- RWPGs should prioritize strategies that protect the inherent **interconnectivity of surface water and groundwater.**

- RWPGs should de-prioritize water management strategies that dewater one region to meet the speculated need of another in the form of inter-basin pipeline transfers or otherwise.

- RWPGs should discontinue the practice of considering Water Management Strategies that rely on Groundwater that has exceeded its **MAG limitations.**

- It is vital that the state assess the **sustainability of water-consuming growth patterns** that regional water planning efforts will directly or indirectly support.

- **Counties should have additional authority** for land use planning and for regulating development based on water availability and protection of water resources.

- **Eminent Domain** powers should be recognized as contributing to the disruption of the values that undisturbed landscapes bring to natural hydrologic and ecologic functions. Given the Regional Water Planning Group's lack of authority to ignore current legal precedent, they should use their prioritization powers (HB 4, 2013) to minimize projects where using eminent domain would be necessary.

- **Rainwater harvesting** should be widely encouraged to meet rural and urban domestic water demands, as well as use for limited irrigation, such as vineyards, orchards or small farms under drip irrigation. Livestock and wildlife can also be provided supplemental water by rainwater harvesting.

- The **revision of population and demand estimates** should be put before the public for review before being presented to the planning groups for consideration and adoption.

- Due to the importance of spring-flow on the base-flow of our rivers, it is reasonable that the RWPGs encourage Hill Country Groundwater Conservation Districts to consider **management rules based on spring-flow.**

- The RWPGs should encourage better communication between the two regional planning processes developed by the Legislature (**RWPGs and GMAs**) to improve conflicting methodologies of reaching long-term planning goals.

- The Hill Country contains some of the most ecologically pristine areas in the State. The preservation of this natural environment via designation of **Unique Stream Segments** is an important component of the Region's economy. Hill Country Alliance recommends that Region K actively promote the designation of its listed unique stream segments in the 2017 legislature.

- The RWPGs should support vegetative management programs that improve the land's ability to absorb, retain, filter and slow rainwater. A **balanced approach to brush control** can be beneficial, however, a narrow goal only to "encourage the enhancement of runoff (**WSEP**)" must be avoided. Any program to incentivize land practices for the benefit of water supply must be for the purpose of improving the overall health and function of water catchment areas for the long-term.

- The RWPGs should continue to encourage funding for projects that empower landowners to better manage their lands for the long-term health of our water supply.

- Water-user groups should develop more uniform **conservation oriented management** plans and should be required to bring down their **Gallons per Capita per Day** usage to reflect the climatic realities of the region.

Study and Data Needs: The State should fund or conduct these specific studies to shed more information on specific water resource issues that are critical to future RWPG decisions.

- **Aquifer Science -** The Hill Country is underlain by limestone aquifers in which there are many remaining hydrological questions. A basic, unbiased, scientific study that encompasses the hydrologic characterization of the inter-formational flow between these adjacent and associated aquifers and their contribution to surface water flows is needed in order for the local groundwater management entities and the RWPGs to make informed management decisions and recommendations that maintain sustainable systems.

- **Trinity Aquifer -** The Hill Country RWPGs should explore the creation of a Regional Trinity GCD. A small regional GCD was recommended by the TCEQ for Hays, Travis and Comal Counties in 2010. This concept should be revisited and studied for the broader Hill Country Trinity region.

- **Headwaters Groundwater/Spring-flow Analysis -** Surface water base-flow in most Hill Country Rivers is derived almost exclusively from groundwater discharge through springs. However, development of management practices is impaired by a lack of understanding about how groundwater level elevations relate to spring-flow rates. Few monitoring wells are in place that can provide continuous water level readings, and no attempt has thus far been made to relate this data to spring-flows. A study is needed to evaluate this critical interaction so that future management decisions can be based on a more substantial level of scientific knowledge.

- **Groundwater/Surface Water Relationship -** The RWPGs should encourage the State (TWDB) to embrace this concept and focus water availability studies on this topic. This water supply policy definition can best be achieved when the relationship between groundwater and surface water is fully understood.

- **Unpermitted Withdrawals of Riparian Water -** A significant amount of unpermitted riparian water is withdrawn from rivers that is unaccounted for in the Water Availability Models. State water agencies should devise a survey method to establish a reasonable estimate of these diversions.

- **Optimization of Water Conservation and Efficiency -** A number of water utilities and communities in Texas have established enviable track records of success in reducing per capita water use and promoting a water conservation ethic, thereby stretching existing water supplies. However, this record of success is not universal in Texas, and indeed many communities and utilities have made minimal or no efforts to advance water conservation and efficiency. A study is needed of the additional opportunities in the Hill Country and in Texas to advance water conservation and efficiency, the potential for reducing future water demands through enhanced conservation and efficiency, and the steps needed to achieve that goal.

- **Conservation And Drought Management** - There is a need for the funding of educational programs by State agencies to assist Regional Water Planning Groups in educating both the public and private sectors about conservation and drought management. The Regional Planning group should push for the funding of programs such as the *State Water Conservation Education Program*, and the *Water IQ-Know Your Water* campaign, formally established (but unfunded) by the Texas Legislature with the passage of SB 3/HB 4 in 2007.

Regionally Specific *Water Management Strategy* Evaluations:

REGION K:

• HCA notes that 13 out of a total of 62 strategies (20%) in the Recommended Water Management Strategy Summary Table (Appendix 5B) are categorized as Conservation, Reuse, Drought Management, or Rainwater Strategies.

• Region K should be commended for recommending these conservation, reuse, and rainwater harvest strategies as net-zero water supply projects.

• The remaining 80% of the strategies consist of infrastructure improvements, transmission pipelines, groundwater expansion, desalination, and aquifer storage and recovery projects. Of those projects, majority represents groundwater expansion.

• Hill Country Alliance recognizes that this Board is mandated to plan for future need. However, to the extent possible, groundwater into long distance transmission pipeline Water Management Strategies should be reevaluated on the basis of MAG limitations, recharge rates, and aquifer health. The following is a prime example:

- Hays County Pipeline (Wimberley-Woodcreek) – Groundwater Importation (4000 ac-ft/yr)

• Hill Country Alliance would recommend in those cases that alternative supplies such as rainwater projects be explored. Rainwater projects represent fiscally comparable and resource viable alternatives to aquifer reliance.

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ATTACHMENT I

Central Texas Water Coalition Comments

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CENTRAL TEXAS WATER COALITION

September 15, 2015

VIA E-MAIL TO stacy.pandey@lcra.org
Ms. Stacy Pandey, Region K Administrative Agent
P.O. Box 220
Austin, Texas 78767

Re: Comments on Lower Colorado Regional Water Planning Group (Region K) Initially Prepared Plan (IPP)

Dear Ms. Pandey:

On behalf of the Central Texas Water Coalition (CTWC), we appreciate the opportunity to provide the attached comments on the Initially Prepared Plan (IPP) drafted by the LCRWPG for the current regional water planning cycle. We also want to take this opportunity to thank all of the members of the LCRWPG who have spent so many hours putting together the IPP.

Many of our comments reflect the same theme: going forward, we believe the Region K Plan should place more emphasis on conservation by all user groups basin-wide. There is a great opportunity to reduce our water supply shortages by using water more carefully and investing in efforts to increase efficiency. Members of CTWC put a great deal of time and thought into these comments and thank you in advance for your review and consideration of them.

We are happy to answer any questions that members of the LCRWPG have regarding these comments and recommendations. Feel free to contact me at 512.755.4805.

Sincerely,

Jo Karr Tedder

Jo Karr Tedder, President
Central Texas Water Coalition

cc: Mr. John Burke, LCRWPG Chair
Ms. Jaime Burke, AECOM

Attachment: CTWC Comments on Region K IPP

CTWC Comments on Region K IPP

September 15, 2015

CHAPTER 1

CONCERN 1: Texas Water Development Board (TWDB) rules require that the regional water plan include a description of the regional water planning area including, among other things, social and economic aspects of a region such as information on current population, economic activity and economic sectors heavily dependent on water resources. This information belongs in Chapter 1. However, the in-depth description of the importance of Matagorda Bay is currently placed in Chapter 2, information about the impacts of rice farming is peppered throughout the IPP, and comprehensive information regarding the economic and social impacts of the Highland Lakes in Central Texas is lacking. Considering the enormous impacts of the Highland Lakes on the Central Texas economy, this omission must be remedied. To be complete and balanced, discussions of the economic and social aspects with respect to each of the three of the major Region K interests – Highland Lakes users, lower basin irrigators, and bay and estuary interests – should be included in Chapter 1.

RECOMMENDATION 1: In the Final Plan, move IPP Section 2.4.1, which is entitled "The Story/History of Matagorda Bay," into a new appendix to Chapter 1. Add to Chapter 1 the attached suggested appendix entitled "The Highland Lakes: History and Social and Economic Importance." These appendices can be described as "Background Information Provided by Interest Groups within Region K."

In the IPP, references to the history, economics, and importance of agriculture and its water needs appear to be inserted and emphasized throughout the document, while other water users may not be mentioned. Rather than embarking on an extensive revision of the Plan's text at this time, we encourage the LCRWPG to consolidate the information on the history and social and economic importance of agricultural irrigation that is now scattered throughout the IPP into a third new appendix to Chapter 1, and to enlist the expertise of lower basin irrigators and other interested persons to develop this new appendix for inclusion in the Plan for the next planning cycle. This appendix would also be introduced within the text of the Plan as "Background Information Provided by Interest Groups within Region K."

CONCERN 2: Currently, Section 1.2.5.3 describes the minimum legal requirements for water conservation plans and drought contingency plans. These requirements only apply to water suppliers and water right holders. However, the need for water conservation in Region K is universal and applies to all users. This section misses an opportunity to emphasize the importance of conservation efforts by all users, beyond the minimum legal requirements for some users.

RECOMMENDATION 2: In the Final Plan, add statements regarding the universal need for conservation, across all user groups. Metrics are needed to monitor and measure the efficacy of conservation measures taken by *all users*.

CONCERN 3: Public water suppliers supplying potable water audit their systems for water loss, such as losses due to leaks in pipes that deliver water. Section 1.2.5.4 includes a description of current use of water audits in Region K and includes a table entitled “Water Loss Audit Summary for Region K.” This table is incomplete in that it fails to report one of the major areas of water loss: conveyance systems for agricultural irrigation water. In recommendations for Chapter 5, CTWC proposes that agricultural irrigators and the Lower Colorado River Authority (LCRA) should be subject to a requirement to audit water losses in their conveyance systems (which are currently substantial), in a manner similar to public water suppliers. The results of those audits should be reported here, alongside audits for potable water systems.

RECOMMENDATION 3: In future Plans, provide a complete description of water losses in distribution and conveyance systems in Region K in Section 1.2.5.4 by adding results of water loss audits from agricultural irrigation water users and LCRA-owned conveyance systems.

CONCERN 4: Chapter 1 is intended to describe the region, providing important context for the rest of the regional plan. However, there are several critical climatological phenomena and trends that act upon Region K and influence water supplies and availability that are not mentioned in the IPP. Chapter 1 would benefit from inclusion of information regarding these phenomena and trends, including:

- Changes in climate and rainfall as one moves from west to east across the basin;
- Climatology related to the Balcones Escarpment and the so-called “I-35 Curse”;
- The overall drying trend across the state; and
- The influence of the Atlantic Multi-Decadal Oscillation (AMO) and Pacific Decadal Oscillation (PDO).

RECOMMENDATION 4: In the Final Plan, add a brief discussion of current research on the effect of the Balcones Escarpment on rainfall, sometimes referred to as the “I-35 Curse,” to Sections 1.2.1.1 and/or 1.2.1.2 on Geology and Climate. LCRA’s Bob Rose helped explain this phenomenon in a Weather Channel segment in 2014. This natural feature is shown in Figure 1.4 in the Geology Section 1.2.1.1, but its substantial impact on rainfall is not addressed in Section 1.2.1.2 on Geology and Climate. This important natural feature often acts as a “natural boundary” that channels rainfall up the I-35 corridor and east of I-35, and often inhibits rainfall from reaching the watershed area to the northwest. It should be identified in Chapter 1 as a factor that adversely affects the inflows into the Highland Lakes.

As part of the drought cycle discussion on Page 1-12, present and address recent scientific research results regarding the fundamental drivers of long-term weather patterns that have been linked to long-term (20-30 year) naturally-occurring ocean surface temperature cycle climatology-related factors such as the PDO and AMO, and their effects on long-term drought patterns. These major driving factors, as identified by State Climatologist Dr. John Nielsen-Gammon, LCRA’s meteorologist Bob Rose, and TWDB’s Robert Mace, should be included in the drought cycle discussion as these factors represent significant risks to water availability and associated water planning during long-term drought cycles.

CONCERN 5: Section 1.2.4.2 presents "Threats Due to Water Quantity Issues," but does not include any discussion of the major socioeconomic impacts of low reservoir water levels upon Region K. Sustained low reservoir levels beginning in 2011 resulted in major adverse socioeconomic impacts on tourism, business, jobs and property values in the Highland Lakes area of Region K. Failure to address this threat represents a major gap in the Plan, as economic losses such as decreases in lake-area property values can be in the billions of dollars, and the associated decline in tax revenues impacts the entire State.

RECOMMENDATION 5: In the Final Plan, add text to Section 1.2.4.2 to present "Threats Due to Low Reservoir Levels." Consider referencing the proposed appendix entitled "The Highland Lakes: History and Social and Economic Importance," as appropriate. The full picture should be quantified in order to capture one of the biggest threats due to water quantity issues – a threat that became a reality in the Highland Lakes area during this planning cycle.

CHAPTER 2

CONCERN 1: Review of some portions of the IPP has raised serious concerns about the basis for the numbers proposed to be used for agricultural irrigation demands, supplies, and needs in the next cycle of regional water planning within this Region. More specifically, the methods for arriving at these numbers, and the justifications and explanations for the numbers, appear to rely upon some assertions and conclusions that are fundamentally flawed or that ignore available information and research in a manner that leads to larger agricultural irrigation water demands, lower estimates of available water supplies, and higher projected needs (shortages) for the next 50 years. This trend toward increasing water demand for agricultural irrigation in the rice-growing counties along the Texas coast is clearly in conflict with the legal and scientific expectations for rice farming in this river basin.

The Region K records indicate that the LCRWPG received proposed non-municipal water demand numbers from the TWDB that were significantly lower than the Region is now using in the 2016 Regional Water Plan. In addition, Region K's demand numbers for this planning cycle are approximately *71,000 acre-feet higher* than the irrigation demands for the lower three counties that Region K used in its 2011 Plan. Looking forward, Region K also proposes to use a projected rate of decadal reduction in agricultural demand of only 2.69% (rather than a 3-4% or more decadal decrease in agricultural demands over the years ahead). All of these decisions have significant and critical importance in this planning process.

Issues Raised by Agricultural Demand Numbers

1. Choice of Datasets. At the outset, the choice of the datasets used to arrive at the agricultural irrigation demand numbers raises questions. According to the document entitled "Region K's Recommended Modifications to TWDB's 2017 Non-Municipal Draft Demand Projections" dated October 10, 2012, the irrigation demands for Colorado, Matagorda, and Wharton Counties were calculated using three sources of information:

A. The historic surface water use for agricultural purposes at LCRA-affiliated irrigation operations based on LCRA Annual Water Use Reports for 1992-2011. The first source of information is LCRA's annual water use reports for 1992-2011 for the four LCRA-affiliated irrigation operations (located in Colorado, Wharton, and Matagorda Counties). From the set of 20 numbers, the 90th Percentile was chosen as the Demand, then it was adjusted downward for Garwood (from 103,992 acre-feet/year to 100,000 acre-feet/year) and for Pierce Ranch (from 39,275 acre-feet/year to 30,000 acre-feet/year). The choice of the 90th Percentile for this set of data means that the historic surface water use between 1992 and 2011 would be met 90% of the time. Looking at the historic usage numbers, using the 103,992 AF/year 90th Percentile for Garwood, Garwood's demands were met in every year except 1996 (when it used 107,223 AF) and 2011 (when it used 117,667 AF).
Gulf Coast's demands were met in every year except 1998 and 2009.
Lakeside's demands were met in every year except 1998.
Pierce Ranch's demands were met in every year except 1992 and 1994.
Using the total demands, 1998 was the only year where the 90th Percentile number was not reached.
Using the total historic use numbers, adjusted downward by contract limitations for Garwood and Pierce Ranch, the 90th Percentile demand number was not reached in 1998 (479,976 AF) or in 2011 (464,314 AF).

B. TCEQ Water Use Reports for all surface water rights other than LCRA, STPNOC, and Corpus Christi for the years 2000-2011:
AECOM calculated the 90th Percentile of the historic uses of water in the three downbasin counties for these selected years and added them to the demand, by county.

C. Estimates of Groundwater Agricultural Use in the Portions of Colorado, Wharton and Matagorda counties within Region K for the year 2009:
AECOM estimated groundwater use for the year 2009 and added this to the demand, by county.

2. Choice of Years included in Datasets. There are three different sets of years included for historic use purposes: the years 1992-2011; the years 2000-2011; and the year 2009. It is difficult to understand how this random compilation of historic water use information provides a strong foundation for the Agricultural Irrigation Demands utilized in the 2016 IPP.

3. Total Disconnect between Number of Acres Irrigated and Amount of Water Used or Needed. Discussions with representatives of the LCRA and the Region K consultant have confirmed that the number of irrigated acres is NOT a part of the demand equation in this IPP. The demand numbers were calculated using the three datasets above, without considering the number of acres that were irrigated, the crops that were grown, or the 5.25 acre-feet/acre duty that formed the basis for the surface water rights issued by the State for agricultural irrigation of rice in the Lower Colorado River Basin. Without connecting the number of acres irrigated to the volume of water used for irrigation, there are no metrics for assessing the water use per acre and no metrics for evaluating the effectiveness of conservation projects. Under Texas law, water rights for irrigation uses are attached to the land and are based, in large part, on the total acreage to be irrigated (*see* Texas Water Code §11.124). The methodology used for the IPP demand

numbers assumes that the number of irrigated acres is irrelevant, and such an assumption leads to calculations and planning decisions that lack the technical and legal foundations to support them.

4. Use of Historic Numbers as a Predictor of Future Agricultural Irrigation Demands. In view of the evolving nature of the agricultural business along the Texas Gulf Coast, and the number of variables influencing a farmer's choice to plant certain crops (such as crop insurance and federal subsidies), along with the lingering drought conditions in recent years, it seems illogical to use selected historic years of water use as the basis for predicting and planning near-term and long-term water use demands for this user group.

In sum, the agricultural irrigation demand numbers included in the IPP appear to be derived from a random assortment of historic water use reports for the non-municipal users in the basin, using a methodology that assures that the demands of these users remain at historically high levels, regardless of improvements or advancements in the farming industry over the years. CTWC disagrees with Region K's decision to reject the TWDB's estimate of water needs for agricultural irrigation in the region and instead use estimates based on flawed methodology.

RECOMMENDATION 1: In the Final Plan, remove the current water demand numbers for agricultural irrigation in the three lower basin counties (Colorado, Wharton, Matagorda) and replace them with numbers based upon a scientifically sound, justified, and reasonable methodology for calculating water demands. This methodology should employ a standard metric to calculate water needs, such as acre-feet per acre irrigated for each crop type.

In the alternative, decline to adopt the dramatically increased non-municipal demand numbers proposed in the IPP at this time and utilize the TWDB's estimated non-municipal demand numbers for the Final Plan. Commit to developing and implementing a scientifically sound methodology that employs standardized metrics for estimating future non-municipal demands, and commit to using the new method in the next planning cycle. Include a footnote to the agricultural irrigation demand numbers for the three lower basin counties (Colorado, Wharton, Matagorda) stating that comments were filed questioning the basis of the numbers and that they will be re-evaluated during the next planning cycle.

CONCERN 2: As noted in Chapter 1 comments, the discussion of Matagorda Bay contained in Section 2.4.1 belongs in Chapter 1, which describes the planning area, including social and economic impacts, as opposed to Chapter 2, which describes water demands. A parallel discussion of the social and economic impacts of the Highland Lakes region should be included alongside the Matagorda Bay description within Chapter 1.

RECOMMENDATION 2: Move the discussion of Matagorda Bay contained in Section 2.4.1 to Chapter 1 or append it to Chapter 1.

CHAPTER 3

CONCERN: In four of the five years within the 2011-2015 planning cycle, the majority of Region K's surface water supplies have been governed by emergency orders issued by the Texas Commission on Environmental Quality (TCEQ) to authorize the LCRA to vary from the terms of its 2010 Water Management Plan for the operation of Lakes Buchanan and Travis due to dangerously low stored water supplies. Although the LCRA has applied for amendments to its Water Management Plan, the extended drought and its impacts on water in the Highland Lakes have demonstrated an urgent need for improvements in the quantification of the firm yield for these reservoirs.

RECOMMENDATION: The identification of currently available water supplies contained in Chapter 3 should emphasize the need to immediately re-visit the firm yield calculations for Lakes Buchanan and Travis, and should assess whether the firm supply of the Highland Lakes is sufficient for current and future demands.

CHAPTER 4

CONCERN: As a result of the flawed methodology for computing demands, discussed under Chapter 2, above, needs (shortages) for agricultural irrigation are artificially inflated.

RECOMMENDATION: The needs (shortages) for the three lower basin counties (Colorado, Wharton, Matagorda) should be re-calculated after applying a scientifically-sound methodology to arrive at demands.

In the alternative, needs (shortages) should be recalculated using the TWDB's estimates of non-municipal demands. Commit to developing and implementing a scientifically-sound methodology that employs standards metrics for estimating future non-municipal demands and adjusting needs (shortages) based upon revised demand numbers during the next planning cycle. Include a footnote to the agricultural irrigation needs (shortages) for the three lower basin counties (Colorado, Wharton, Matagorda) stating that comments were filed questioning the basis of the numbers and that they will be re-evaluated during the next planning cycle.

CHAPTER 5

CONCERN 1: One of the main charges of a Regional Water Planning Group is to "consider water conservation practices, including potentially applicable best management practices, for each identified water need." (31 Tex. Admin. Code § 357.34(f)). Water conservation measures include "practices, techniques, and technologies that will reduce the consumption of water, reduce the loss or waste of water, or improve the efficiency in the use of water." (31 Tex. Admin. Code § 357.10(26)). However, the IPP fails to include one of the most proven, effective, low-cost water management strategies available, which incentivizes attainment of all three of these goals: appropriate water pricing. Water pricing should be included in Chapter 5 as a water management strategy for all user groups.

A discussion of the impacts of water pricing should also be included as part of the conservation water management strategy discussion because the price of water is a primary driver for conservation. Perhaps more than any other factor, the price paid for water influences people's choices to either consume or conserve. Cities use tiered pricing as a water management strategy to effectively discourage waste. Similar strategies should be applied to water pricing for agricultural irrigation users. At the very least, water should *never* be sold for less than the cost of conserving it. It must be priced such that a cost/benefit analysis does not result in a business decision to waste cheap water rather than invest in conservation measures and take care that each acre-foot is used as efficiently as possible.

Strategic water pricing is proven to be effective at modifying behavior and increasing conservation. Moreover, it is highly cost-effective because it does not require the massive capital outlays of other conservation strategies that often require building new infrastructure or implementing expensive technology. It does not make sense that the IPP contains conservation strategies that cost hundreds of millions of dollars and strategies that cannot be implemented because funding is not available, but leaves out the less expensive, low-hanging fruit of appropriate water pricing.

RECOMMENDATION 1: The LCRWPG has the authority and duty to recommend strategies for water conservation. Because it is a proven, efficient method to modify behavior and leads to significant water savings, water pricing should be included in the Final Plan as a recommended water conservation measure for all water suppliers and all types of water uses.

CONCERN 2: Section 5.2.2 of the IPP includes information on water conservation and recommended conservation-related strategies. Notably, it includes specific, quantitative targets for municipal per capita water conservation. Using quantifiable targets and the metric of gallons per capita per day (gpcd), the municipalities of Central Texas have made and continue to make excellent progress in water conservation – Austin has reduced its per capita use by 30% over the past decade. However, cities' conservation efforts alone are not enough to ensure water supplies for all water user groups over the planning period. Other users must do their part by setting similar quantitative conservation goals, taking action to meet those goals, and tracking their progress by a standardized metric. It is especially critical that these principles be applied in agricultural irrigation – the single largest use category in Region K.

The IPP contains a number of strategies for reducing water usage in the irrigation districts of the lower three counties in the lower Colorado River basin, as well as estimates of their possible water savings and costs. However, there is no commitment to achieving any quantifiable conservation goals, no timeframe for meeting conservation goals, and no tracking, monitoring, or reporting of progress toward goals. Without any of these critical programmatic components, these conservation strategies are unlikely to come to fruition, much less achieve conservation savings of a magnitude to consider them water management strategies. This is especially true for those strategies that appear to be cost-prohibitive on their face, with astronomical price tags and no potential funding source.

In order to make these strategies meaningful, the Plan must include programmatic components similar to those used so effectively for municipal conservation efforts. First, quantitative conservation targets must be put in place for per-acre usage for rice farming, with reasonable, concrete timeframes for achievement. Many rice farmers have made excellent progress; however, some still use in excess of 5.25 acre-feet of water per acre of rice (which TCEQ considers a waste of water). Recent comments from the Texas agriculture commissioner indicate that Texas agriculture is using on average 1.5 acre-feet of water per acre at a 98% efficiency level. Using this as a target, the agricultural irrigators of Region K have significant room to improve their conservation record.

Second, provisions must be in place to demonstrate the achievement of conservation targets. The success of agricultural conservation efforts must be monitored, tracked, and reported over time to ensure meaningful progress. This is precisely the type of accountability that ensures that cities meet their goals, and it should be applied to the other large user group – agriculture – for the same reason. Without it, we have not seen the progress in conservation that was expected from the agricultural sector. The 1989 order approving LCRA's Water Management Plan includes an expectation that on-farm water usage would be reduced by 25-30% as time went by. And yet 25 years later, it appears that no progress has been made. According to LCRA records, the average usage per acre, including canal losses, actually increased from 5.3 acre-feet per acre to 5.5 acre-feet per acre from 1990 to 2011.

Finally, water suppliers should adopt policies for enforcement of conservation targets. Without any consequences in place for failure to meet conservation goals, water users will be much less likely to apply the effort necessary to achieve them.

RECOMMENDATION 2: Chapter 5 of the Plan needs to be updated with realistic, quantitative conservation targets for agricultural irrigators; set, reasonable timeframes for achieving targets; and provisions for monitoring, tracking and reporting levels of conservation achievement. Results of agricultural irrigators' conservation efforts should be reported in the Region K Plan using a standardized metric such as acre-feet of water used per acre. CTWC recognizes that this recommendation would require significant revision of the Plan, and therefore suggests that these revisions be developed and added to the Plan during the next regional planning cycle.

CONCERN 3: Public water suppliers supplying potable water audit their systems for water loss, such as losses due to leaks. (*See* IPP Section 1.2.5.4 for a description of current use of water audits in Region K). Using these audits, public water suppliers analyze the amount of water lost within their distribution systems and are held accountable for reducing that waste by repairing leaks or otherwise minimizing water loss. This tool should be applied equally to agricultural irrigation users and the LCRA so that the amount of water lost within their conveyance systems can be quantified, monitored, and reduced. Water losses should be monitored and quantified for *all* water distribution systems.

RECOMMENDATION 3: Add to Section 5.2.2.4, Recommended Water Management Strategies related to Irrigation Conservation, a recommendation that agricultural irrigation water users and the LCRA develop a system to monitor water losses in their conveyance systems on a regular basis and publicly report the raw data.

CONCERN 4: The statement "the flood culture is not required to grow rice, but is currently the only practical method for maintaining the required saturated soil conditions," is an unsupported statement of fact. (*See* Section 5.2.2.4.1, p. 5-20).

RECOMMENDATION 4: In the Final Plan, remove the statement "the flood culture is not required to grow rice, but is currently the only practical method for maintaining the required saturated soil conditions" from Section 5.2.2.4.1 (p. 5-20).

CONCERN 5: Water management strategies for agricultural irrigation should include the use of brackish groundwater, drip irrigation, and any other supplies and methods supported by current agricultural research. Considering the fact that agricultural irrigation is the number one water use in Region K, the LCRWPG should encourage agricultural users to develop and implement cutting-edge irrigation methods rather than endorse entrenchment in unsustainable irrigation methods.

RECOMMENDATION 5: In the next planning cycle, encourage increased dialogue between academic institutions, industry representatives, government officials, and local farming communities regarding tools, technology, methods and new supplies and with potential application to agricultural irrigation.

CONCERN 6: CTWC opposes the proposed LCRA "Enhanced Recharge" project cited as an alternative water management strategy in Section 5.3.1.7 of the IPP (p. 5-152) to benefit agricultural users in the lower Colorado River basin. This project proposes diverting surface water from the Colorado River and dumping it into recharge basins to allow it to leach into the ground. The water would then be available to groundwater users in the area and to wells that could augment irrigation canal flows. In short, this project proposes to convert state water, which is owned by the state and held in trust for the people of the State of Texas, into the private property of rice farmers. This proposal is contrary to the concept of the public trust and therefore contrary to public policy.

RECOMMENDATION 6: In the Final Plan, remove the LCRA "Enhanced Recharge Project" because it is contrary to public policy and therefore should be considered infeasible.

CONCERN 7: CTWC opposes inclusion of the Goldthwaite Channel Dam as a water management strategy because it is unsupported by technical information or need from a municipal user.

RECOMMENDATION 7: CTWC understands that after careful consideration by the LCRWPG, the Goldthwaite Channel Dam will not be included as a recommended water strategy at this time. CTWC supports the LCRWPG's decision in this regard.

CHAPTER 6

CONCERN: Section 6.3.1 of the IPP states, in part:

> LCRA's water rights in these counties used for rice farming are some of the most senior rights within the entire Colorado River Basin. However, the irrigators using these water rights do not have a sufficiently reliable supply of water under drought-of-record (DOR) conditions.

This language implies that rice farmers are entitled to use LCRA's senior downstream water rights or that those water rights are earmarked or set aside for rice farming. Many members of the public continue to mistakenly believe that rice farmers own these senior water rights or are otherwise legally entitled to water under senior water rights. This language supports that misconception and should be eliminated to avoid perpetuating confusion.

RECOMMENDATION: In the Final Plan, adopt a revised version of the quoted portion of Section 6.3.1, as follows:

> ~~LCRA's water rights in these counties used for rice farming are some of the most senior rights within the entire Colorado River Basin.~~ However, ~~the~~ irrigators <u>in the lower three counties</u> ~~using these water rights~~ do not have a sufficiently reliable supply of water under drought-of-record (DOR) conditions.

CHAPTER 7

CONCERN: Chapter 7 covers drought planning and response by wholesale and retail water suppliers and customers, including preparations for alternate supplies and strategies for reducing municipal water demands during drought. The discussion in Chapter 7 also refers the reader to Section 5.2.4.8 for details on drought management strategies for irrigators in Colorado, Matagorda and Wharton counties. However, the only strategy presented for rice farming is a very simplistic assumption of only producing a first crop for all producers. Given the recent history of Emergency Orders for the last four years, it would appear that a more comprehensive drought plan is needed to address the potential of much more limited surface water releases than would be required to support an entire first crop for all three of these counties, It also would appear that the drought management strategies for rice farming should recognize and incorporate the extensive utilization of supplemental water supply from groundwater wells, which does not appear to be addressed in Chapter 5 or 7. The basis for the unit costs for drought management presented by county in Chapter 7 is also unclear, particularly when utilization of groundwater is considered. This is problematic because as stated in the Plan, "(r)ice production in the lower three counties of the Lower Colorado Regional Water Planning Area is the agricultural resource most dependent upon a reliable, extensive water supply." (IPP Section 6.3.1, p. 6-2). And, their interruptible supply of surface water is particularly vulnerable to drought emergencies, as experienced over the past few years. It is logical that the regional plan would include much more comprehensive strategies for water demand reduction and alternate supplies for agricultural users, as well as municipal users, to cope with drought emergencies.

RECOMMENDATION: In the next planning cycle, the LCRWPG should emphasize the importance of comprehensive drought planning for *all* user groups.

CHAPTER 8

CONCERN 1: There were numerous concerns regarding the draft of Chapter 8 presented in the IPP, as originally published. However, these concerns have largely been addressed in the revised version of Chapter 8 that is presented on the Region K website at http://www.regionk.org/wp-content/uploads/2015/05/Region_K_Ch_8_2016_Plan_IPP_plus_new_edits_052915.docx.
CTWC especially supports the recommendation in Section 8.1.6.3 that the TCEQ, TWDB, and Texas Legislature play leadership roles in the development of water use metrics, efficiency standards, and best management practices, including monitoring and delivery systems basin-wide. All users throughout the basin must understand their own water use, identify inefficiencies, and use every tool available to ensure the efficient use of water.

RECOMMENDATION 1: CTWC supports the adoption of the revised version of Chapter 8 that is presented on the Region K website and recommends that the revised version be incorporated into the Final Plan rather than the draft Chapter 8 presented in the IPP.

CONCERN 2: In recent drought years, inflows to the Highland Lakes have been historically low. Precipitation events in the watershed have not translated into the volume of inflows expected based upon historical observations. CTWC is very concerned about this observed significant decrease in inflows. Because of the importance of the Highland Lakes to the Region K water supply, this trend must be studied and its causes understood and addressed as appropriate. The IPP contains a placeholder for a section for additional recommendations regarding *Inflows to Highland Lakes* (at Section 8.1.9). The revised draft of Chapter 8 that is presented at the Region K web site includes a new proposed section 8.1.10 addressing this concern and calling for hydrologic study of this issue.

RECOMMENDATION 2: Add new Section 8.1.10, *Inflows to Highland Lakes*, as presented in the revised version of Chapter 8 that is presented on the Region K web site, to the Final Region K Plan.

CONCERN 3: Current water planning constructs include a specific set of water user groups or "WUGs". It is the aim of water planning to help ensure that water is available to each of these water user groups. They include municipal users, agricultural irrigators, industry, mining, and others. However, there are no water user groups representing the needs of the environment or recreational users, including recreational business and industry, leaving these important user groups without adequate planning to provide water for their needs. In fact, the planning process appears to support only consumptive uses without regard for those uses that would be supported by leaving water in place in the source of supply. Water needed to support the environment and recreation is critical to the quality of life and economy of the State of Texas. Addition of the environment and recreation as water user groups would give these needs the seat at the water planning table that they deserve.

RECOMMENDATION 3: The LCRWPG should adopt into Section 8.1.11 the following recommended improvement to the regional water planning process for submission to the Texas Water Development Board and Texas Legislature:

> The LCRWPG would support action by the TWDB to revise its rules to enumerate the environment and recreational users, including recreational business and industry, as water user groups ("WUGs") for which water demands and water supplies will be identified and analyzed and for which plans will be developed to meet water needs (*see* 30 Tex. Admin. Code § 357.10(29)). If direction from the Texas Legislature is necessary to initiate this rule change, the LCRWPG recommends that the Texas Legislature take the necessary action to direct the TWDB to revise its rules.

The revised draft of Chapter 8 that is presented at the Region K web site contains a recommendation to recognize environmental flows as a formal category of water use to be planned for (*see* Section 8.1.2.2, item 4). CTWC supports the addition of environmental use, but recommends the broader language above to include protection of recreational use and recreational business and industry, which, similar to environmental flows, are largely in-place water uses and are critical to Texas' economy and quality of life.

CONCERN 4: Water rights permits issued by the TCEQ must be consistent with Regional Water Plans (*see* 30 Tex. Admin. Code § 295.16). However, regional water planning groups are not consulted in this determination by TCEQ and often do not even know when an application has been filed for a permit that could impact or by impacted by the Regional Water Plan. Regional water planning groups should be provided with notice of such applications and application information, such as technical memoranda, so that they can provide input to the TCEQ in the permit application process.

RECOMMENDATION 4: The LCRWPG should adopt into Section 8.1.11 the following recommended improvement to the regional water planning process for submission to the TCEQ:

> A TCEQ water right permit must address a water supply need in a manner that is consistent with the state water plan and the relevant approved regional water plan (Tex. Water Code § 11.134(b)(3)(E)). The LCRWPG requests that the TCEQ provide notices of water right permit applications, draft permits, and staff memoranda to the applicable regional water planning groups for each new water right or water right amendment application. This will enable regional water planning groups to analyze each proposed permit's consistency with the regional water plan.

CHAPTER 11

CONCERN: As discussed fully under Chapter 2, above, CTWC questions the huge increases in agricultural irrigation demand numbers compared to the prior (2011) Regional Water Plan.

RECOMMENDATION: Revise the text and tables in Section 11.2.2 (pages 11-2 to 11-4) and the tables and graphs in Appendix 11B to maintain consistency with either recommended change to Chapter 4. At a minimum, include a footnote to Section 11.2.2 and the Irrigation Water Demand Comparison, and Colorado, Wharton, and Matagorda County Total Water Demand Comparison charts in Appendix 11B stating that comments were filed questioning the basis of the numbers and that they will be re-evaluated during the next planning cycle.

APPENDIX ____

THE HIGHLAND LAKES: HISTORY AND SOCIAL AND ECONOMIC IMPORTANCE

Brief History of the Highland Lakes System

The Highland Lakes system is comprised of two water storage reservoirs, Lakes Buchanan and Travis, and four pass-through reservoirs, Lakes Inks, LBJ, Marble Falls and Austin. During the construction of the dams and development of the Highland Lakes system, the Lower Colorado River Authority (LCRA) acquired large tracts of land that surround the reservoir system. LCRA is authorized to develop, manage, and promote the use of these lands for parks, recreational facilities and natural science laboratories and to promote the preservation of fish and wildlife. LCRA must also provide public access to, and use of, its lakes and lands for recreation.

In the early years of LCRA's existence, the predominant priorities in water resources management were to moderate and control the floods and droughts in the Lower Colorado River Basin. This was accomplished through the construction of dams in the Texas Hill Country west of Austin, which created the Highland Lakes. Due to the Highland Lakes, the ravages of floodwaters on the lower Colorado River have largely been controlled. The Highland Lakes have historically also provided a dependable source of water supply for municipal, industrial, agricultural, and mining uses. Additionally, the Highland Lakes provided the source of inexpensive, renewable electrical energy, and recreational opportunities for the citizens and communities of Central Texas. In sum, the work of LCRA in its early years provided the foundation on which much of the present day population and economy of Central Texas now depend. The rapidly-increasing population of Austin and surrounding Central Texas communities requires additional water resources for drinking water and to sustain business and industry. Tourism and recreation became significant industries, both on the Highland Lakes and lower Colorado River.

Tourism and Recreational Demands

The use of water for recreation and tourism is closely linked to the population of an area, location of the recreational opportunity and ease of access, and the value of the resource to recreational users. Recreational users are interested in qualities including: full lakes, flowing rivers, clean water, and aesthetics. In many areas, recreational uses of the waterways are increasing steadily. The entire Highland Lakes area, from Lake Austin to Lake Buchanan, receives a great deal of recreational use from boaters, park visitors, swimmers and anglers from all over Texas and the Southwestern United States.

Recreation and tourism in the Highland Lakes area are important contributors to local economies. The recreation industry associated with the Highland Lakes experienced phenomenal growth from 2000-2010 and became the major economic stability factor in many of the counties surrounding the Highland Lakes. However, the viability of this recreational industry is strongly tied to the level of water in the reservoirs, with the Conservation Base recreational levels of Lake Travis defined as 660 feet above mean sea level (msl) and of Lake Buchanan as 1,012 feet msl. In the pass through lakes—Inks, LBJ, Marble Falls, and Austin—little impact is felt from variations in the levels of Lakes Buchanan and Travis.

An expected annual cycle includes the filling of the conservation storage space in the winter and spring months of the year to be drawn down by water uses during the summer months. The recreational users of these reservoirs are accustomed to a certain amount of variation in the lake levels. However, extreme variations can have an adverse impact on recreational and tourism interests.

Lake Travis

Lake Travis is a 19,000-acre lake with over 270 miles of shoreline located in Texas within Travis and Burnet Counties. Formed in 1937 with the creation of the Marshall Ford Dam, Lake Travis has been and continues to be an important force in the economic growth and sustainability of the region. Lake Travis is the source of water and electricity for its surrounding communities, including but not limited to the municipalities of Briarcliff, Lakeway, Lago Vista, Jonestown, Point Venture, The Hills of Lakeway, Volente, and Austin (currently, 23 municipalities rely on Lake Travis for water). The lake is a recreational destination for boaters and other water enthusiasts throughout the state, and is an important component of the region's tourism economy. Businesses of all sizes depend upon Lake Travis for their operations, including restaurants, hotels, boat rentals, marinas, golf courses, scuba operators, and real estate brokers and developers. Companies, including Samsung, Freescale, AMD, and 3M, rely upon Lake Travis for their manufacturing operations as well. Finally, the lake is an amenity to the surrounding households. Since 1990, the size of the population living within 30 miles of Lake Travis has more than doubled to over 1.5 million people according to the U.S. Census. Communities such as Lakeway, Lago Vista, Jonestown, Point Venture, Briarcliff, and Village of the Hills were founded around Lake Travis in the 1960s and have grown to a total population of almost 22,000 as of 2010.

Lake Travis is a controlled-flow lake, with water coming in through rainfall and inflows from area creeks, rivers, and streams, and water going out to serve the demand of surrounding cities, water utilities, irrigation needs for the downstream industrial and agricultural users, and flows sufficient to maintain downstream instream flow needs and bay and estuary health. The lake is considered full at an elevation of 681.1 feet ("full pool") above mean sea level (msl), and lake levels have fluctuated from a low of 614 feet in 1951 to a high of 710 feet in 1991. In addition to its use for flood control, hydroelectric power, water supply, and water quality, Lake Travis supports broad recreational tourism and diverse fish and wildlife habitats. Drought, increased water use, downstream demands, and reduced inflows all cause water levels in Lake Travis to fall. Conversely, during flood events, businesses surrounding the lake may be forced to close for extended periods of time.

An economic impact study by consulting firm RCLCO in 2011 used historical data and econometric models to assess the financial impact low lake levels or poor water quality have on the region. This study established a baseline to measure the fiscal and economic impacts associated with Lake Travis in 2010, and found that a full Lake Travis generates revenues from property, sales, hotel and mixed beverage taxes that buys ambulances, maintains schools and provides state government with needed funding.

Some key data defining the 2010 baseline of the Lake Travis economic engine include:

- $207.2 million in revenue for state and local governments from property taxes ($158.4 million), sales taxes ($45.2 million), hotel occupancy and mixed beverage taxes;

- $8.4 billion in assessed property value ($4.353 billion in lake-related homes and land property value in 2010 from Travis County Appraisal District);
- $3.6 million in hotel and mixed beverage taxes;
- 3,900 commercial businesses in study area, which contribute $45.2 million in sales taxes; and
- Lake related activity in 2010 base case:
  - Total visitor-related spending creates 1,607 jobs, $34.6 million in direct wages, and $90.5 million in value added to the local economy; and
  - Boat sales spending creates 309 jobs, $12.2 million in direct wages and $22.1 million in total value added to the economy.

The study found that adverse economic impacts begin when lake levels remain below 660 feet, and significant economic impacts occur when lake levels fall below 650 feet. Some specific effects that the study predicted include:
- 350,000 – 375,000 fewer park visits;
- 29 lost jobs for each 10% drop in park visits;
- $23.6 million to $38.8 million reductions in visitor spending; and
- Up to 241 lost jobs and $6.1 million in lost wages.

The study also found significant annual fiscal impacts could occur, including:
- $21.9 million in total fiscal revenues lost versus the 2010 base case; and
- $1.7 million lost sales tax revenues.

As a result of the extended severe drought that began in 2008 and large interruptible water releases under the Water Management Plan during the severe drought in 2011, Lake Travis lake levels fell to the 620-630 foot elevation and remained there from 2001 until May of 2015. As a result, many of the predicted impacts became reality. Public access to Lake Travis was severely impaired below 630 feet, and the lake also became much more dangerous to navigate as the lake levels fell. With loss of access, tourism greatly declined and many lake-related businesses and restaurants closed, and continue to close, including high-profile ones that have been in business for many years. Marina businesses are also struggling, as occupancy rates and jobs are down by 35-40%, and profitability is being severely impacted.

Low lake levels also impacted the real estate sector of the economy. While the Austin metropolitan area is enjoying significant growth and increased property values, lake-related property values greatly suffered, both with homes and unimproved land values. The following results have been compiled by the real estate industry for the 2009-2014 timeframe:
- Median sales price decline of waterfront/view homes down 29.5% since 2011
- $/sq. ft. average price decline 33.9% since 2009
- Median undeveloped waterfront/view land price down 36.8% since 2009
- Real estate inventory levels are a very strong indicator of the health of a real estate market. While the residential market across the 5-county Austin metropolitan area had less than three months' supply as of December 2014, active listing inventory for homes with Lake Travis frontage will last more than two years at the Dec. 2014 pace of sales. There is more than three years of listing inventory for unimproved lots on Lake Travis.

These declines in water-related home and land values have a significant aggregate effect, both on the homeowners and on the taxing districts that rely on property taxes. According to data provided by the Travis County Appraisal District, waterfront market values on Lake Travis were about $2.428 billion in 2010, and related subdivisions that were not waterfront accounted for about $1.925 billion in market values, or a total of $4.353 billion. Based on analysis from real estate sales data, property value declines since 2010 are in the 10-30%+ range, and as such, the total impact on lake-related properties on Lake Travis in Travis County could be in the $400 million to over $1 billion range, as of the end of 2014.

At the same time, a real estate analysis of the Austin metropolitan area shows that it has enjoyed about 40% appreciation in residential values and 50% in lot values over the past six years, in stark contrast to property with Lake Travis views and/or frontage, which have actually lost approximately 10-30% in value since 2010. As such, property tax appraisals from TCAD have not increased and the associated tax base has lost tax receipts that could have occurred on a lost potential basis, had these lake-related properties appreciated in a similar manner as the rest of the Austin area. By again utilizing the 2010 appraised value for these lake-related properties of $4.353 billion, this likely represents as much as another $1.5 to 2 billion in lost taxable appreciation values on lake-related properties, and the associated loss in tax base revenues. Combining both the loss in value and the lack of appreciation on these lake-related properties creates a total adverse property value estimated impact from very low lake levels of $2-3 billion, and the associated loss of annual property tax revenues that support schools and county services. Given the very strong and on-going population growth in the area, and the magnitude of the lost tax revenues from lake-related properties, the shortfalls will likely have to be borne by the rest of the taxpayers to meet required service needs.

Upper Highland Lakes and Burnet and Llano Counties

Located along the Colorado River, both Burnet and Llano counties have strong agricultural and ranching sectors combined with tourists seeking water-related recreational opportunities. The tourism sector is the largest employer in the region with visitors spending millions of dollars each year at hotels, restaurants, and shops. In addition, the price premium waterfront properties command creates local property tax revenue. However, in 2014, responding to the multiple years of low lake levels in Lake Buchanan and its negative impact on property values, the Burnet County Appraisal District took action to reduce the market value of properties on Lake Buchanan by approximately $33,000,000 [Source: Chief Appraiser, Burnet County Appraisal District; March 2015].

In 2011, in a joint effort to measure the contribution of the upper Highland Lakes to the regional and state economies, Burnet and Llano Counties retained a project team to perform an economic impact analysis. The project team of TXP, Inc., Concept Development and Planning, LLC, and Diverse Planning and Development conducted the assessment for Burnet and Llano Counties that was completed in the fall of 2012. The study area for the project included Burnet and Llano Counties as well as the properties at nearby Lake Buchanan, Inks Lake, Lake LBJ, Lake Marble Falls, and Lake Travis (only the portion in Burnet County).

Over the past two decades, communities adjacent to the lakes have been the fastest growing in the two-county area. Since 2000, the majority of new homes built in the Upper Highland Lakes Region have been lake-adjacent. Nearly three-quarters of all homes built in the two counties in the past decade were within two miles of the lakes. Hotel occupancy tax revenue generated by properties in the Upper Highland Lakes Region has more than doubled since 2000. Over 81.1 percent of Burnet and Llano Counties' accommodation and lodging businesses are within two miles of the lakes.

In 2011, direct spending by all visitors to Burnet and Llano Counties resulted in the following:

- $161.3 million in direct economic activity;
- $58.9 million in earnings for employees and business owners;
- 3,125 jobs (or 25.9 percent of total regional employment);
- $3.46 million in local tax revenue excluding property taxes; and
- $9.2 million in state tax revenue.

Economic Activity & Tax Revenue Attributable to the Upper Highland Lakes

In the Upper Highland Lakes Region, the properties around the lakes are among the most valuable in the area. Lake-related properties in this region account for just 1.9 percent of the geographic area of the counties, but a disproportionately large 46.7 percent of their total taxable value.

The average taxable value of a home on the lakes is substantially greater than the countywide averages – ranging from approximately 70 percent higher around Lake Buchanan to more than 3.5 times the average home price in Burnet and Llano Counties around Lake LBJ and Lake Marble Falls.

The proportion of taxable hotel room revenue attributable to lake-related hotel properties is approximately 75 percent of total Upper Highland Lakes Region hotel sector activity. Lake-related hotel activity generates about $1 million in tax revenues for the State of Texas each year.

In 2011, direct purchases (based on room capacity and hotel occupancy tax receipts) by lake-related visitors to Burnet and Llano Counties resulted in the following:

- $122.5 million in direct economic activity;
- $45.3 million in earnings for employees and businesses owners;
- 2,454 jobs;
- $2.6 million in local tax revenue excluding property taxes; and
- $7.0 million in state tax revenue.

The total economic impact in 2011 of lake-related visitor spending in the Upper Highland Lakes, including indirect positive effects on support services and businesses, were described as follows:

- $185.5 million in total economic activity;
- $81.7 million in earnings for employees and businesses owners; and

- 3,648 jobs.

Long-term Low Lake Level Implications for the Upper Highland Lakes Region

Some of the key findings from the study include:

- The Highland Lakes community's overwhelming concern is that overall economic activity in the region will not return to its pre-drought growth rate because of the prolonged low lake levels.

- Low lake levels could adversely impact development of 5,799 undeveloped, lake-related acres, with an additional 1,180 underdeveloped acres that have a potential taxable property value of $1.4 billion around the lakes. Low lake levels correspond to a significant decline in tourism and visitor spending, with the decline increasing as levels further decline.

Since the drought began in 2008, Lake Buchanan has primarily been at levels below the conservation level of 1,012 feet above msl. The situation worsened significantly in the summer of 2011, when lake levels fell below 995 feet and continued to fall. At these low levels, lake access was very restricted and public boat ramps were closed, and tourism around the lake was adversely impacted. Numerous tourism-related businesses suffered or closed, such as restaurants, grocery stores and resorts, and associated job losses have been significant. For example, at the time of the study, charter fishing trips were down over 80%.

Sustained low lake levels also allowed the salt cedar population to dramatically overgrow the very large areas of exposed lake bed, creating a whole host of emerging problems.

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ATTACHMENT J

Sierra Club and Sierra Club Member Comments

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September 15, 2015

Mr. John Burke, Chairman
Lower Colorado Regional Water Planning Group
496 Shiloh Road
Bastrop, Texas 78602

Re: Review of the 2016 Region K Initially Prepared Plan

Dear Mr. Burke,

Thank you for the opportunity to review and provide comments on the Region K Initially Prepared Plan (IPP). The Region K Water Planning Group is to be commended for the effort that has gone into the development of the 2016 IPP. We appreciate the group's dedication to meeting the region's water needs for decades to come and attention to sustainable water management strategies such as water conservation and drought management. Planning for and appropriately managing water resources is everyone's concern and we acknowledge the time, energy, and expertise that have gone into the development of this IPP.

We offer the following comments on the IPP:

<u>Water Management Strategies are in Excess of "Needs" (Overplanning)</u>

It is the Sierra Club and National Wildlife Federation's position that water management strategies included in the state's 16 regional water plans should closely align with the "needs" or "water shortages" identified through the regional water planning process. Region K has recommended water management strategies far in excess of the needs identified in the IPP.

<u>A review of recommended water management strategies (WMS) compared to projected needs reveals that recommended WMS are almost double what the needs or projected water shortages are by the year 2070</u>. We acknowledge that there are caveats to these numbers. The planning group should examine this issue, identify specifically where the overplanning is occurring and determine which strategies are

most appropriate to meet the stated needs. We recommend that Region K recommend a suite of WMS that are in line with the actual “needs”.

Region K Needs Compared to Recommended WMS in 2016 IPP						
	2020	2030	2040	2050	2060	2070
Total Region K WUG Needs (afy)	377,511	391,892	397,366	410,210	460,228	523,205
Total Recommended Region K WMS (afy)	623,523	711,684	770,623	858,724	920,071	999,580

Recommending water management strategies in excess of needs leads to inflated cost estimates and ties up supplies that may be needed elsewhere. In addition, these excess WMS may have substantial environmental, social and economic consequences if implemented. Planning to use more water from aquifers and rivers than is needed to meet human water supply needs is potentially detrimental to the region’s ecosystems and makes the planning process more like a list compilation exercise than a true planning exercise.

The regional water planning process is adaptable. There are several mechanisms available to water providers to ensure flexibility in water supply approaches. They include a five-year planning cycle to address new information, a straightforward amendment process to quickly deal with changed or emergency conditions, and a mechanism to identify potential water projects as alternate rather than recommended strategies. Region K should use these tools to create a plan that more accurately reflects the water management strategies that are truly needed to meet future water demands.

In future planning cycles, we recommend that the planning group have a discussion about how to approach this issue and develop a timeline that allows the consultants and planning group members sufficient time to deliberate whether the inclusion of each WMS is appropriate. This includes evaluating impacts of WMS, including whether the strategies are consistent with the long-term protection of the state’s water resources, agricultural resources and natural resources per 31 TAC § 357.35 (b)(c).

Water Conservation

The Sierra Club and National Wildlife Federation appreciate Region K’s careful consideration of water conservation as a water management strategy. However, the recommendation should be stronger.

As shown in the table below, the 2016 IPP recommends Water User Groups (WUG) apply water conservation as a WMS to reduce their GPCD by 10% per decade for entities with a 200+ GPCD and recommends a 5% reduction in GPCD per decade for entities with a GPCD greater than 140.

Region K 2016 IPP – Water Conservation Recommendations		
	% reduction per year	% reduction per decade
>200 GPCD	1%	10%
>140 GPCD	.5%	5%

However, as you can see from the table below, the adopted 2012 Region K plan had a stronger water conservation recommendation. The recommendation from the previous plan is in line with state recommendations that all water users with a GPCD above 140 should reduce water use by at least 1% per year until they reach 140 GPCD.

Region K Adopted 2012 Regional Water Plan Water Conservation Recommendations		
	% reduction per year	% reduction per decade
All WUGs with GPCD above 140	1%	10%
WUGs with a need and GPCD 100 - 140	.25%	2.5%

With a growing population and intense droughts putting pressure on our water supplies we need to do more on conservation, not less. Water conservation is a cost effective and environmentally friendly way to stretch existing water supplies to meet growing demands. We recommend that Region K consider adopting water conservation recommendations consistent with recommendations from the last planning cycle.

It is important to note that the savings do not have to stop once 140 GPCD is reached. Cities such as San Antonio and Austin have reduced their water use below 140 GPCD and are still working to achieve additional savings. Please consider the success of the existing programs and the ability to maximize water savings through advanced conservation strategies.

Drought Management

The Region K IPP includes a robust recommendation to employ drought management as a water management strategy. The Sierra Club and National Wildlife Federation support this recommendation and commend the water planning group on including this proactive water supply strategy. Central Texans have shown that they are capable of responding to dry conditions by reducing their water use in a big way. This protects and significantly prolongs our water supply during drought, which allows communities to avoid costly water supply projects that may only occasionally be needed. Inclusion of this strategy acknowledges previous success and helps communities take this strategy seriously.

We support the planning group's recommendation that water suppliers consider coordinating drought stage information among users of the same source of water. We believe this will enhance public knowledge of and improve participation, which leads to successful implementation of drought measures.

We also support the planning group's recommendation that water suppliers begin education efforts prior to reaching drought stage levels.

Environmental Impacts of WMS

The Sierra Club and National Wildlife Federation are concerned that the environmental impacts of some of the WMS in the Region K plan are understated and that the Region K's impact analysis masks some of the potential environmental impacts of water management strategies. We acknowledge that such an impacts evaluation can be complicated. Using WAM Run3 as the starting point for evaluations masks many real world impacts. However, many of the proposed strategies WILL have an impact on the quantity and timing of environmental flows as compared to current conditions. Those impacts should be acknowledged in a quantified manner where possible.

Shifting water use from agriculture to municipal and steam electric, increased reliance on direct and indirect reuse, full use of water rights and new downstream surface water storage have the potential to significantly alter the quantity and timing of instream flows in the Colorado River and freshwater inflows to Matagorda Bay, thus impacting fish and wildlife populations. Region K members should do all they can to understand and address this issue.

The IPP states that several of the WMS have the potential to reduce instream flows. We are concerned about the cumulative impacts of these strategies since reduced instream flows are listed as a potential impact for numerous strategies. The RWPG should consider examining the cumulative impacts of WMS and at least provide some kind of analysis of the potential impacts in Chapter 5.

Unique Stream Segments

The Region K IPP does not include any recommendations for designation of ecologically unique stream segments. Work has previously been done to identify these segments and provide relevant information per 31 TAC § 357.8. This information has historically been included in the Region K plan and it is our understanding that these were inadvertently left out and will be added back into the final plan. Please ensure that information on ecologically unique stream segments is added back into the Region K plan prior to final submittal.

Creating a Regional Water Plan that Includes all Needs

The failure of regional water planning groups to address environmental water needs is an issue in all 16 regional water planning groups and in the planning approach put forth by the Texas Water Development Board. While it is understood that environmental water needs will not be included as a water need in the 2016 IPP, Region K should consider including this important user group in the development of the 2021 regional water plan. To be comprehensive, a water plan must include all water needs. We appreciate the policy statements in Chapter 8 that support this concept. The Region K plan should do what it can to ensure that water is available to meet the needs of fish and wildlife. If the Colorado River, its creeks and tributaries and Matagorda Bay are not healthy and productive, this region will not be healthy and productive.

Thank you for the opportunity to submit comments on the Region K IPP. We commend the planning group for their thoughtful consideration of the water supply challenges and solutions in the region. Much of the success of Region K is due to the ability of the members to work together as a group and in subcommittees to understand and vet the issues under consideration as part of the planning process.

Thank you for your consideration of these comments. Please feel free to contact me if you have any questions.

Sincerely,

Jennifer Walker
Water Resources Coordinator
Sierra Club, Lone Star Chapter
512-477-1729
jennifer.walker@sierraclub.org

Myron Hess
Manager, Texas Water Program/Counsel
National Wildlife Federation
512-610-7754
mhess@nwf.org

Cc: Jaime Burke, AECOM
Stacy Pandey, LCRA

Mr. Jonathan Ayres
13301 Ramrod Dr
Manchaca, TX 78652-3037
(512) 233-4606

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

I commend the Region K Water Planning Group for the tremendous effort that has gone into the development of the draft 2016 regional water plan and I appreciate your dedication to meeting the water needs of our area for decades to come and your attention to sustainable strategies such as water conservation and drought response. I offer the following comments regarding improvements to the draft 2016 Region K plan:

(1) The draft Region K Plan proposes a variety of new projects. These projects are in excess of the water needs that have been calculated for the Region K area by the planning group. Projects such as the four proposed off-channel reservoirs along the lower Colorado River, have the potential to create unnecessary and excessive environmental and financial costs and could end up being a disincentive for water conservation. The Region K plan should include water projects that help meet the projected water shortages in the region, however the plan should not include strategies in excess of the water needs. Regional water plans are updated every five years. There is a straight-forward amendment process in case water provider plans change and there are mechanisms in the planning process to include additional water projects as alternate rather than recommended strategies. Region K should use these tools to create a plan that reflects the water projects that are truly needed to meet future demand.

(2) Water conservation is a big part of the Region K plan but I am disappointed to see that the recommendations in the plan are not as strong they were in the previous plan. With a growing population and intense droughts we need to do more on conservation, not less. The current plan recommends that water suppliers with a per capita usage of over 200 gallons reduce their water use by 10% per decade and that water suppliers with a per capita usage of between 140 and 200 gallons reduce their water use 5% per decade. I recommend that Region K use the water conservation strategy from the 2012 Region K plan. That plan recommends that all water suppliers with a GPCD of more than 140 reduce their water use by 10% per decade. This is in line with state recommendations and many cities across Texas, including Austin, have shown that this is feasible.

(3) The Colorado River and Matagorda Bay are rich ecological habitats that require water and nutrients to allow the fish and wildlife that call these areas home to survive and thrive. To create a truly comprehensive water plan, the Region K planners must find a way to account for and plan for the water that will be needed to maintain the environmental flows that are the natural heritage of this region. The

Colorado River and its tributaries connect all the communities in Region K and are an essential part of our fabric. Without healthy rivers and streams the region is unhealthy. As this region continues to grow and water demands increase this is even more urgent. Please find a way to address this hole in the planning process.

I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

I HIGHLY RECOMMEND THAT YOU COME DOWN TO MANCHACA AND TALK WITH FOLKS WHO HAVE LIVED HERE 30 YEARS OR LONGER AND WHO ARE GARDENING FOR THEIR FOOD OR LIVELIHOOD.

JONATHAN AYRES
13301 RAMROD DR
MANCHACA, TX78652

Sincerely,
Mr. Jonathan Ayres

Mrs. Deborah Wilson
3200 Park Hills Dr
Austin, TX 78746-5515

Sep 11, 2015

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Austin, TX 78767

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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. As a native Texan I thank you for the opportunity to comment on the 2016 Region K IPP and hope the results of this process will set standards for other regions to emulate.

Sincerely,
Mrs. Deborah Wilson

Ms. Lida Saunders
9005 Frock Ct
Austin, TX 78748-5332
(512) 382-9074

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,

Lida Saunders
9005 Frock Ct.
Austin, Tx 78748

Sincerely,
Ms. Lida Saunders

Dr. Harry Miller
1402 Foxwood Cv
Austin, TX 78704-2718

Sep 11, 2015

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P.O. Box 220
Austin, TX 78767

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1402 Foxwood Cv
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Sincerely,
Dr. Harry Miller

Mr. Daniel Wattles
264 Rugged Earth Dr
Austin, TX 78737-9086
(512) 799-1914

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P.O. Box 220
Austin, TX 78767

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Colorado River and its tributaries connect all the communities in Region K and are an essential part of our fabric. Without healthy rivers and streams the region is unhealthy. As this region continues to grow and water demands increase this is even more urgent. Please find a way to address this hole in the planning process

(4) I would also like to recommend that restrictions be put in place to prohibit large recreational water projects such as the "Hawaiian Falls" theme part in Pflugerville and the new "Surf's Up" surfing park that is currently under construction. These projects are a shameful waste of water in a region that is experiencing extreme climate cycles.

I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Mr. Daniel Wattles

Mr. stephen wogan
10812 River Plantation Dr
Austin, TX 78747-1482

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

I commend the Region K Water Planning Group for the tremendous effort that has gone into the development of the draft 2016 regional water plan and I appreciate your dedication to meeting the water needs of our area for decades to come and your attention to sustainable strategies such as water conservation and drought response. I offer the following comments regarding improvements to the draft 2016 Region K plan:

THE SIMPLE SOLUTION FOR THE POPULATION OVERWHELMING WATER SUPPLIES EVERYWHERE IS TO PASS OUT BILLIONS OF CONDOMS. THE POPE HAS SAID THAT PEOPLE SHOULD STOP BREEDING LIKE RABBITS (A PROBLEM RESULTING FROM THE CHURCH'S OWN POLICIES). CHANGE IS IN THE AIR, BUT WE ARE RAPIDLY RUNNING OUT OF TIME...AND WATER.

REAL SOLUTION IN THE INTERIM IS TO IMPOSE AND ENFORCE TOUGH STANDARDS ON WATERING THE YARD, WASHING CARS (EVEN COMMERCIALLY), AND ON INCREDIBLE AMOUNTS OF WATER USED IN THE POWER GENERATION INDUSTRIES. TIME FOR SOLAR, WIND, AND BICYCLE POWER!

(1) The draft Region K Plan proposes a variety of new projects. These projects are in excess of the water needs that have been calculated for the Region K area by the planning group. Projects such as the four proposed off-channel reservoirs along the lower Colorado River, have the potential to create unnecessary and excessive environmental and financial costs and could end up being a disincentive for water conservation. The Region K plan should include water projects that help meet the projected water shortages in the region, however the plan should not include strategies in excess of the water needs. Regional water plans are updated every five years. There is a straight-forward amendment process in case water provider plans change and there are mechanisms in the planning process to include additional water projects as alternate rather than recommended strategies. Region K should use these tools to create a plan that reflects the water projects that are truly needed to meet future demand.

(2) Water conservation is a big part of the Region K plan but I am disappointed to see that the recommendations in the plan are not as strong they were in the previous plan. With a growing population and intense droughts we need to do more on conservation, not less. The current plan recommends that water suppliers with a per capita usage of over 200 gallons reduce their water use by 10% per decade and that water suppliers with a per capita usage of between 140 and 200 gallons reduce their water use 5% per decade. I recommend that Region K use the water conservation strategy from the 2012 Region K plan. That plan

recommends that all water suppliers with a GPCD of more than 140 reduce their water use by 10% per decade. This is in line with state recommendations and many cities across Texas, including Austin, have shown that this is feasible.

(3) The Colorado River and Matagorda Bay are rich ecological habitats that require water and nutrients to allow the fish and wildlife that call these areas home to survive and thrive. To create a truly comprehensive water plan, the Region K planners must find a way to account for and plan for the water that will be needed to maintain the environmental flows that are the natural heritage of this region. The Colorado River and its tributaries connect all the communities in Region K and are an essential part of our fabric. Without healthy rivers and streams the region is unhealthy. As this region continues to grow and water demands increase this is even more urgent. Please find a way to address this hole in the planning process.

I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Mr. stephen wogan

Mr. Morris Sandel
6113 Nuckols Crossing Rd
Austin, TX 78744-4578
(512) 462-4971

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

I commend the Region K Water Planning Group for the tremendous effort that has gone into the development of the draft 2016 regional water plan and I appreciate your dedication to meeting the water needs of our area for decades to come and your attention to sustainable strategies such as water conservation and drought response. I offer the following comments regarding improvements to the draft 2016 Region K plan:

(1) The draft Region K Plan proposes a variety of new projects. These projects are in excess of the water needs that have been calculated for the Region K area by the planning group. Projects such as the four proposed off-channel reservoirs along the lower Colorado River, have the potential to create unnecessary and excessive environmental and financial costs and could end up being a disincentive for water conservation. The Region K plan should include water projects that help meet the projected water shortages in the region, however the plan should not include strategies in excess of the water needs. Regional water plans are updated every five years. There is a straight-forward amendment process in case water provider plans change and there are mechanisms in the planning process to include additional water projects as alternate rather than recommended strategies. Region K should use these tools to create a plan that reflects the water projects that are truly needed to meet future demand.

(2) Water conservation is a big part of the Region K plan but I am disappointed to see that the recommendations in the plan are not as strong they were in the previous plan. With a growing population and intense droughts we need to do more on conservation, not less. The current plan recommends that water suppliers with a per capita usage of over 200 gallons reduce their water use by 10% per decade and that water suppliers with a per capita usage of between 140 and 200 gallons reduce their water use 5% per decade. I recommend that Region K use the water conservation strategy from the 2012 Region K plan. That plan recommends that all water suppliers with a GPCD of more than 140 reduce their water use by 10% per decade. This is in line with state recommendations and many cities across Texas, including Austin, have shown that this is feasible.

(3) The Colorado River and Matagorda Bay are rich ecological habitats that require water and nutrients to allow the fish and wildlife that call these areas home to survive and thrive. To create a truly comprehensive water plan, the Region K planners must find a way to account for and plan for the water that will be needed to maintain the environmental flows that are the natural heritage of this region. The

Colorado River and its tributaries connect all the communities in Region K and are an essential part of our fabric. Without healthy rivers and streams the region is unhealthy. As this region continues to grow and water demands increase this is even more urgent. Please find a way to address this hole in the planning process.

I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

"Protect our water!" -Mo Sandel

Sincerely,
Mr. Morris Sandel

Mrs. Susan Teague
1413 Oak Hurst Rd
Austin, TX 78734-2545

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

What have the priorities been in Texas? Why has Texas has been asleep at the water wheel for so long?...

Water know no boundary and nothing can be sustained without it...Nothing can be healthy without CLEAN water...

In Texas all the talk is about quantity not quality for too long? Floating boats and economy's based on lies...as motor boats pass by on the highway headed for marina's in neighborhoods they do not belong in..we wonder....will children get cancer in their lifetime as those in place to protect us let money scream the loudest?

Why did LCRA stand in the way of legal precedence and knowingly reward private corporate marina developers linked to a commercial dock building business that disregarded deeded property rights and environmental law and dumped toxins (linked to documented dumping of oil, spent welding rods, batteries, tires, gigantic hydroelectric petroleum based pipes, metal, tires, air conditioners, abandoned boats and motors, glass, tools, trash, treated lumber, and even human feces) in the watershed and flood pool and water of Lake Travis our Central Tx drinking water reservoir below our homes?....Why did LCRA reward these linked commercial marina developers with marina permits for a private corporate marina and fuel storage in a by deed NO commercial neighborhood where it did not belong?

How is the manipulation of the courts by teams of corporate lawyers good for us and the disregard of hundreds of deeds that state "NO COMMERCIAL EVER" good for us? We won lawsuits in District Court protecting our deeded property rights, our property and our no commercial neighborhood and the clean water that we drink in Lake Travis...and it's flood pool... that were completely overturned on appeal by the founding partner in their lawfirm by a Judge who had notice and refused to recuse. Is this what Judges do? Our lower court rulings upholding our deeded property right were completely overturned with gross impropriety and without legal justification! Our deeded property rights that "ran with the land binding on all heirs and assigns" for over 70 years protected everyone and us and our clean water before the EPA even existed. To say again, this is why lake Travis was so clean for so long...it was protected by our deeded property rights. Our rights protected the clean waters of Lake Travis and the watershed/flood pool and our neighborhood and our deeded property and the rights that we owned were valuable to us! What we worked for our whole lives was "taken" and given to linked private corporate marina developers to put their private marina in a by deed no commercial neighborhood where it does not belong flipping the property over and over over the years and survey after survey until they got what they wanted. Who protects us? Is the State of Texas above the Constitution of the USA? How is this good for us? WE OBJECT!

It appears that Texas has been asleep at the waterwheel for too long and we wonder who to trust and who really protects us and our living water, our private water wells as it appears that money and powerful hidden investors and corporate entities run roughshod over us and our deeded property rights and our Constitutional rights! How do we stand up to them? Are the courts only for the wealthy and the powerful and politically connected and their teams of lawyers? I am a nurse, not a lawyer and I Object! Do we have the wrong people in charge in Texas as we wonder do those in place to protect us look the other way?

Is it about quantity of water...not quality in Texas! Who protects the legacy we will leave our children when an economy based on motor boating and allowing private marina's where they do not belong on our drinking water in our by deed no commercial neighborhoods is the priority...as principalities appear to stand in the way of legal precedent and profits and money scream the loudest. Who will really pay the piper so a few can fuel up and float their private marina's and gigantic yachts on our drinking water? The cone of influence in drought is widening in Texas and we all know that run off is contaminated in times of flood and dumps into our clean water reservoir. During floods, the contaminated sediment is churned up and for months puts our Central Texas reservoir Lake Travis at risk and...contaminants can be absorbed into our skin while swimming or bathing. We do not want to realize what good science tells us that cholera is not a thing of the past and pcb's and pharmaceuticals cannot be filtered out and are cumulative. We wonder are sewerage treatment facilities that dump into our reservoirs, compliant with discharge permits?

Who will pay for costly spills from fuel contamination when tanks and lines rupture at private marina's? Who was pushing for "floating habitable structures" on Lake Travis our Central Tx drinking water? How is this good for us? Will taxpayers be asked to pay for new drinking water reservoirs? Why is the talk mostly about quantity of water to remain in Lake Travis not quality of water? Is the real agenda so private commercial marina's can flourish? Will cities like San Antonio growth charged and water starved and other similar cities who plan to build out have enough water to do so? Do cities like Austin and SA other city's looking for water and tapping into Lake Travis take exception to the private marina's and commercialization of the drinking water source they considered using? Will rice farmers be told to get water elsewhere? Who will do the right thing? Who really protects us and our clean water?

Nothing can be sustained without clean air, water and food! What are the priorities in Texas? Got science? Do we have the fox guarding the chicken coop for too long? As we wonder who really protects our health and welfare?

We tried to stand up for our deeded property rights that protected us and the clean water and watershed below our home in years of lawsuits...we were harassed, threatened and maligned...and we have been crushed by powerful forces who will do anything to get what they want and a system that has appeared to be rigged. We have been drained financially and in every way by linked private entities who see themselves as doing nothing wrong. Stop selling our clean drinking water to the highest bidder in Texas. In other states, motor boats are not even allowed on drinking water reservoirs!

Strengthen the Clean Water Act! We all need clean water to be healthy! The cumulative effects of toxins from private commercial enterprises in the wrong place will hurt us all! Do not privatize or commercialize our clean drinking water!

Water and air no boundary and belong to us all...nothing can live without it...it is our living water....revere it, do not poison it or sell it or allow it to be stolen by powerful forces, pretenders, hidden investors and dirty politics! Our deeded rights were covenants that ran with the land and did just that...our rights protected all of us and the water from private commercial enterprise where it did not belong for 70 years before the EPA existed! Now who do we trust? Now who really protects us as Texas will welcome more and more people who will need clean drinking water? Who will be the "kings with no clothes" in Texas floating their yachts on Lake Travis?

Sincerely,
Mrs. Susan Teague

Dr. Richard Day
PO Box 4848
702 Sky Lane
Horseshoe Bay, TX 78657-4848

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

II commend the Region K Water Planning Group for the tremendous effort that has gone into the development of the draft 2016 regional water plan and I appreciate your dedication to meeting the water needs of our area for decades to come and your attention to sustainable strategies such as water conservation and drought response. I offer the following comments regarding improvements to the draft 2016 Region K plan:

(1) The draft Region K Plan proposes a variety of new projects. These projects are in excess of the water needs that have been calculated for the Region K area by the planning group. Projects such as the four proposed off-channel reservoirs along the lower Colorado River, have the potential to create unnecessary and excessive environmental and financial costs and could end up being a disincentive for water conservation. The Region K plan should include water projects that help meet the projected water shortages in the region, however the plan should not include strategies in excess of the water needs. Regional water plans are updated every five years. There is a straight-forward amendment process in case water provider plans change and there are mechanisms in the planning process to include additional water projects as alternate rather than recommended strategies. Region K should use these tools to create a plan that reflects the water projects that are truly needed to meet future demand.

(2) Water conservation is a big part of the Region K plan but I am disappointed to see that the recommendations in the plan are not as strong they were in the previous plan. With a growing population and intense droughts we need to do more on conservation, not less. The current plan recommends that water suppliers with a per capita usage of over 200 gallons reduce their water use by 10% per decade and that water suppliers with a per capita usage of between 140 and 200 gallons reduce their water use 5% per decade. I recommend that Region K use the water conservation strategy from the 2012 Region K plan. That plan recommends that all water suppliers with a GPCD of more than 140 reduce their water use by 10% per decade. This is in line with state recommendations and many cities across Texas, including Austin, have shown that this is feasible.

(3) The Colorado River and Matagorda Bay are rich ecological habitats that require water and nutrients to allow the fish and wildlife that call these areas home to survive and thrive. To create a truly comprehensive water plan, the Region K planners must find a way to account for and plan for the water that will be needed to maintain the

environmental flows that are the natural heritage of this region. The Colorado River and its tributaries connect all the communities in Region K and are an essential part of our fabric. Without healthy rivers and streams the region is unhealthy. As this region continues to grow and water demands increase this is even more urgent. Please find a way to address this hole in the planning process.

I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Dr. Richard Day

Ms. Tria Shaffer
15247 Faubion Trl
Leander, TX 78641-8015
(512) 260-5056

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

I commend the Region K Water Planning Group for the tremendous effort that has gone into the development of the draft 2016 regional water plan and I appreciate your dedication to meeting the water needs of our area for decades to come. Unfortunately, your plan does not address water conservation and wildlife needs adequately. I offer the following comments regarding improvements to the draft 2016 Region K plan:

(1) The draft Region K Plan proposes a variety of new projects. These projects are in excess of the water needs that have been calculated for the Region K area by the planning group. Projects such as the four proposed off-channel reservoirs along the lower Colorado River, have the potential to create unnecessary and excessive environmental and financial costs and could end up being a disincentive for water conservation. The Region K plan should include water projects that help meet the projected water shortages in the region, however the plan should not include strategies in excess of the water needs. Regional water plans are updated every five years. There is a straight-forward amendment process in case water provider plans change and there are mechanisms in the planning process to include additional water projects as alternate rather than recommended strategies. Region K should use these tools to create a plan that reflects the water projects that are truly needed to meet future demand. With a five year review in place, more than adequate safe guards are in place to modify the plan as needs may arise.

(2) Water conservation is not a big enough part of the Region K plan--recommendations in the plan are not as strong they were in the previous plan. With a growing population and intense droughts we need to do more on conservation, not less. The current plan recommends that water suppliers with a per capita usage of over 200 gallons reduce their water use by 10% per decade and that water suppliers with a per capita usage of between 140 and 200 gallons reduce their water use 5% per decade. I recommend that Region K use the water conservation strategy from the 2012 Region K plan. That plan recommends that all water suppliers with a GPCD of more than 140 reduce their water use by 10% per decade. This is in line with state recommendations and many cities across Texas, including Austin, have shown that this is feasible. Money does not transform into water--conservation is the #1 way to protect this precious resource or we will end up like California.

(3) The Colorado River and Matagorda Bay are rich ecological habitats that require water and nutrients to allow the fish and wildlife that

call these areas home to survive and thrive. To create a truly comprehensive water plan, the Region K planners must find a way to account for and plan for the water that will be needed to maintain the environmental flows that are the natural heritage of this region. (Again, conservation measures will help achieve this vital need.) The Colorado River and its tributaries connect all the communities in Region K and are an essential part of our fabric. Without healthy rivers and streams the region is unhealthy. As this region continues to grow and water demands increase this is even more urgent. Please find a way to address this hole in the planning process.

I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. As the planners, it is ultimately your responsibility to insure that the needs of all entities are met. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Ms. Tria Shaffer

Mr. Dave and Rita Cross
116 Schooner Dr
Lakeway, TX 78738-1003

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

We commend the Region K Water Planning Group for the tremendous effort that has gone into the development of the draft 2016 regional water plan, and we appreciate your dedication to meeting the water needs of our area for decades to come and your attention to sustainable strategies such as water conservation and drought response. We offer the following comments regarding improvements to the draft 2016 Region K plan:

(1) The draft Region K Plan proposes a variety of new projects. These projects are in excess of the water needs that have been calculated for the Region K area by the planning group. Projects such as the four proposed off-channel reservoirs along the lower Colorado River, have the potential to create unnecessary and excessive environmental and financial costs and could end up being a disincentive for water conservation. The Region K plan should include water projects that help meet the projected water shortages in the region, however the plan should not include strategies in excess of the water needs. Regional water plans are updated every five years. There is a straight-forward amendment process in case water provider plans change and there are mechanisms in the planning process to include additional water projects as alternate rather than recommended strategies. Region K should use these tools to create a plan that reflects the water projects that are truly needed to meet future demand.

(2) Water conservation is a big part of the Region K plan but I am disappointed to see that the recommendations in the plan are not as strong they were in the previous plan. With a growing population and intense droughts we need to do more on conservation, not less. The current plan recommends that water suppliers with a per capita usage of over 200 gallons reduce their water use by 10% per decade and that water suppliers with a per capita usage of between 140 and 200 gallons reduce their water use 5% per decade. I recommend that Region K use the water conservation strategy from the 2012 Region K plan. That plan recommends that all water suppliers with a GPCD of more than 140 reduce their water use by 10% per decade. This is in line with state recommendations and many cities across Texas, including Austin, have shown that this is feasible.

(3) The Colorado River and Matagorda Bay are rich ecological habitats that require water and nutrients to allow the fish and wildlife that call these areas home to survive and thrive. To create a truly comprehensive water plan, the Region K planners must find a way to account for and plan for the water that will be needed to maintain the

environmental flows that are the natural heritage of this region. The Colorado River and its tributaries connect all the communities in Region K and are an essential part of our fabric. Without healthy rivers and streams the region is unhealthy. As this region continues to grow and water demands increase this is even more urgent. Please find a way to address this hole in the planning process.

We believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. We thank kindly you for the opportunity to comment on the 2016 Region K IPP!

Sincerely,
Mr. Dave and Rita Cross

Ms. Margot Clarke
5106 Evergreen Ct
Austin, TX 78731-5420

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

While I commend the Region K Water Planning Group for the tremendous effort that has gone into the development of the draft 2016 regional water plan and appreciate your dedication to meeting the water needs of our area, I believe that there must be more focus on sustainable strategies such as water conservation and drought response. Therefore, I offer the following comments regarding improvements to the draft 2016 Region K plan:

(1) The draft Region K Plan proposes a variety of new projects for water supplies in excess of the needs that have been calculated for Region K by the planning group. These projects, such as the four proposed off-channel reservoirs along the lower Colorado River, could very well result in unnecessary and excessive environmental and financial costs and even become a disincentive for water conservation.

The Region K plan should include water projects that help meet the projected water shortages in the region, but not strategies in excess of the water needs. Regional water plans are updated every five years, and there is a straight-forward amendment process in case water provider plans change. Also, there are mechanisms in the planning process to include additional water projects as alternate rather than recommended strategies. Region K should use these tools to create a plan that reflects the water projects that are truly needed to meet future demand.

(2) Water conservation is a big part of the Region K plan but I am disappointed to see that the recommendations in the plan are not as strong they were in the previous plan. With a growing population and intense droughts, we need to do more on conservation, not less. The current plan recommends that water suppliers with a per capita usage of over 200 gallons reduce their water use by 10% per decade and that water suppliers with a per capita usage of between 140 and 200 gallons reduce their water use 5% per decade. I strongly urge Region K to use the water conservation strategy from the 2012 Plan. That plan recommends that all water suppliers with a GPCD of more than 140 reduce their water use by 10% per decade. This is in line with state recommendations and many cities across Texas, including Austin, have shown that this is feasible.

(3) The Colorado River and Matagorda Bay are unique and rich ecological habitats requiring water and nutrients for the fish and wildlife in these areas to survive and thrive. To create a truly comprehensive water plan, the Region K planners must find a way to account and plan

for the water that will be needed to maintain the environmental flows that feed the natural heritage of this region. The Colorado River and its tributaries connect all the communities in Region K and are an essential part of our fabric. Without healthy rivers and streams, the region is unhealthy. As this region continues to grow and water demands increase, this is even more urgent. It is essential that you find a way to address this hole in the planning process.

I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Ms. Margot Clarke

Mr. Raul Bustillo
3909 Aggie Dr
Bay City, TX 77414-4613
(979) 318-9542

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

I commend the Region K Water Planning Group for the tremendous effort that has gone into the development of the draft 2016 regional water plan and I appreciate your dedication to meeting the water needs of our area for decades to come and your attention to sustainable strategies such as water conservation and drought response. I offer the following comments regarding improvements to the draft 2016 Region K plan:

(1) The draft Region K Plan proposes a variety of new projects. These projects are in excess of the water needs that have been calculated for the Region K area by the planning group. Projects such as the four proposed off-channel reservoirs along the lower Colorado River, have the potential to create unnecessary and excessive environmental and financial costs and could end up being a disincentive for water conservation. The Region K plan should include water projects that help meet the projected water shortages in the region, however the plan should not include strategies in excess of the water needs. Regional water plans are updated every five years. There is a straight-forward amendment process in case water provider plans change and there are mechanisms in the planning process to include additional water projects as alternate rather than recommended strategies. Region K should use these tools to create a plan that reflects the water projects that are truly needed to meet future demand.

(2) Water conservation is a big part of the Region K plan but I am disappointed to see that the recommendations in the plan are not as strong they were in the previous plan. With a growing population and intense droughts we need to do more on conservation, not less. The current plan recommends that water suppliers with a per capita usage of over 200 gallons reduce their water use by 10% per decade and that water suppliers with a per capita usage of between 140 and 200 gallons reduce their water use 5% per decade. I recommend that Region K use the water conservation strategy from the 2012 Region K plan. That plan recommends that all water suppliers with a GPCD of more than 140 reduce their water use by 10% per decade. This is in line with state recommendations and many cities across Texas, including Austin, have shown that this is feasible.

(3) The Colorado River and Matagorda Bay are rich ecological habitats that require water and nutrients to allow the fish and wildlife that call these areas home to survive and thrive. To create a truly comprehensive water plan, the Region K planners must find a way to account for and plan for the water that will be needed to maintain the environmental flows that are the natural heritage of this region. The

Colorado River and its tributaries connect all the communities in Region K and are an essential part of our fabric. Without healthy rivers and streams the region is unhealthy. As this region continues to grow and water demands increase this is even more urgent. Please find a way to address this hole in the planning process. Planners should take into consideration the Mary Rhodes pipeline delivering water from the Colorado River to Corpus Christi, the probability that two units added to STP nuclear plant, brackish water use for geothermal plants in Matagorda county.

I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP. Raul Bustillos 3909 Aggie Dr. Bay City Texas

Sincerely,
Mr. Raul Bustillo

Ms. Julia Kuglen
5402 Mount Bonnell Rd
Austin, TX 78731-4610

Sep 12, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

I commend the Region K Water Planning Group for its work drafting the 2016 regional water plan. Thank you for your dedication to meeting the long-term water needs of our area and your attention to sustainable strategies such as water conservation and drought response. I offer the following comments about the draft 2016 Region K plan:

(1) The draft Region K Plan proposes a variety of new projects. These projects exceed Region K water needs as calculated by the planning group. Projects such as the four proposed off-channel reservoirs along the lower Colorado River may create unnecessary and excessive environmental and financial costs and a disincentive for water conservation. The Region K plan should include water projects that help meet the projected regional water shortages, but should not include strategies that exceed the water needs. Regional water plans are updated every five years. A straight-forward amendment process allows for changes as needed, and the planning process allows planners to include alternate plans. Region K should use these tools to create a plan that reflects the water projects that are truly needed to meet future demand.

(2) Water conservation is a big part of the Region K plan, but I am disappointed that the recommendations in the plan are weaker than those in the previous plan. The growing population and intense droughts demand more conservation, not less. The current plan recommends that water suppliers with a per capita usage of over 200 gallons reduce their water use by 10% per decade and that water suppliers with a per capita usage of between 140 and 200 gallons reduce their water use 5% per decade. I recommend that Region K use the water conservation strategy from the 2012 Region K plan. That plan recommends that all water suppliers with a GPCD of more than 140 reduce their water use by 10% per decade. This is in line with state recommendations, and many cities across Texas, including Austin, have shown that this 10% reduction is feasible.

(3) The Colorado River and Matagorda Bay are rich ecological habitats that must be sustained. To create a truly comprehensive water plan, the Region K planners must find a way to maintain the water flows that are the natural heritage of this region--a mandate that becomes more urgent as human population and development grows and water demands increase. Please address this hole in the plan.

I believe that these changes in the plan would use our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Ms. Julia Kuglen

Ms. Jane Chamberlain
3904 Becker Ave
Austin, TX 78751-5209

Sep 12, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

Thank you for your diligence in trying to plan our water use to best accommodate everyone in this area. As regards the draft 2016 Region K plan, I would like to ask that we consider environmental priorities before all else; we've grown into the habit of wasting this precious resource over generations, and we need to learn new ways of conserving and reusing as opposed to creating plans that allow for unknowable growth. To do the latter is to continue along the path that has brought us to a water crisis. Therefore I ask you return to the 2012 Region K plan which was more strict in its requirements for cutting back. This is in line with state recommendations, and many cities across Texas have shown that it's feasible.

In keeping with the environmental priority, I ask you to plan, rather than for human growth, for the maintenance of the Colorado River and Matagorda Bay. These rich ecological habitats must be protected for the benefit of all of us. Without healthy rivers and streams our region can't prosper.

I ask you to review the draft and present a more environmentally aware plan for conserving while utilizing a precious resource that we can no longer take for granted.

Sincerely,
Ms. Jane Chamberlain

Mr. Joe Stone
PO Box 1208
Manor, TX 78653-1208

Sep 12, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

I commend the Region K Water Planning Group for the tremendous effort that has gone into the development of the draft 2016 regional water plan and I appreciate your dedication to meeting the water needs of our area for decades to come and your attention to sustainable strategies such as water conservation and drought response. I offer the following comments regarding improvements to the draft 2016 Region K plan: Please make this plan one that will protect our natural resources with consideration for the wildlife as well as future generations. Thanks,
Joe Stone

(1) The draft Region K Plan proposes a variety of new projects. These projects are in excess of the water needs that have been calculated for the Region K area by the planning group. Projects such as the four proposed off-channel reservoirs along the lower Colorado River, have the potential to create unnecessary and excessive environmental and financial costs and could end up being a disincentive for water conservation. The Region K plan should include water projects that help meet the projected water shortages in the region, however the plan should not include strategies in excess of the water needs. Regional water plans are updated every five years. There is a straight-forward amendment process in case water provider plans change and there are mechanisms in the planning process to include additional water projects as alternate rather than recommended strategies. Region K should use these tools to create a plan that reflects the water projects that are truly needed to meet future demand.

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comprehensive water plan, the Region K planners must find a way to account for and plan for the water that will be needed to maintain the environmental flows that are the natural heritage of this region. The Colorado River and its tributaries connect all the communities in Region K and are an essential part of our fabric. Without healthy rivers and streams the region is unhealthy. As this region continues to grow and water demands increase this is even more urgent. Please find a way to address this hole in the planning process.

I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Mr. Joe Stone

Ms. Mary Jozwiak
111 Barton Meadow Dr
Dripping Springs, TX 78620-3881
(512) 858-7821

Sep 13, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

I commend the Region K Water Planning Group for the tremendous effort that has gone into the development of the draft 2016 regional water plan and I appreciate your dedication to meeting the water needs of our area for decades to come and your attention to sustainable strategies such as water conservation and drought response. I offer the following comments regarding improvements to the draft 2016 Region K plan:

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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

I absolutely support the above recommendations.

Sincerely,
Ms. Mary Jozwiak

Ms. susan lefler
8701 Bear Creek Dr
Austin, TX 78737-4407

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Ms. susan lefler

Mrs. Connie Moran
536 Hampton St
Buda, TX 78610-3229

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mrs. Connie Moran

Ms. barb lee
PO Box 519
Spicewood, TX 78669-0519

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Ms. barb lee

Mrs. Johnna Shelton
2943 Thousand Oaks Dr
Austin, TX 78746-7661

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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2943 Thousand Oaks Dr
Austin, TX 78746-7661

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P.O. Box 220
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Austin, TX 78746-7661

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P.O. Box 220
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2943 Thousand Oaks Dr
Austin, TX 78746-7661

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P.O. Box 220
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Sincerely,
Mrs. Johnna Shelton

Ms. Daisy Arellano
117 Timber Hill Cv
Cedar Creek, TX 78612-4927
(512) 689-6518

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Ms. Daisy Arellano

Mrs. Kathryn Ehlert
2107 Woodmont Ave
Austin, TX 78703-3251
(512) 466-1314

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mrs. Kathryn Ehlert

Mr. David Grant
13157 Halsell Dr
Austin, TX 78732-2166
(512) 576-4188

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Mr. David Grant

Dr. John Lemaux
1404 E 13th St
Austin, TX 78702-1128
(512) 364-3854

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

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Sincerely,
Dr. John Lemaux

Miss Rebecca Seiler
520 Woodward St
521
Austin, TX 78704-7310
(512) 818-5770

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Miss Rebecca Seiler

Ms. greta factor
4116 Gandara Bnd
Austin, TX 78738-6779

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Ms. greta factor

Mr. Chip Waldron
4414 Garnett St
Austin, TX 78745-1930

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Mrs. Mary Gifford
5002 Strass Dr
Austin, TX 78731-5630

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Mrs. Mary Gifford

Mr. Chris Ruiz
3715 S 1st St Apt 406
Austin, TX 78704-0107

Sep 11, 2015

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P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Chris Ruiz

Mr. Benjamin Alpers
1602 Fairplay Ct
Austin, TX 78721-1316
(512) 922-3440

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Stacy Pandey
P.O. Box 220
Austin, TX 78767

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1602 Fairplay Ct
Austin, TX 78721-1316
(512) 922-3440

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Sincerely,
Mr. Benjamin Alpers

Mrs. Claire Bush
1124 Clayton Ln
Apt L
Austin, TX 78723-1012

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mrs. Claire Bush

Ms. Danielle Stanley
6400 Salcon Cliff Dr
Austin, TX 78749-4291

Sep 11, 2015

Stacy Pandey
P.O. Box 220
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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Ms. Danielle Stanley

Mr. Ken Box
1117 W 9th St
Austin, TX 78703-4925
(512) 473-9936

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

I commend the Region K Water Planning Group for the tremendous effort that has gone into the development of the draft 2016 regional water plan and I appreciate your dedication to meeting the water needs of our area for decades to come and your attention to sustainable strategies such as water conservation and drought response. I offer the following comments regarding improvements to the draft 2016 Region K plan:

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Sincerely,
Mr. Ken Box

Ms. Scherry Hodges
3206 Kerbey Ln
Austin, TX 78703-1451
(737) 703-8436

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. Scherry Hodges

Mr. John Rooney
4905 Avenue H
Austin, TX 78751-2530

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mr. John Rooney

Ms. Sharon Gillespie
1103 Enfield Rd
Austin, TX 78703-4127

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. Sharon Gillespie

Mr. Ronnie Weiss
15048Haley Hollow
Austin, TX 78728

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

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Sincerely,
Mr. Ronnie Weiss

Ms. Rigena Osborne
1919 Burton Dr
Austin, TX 78741-4276

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Ms. Rigena Osborne

Mrs. michelle engebretson
310 Crest Dr.
Kingsland, TX 78639

Sep 11, 2015

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P.O. Box 220
Austin, TX 78767

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Mrs. michelle engebretson

Mr. Colin Clark
302 W Johanna St
Austin, TX 78704-4234

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mr. Colin Clark

Mrs. JOY MCMILLIN
3407 Graybuck Rd
Austin, TX 78748-1002
(512) 282-0253

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mrs. JOY MCMILLIN

Ms. Robin Schneider
2609 Sherwood Ln
Austin, TX 78704-5644

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. Robin Schneider

Ms. Paula Stone
128 danos
Fbg, TX 78624

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Ms. Paula Stone

Ms. irene navarrette
21315 Union Lee Church Rd
Manor, TX 78653-5320

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

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Sincerely,
Ms. irene navarrette

Mr. CE Saunier
15200 Hyson Xing
Pflugerville, TX 78660-3045

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mr. CE Saunier

Ms. Pam Clift
8200 Neely Dr Apt 232
Austin, TX 78759-8555

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. Pam Clift

Ms. Cheyenne Weaver
615 W Johanna St
Austin, TX 78704-4125
(512) 751-1723

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. Cheyenne Weaver

Mrs. Lauren Hicks
1601 Glenvalley Dr
Austin, TX 78723-1115

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Mr. Christopher Dowling
4009 Highland Dr
Austin, TX 78734-2054

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P.O. Box 220
Austin, TX 78767

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Mr. Christopher Dowling

Mr. Ray Olah
6104 Rickerhill Ln
Austin, TX 78739-1684

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Ray Olah

Ms. Shelly Buse
356 Cowpoke Cyn
Driftwood, TX 78619-9746
(512) 517-0726

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Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Ms. Shelly Buse

Mr. Michael Wakeland
4804 Fast Fox Trl
Austin, TX 78746-2306

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Michael Wakeland

Ms. Adrienne Inglis
PO Box 29807
Austin, TX 78755-6807

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Ms. Adrienne Inglis

Mr. Saeed Kazmi
11020 Liberty Farms Dr
Austin, TX 78754-5971
(512) 650-7813

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Mr. Saeed Kazmi

Dr. James Neely
9707 Anderson Mill Rd
Austin, TX 78750-2298

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

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Sincerely,
Dr. James Neely

Mrs. Beth Duval
3206 Bluebell Bend Cv
Round Rock, TX 78665-3808

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mrs. Beth Duval

Dr. Yvonne Hansen
6206 Hillston Dr
Austin, TX 78745-4351
(512) 852-9731

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Dr. Yvonne Hansen

Mr. Neal Howerton
8912 Circle Dr Unit C
Austin, TX 78736-7997

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mr. Neal Howerton

Ms. Sheila Chaffins
109 Seneca Dr
Burnet, TX 78611-5969
(830) 265-0451

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Ms. Sheila Chaffins

Dr. Earle Lewis
11501 Brenham St
Manor, TX 78653-5368
(512) 272-4415

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P.O. Box 220
Austin, TX 78767

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Sincerely,
Dr. Earle Lewis

Mr. Will Foster
10708 Sycamore Hills Rd
Austin, TX 78717-4402
(512) 626-0714

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Will Foster

Mr. Matthew Gossage
1807 Salina St
Austin, TX 78702-1247
(512) 669-9968

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Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Mr. Matthew Gossage

Mr. Kevin Kettle
5107 Lambs Ln
Austin, TX 78744-5342

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Kevin Kettle

Mr. Arthur Emshoff
1816 Bayou Dr
Bay City, TX 77414-8716
(979) 245-2797

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P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Arthur Emshoff

Mrs. Sharon Bramblett
4612 Duval St
Austin, TX 78751-3206

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Mrs. Sharon Bramblett

Ms. Angelica Brehm
1342 Lamar Square Dr # 307
Austin, TX 78704-2214

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

I commend the Region K Water Planning Group for the tremendous effort that has gone into the development of the draft 2016 regional water plan and I appreciate your dedication to meeting the water needs of our area for decades to come and your attention to sustainable strategies such as water conservation and drought response. I offer the following comments regarding improvements to the draft 2016 Region K plan:

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Sincerely,
Ms. Angelica Brehm

Dr. Deborah Krueger
10500 Laurel Hill Cv
Austin, TX 78730-1400

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Dr. Deborah Krueger

Mr. Ernesto Calderon
7309 Shadywood Dr
Austin, TX 78745-6485

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mr. Ernesto Calderon

Ms. CC Mullen
PO Box 26335
Austin, TX 78755-0335
(512) 338-8187

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. CC Mullen

Mr. Joshua Herting
4440 Corran Ferry Loop
Austin, TX 78749-1116
(281) 908-2169

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mr. Joshua Herting

Mr. Robert Mick
12045 Lincolnshire Dr
Austin, TX 78758-2217
(512) 481-8786

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Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Robert Mick

Ms. Porscha Hudson
14300 Tandem Blvd
Austin, TX 78728-6654

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Ms. Porscha Hudson

Mr. Jeffrey Crunk
9012 Sommerland Way
Austin, TX 78749-4269

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Jeffrey Crunk

Mr. Bill Gould
906 N Avenue H
Elgin, TX 78621-1224

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Bill Gould

Mr. Jerry Mylius
1702 Fawn Dr
Austin, TX 78741-3707
(512) 442-6805

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Jerry Mylius

Mr. Jerry Mylius
1702 Fawn Dr
Austin, TX 78741-3707
(512) 442-6805

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Mr. Jerry Mylius

Mr. Brent Crouch
1010 Maplewood Dr
Pflugerville, TX 78660-2877

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Brent Crouch

Dr. Heather Brandon
1508 Quail Crest Dr
Austin, TX 78758-5025
(512) 797-7858

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P.O. Box 220
Austin, TX 78767

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Sincerely,
Dr. Heather Brandon

Mr. marshall jennings
180 Oneil Ranch Rd
Dripping Springs, TX 78620-4930
(512) 738-5569

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Ms. Yolanda Delgado
3809 Manchaca Rd Apt D
Austin, TX 78704-6727
(512) 444-8334

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P.O. Box 220
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Ms. Peggy Krainman
1801 Warner Ranch Rd Apt 315
Round Rock, TX 78664-7266

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P.O. Box 220
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Ms. bonni scudder
800 Timber Trl
Cedar Park, TX 78613-3405

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Ms. Ann Graham
3815 Avenue H
Austin, TX 78751-4718
(512) 458-8096

Sep 11, 2015

Stacy Pandey
P.O. Box 220
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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Ms. Ann Graham

Mr. Bruce Zivley
251 River Meadows Rd
Wimberley, TX 78676-5138
(512) 468-3531

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

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Sincerely,
Mr. Bruce Zivley

Ms. Mary Cohron
222 east new hope drive
Cedar Park, TX 78613-6301

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. Mary Cohron

Mr. John Botros
714 Turtle Creek Blvd Apt 211
Austin, TX 78745-4255

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mr. John Botros

Ms. H Hoffman
9003 W Pointer Ln
Austin, TX 78758-6442

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. H Hoffman

Mr. William O'Leary
5215 Ledesma Rd
Austin, TX 78721-2648

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

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Mr. William O'Leary

Ms. Alexandra Sigg
Bishop Hall Rm #203
1210 Santa Gertrudis Ave
Kingville, TX 78363
(512) 203-9426

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P.O. Box 220
Austin, TX 78767

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Ms. Alexandra Sigg

Mr. Roy Waley
1310b Palo Duro Rd
Austin, TX 78757-3430

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Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Roy Waley

Ms. Kathy Flocco-McMaster
6712 Bay City Bnd
Austin, TX 78725-2934
(512) 386-5755

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Ms. Kathy Flocco-McMaster

Mr. Thomas W. Cranston
114 Long Hollow Rd
Elgin, TX 78621-5525

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Thomas W. Cranston

Ms. Jeanne Devine
10809 Desert Willow Loop
Austin, TX 78748-4027

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Ms. Jeanne Devine

Mr. S. Hodgkins
P Box 668
Dripping Springs, TX 78620

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Mr. S. Hodgkins

Mr. Mark Aflatooni
PO Box 28143
Austin, TX 78755-8143

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

I commend the Region K Water Planning Group for the tremendous effort that has gone into the development of the draft 2016 regional water plan and I appreciate your dedication to meeting the water needs of our area for decades to come and your attention to sustainable strategies such as water conservation and drought response. I offer the following comments regarding improvements to the draft 2016 Region K plan:

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Sincerely,
Mr. Mark Aflatooni

Mrs. Marjory Gentsch
Goldenwood Way
Austin, TX 78737

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mrs. Marjory Gentsch

Ms. Kathryn Samec
8502 Soho Dr
Austin, TX 78748-6533

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. Kathryn Samec

Ms. Kathleen Robertson
6317 Zadock Woods Dr
Austin, TX 78749-2609
(512) 301-1190

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. Kathleen Robertson

Mrs. Kelly Henley
12201 Conrad Rd
Austin, TX 78727-6416

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

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Sincerely,
Mrs. Kelly Henley

Ms. Jane Jatinen
307 N Cuernavaca Dr
Apt F
Austin, TX 78733-3244

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Ms. Jane Jatinen

Ms. Rhonda Pfluger
PO Box 855
Pflugerville, TX 78691-0855
(512) 251-3262

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Ms. Rhonda Pfluger

Mr. Mel Hazlewood
437 Saint Andrews St
Meadowlakes, TX 78654-6811

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Mel Hazlewood

Ms. Morgan Seibert
501 E Oltorf St
Apt 355
Austin, TX 78704-5634
(619) 980-7719

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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501 E Oltorf St
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Austin, TX 78704-5634
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Sincerely,
Ms. Morgan Seibert

Mr. Jim Hill
PO Box 162602
Austin, TX 78716-2602
(512) 327-7717

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mr. Jim Hill

Ms. Paula Niemeyer
PO Box 7711
Austin, TX 78713-7711

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. Paula Niemeyer

Miss Louisa Morris
7 Concord Cir
Austin, TX 78737-9072

Sep 11, 2015

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P.O. Box 220
Austin, TX 78767

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Sincerely,
Miss Louisa Morris

Mrs. glenna smyer
208 Black Jack Ln
Bastrop, TX 78602-7632
(512) 496-9125

Sep 11, 2015

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P.O. Box 220
Austin, TX 78767

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Mrs. glenna smyer

Ms. t logan
3910 S Ih 35
Austin, TX 78704-7442

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Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Ms. t logan

Ms. Brooke Jones
11106 Blossom Bell Dr
Austin, TX 78758-4216

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
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Ms. Zulma Gregory
7905 San Felipe Blvd Apt 116
Austin, TX 78729-7638
(512) 582-9491

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Ms. Bonnie Lynn MacKinnon
1603 S Elm St
Georgetown, TX 78626-6930

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P.O. Box 220
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Ms. Bonnie Lynn MacKinnon

Ms. Mindy Webber
102 Cedar Springs Dr
Wimberley, TX 78676-5603

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P.O. Box 220
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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Ms. Mindy Webber

Mr. cris mcbride
17005 Indian Chief Dr
Cedar Park, TX 78613-7267
(512) 267-3896

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

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Sincerely,
Mr. cris mcbride

Ms. Sally Jacques
4620 Banister Ln
Austin, TX 78745-1806

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. Sally Jacques

Mrs. Susie Way
140 Willow Leaf Ln
Buda, TX 78610-3629
(713) 432-1377

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mrs. Susie Way

Mr. Art Steele
310 Chisholm Trl Apt 206
Round Rock, TX 78681-5073

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mr. Art Steele

Mr. Billy Halgat
8104 Manassas Dr
Austin, TX 78745-6924

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Miss Stephanie Lake
410 N Pine St
Fredericksburg, TX 78624-4336

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P.O. Box 220
Austin, TX 78767

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Miss Stephanie Lake

Mr. Wayne Tisdale
428 Colorado Dr
Cedar Creek, TX 78612-3580
(512) 820-9405

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P.O. Box 220
Austin, TX 78767

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Dr. Gerald Smolinsky
2125 Melridge Pl
Austin, TX 78704-2019
(512) 441-1943

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P.O. Box 220
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Mr. Kenneth Salinas
2211 W North Loop Blvd
Apt 125
Austin, TX 78756-2310

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P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Kenneth Salinas

Ms. Tiffanay Waller
811 Sonny Dr
Leander, TX 78641-2314
(512) 626-7991

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Ms. Tiffanay Waller

Mr. Michael Hanson
120 Silla Sendero
Wimberley, TX 78676-5837

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

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Sincerely,
Mr. Michael Hanson

Mr. Marc Lionetti
405 Battle Bend Blvd
Austin, TX 78745-2341
(510) 872-0550

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mr. Marc Lionetti

Ms. Melanie Sinclair
5413 Manchaca Rd
Apt 144
Austin, TX 78745-2869

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. Melanie Sinclair

Mr. Michael Revord
4616 Trail Crest Cir
Austin, TX 78735-6326

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mr. Michael Revord

Mrs. Simone Dail
1714 Samoa Ct
Pflugerville, TX 78660-8160

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Mrs. Simone Dail

Ms. Odilia Leal-McBride
8310 Briarwood Ln
Austin, TX 78757-7645
(936) 414-8149

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P.O. Box 220
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Ms. Odilia Leal-McBride

Mr. Al Braden
2810 W Fresco Dr
Austin, TX 78731-5022
(512) 944-3377

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Al Braden

Mrs. Sara Reynolds
470
Austin, TX 78749-1617

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mrs. Sara Reynolds

Mr. Ray Reece
507 S 1st St # 351
Austin, TX 78704-1207

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Ray Reece

Ms. Suzanne McAnna
8413 Cockney Dr
Austin, TX 78748-6507

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Ms. Suzanne McAnna

Ms. Carol Pennington
1005 Bluebird Dr
Manchaca, TX 78652-4157
5

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Ms. Carol Pennington

Mr. Robert Long
2211 W North Loop Blvd Apt 234
Austin, TX 78756-2317
(512) 663-2506

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

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Sincerely,
Mr. Robert Long

Mr. Greg Sells
3300 Parker Ln
Apt 258
Austin, TX 78741-6942
(512) 443-6461

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mr. Greg Sells

Ms. Karen Prothero
21609 Arrowhead Pt
Lago Vista, TX 78645-6100
(512) 267-0567

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. Karen Prothero

Miss Ariana Rodriguez
1615 High Rd
Kyle, TX 78640-4827
(512) 745-3245

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Miss Ariana Rodriguez

Ms. Carter Neal
5514 Roosevelt Ave
Austin, TX 78756-1766

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. Carter Neal

Ms. Clare McCollam
3014 W William Cannon Dr Apt
932
Austin, TX 78745-5150
(512) 377-9421

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Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Ms. Clare McCollam

Ms. Jeri Porter
432 Brady Ln
West Lake Hills, TX 78746-5502
(512) 317-0515

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Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Ms. Jeri Porter

Ms. Emory Porter
8200 Breeze Way
Jonestown, TX 78645-9645

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P.O. Box 220
Austin, TX 78767

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Sincerely,
Ms. Emory Porter

Ms. Molly Hornbuckle
107 Harness Ln
Georgetown, TX 78633-4873
(512) 639-8963

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Ms. Molly Hornbuckle

Mr. James Evans
16001 Crystal Hills Dr
Austin, TX 78737-9149

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. James Evans

Mr. James Lowe
PO Box 978
Manor, TX 78653-0978
(512) 906-6133

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Mr. James Lowe

Ms. Carol Fly
2205 Broughton Ct
Austin, TX 78727-3143
(111) 111-1111

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

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Sincerely,
Ms. Carol Fly

Dr. Don and Sharon Brown
4213 Avenue F
Austin, TX 78751-3720

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Dr. Don and Sharon Brown

Ms. Malva Mcintosh
50109 Thunderbird Ln
Georgetown, TX 78626-6237

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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50109 Thunderbird Ln
Georgetown, TX 78626-6237

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P.O. Box 220
Austin, TX 78767

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Mr. Brent Bray
802 Parkview Dr
Pflugerville, TX 78660-2318

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mr. Brent Bray

Ms. Lisa LeBlanc
4620 W William Cannon Dr Apt 5
Austin, TX 78749-2316
(972) 358-9011

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Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Ms. Lisa LeBlanc

Miss Brittany Bramlett
8211 Loralinda Dr
Austin, TX 78753-5854
(870) 577-9511

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Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Ms. Patricia Murdock
23232 Wells Branch Pkwy
Austin, TX 78728
(512) 514-0543

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Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Ms. Patricia Murdock

Mrs. Natalia Leal
7020 Colberg Ct
Austin, TX 78749-4184

Sep 11, 2015

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P.O. Box 220
Austin, TX 78767

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Mrs. Natalia Leal

Mr. Alex King
7211 Easy Wind Dr
Austin, TX 78752-2364

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P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Alex King

Ms. Janet Delaney
5406 Western Hills Dr
Austin, TX 78731-4824

Sep 11, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Ms. Janet Delaney

Ms. fathom Clark
19339 Wilke Ln
Pflugerville, TX 78660-7400
(737) 703-9954

Sep 12, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

I commend the Region K Water Planning Group for the tremendous effort that has gone into the development of the draft 2016 regional water plan and I appreciate your dedication to meeting the water needs of our area for decades to come and your attention to sustainable strategies such as water conservation and drought response. I offer the following comments regarding improvements to the draft 2016 Region K plan:

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Sincerely,
Ms. fathom Clark

Mr. Vince Mendieta
6005 Cherry Creek Dr
Austin, TX 78745-3421
(512) 555-1212

Sep 12, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mr. Vince Mendieta

Dr. Eva Malina
10735 FM 2668
Bay City, TX 77414-2954

Sep 12, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Dr. Eva Malina

Dr. Gloria Gannaway
3002 Oak Park Dr
Austin, TX 78704-4615

Sep 12, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Dr. Gloria Gannaway

Mr. Blaine Burris
4707 Gillis St
Austin, TX 78745-1813
(512) 796-5213

Sep 12, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
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Ms. Emily Northrop
124 Finch Ln
Georgetown, TX 78626-7383

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P.O. Box 220
Austin, TX 78767

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Sincerely,
Ms. Emily Northrop

Mr. Larry Sunderland
1507 Summit St
Austin, TX 78741-2519
(512) 426-0871

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Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Mr. Donald Matthews
17221 Tobermory Dr
Pflugerville, TX 78660-1726
(512) 552-2491

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P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Donald Matthews

Ms. Dana Kuykendall
4311 Sinclair Ave
Austin, TX 78756-3218

Sep 12, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Ms. Dana Kuykendall

Mr. SETH WINKELMANN
5511 Belmont Ave
Dallas, TX 75206-6723

Sep 12, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. SETH WINKELMANN

Mrs. Ayn Massa
513 Konstanty Cir
West Lake Hills, TX 78746-6435

Sep 12, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Mrs. Ayn Massa

Mrs. Mary Alexander
6503 Bluff Springs Rd
Austin, TX 78744-4272

Sep 12, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

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Sincerely,
Mrs. Mary Alexander

Mr. Roger Duck
1311 Exposition Blvd
Apt 8
Austin, TX 78703-3623

Sep 12, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mr. Roger Duck

Ms. Kathleen Jaissle
12342 Hunters Chase Dr
Apt 2511
Austin, TX 78729-7209

Sep 12, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. Kathleen Jaissle

Mr. Bruce Long
PO Box 92814
Austin, TX 78709-2814
(512) 243-5462

Sep 12, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mr. Bruce Long

Ms. Anne Ruthstrom
757a Oakdale Dr
Sunset Valley, TX 78745-4643

Sep 12, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. Anne Ruthstrom

Dr. R. E. Wyllys
1306 Belmont Pkwy
Austin, TX 78703-1416

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P.O. Box 220
Austin, TX 78767

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Dr. R. E. Wyllys

Mr. Grover Shade
8427 W Old Lockhart Rd
Muldoon, TX 78949-5003

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P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Grover Shade

Mrs. Marlene Beldin
2300 Waterway Bnd
Austin, TX 78728-4508

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Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mrs. Marlene Beldin

Ms. Jeanette Winfield
120 Bar L Mesa Dr
Cedar Creek, TX 78612-3137

Sep 12, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Ms. Jeanette Winfield

Mr. Al Giles
8503 Forest Heights Ln
Austin, TX 78749-3511
(512) 891-9803

Sep 12, 2015

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P.O. Box 220
Austin, TX 78767

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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Mr. Al Giles

Mrs. Marie Blazek
1100 Water
Bastrop, TX 78602

Sep 13, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

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Sincerely,
Mrs. Marie Blazek

Ms. LaNaye Geiser
406 Country Ln
Mcdade, TX 78650-5068
(512) 417-0272

Sep 13, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. LaNaye Geiser

Dr. Jamie Gwynn
2304 Dovetail St
Pflugerville, TX 78660-6521

Sep 13, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Dr. Jamie Gwynn

Mrs. Mamie Bondy
4300 Painted Pony Cv
Austin, TX 78735-6368

Sep 13, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Mrs. Mamie Bondy

Ms. C Wolfe
1202 Marcy St
Austin, TX 78745-1031

Sep 13, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Ms. C Wolfe

Mrs. Marguerite Foster
251 Forest Lake Dr
Del Valle, TX 78617-5644

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P.O. Box 220
Austin, TX 78767

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Mrs. Marguerite Foster

Ms. Katie Walsh
8109 Appomattox Dr
Austin, TX 78745-6903

Sep 13, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Ms. Katie Walsh

Mr. Abraham Clabby
5116 Jacobs Creek Ct
Austin, TX 78749-2214
(858) 405-9636

Sep 13, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Abraham Clabby

Miss Michelle McClendon
8425 Seminary Ridge Dr
Austin, TX 78745-7537

Sep 13, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Miss Michelle McClendon

Mr. Jesus Pantel
401 Little Texas Ln Apt 1625
Austin, TX 78745-4137

Sep 13, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Jesus Pantel

Mrs. Debra Robertson
3409 Shady Valley Dr
Austin, TX 78748-1890
(512) 731-6576

Sep 13, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Mrs. Debra Robertson

Mr. Dale Clark
706 Sparks Ave
Austin, TX 78705-3103
(512) 472-6148

Sep 13, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

I commend the Region K Water Planning Group for the tremendous effort that has gone into the development of the draft 2016 regional water plan and I appreciate your dedication to meeting the water needs of our area for decades to come and your attention to sustainable strategies such as water conservation and drought response. I offer the following comments regarding improvements to the draft 2016 Region K plan:

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Sincerely,
Mr. Dale Clark

Miss Alison Bittick
5133 Avery Ct
The Colony, TX 75056-2334
(972) 955-3732

Sep 14, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Miss Alison Bittick

Mrs. Janet Petermann
1312W 40St
Austin, TX 787563615

Sep 14, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

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Sincerely,
Mrs. Janet Petermann

Ms. Margaret Schulenberg
300 Pecan Ln
Round Rock, TX 78664-4529

Sep 14, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. Margaret Schulenberg

Ms. Alexis Dekle
1813 Crown Dr
Austin, TX 78745-1791

Sep 14, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Sincerely,
Ms. Alexis Dekle

Mrs. Lauren Stark
2908 Wadsworth Way
Austin, TX 78748-1231

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Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mrs. Lauren Stark

Ms. Karin Ascot
405 Academy Dr
Austin, TX 78704-1812

Sep 14, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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Ms. Karin Ascot

Mr. Dick Kallerman
2510 Cedarview Dr
Austin, TX 78704-3802
(512) 444-1326

Sep 14, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Mr. Dick Kallerman

Ms. Annie Kellough
12303 Blue Water Dr
Austin, TX 78758-2802
(512) 810-2418

Sep 14, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Ms. Annie Kellough

Ms. Erin Cozart
5009 McDade Dr
Austin, TX 78735-6395

Sep 14, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

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Sincerely,
Ms. Erin Cozart

Mrs. Marylee Hicks
2311 Lakehurst Dr
Austin, TX 78744-5033

Sep 15, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

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I commend the Region K Water Planning Group for the tremendous effort that has gone into the development of the draft 2016 regional water plan and I appreciate your dedication to meeting the water needs of our area for decades to come and your attention to sustainable strategies such as water conservation and drought response. I offer the following comments regarding improvements to the draft 2016 Region K plan:

(1) The draft Region K Plan proposes a variety of new projects. These projects are in excess of the water needs that have been calculated for the Region K area by the planning group. Projects such as the four proposed off-channel reservoirs along the lower Colorado River, have the potential to create unnecessary and excessive environmental and financial costs and could end up being a disincentive for water conservation. The Region K plan should include water projects that help meet the projected water shortages in the region, however the plan should not include strategies in excess of the water needs. Regional water plans are updated every five years. There is a straight-forward amendment process in case water provider plans change and there are mechanisms in the planning process to include additional water projects as alternate rather than recommended strategies. Region K should use these tools to create a plan that reflects the water projects that are truly needed to meet future demand.

(2) Water conservation is a big part of the Region K plan but I am disappointed to see that the recommendations in the plan are not as strong they were in the previous plan. With a growing population and intense droughts we need to do more on conservation, not less. The current plan recommends that water suppliers with a per capita usage of over 200 gallons reduce their water use by 10% per decade and that water suppliers with a per capita usage of between 140 and 200 gallons reduce their water use 5% per decade. I recommend that Region K use the water conservation strategy from the 2012 Region K plan. That plan recommends that all water suppliers with a GPCD of more than 140 reduce their water use by 10% per decade. This is in line with state recommendations and many cities across Texas, including Austin, have shown that this is feasible.

(3) The Colorado River and Matagorda Bay are rich ecological habitats that require water and nutrients to allow the fish and wildlife that call these areas home to survive and thrive. To create a truly comprehensive water plan, the Region K planners must find a way to account for and plan for the water that will be needed to maintain the environmental flows that are the natural heritage of this region. The Colorado River and its tributaries connect all the communities in Region K and are an essential part of our fabric. Without healthy rivers and streams the region is unhealthy. As this region continues to grow and water demands increase this is even more urgent. Please find a way to address this hole in the planning process.

I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Mrs. Marylee Hicks

Mr. Will Branch
2309 Trafalgar Dr
Austin, TX 78723-4001

Sep 15, 2015

Stacy Pandey
P.O. Box 220
Austin, TX 78767

Subject: RE: Comments on the 2016 Region K Initially Prepared Plan (IPP)

Dear Stacy Pandey,

I commend the Region K Water Planning Group for the tremendous effort that has gone into the development of the draft 2016 regional water plan and I appreciate your dedication to meeting the water needs of our area for decades to come and your attention to sustainable strategies such as water conservation and drought response. I offer the following comments regarding improvements to the draft 2016 Region K plan:

(1) The draft Region K Plan proposes a variety of new projects. These projects are in excess of the water needs that have been calculated for the Region K area by the planning group. Projects such as the four proposed off-channel reservoirs along the lower Colorado River, have the potential to create unnecessary and excessive environmental and financial costs and could end up being a disincentive for water conservation. The Region K plan should include water projects that help meet the projected water shortages in the region, however the plan should not include strategies in excess of the water needs. Regional water plans are updated every five years. There is a straight-forward amendment process in case water provider plans change and there are mechanisms in the planning process to include additional water projects as alternate rather than recommended strategies. Region K should use these tools to create a plan that reflects the water projects that are truly needed to meet future demand.

(2) Water conservation is a big part of the Region K plan but I am disappointed to see that the recommendations in the plan are not as strong they were in the previous plan. With a growing population and intense droughts we need to do more on conservation, not less. The current plan recommends that water suppliers with a per capita usage of over 200 gallons reduce their water use by 10% per decade and that water suppliers with a per capita usage of between 140 and 200 gallons reduce their water use 5% per decade. I recommend that Region K use the water conservation strategy from the 2012 Region K plan. That plan recommends that all water suppliers with a GPCD of more than 140 reduce their water use by 10% per decade. This is in line with state recommendations and many cities across Texas, including Austin, have shown that this is feasible.

(3) The Colorado River and Matagorda Bay are rich ecological habitats that require water and nutrients to allow the fish and wildlife that call these areas home to survive and thrive. To create a truly comprehensive water plan, the Region K planners must find a way to account for and plan for the water that will be needed to maintain the environmental flows that are the natural heritage of this region. The Colorado River and its tributaries connect all the communities in Region K and are an essential part of our fabric. Without healthy rivers and streams the region is unhealthy. As this region continues to grow and water demands increase this is even more urgent. Please find a way to address this hole in the planning process.

I believe that these changes in the plan would provide a more certain path to using our region's water resources more efficiently and economically. Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,
Mr. Will Branch

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ATTACHMENT K

National Wildlife Federation and NWF Member Comments

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September 15, 2015

Mr. John Burke, Chairman
Lower Colorado Regional Water Planning Group
496 Shiloh Road
Bastrop, Texas 78602

Re: Review of the 2016 Region K Initially Prepared Plan

Dear Mr. Burke,

Thank you for the opportunity to review and provide comments on the Region K Initially Prepared Plan (IPP). The Region K Water Planning Group is to be commended for the effort that has gone into the development of the 2016 IPP. We appreciate the group's dedication to meeting the region's water needs for decades to come and attention to sustainable water management strategies such as water conservation and drought management. Planning for and appropriately managing water resources is everyone's concern and we acknowledge the time, energy, and expertise that have gone into the development of this IPP.

We offer the following comments on the IPP:

Water Management Strategies are in Excess of "Needs" (Overplanning)

It is the Sierra Club and National Wildlife Federation's position that water management strategies included in the state's 16 regional water plans should closely align with the "needs" or "water shortages" identified through the regional water planning process. Region K has recommended water management strategies far in excess of the needs identified in the IPP.

A review of recommended water management strategies (WMS) compared to projected needs reveals that recommended WMS are almost double what the needs or projected water shortages are by the year 2070. We acknowledge that there are caveats to these numbers. The planning group should examine this issue, identify specifically where the overplanning is occurring and determine which strategies are most appropriate to meet the stated needs. We recommend that Region K recommend a suite of WMS that are in line with the actual "needs".

Region K Needs Compared to Recommended WMS in 2016 IPP						
	2020	2030	2040	2050	2060	2070
Total Region K WUG Needs (afy)	377,511	391,892	397,366	410,210	460,228	523,205
Total Recommended Region K WMS (afy)	623,523	711,684	770,623	858,724	920,071	999,580

Recommending water management strategies in excess of needs leads to inflated cost estimates and ties up supplies that may be needed elsewhere. In addition, these excess WMS may have substantial environmental, social and economic consequences if implemented. Planning to use more water from aquifers and rivers than is needed to meet human water supply needs is potentially detrimental to the region's ecosystems and makes the planning process more like a list compilation exercise than a true planning exercise.

The regional water planning process is adaptable. There are several mechanisms available to water providers to ensure flexibility in water supply approaches. They include a five-year planning cycle to address new information, a straightforward amendment process to quickly deal with changed or emergency conditions, and a mechanism to identify potential water projects as alternate rather than recommended strategies. Region K should use these tools to create a plan that more accurately reflects the water management strategies that are truly needed to meet future water demands.

In future planning cycles, we recommend that the planning group have a discussion about how to approach this issue and develop a timeline that allows the consultants and planning group members sufficient time to deliberate whether the inclusion of each WMS is appropriate. This includes evaluating impacts of WMS, including whether the strategies are consistent with the long-term protection of the state's water resources, agricultural resources and natural resources per 31 TAC § 357.35 (b)(c).

Water Conservation

The Sierra Club and National Wildlife Federation appreciate Region K's careful consideration of water conservation as a water management strategy. However, the recommendation should be stronger.

As shown in the table below, the 2016 IPP recommends Water User Groups (WUG) apply water conservation as a WMS to reduce their GPCD by 10% per decade for entities with a 200+ GPCD and recommends a 5% reduction in GPCD per decade for entities with a GPCD greater than 140.

Region K 2016 IPP – Water Conservation Recommendations		
	% reduction per year	% reduction per decade
>200 GPCD	1%	10%
>140 GPCD	.5%	5%

However, as you can see from the table below, the adopted 2012 Region K plan had a stronger water conservation recommendation. The recommendation from the previous plan is in line with state recommendations that all water users with a GPCD above 140 should reduce water use by at least 1% per year until they reach 140 GPCD.

Region K Adopted 2012 Regional Water Plan Water Conservation Recommendations		
	% reduction per year	% reduction per decade
All WUGs with GPCD above 140	1%	10%
WUGs with a need and GPCD 100 - 140	.25%	2.5%

With a growing population and intense droughts putting pressure on our water supplies we need to do more on conservation, not less. Water conservation is a cost effective and environmentally friendly way to stretch existing water supplies to meet growing demands. We recommend that Region K consider adopting water conservation recommendations consistent with recommendations from the last planning cycle.

It is important to note that the savings do not have to stop once 140 GPCD is reached. Cities such as San Antonio and Austin have reduced their water use below 140 GPCD and are still working to achieve additional savings. Please consider the success of the existing programs and the ability to maximize water savings through advanced conservation strategies.

Drought Management

The Region K IPP includes a robust recommendation to employ drought management as a water management strategy. The Sierra Club and National Wildlife Federation support this recommendation and commend the water planning group on including this proactive water supply strategy. Central Texans have shown that they are capable of responding to dry conditions by reducing their water use in a big way. This protects and significantly prolongs our water supply during drought, which allows communities to avoid costly water supply projects that may only occasionally be needed. Inclusion of this strategy acknowledges previous success and helps communities take this strategy seriously.

We support the planning group's recommendation that water suppliers consider coordinating drought stage information among users of the same source of water. We believe this will enhance public knowledge of and improve participation, which leads to successful implementation of drought measures.

We also support the planning group's recommendation that water suppliers begin education efforts prior to reaching drought stage levels.

Environmental Impacts of WMS

The Sierra Club and National Wildlife Federation are concerned that the environmental impacts of some of the WMS in the Region K plan are understated and that the Region K's impact analysis masks some of the potential environmental impacts of water management strategies. We acknowledge that such an impacts evaluation can be complicated. Using WAM Run3 as the starting point for evaluations masks many real world impacts. However, many of the proposed strategies WILL have an impact on the quantity and timing of environmental flows as compared to current conditions. Those impacts should be acknowledged in a quantified manner where possible.

Shifting water use from agriculture to municipal and steam electric, increased reliance on direct and indirect reuse, full use of water rights and new downstream surface water storage have the potential to significantly alter the quantity and timing of instream flows in the Colorado River and freshwater inflows to Matagorda Bay, thus impacting fish and wildlife populations. Region K members should do all they can to understand and address this issue.

The IPP states that several of the WMS have the potential to reduce instream flows. We are concerned about the cumulative impacts of these strategies since reduced instream flows are listed as a potential impact for numerous strategies. The RWPG should consider examining the cumulative impacts of WMS and at least provide some kind of analysis of the potential impacts in Chapter 5.

Unique Stream Segments

The Region K IPP does not include any recommendations for designation of ecologically unique stream segments. Work has previously been done to identify these segments and provide relevant information per 31 TAC § 357.8. This information has historically been included in the Region K plan and it is our understanding that these were inadvertently left out and will be added back into the final plan. Please ensure that information on ecologically unique stream segments is added back into the Region K plan prior to final submittal.

Creating a Regional Water Plan that Includes all Needs

The failure of regional water planning groups to address environmental water needs is an issue in all 16 regional water planning groups and in the planning approach put forth by the Texas Water Development Board. While it is understood that environmental water needs will not be included as a water need in the 2016 IPP, Region K should consider including this important user group in the development of the 2021 regional water plan. To be comprehensive, a water plan must include all water needs. We appreciate the policy statements in Chapter 8 that support this concept. The Region K plan should do what it can to ensure that water is available to meet the needs of fish and wildlife. If the Colorado River, its creeks and tributaries and Matagorda Bay are not healthy and productive, this region will not be healthy and productive.

Thank you for the opportunity to submit comments on the Region K IPP. We commend the planning group for their thoughtful consideration of the water supply challenges and solutions in the region. Much of the success of Region K is due to the ability of the members to work together as a group and in subcommittees to understand and vet the issues under consideration as part of the planning process.

Thank you for your consideration of these comments. Please feel free to contact me if you have any questions.

Sincerely,

Jennifer Walker
Water Resources Coordinator
Sierra Club, Lone Star Chapter
512-477-1729
jennifer.walker@sierraclub.org

Myron Hess
Manager, Texas Water Program/Counsel
National Wildlife Federation
512-610-7754
mhess@nwf.org

Cc: Jaime Burke, AECOM
Stacy Pandey, LCRA

Dr. Eric Mallin
3106 White Rock Dr
Austin, TX 78757-4450

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

The draft Lower Colorado Regional Water Plan (Region K) fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Dr. Eric Mallin

Ms. Barbara Keir
11909 Arabian Trl
Austin, TX 78759-2403

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future. Humans do not exist independently of nature and wildlife -- we are an integral part of the ecosystem, and because of this we must take the needs of the entire ecosystem into consideration when planning for water usage -- not just the needs of humans.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Ms. Barbara Keir

Ms. Yvonne Hansen
6206 Hillston Dr
Austin, TX 78745-4351

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my deepest concerns about the sad short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

We each live in an ecosystem where every species - even us - count and the habitat counts as well. Any action taken within an ecosystem effects every element of that ecosystem to some degree, even to a species demise.

Do your job. Think systemically, as in ecosystem. You know, like 'operations have effects' and 'there's no such thing as a free lunch''.

Sincerely,
Ms. Yvonne Hansen

Ms. Beverly Petty
154 Travis Rd
Paige, TX 78659-4839

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan. The water belongs to us all so don't jeopardize our needs or the needs of fish and wildlife.

Sincerely,
Ms. Beverly Petty

Mr. Will Trippet
708 W 15th St
Georgetown, TX 78626-6676

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

More than anything else its already bad enough that the water is contaminated with untraced pharmaceutical metabolites creating mutations.   Please give wildlife some kind of tiny break or we'll all die if the biosphere achieves critical mass.

Sincerely,
Mr. Will Trippet

Mr. Gary Cook
709 Baylor St Apt C
Austin, TX 78703-4944

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.
rth

Sincerely,
Mr. Gary Cook

Mrs. Leslie Valentine
2105 N Oak Canyon Rd
Austin, TX 78746-2308

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

As a long-time native Texan, I am writing to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

My friends and family have a Iong tradition of hunting, fishing and bird-watching. Without adequate water flows in rivers, we will lose our unique Texas heritage of spectacular nature and wildlife. I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mrs. Leslie Valentine

Mr. Jerell Lambert
2617 Crownspoint Dr
Austin, TX 78748-5122

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects. These projects are part of an unwanted and uneeded attempt to bring massive urban sprawl to the region, the result being as always the enrichment of the few at the expense of everyone else including wildlife.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mr. Jerell Lambert

Ms. Cathy Ramsey
131 Barton Ranch Rd
Dripping Springs, TX 78620-3763

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

As paddlers, my family and I receive great joy from our Texas rivers, and care deeply about their heath and vitality. Adequate base flow to ensure their continuing beauty and functionality must be part of any plan made to serve the public.

With this in mind, I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Ms. Cathy Ramsey

Mr. Dave and Rita Cross
116 Schooner Dr
Lakeway, TX 78738-1003

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

We write to voice our concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future!

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects. Incredible!

We care deeply about the future of this region's natural heritage. We urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan!

We thank you kindly!

Sincerely,
Mr. Dave and Rita Cross

Mrs. Brenda J Gitter
6310 Ledge Mountain Dr
Austin, TX 78731-3741

Sep 12, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

As a resident of Austin and noticing how my neighbors waste precious water, cities can do a better job.   We must protect wildlife and agriculture while cities should better utilize their water resources.
If you could only see the water running down my street every morning from homes watering their lawns regardless what day of the week...

Sincerely,
Mrs. Brenda J Gitter

Ms. Marisa Morales
16807 Black Kettle Dr
Leander, TX 78641-3300

Sep 14, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Marisa Morales
Leander TX 78641

Sincerely,
Ms. Marisa Morales

Ms. Sue Schwaller
502 E 12th St
Houston, TX 77008-7008

Sep 14, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

Fresh water inflows are vital to fish and wildlife all along the gulf coast. It is important to me that water plans be written carefully and thoughtfully to care for humans and the wildlife. I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Ms. Sue Schwaller

Mr. Raul Bustillo
3909 Aggie Dr
Bay City, TX 77414-4613

Sep 14, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.
Four reservoirs are not the answer for Matagorda County future water needs. We are looking at importing food in the near future if reservoirs are a reality for Matagorda County. Same as Mexico does imports food. Can' feed its people. Visit Israel if want to know about water needs its a desert country.

Sincerely,
Mr. Raul Bustillo

Dr. Emily Seldomridge
4300 Bay Area Blvd
Apt 3834
Houston, TX 77058-1146

Sep 14, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

Although Matagorda Bay is resilient, it may potentially be on the verge of peril because of future decreased freshwater inflows with increased projected population, commerce, and industry. Protecting vital freshwater inflows to Matagorda Bay, as well as protecting instream flows in its tributaries, is key to the continued health and productivity of Matagorda Bay. These inflows help produce a normal range of salinities in the bay and provide inputs of beneficial nutrients and sediments. Excess projects and strategies create disincentives for water conservation and cause unnecessary environmental, financial, and social costs.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Dr. Emily Seldomridge

Mrs. Brigid Berger
206 Birdsall St
Houston, TX 77007-8108

Sep 14, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Brigid Berger
206 Birdsall
Houston, Texas 77007

Sincerely,
Mrs. Brigid Berger

Ms. Pauline Parker
900 Chicon St
Austin, TX 78702-2753

Sep 14, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.
900 Chicon Street
Austin, TX 78702

Sincerely,
Ms. Pauline Parker

Mr. Jeffrey Bean
2515 Riverlawn Dr
Kingwood, TX 77339-2435

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

We must be mindful as we plan for the future that maintaining our region's natural habitat and beauty are what will make living here worthwhile.

Sincerely,
Mr. Jeffrey Bean

Mr. Ernest Henslee
2522 Woodbury Dr
San Antonio, TX 78217-5731

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Please correct this plan to allow water needs for wildlife and fish.

Sincerely,
Ernest Henslee
2522 Woodbury Drive
San Antonio, Texas 78217-5731
(Cell) 210-792-2089

Sincerely,
Mr. Ernest Henslee

Ms. Johanna Arendt
601 Nelray Blvd
Austin, TX 78751-1045

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Ms. Johanna Arendt

Ms. Beverly Walker
1602 Teepee Trl
Kingsland, TX 78639-9574

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

The plan must be improved.

I agree with any actions preventing more assaults on the planet and wish to encourage long-term thinking over greed, industrial pollution, and "progress" which devolves into tax-payers trying to clean up capitalists' messes.

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Ms. Beverly Walker

Ms. Jane Tillman
7509 Parkview Cir
Austin, TX 78731-1125

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future. Our quality of life depends on a healthy functioning ecosystem which includes fish and wildlife such as the endangered Whooping Crane.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Ms. Jane Tillman

Dr. Thomas La Point
1900 Highland Park Cir
Denton, TX 76205-6932

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I am deeply concerned about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Dr. Thomas La Point

Mr. James Cravens
PO Box 1005
Refugio, TX 78377-1005

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

This is to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). I urge you to consider the long range implications for all parties. We need a comprehensive plan that considers ALL needs if we are to have sustainable groundwater, flowing rivers, healthy bays, and fish and wildlife in our children's future.

Instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan. Please look at the situation through long range eyes that can see beyond ten or fifteen years.

Thank you for your consideration,

Sincerely,
Mr. James Cravens

Mrs. D Dziak
15204 Mandarin Xing
Pflugerville, TX 78660-3052

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mrs. D Dziak

Miss Liz Dean
330 Heart Springs Rd
Dripping Springs, TX 78620-2432

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Miss Liz Dean

Mrs. Amanda Fuller
2408 Kapalua Pl
Pflugerville, TX 78660-7949

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mrs. Amanda Fuller

Mr. Austin Neal
1106 Northwestern Ave
Austin, TX 78702-2861

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mr. Austin Neal

Mrs. Lilia Valdez
11316 Jollyville Rd
Austin, TX 78759-5941

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mrs. Lilia Valdez

Mr. Alan Holt
PO Box 2183
Manchaca, TX 78652-2183

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mr. Alan Holt

Mrs. Mary Khan
11901 Tedford St
Austin, TX 78753-2131

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mrs. Mary Khan

Mr. Frank Patterson
8602 Karling Dr
Austin, TX 78724-1802

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mr. Frank Patterson

Mr. Christopher Dowling
4009 Highland Dr
Austin, TX 78734-2054

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mr. Christopher Dowling

Mr. Christopher Phillips
2913 Hunter Rd Apt 1113
San Marcos, TX 78666-6458

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mr. Christopher Phillips

Mrs. Heather Miller
4805 Enchanted Ln
Austin, TX 78745-1712

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mrs. Heather Miller

Dr. Susan Deans-Smith
13800 Pecan Holw
Leander, TX 78641-7624

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Dr. Susan Deans-Smith

Mrs. Sharon Bramblett
4612 Duval St
Austin, TX 78751-3206

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mrs. Sharon Bramblett

Ms. Gina Obrien
202 Jennifer Ln
Bastrop, TX 78602-6656

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Ms. Gina Obrien

Ms. Dee Dunseith
2501 Louis Henna Blvd
Round Rock, TX 78664-5740

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Ms. Dee Dunseith

Mr. Terry Owings
1911 Mockingbird Ln
Leander, TX 78641-2206

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mr. Terry Owings

Mr. Matt Morgan
715 Windsong Trl
West Lake Hills, TX 78746-3539

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mr. Matt Morgan

Ms. Kara Canipe
1502 Chippeway Ln
Austin, TX 78745-3721

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Ms. Kara Canipe

Mr. Mark Aflatooni
PO Box 28143
Austin, TX 78755-8143

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mr. Mark Aflatooni

Ms. Rainbow Di Benedetto
7708 Waldon Dr
Austin, TX 78750-8264

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Ms. Rainbow Di Benedetto

Mr. Thomas W. Cranston
114 Long Hollow Rd
Elgin, TX 78621-5525

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mr. Thomas W. Cranston

Mr. Brook Heimbaugh
11202 Alhambra Dr
Austin, TX 78759-5001

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mr. Brook Heimbaugh

Ms. Irene Martinez
17604 Klamath Falls Dr
Round Rock, TX 78681-3521

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Ms. Irene Martinez

Ms. Crystal Mitchell
309 Misty Wood
Bertram, TX 78605-3776

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Ms. Crystal Mitchell

Mr. Glenn Schuetz
1400b Cinnamon Path
B
Austin, TX 78704-4869

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mr. Glenn Schuetz

Ms. Sheila Chaffins
109 Seneca Dr
Burnet, TX 78611-5969

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Dear Lower Colorado Regional Water Planning Grp,

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Sincerely,
Ms. Sheila Chaffins

Dr. Steven Riley
17309 Montana Falls Dr
Round Rock, TX 78681-3581

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Dr. Steven Riley

Ms. Chantal Eldridge
6526 Needham Ln
Austin, TX 78739-1512

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Ms. Chantal Eldridge

Mr. Steve Kuehner
1811 Morrow St
Austin, TX 78757-1233

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mr. Steve Kuehner

Mrs. Ingrid Ableidinger
313
Austin, TX 78732

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mrs. Ingrid Ableidinger

Mrs. Tanya Kasper
971 Taylor Ranch Rd
Wimberley, TX 78676-4133

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mrs. Tanya Kasper

Dr. John Lemaux
1404 E 13th St
Austin, TX 78702-1128

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Dr. John Lemaux

Mr. Steve Sivley
3116 Wheeler St
Austin, TX 78705-2816

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mr. Steve Sivley

Dr. Gloria Gannaway
3002 Oak Park Dr
Austin, TX 78704-4615

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Dr. Gloria Gannaway

Mrs. Jeannie Smothers
108 S Olive St
Fredericksburg, TX 78624-4736

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mrs. Jeannie Smothers

Ms. melanie rushing
.
., TX 78636

Sep 11, 2015

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Sincerely,
Ms. melanie rushing

Mr. Wade Russell
107 Bob Estes Cv
Round Rock, TX 78664-4028

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mr. Wade Russell

Mrs. Lindsey Caudill
8518 Ganttcrest Dr
Austin, TX 78749-3516

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
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Sincerely,
Mrs. Lindsey Caudill

Mr. Gregory Berry
903 Park Village Cv
Austin, TX 78758-5812

Sep 11, 2015

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TX

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Sincerely,
Mr. Gregory Berry

Mrs. Marlene Beldin
2300 Waterway Bnd
Austin, TX 78728-4508

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mrs. Marlene Beldin

Mrs. Frances Weller
19012 Double Canyon Dr
Jonestown, TX 78645-9655

Sep 11, 2015

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Sincerely,
Mrs. Frances Weller

Ms. Elizabeth Miller
2500 Louis Henna Blvd Apt 3301
Round Rock, TX 78664-5776

Sep 11, 2015

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Sincerely,
Ms. Elizabeth Miller

Mr. Michael McCurdy
321 Saddleback Rd
Austin, TX 78737-4570

Sep 11, 2015

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Sincerely,
Mr. Michael McCurdy

Ms. Claire McKay
1417 Dwyce Dr
Austin, TX 78757-2515

Sep 11, 2015

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Sincerely,
Ms. Claire McKay

Mrs. Glory Arroyos
3100 Garden Villa Ln
Austin, TX 78704-6105

Sep 11, 2015

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Sincerely,
Mrs. Glory Arroyos

Ms. Kathleen Robertson
6317 Zadock Woods Dr
Austin, TX 78749-2609

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Sincerely,
Ms. Kathleen Robertson

Mr. Nick Bohmann
211 Oakleaf Dr
Sunrise Beach, TX 78643-9206

Sep 11, 2015

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Sincerely,
Mr. Nick Bohmann

Ms. Carol Fly
2205 Broughton Ct
Austin, TX 78727-3143

Sep 11, 2015

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Sincerely,
Ms. Carol Fly

Ms. Eren Giles
3302 Rosefinch Trl
Austin, TX 78746-6640

Sep 11, 2015

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Sincerely,
Ms. Eren Giles

Mrs. jennifer anderson
1611 Alta Vista Ave
Austin, TX 78704-3111

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Sincerely,
Mrs. jennifer anderson

Mrs. Julita Zaborovsky
7006 Windridge Cv
Austin, TX 78759-7007

Sep 11, 2015

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Sincerely,
Mrs. Julita Zaborovsky

Ms. Jane Jatinen
307 N Cuernavaca Dr
Apt F
Austin, TX 78733-3244

Sep 11, 2015

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Sincerely,
Ms. Jane Jatinen

Mr. James D Johnson
5903 Bull Creek Rd
Austin, TX 78757-3101

Sep 11, 2015

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Sincerely,
Mr. James D Johnson

Mrs. Claire Bush
1124 Clayton Ln
Apt L
Austin, TX 78723-1012

Sep 11, 2015

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Sincerely,
Mrs. Claire Bush

Ms. Stacey Mead
2104 E Anderson Ln
Apt 1813
Austin, TX 78752-1962

Sep 11, 2015

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Sincerely,
Ms. Stacey Mead

Ms. Iris Haro
258 Engineers Pass
Jarrell, TX 76537-1695

Sep 11, 2015

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Sincerely,
Ms. Iris Haro

Ms. Janine Child
1118 Reagan Ter
Austin, TX 78704-2637

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Sincerely,
Ms. Janine Child

Ms. Nancy Harris
7501 Aspen Brook Dr
Austin, TX 78744-1759

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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Sincerely,
Ms. Nancy Harris

Ms. Jeanne Devine
10809 Desert Willow Loop
Austin, TX 78748-4027

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Ms. Jeanne Devine

Mr. Jim Hill
PO Box 162602
Austin, TX 78716-2602

Sep 11, 2015

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TX

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Sincerely,
Mr. Jim Hill

Mrs. Maryellen Sherrod
201 Hunters Crossing Blvd
Bastrop, TX 78602-3972

Sep 11, 2015

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TX

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Sincerely,
Mrs. Maryellen Sherrod

Miss Louisa Morris
7 Concord Cir
Austin, TX 78737-9072

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Dear Lower Colorado Regional Water Planning Grp,

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Sincerely,
Miss Louisa Morris

Ms. Bonnie Lynn MacKinnon
1603 S Elm St
Georgetown, TX 78626-6930

Sep 11, 2015

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TX

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Sincerely,
Ms. Bonnie Lynn MacKinnon

Mrs. Lorelei O'Malley
12 Sonata Cir
Wimberley, TX 78676-2011

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mrs. Lorelei O'Malley

Mrs. Holly Smothers
2303 W Riviera Dr
Cedar Park, TX 78613-4605

Sep 11, 2015

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Sincerely,
Mrs. Holly Smothers

Ms. Zulma Gregory
7905 San Felipe Blvd Apt 116
Austin, TX 78729-7638

Sep 11, 2015

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Sincerely,
Ms. Zulma Gregory

Mr. ART IGLESIAS
PO Box 1247
Johnson City, TX 78636-1247

Sep 11, 2015

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Sincerely,
Mr. ART IGLESIAS

Ms. Peggy Krainman
1801 Warner Ranch Rd Apt 315
Round Rock, TX 78664-7266

Sep 11, 2015

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TX

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Sincerely,
Ms. Peggy Krainman

Mr. JAMES BENNING
182 Turner Ln
Paige, TX 78659-4290

Sep 11, 2015

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TX

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Dear Lower Colorado Regional Water Planning Grp,

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Sincerely,
Mr. JAMES BENNING

Ms. Lacey McCormick
1500 Northridge Dr
Austin, TX 78723-2522

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Ms. Lacey McCormick

Mrs. Sarah Larocca
3204 Whites Dr
Austin, TX 78735-6929

Sep 11, 2015

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Sincerely,
Mrs. Sarah Larocca

Mr. Theodore Brazeau
550 Hillview Cir
Dripping Springs, TX 78620-3373

Sep 11, 2015

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Sincerely,
Mr. Theodore Brazeau

Miss courtney murphy
708 W 15th St
Apt J3
Georgetown, TX 78626-6660

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Miss courtney murphy

Ms. Yolanda Torres
6517 Mitra Dr
Austin, TX 78739-1900

Sep 11, 2015

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Sincerely,
Ms. Yolanda Torres

Ms. Sally Jacques
4620 Banister Ln
Austin, TX 78745-1806

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Sincerely,
Ms. Sally Jacques

Mr. Will Foster
10708 Sycamore Hills Rd
Austin, TX 78717-4402

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Sincerely,
Mr. Will Foster

Ms. Alyssa Cummings
7611 Tisdale Dr
Austin, TX 78757-1440

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Sincerely,
Ms. Alyssa Cummings

Ms. Michelle Brinkman
7407 Brookhollow Dr
Austin, TX 78752-2106

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Sincerely,
Ms. Michelle Brinkman

Ms. Caroline Dawson
2300 Nueces St
Apt 222
Austin, TX 78705-5251

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Sincerely,
Ms. Caroline Dawson

Ms. Samantha Schou
106 Kokomo Ln
Bastrop, TX 78602-5904

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Sincerely,
Ms. Samantha Schou

Dr. Murray Lerner
3906 Becker Ave
Austin, TX 78751-5209

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Sincerely,
Dr. Murray Lerner

Miss Tiffanay Waller
811 Sonny Dr
Leander, TX 78641-2314

Sep 11, 2015

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TX

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Sincerely,
Miss Tiffanay Waller

Ms. Sarah Howe
2804 Los Alamos Ct
Round Rock, TX 78665-5675

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Sincerely,
Ms. Sarah Howe

Mr. William Stone
6308 Shoal Creek Blvd
Austin, TX 78757-2724

Sep 11, 2015

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Sincerely,
Mr. William Stone

Ms. Nell Clowder
14001 Trail Driver St
Austin, TX 78737-9522

Sep 11, 2015

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Sincerely,
Ms. Nell Clowder

Ms. Carol Adams
9504 Glenlake Dr
Austin, TX 78730-3340

Sep 11, 2015

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Sincerely,
Ms. Carol Adams

Ms. Leslie McCollom
507 Kingfisher Creek Dr
Austin, TX 78748-2423

Sep 11, 2015

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Sincerely,
Ms. Leslie McCollom

Ms. M. Susan Lewis
2811 Lariat Trl
Austin, TX 78734-2312

Sep 11, 2015

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Sincerely,
Ms. M. Susan Lewis

Mrs. Kathleen Clark
103 Sycamore Creek Dr
Dripping Springs, TX 78620-3324

Sep 11, 2015

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Sincerely,
Mrs. Kathleen Clark

Ms. Katie Applefield
1219 S Lamar Blvd
Austin, TX 78704-2305

Sep 11, 2015

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Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Ms. Katie Applefield

Mr. Robert Carpenter
5202 Brookdale Ln
Austin, TX 78723-4021

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Dear Lower Colorado Regional Water Planning Grp,

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Sincerely,
Mr. Robert Carpenter

Mr. Marc Lionetti
405 Battle Bend Blvd
Austin, TX 78745-2341

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mr. Marc Lionetti

Mr. Jose Augusto Lozano
606 Candleberry Cir
Pflugerville, TX 78660-4335

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mr. Jose Augusto Lozano

Dr. alan friedman
1908 Stamford Ln
Austin, TX 78703-2942

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Dr. alan friedman

Miss Flavia Zaltana
1421 W Wells Branch Pkwy
Pflugerville, TX 78660-3228

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Miss Flavia Zaltana

Dr. Amanda Harrison
1006 Ruth Ave
Austin, TX 78757-2614

Sep 11, 2015

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Sincerely,
Dr. Amanda Harrison

Mrs. Renee Arvin
22925 Moulin Dr
Briarcliff, TX 78669-2322

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mrs. Renee Arvin

Mrs. Betty Ferrero
308 Pecan Ln
Round Rock, TX 78664-4529

Sep 11, 2015

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Sincerely,
Mrs. Betty Ferrero

Mrs. Liz LaFour
4324 County Road 126
Van Vleck, TX 77482-6140

Sep 11, 2015

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Sincerely,
Mrs. Liz LaFour

Mrs. Simone Dail
1714 Samoa Ct
Pflugerville, TX 78660-8160

Sep 11, 2015

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Sincerely,
Mrs. Simone Dail

Ms. Julianne Compere
245Glenn View Drive
Blanco, TX 78696

Sep 11, 2015

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Sincerely,
Ms. Julianne Compere

Mr. James Flanagan
181 Mamalu Dr
Bastrop, TX 78602-6343

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Sincerely,
Mr. James Flanagan

Mr. Ken Box
1117 W 9th St
Austin, TX 78703-4925

Sep 11, 2015

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Sincerely,
Mr. Ken Box

Ms. Dorinda Scott
1809 Treadwell St
Austin, TX 78704-2147

Sep 11, 2015

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TX

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Sincerely,
Ms. Dorinda Scott

Ms. Dianne Midgette
3206 Dancy St
Austin, TX 78722-2219

Sep 11, 2015

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Sincerely,
Ms. Dianne Midgette

Mr. Michael Jones
313 Lone Oak Dr
Austin, TX 78704-5238

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Sincerely,
Mr. Michael Jones

Mr. Marco Medrani
3943 Lord Byron Cir
Round Rock, TX 78664-3933

Sep 11, 2015

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Sincerely,
Mr. Marco Medrani

Mrs. Donna Monroe
9229 Spicebrush Dr
Austin, TX 78759-7750

Sep 11, 2015

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Sincerely,
Mrs. Donna Monroe

Ms. Stephanie Aguilar
2005 Brushy Creek Rd
Round Rock, TX 78664-9400

Sep 11, 2015

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Sincerely,
Ms. Stephanie Aguilar

Dr. Danilo Udovicki
5101 Single Shot Cir
Austin, TX 78723-6147

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Sincerely,
Dr. Danilo Udovicki

Ms. Deborah Miller
5306 Abingdon Pl
Austin, TX 78723-3117

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Sincerely,
Ms. Deborah Miller

Mrs. Madeline Dowdy
16809 Cree Lake Ct
Leander, TX 78641-3310

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Sincerely,
Mrs. Madeline Dowdy

Ms. CLYDE-LINDA MATTHEWS
1506 S Interstate 35
Apt 1311
San Marcos, TX 78666-6047

Sep 11, 2015

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Sincerely,
Ms. CLYDE-LINDA MATTHEWS

Ms. Amanda McKnight
805 Nile St
Austin, TX 78702-2933

Sep 11, 2015

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Sincerely,
Ms. Amanda McKnight

Mr. Elliot Mason
7200 Easy Wind Dr Unit 3006
Austin, TX 78752-0002

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Sincerely,
Mr. Elliot Mason

Ms. Glenda Collins
7024 Kings Row Apt 3
Austin, TX 78746-5075

Sep 11, 2015

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Sincerely,
Ms. Glenda Collins

Ms. Anne Chenu
2614 Deerfoot Trl
Austin, TX 78704-2716

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Sincerely,
Ms. Anne Chenu

Mr. James Lowe
PO Box 978
Manor, TX 78653-0978

Sep 11, 2015

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Sincerely,
Mr. James Lowe

Mrs. Michelle Johnson
3809 Cypress Point Cv
Round Rock, TX 78664-4051

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Sincerely,
Mrs. Michelle Johnson

Ms. Judith Stueve
228 Pine Canyon Dr
Smithville, TX 78957-2278

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Sincerely,
Ms. Judith Stueve

Ms. olivia blond
4505 Duval St Apt 354
Austin, TX 78751-3231

Sep 11, 2015

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Sincerely,
Ms. olivia blond

Ms. Robbe Brunner
4509 Rosedale Ave
Austin, TX 78756-3027

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Ms. Robbe Brunner

Ms. LISA STEVENS
12032 Lincolnshire Dr
Austin, TX 78758-2213

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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Sincerely,
Ms. LISA STEVENS

Mrs. Merrie Tomlinson
8005 Caribou Parke Cv
Austin, TX 78726-4020

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mrs. Merrie Tomlinson

Miss Stephanie Kaplan
9218 Balcones Club Dr Apt 824
Austin, TX 78750-2751

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Miss Stephanie Kaplan

Ms. Brandy Fontenot
312 Wegstrom St
Hutto, TX 78634-3304

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
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Sincerely,
Ms. Brandy Fontenot

Mrs. Gin Hurst
3512 Greenway St
Austin, TX 78705-1818

Sep 11, 2015

Lower Colorado Regional Water Planning Grp
TX

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Dear Lower Colorado Regional Water Planning Grp,

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Sincerely,
Mrs. Gin Hurst

Mrs. Gelinda Schmidt
12305 Taylor Draper
Austin, TX 79759

Sep 11, 2015

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Sincerely,
Mrs. Gelinda Schmidt

Ms. Janet Delaney
5406 Western Hills Dr
Austin, TX 78731-4824

Sep 11, 2015

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Sincerely,
Ms. Janet Delaney

Mrs. Peggy Cope
2108 Zephyr Ln
Round Rock, TX 78664-7044

Sep 11, 2015

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Sincerely,
Mrs. Peggy Cope

Ms. Natalia Stadelbauer
7020 Colberg Ct
Austin, TX 78749-4184

Sep 11, 2015

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Sincerely,
Ms. Natalia Stadelbauer

Mr. Alex King
7211 Easy Wind Dr
Austin, TX 78752-2364

Sep 11, 2015

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Sincerely,
Mr. Alex King

Mr. Charles Dickey
2004 Zach Scott St
Austin, TX 78723-5399

Sep 11, 2015

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Sincerely,
Mr. Charles Dickey

Mr. Vince Mendieta
6005 Cherry Creek Dr
Austin, TX 78745-3421

Sep 12, 2015

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Sincerely,
Mr. Vince Mendieta

Ms. Lauren Glover
306 W 7th St
Taylor, TX 76574-3256

Sep 12, 2015

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Sincerely,
Ms. Lauren Glover

Mrs. Bennie Scott
300 Taylor St
Smithville, TX 78957-2527

Sep 12, 2015

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Sincerely,
Mrs. Bennie Scott

Mr. Alex Herrera
9420 Bradner Dr
Austin, TX 78748-5730

Sep 12, 2015

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Sincerely,
Mr. Alex Herrera

Ms. Kaiba White
1307 Barton Hills Dr
Austin, TX 78704-8816

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Sincerely,
Ms. Kaiba White

Ms. marcia torney
1114 Ascot St
Georgetown, TX 78626-7660

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Sincerely,
Ms. marcia torney

Mr. Mark Wilson
4311 Sinclair Ave
Austin, TX 78756-3218

Sep 12, 2015

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Sincerely,
Mr. Mark Wilson

Mr. Steven Rodriguez
1024 High Grove Rd
Cedar Creek, TX 78612-4861

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Sincerely,
Mr. Steven Rodriguez

Ms. Anne Burnham
43 Rainey St
Austin, TX 78701-4426

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Sincerely,
Ms. Anne Burnham

Ms. geraldine crapuche
22 rue andré chénier
wanda, TX 78960

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Sincerely,
Ms. geraldine crapuche

Ms. Della Fernandez
1304 Mariposa Dr
Austin, TX 78704-4400

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Sincerely,
Ms. Della Fernandez

Mr. Joe Rogers
PO Box 2509
Austin, TX 78768-2509

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Sincerely,
Mr. Joe Rogers

Mr. Ryan Matthews
4205 Speedway
Austin, TX 78751-3769

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Sincerely,
Mr. Ryan Matthews

Ms. Andrea Arsola
PO Box 691
Matagorda, TX 77457-0691

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Sincerely,
Ms. Andrea Arsola

Mrs. Arden Riordan
1039 Verbena Dr
Austin, TX 78750-1405

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Sincerely,
Mrs. Arden Riordan

Mr. Bryan Lowry
4019 Briones St
Austin, TX 78723-4040

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Sincerely,
Mr. Bryan Lowry

Ms. Nina Davis
122 Spellbrook Ln
Lakeway, TX 78734-4604

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Sincerely,
Ms. Nina Davis

Mr. naython williams
13003 Campos Dr
Austin, TX 78727-7043

Sep 12, 2015

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Sincerely,
Mr. naython williams

Ms. Lindsay Dofelmier
150 Sabine St
Apt 217
Houston, TX 77007-8357

Sep 12, 2015

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Sincerely,
Ms. Lindsay Dofelmier

Ms. Annette Spanhel
1081 Lonesome Trl
Driftwood, TX 78619-9751

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Sincerely,
Ms. Annette Spanhel

Dr. Heather Brandon
1508 Quail Crest Dr
Austin, TX 78758-5025

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Dr. Heather Brandon

Mrs. Mitzi Jones
3505 GreatbValley Dr.
Cedar Park, TX 78613

Sep 12, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mrs. Mitzi Jones

Ms. CHRISTINE TASHJIAN
10620 N Platt River Dr
Austin, TX 78748-2348

Sep 12, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Ms. CHRISTINE TASHJIAN

Ms. Donna Darling
9910 Lake Ridge Dr
Austin, TX 78733-3123

Sep 13, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

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Sincerely,
Ms. Donna Darling

Mrs. Vicki Davis
7610 Ingrid Dr
Elgin, TX 78621-5203

Sep 13, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mrs. Vicki Davis

Mrs. Nicole Artnak
10015 Lake Creek Pkwy Apt 526
Austin, TX 78729-1729

Sep 13, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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Sincerely,
Mrs. Nicole Artnak

Ms. Rebne Karchefsky
1102 Winecup Ct
Leander, TX 78641-8740

Sep 13, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Ms. Rebne Karchefsky

Ms. C Wolfe
1202 Marcy St
Austin, TX 78745-1031

Sep 13, 2015

Lower Colorado Regional Water Planning Grp
TX

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Dear Lower Colorado Regional Water Planning Grp,

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Sincerely,
Ms. C Wolfe

Ms. Melissa Sellars
1716 Nash Ave
B
Austin, TX 78704-3334

Sep 13, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

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Sincerely,
Ms. Melissa Sellars

Mrs. Rochelle Miller
333 Ella Ln
Dripping Springs, TX 78620-3550

Sep 13, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mrs. Rochelle Miller

Mr. Chris Grigassy
2304 Riverside Farms Rd
Austin, TX 78741-5334

Sep 13, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mr. Chris Grigassy

Miss Michelle McClendon
8425 Seminary Ridge Dr
Austin, TX 78745-7537

Sep 13, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Miss Michelle McClendon

Mrs. Marisa Schmidt
800 W 38th St
Apt 3306
Austin, TX 78705-1393

Sep 13, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mrs. Marisa Schmidt

Mrs. ceci lozano
4709 Pewter Ln
Austin, TX 78744-2936

Sep 14, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mrs. ceci lozano

Ms. Ruth K Todd
408 Northcross Rd
Georgetown, TX 78628-3000

Sep 14, 2015

Lower Colorado Regional Water Planning Grp
TX

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Dear Lower Colorado Regional Water Planning Grp,

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Sincerely,
Ms. Ruth K Todd

Mrs. Claire Bush
1124 Clayton Ln Apt L
Austin, TX 78723-1012

Sep 14, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mrs. Claire Bush

Ms. Annie Kellough
12303 Blue Water Dr
Austin, TX 78758-2802

Sep 14, 2015

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TX

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Sincerely,
Ms. Annie Kellough

Ms. Jennifer Ellis
2108 La Casa Dr
Austin, TX 78704-4723

Sep 14, 2015

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TX

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Sincerely,
Ms. Jennifer Ellis

Ms. Patricia Marshall
20605 County Road 25
Damon, TX 77430-8531

Sep 14, 2015

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Sincerely,
Ms. Patricia Marshall

Mrs. Sharon Sewell
8156 Anglin Drive
Fort Worth, TX 76140

Sep 14, 2015

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Sincerely,
Mrs. Sharon Sewell

Mr. Jon Ellis
2108 La Casa Dr
Austin, TX 78704-4723

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Sincerely,
Mr. Jon Ellis

Mr. David Chimene
11102 Leafwood Ln
Austin, TX 78750-3464

Sep 14, 2015

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TX

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Sincerely,
Mr. David Chimene

Mr. Tom Bowers
310 Bulian Ln
Austin, TX 78746-5419

Sep 14, 2015

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TX

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Sincerely,
Mr. Tom Bowers

Dr. Vincent Fonseca
405 W Magnolia Ave
San Antonio, TX 78212-3219

Sep 14, 2015

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TX

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Sincerely,
Dr. Vincent Fonseca

Mr. Carmen Druke
746 E 19th St
Houston, TX 77008-4472

Sep 14, 2015

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TX

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Sincerely,
Mr. Carmen Druke

Mr. Steve Box
Holiday Lane
Port Lavaca, TX 77979

Sep 14, 2015

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Sincerely,
Mr. Steve Box

Mrs. Alanna Dragomanovich
3809 S Congress Ave Apt 121
Austin, TX 78704-8015

Sep 14, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mrs. Alanna Dragomanovich

Miss Sally Capps
PO Box 323
Mason, TX 76856-0323

Sep 14, 2015

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Sincerely,
Miss Sally Capps

Ms. Frances Patch
2213 Tanglevine Dr
Austin, TX 78748-6150

Sep 14, 2015

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Sincerely,
Ms. Frances Patch

Mrs. Carolyn Boydston
5001 Ranch Road 165
Dripping Springs, TX 78620-4712

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Sincerely,
Mrs. Carolyn Boydston

Mr. Greg Sells
3300 Parker Ln
Apt 258
Austin, TX 78741-6942

Sep 14, 2015

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Sincerely,
Mr. Greg Sells

Mr. Ron Duke
2074 Highway 39
Hunt, TX 78024-3408

Sep 14, 2015

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Sincerely,
Mr. Ron Duke

Mr. Danny Hoagland
3741 William Dehaes Dr
Apt 815
Irving, TX 75038-8910

Sep 14, 2015

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Sincerely,
Mr. Danny Hoagland

Dr. John Carlson
306 S Cassidy Dr
Georgetown, TX 78628-7117

Sep 15, 2015

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Dear Lower Colorado Regional Water Planning Grp,

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Additionally, instead of this draft Plan being a carefully chosen selection of water supply projects that will meet projected water needs, it is a laundry list of projects that puts fish and wildlife at risk due to the potential for de-watering our aquifers and rivers for unneeded water supply projects.

I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Dr. John Carlson

Mrs. Sharon McKemie
4645 Penbrook Ct
Plano, TX 75024-2174

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mrs. Sharon McKemie

Mrs. Norma Morgan
7 Halford Dr
Heath, TX 75032-7605

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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Sincerely,
Mrs. Norma Morgan

Ms. Toni Miles
265 County Road 2668
Mineola, TX 75773-4715

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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Sincerely,
Ms. Toni Miles

Ms. Meg Haenn
901 Longview Cir
Dripping Springs, TX 78620-3523

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Ms. Meg Haenn

Mr. Bill Holt
7407 Scenic Brook Dr
Austin, TX 78736-3021

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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Sincerely,
Mr. Bill Holt

Mrs. Barbara Richert
706 Chimney Rock St
Lufkin, TX 75904-7513

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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Sincerely,
Mrs. Barbara Richert

Ms. Maria Williamson
17107 Cutter Way
Crosby, TX 77532-4504

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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Sincerely,
Ms. Maria Williamson

Mrs. Marijane Lipscomb
2150 Haack Ln
Brenham, TX 77833-1274

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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Sincerely,
Mrs. Marijane Lipscomb

Ms. Susan Sessions
130 Woodhill Rd
Kerrville, TX 78028-7329

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Ms. Susan Sessions

Ms. Rebecca Johnston
806 Hazelton St
Apt A
San Marcos, TX 78666-3190

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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Sincerely,
Ms. Rebecca Johnston

Mrs. Donna Hull
19018 Venture Dr
Lago Vista, TX 78645-8531

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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I care deeply about the future of this region's natural heritage. I urge you to work diligently to correct these shortfalls before finalizing the Region K Water Plan.

Sincerely,
Mrs. Donna Hull

Ms. Brenda Taylor
12117 Emerald Oaks Dr
Austin, TX 78739-4803

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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Sincerely,
Ms. Brenda Taylor

Ms. Lori Clendennen
1605 Sunnyvale St
Austin, TX 78741-2553

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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Sincerely,
Ms. Lori Clendennen

Mrs. Judith Morris
Golf Vista Dr
Austin, TX 78730-3564

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mrs. Judith Morris

Miss Lindsey Gumz
2914 Aftonshire Way Apt 19204
Austin, TX 78748-5848

Sep 15, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Miss Lindsey Gumz

Mr. Dale Bulla
7202 Foxtree Cv
Austin, TX 78750-7932

Sep 16, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

I write to voice my concerns about the short-comings of the draft Lower Colorado Regional Water Plan (Region K). The Plan fails to provide for the water needs of fish and wildlife. We need a comprehensive plan that considers ALL needs if we are to have flowing rivers, healthy bays, and fish and wildlife in our children's future.

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Sincerely,
Mr. Dale Bulla

Mr. Michael Wallick
2401 Comburg Castle Way
Austin, TX 78748-5259

Sep 16, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mr. Michael Wallick

Mr. James Dickson
1518 Barton Springs Rd Trlr 77
Austin, TX 78704-1052

Sep 16, 2015

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TX

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Sincerely,
Mr. James Dickson

Mrs. Ann Connell
PO Box 39
Driftwood, TX 78619-0039

Sep 16, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Mrs. Ann Connell

Ms. Ryan Fleming
5108 Eilers Ave
Austin, TX 78751-2113

Sep 16, 2015

Lower Colorado Regional Water Planning Grp
TX

Subject: Region K Water Plan must consider needs of fish and wildlife

Dear Lower Colorado Regional Water Planning Grp,

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Sincerely,
Ms. Ryan Fleming

Ms. Donna Piercy
3602 Biscay Dr
Arlington, TX 76016-2903

Sep 16, 2015

Lower Colorado Regional Water Planning Grp
TX

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Sincerely,
Ms. Donna Piercy

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ATTACHMENT L

Environment Texas Comments

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Environment Texas
815 Brazos St. Suite 600
Austin, Texas 78701

September 15, 2015

Ms. Stacy Pandey
Region K Administrative Agent *via e-mail stacy.pandey@lcra.org*
P.O. Box 220, Austin, TX 78767

Re: Comments on the 2016 Region K Initially Prepared Plan

Dear Region K Administrative Agent, Stacy Pandey:

Thank you for the opportunity to provide comments on the Initially Prepared Region K water plan. While I appreciate what Region K has already done, both in the past and in the current draft of the 2016 proposed plan to promote water conservation, I offer the following comments to avoid a plan that causes environmental damage to Texas' rivers, forests and other sensitive natural areas and makes insufficient use of water efficiency and conservation.

(1) The Region K plan should only include water projects that help meet the projected water shortages in the region. We should not include any plans that are in excess of our projected water needs.

(2) The population is growing, the climate is changing and the drought is likely to return. As a result, Region K planners should be focused on developing stronger water conservation strategies, not weaker. I recommend that Region K use the water conservation strategy from the 2012 Region K plan. This is in line with state recommendations and many cities across Texas have shown that this is feasible.

(3) To create a truly comprehensive water plan, the Region K planners must find a way to account for and plan for the water that will be needed to maintain the environmental flows that are necessary for the health of our wildlife, including plants and fish. The Colorado River and its tributaries connect all the communities in Region K and are an essential part of our fabric. Without healthy rivers and streams, our entire region is less healthy. As this region continues to grow and water demands increase this is even more urgent. Please find a way to address this hole in the planning process.

I respectfully request that you consider the above comments in order to develop a regional water plan that prioritizes conservation and the health of our ecosystem and our economy over the development of unnecessary projects.

Thank you for the opportunity to comment on the 2016 Region K IPP.

Sincerely,

Sara E. Smith, JD
Staff Attorney
Environment Texas

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ATTACHMENT M

Region K Comment Response Letters to Public Comments

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Region K Comment Response Letters Addressing Public Comments Resulting in Changes to Final 2016 Region K Water Plan

1. **Central Texas Water Coalition Comment Response – New Appendix on Highland Lakes in Chapter 1**
2. **City of Buda Comment Response – Direct Potable Reuse Strategy**
3. **City of Marble Falls Comment Response – Direct Reuse Strategy**
4. **Dave Lindsay Comment Response – New Section on Inflows to Highland Lakes in Chapter 8**
5. **Goldthwaite Channel Dam Comment Response (general) – Removal of Goldthwaite Channel Dam as a Recommended Water Management Strategy**
6. **Hays County Pipeline Strategy (general) – Modification to Recommended Hays County Pipeline Strategy and Removal of Alternative Version**
7. **LCRA Comment Response – Multiple Text Changes**
8. **Mary Cunningham Comment Response - New Appendix on Highland Lakes in Chapter 1 and Removal of Goldthwaite Channel Dam as a Recommended Water Management Strategy**
9. **National Wildlife Federation Comment Response – Recommendation of Unique Stream Segments**
10. **Sierra Club Comment Response – Recommendation of Unique Stream Segments**
11. **STPNOC Comment Response – Water Right Permit Amendment**

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Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

November 12, 2015

Ms. Jo Karr Tedder
President
Central Texas Water Coalition
P.O. Box 328
Spicewood, Tx 78669

Dear Ms. Tedder:

Thank you for your comments on the 2016 Region K Initially Prepared Water Plan (IPP). The Lower Colorado Regional Water Planning Group (LCRWPG) appreciates your concern for the development of comprehensive regional water plans and their role in Texas's future.

The LCRWPG considered your comments at the October 14th Region K planning group meeting. Per your comment regarding the addition of the provided Appendix to Chapter 1, the LCRWPG approved the addition of "The Highland Lakes: History and Social and Economic Importance" as a new Appendix to Chapter 1 of the final 2016 Region K Water Plan. No other changes to the final 2016 Region K Water Plan were made based on your comments. Your comments may be considered further during the pre-planning meeting for the 5th regional water planning cycle to develop the 2021 Region K Water Plan. This meeting will likely be held in early 2016.

We appreciate you taking the time to participate in the regional water planning process and provide comments on the 2016 Region K IPP. We encourage you to continue to participate in future planning cycles.

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

November 12, 2015

Mr. Brian Lillibridge
Water Specialist
City of Buda
P.O. Box 1218
Buda, TX 78610

Dear Mr. Lillibridge:

Thank you for your comments on the 2016 Region K Initially Prepared Water Plan (IPP). The Lower Colorado Regional Water Planning Group (LCRWPG) appreciates your concern for the development of comprehensive regional water plans and their role in Texas's future.

The LCRWPG considered your comment at the October 14th Region K planning group meeting. The LCRWPG did not approve the inclusion of your Direct Potable Reuse project as a recommended water management strategy in the 2016 Region K Water Plan, but did approve its inclusion as an alternative water management strategy. Please continue to update the LCRWPG on the status of your project, and the LCRWPG will be happy to consider moving your project to "recommended" status in the future.

We appreciate you taking the time to participate in the regional water planning process and provide comments on the 2016 Region K IPP. We encourage you to continue to participate in future planning cycles.

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

November 12, 2015

Mr. Mike Hodge
City Manager
City of Marble Falls
800 Third Street
Marble Falls, TX 78654

Dear Mr. Hodge:

Thank you for your comments on the 2016 Region K Initially Prepared Water Plan (IPP). The Lower Colorado Regional Water Planning Group (LCRWPG) appreciates your concern for the development of comprehensive regional water plans and their role in Texas's future.

The LCRWPG considered your comment at the October 14th Region K planning group meeting. The LCRWPG approved the inclusion of your Direct Reuse project as a recommended water management strategy in the 2016 Region K Water Plan, but the distribution-level costs you provided in your comment could not be included in the plan. The TWDB does not allow for distribution-level costs in regional water planning.

We appreciate you taking the time to participate in the regional water planning process and provide comments on the 2016 Region K IPP. We encourage you to continue to participate in future planning cycles.

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

November 12, 2015

Mr. David Lindsay
2509 Sailpoint Drive
Spicewood, TX 78669

Dear Mr. Lindsay:

Thank you for your comments on the 2016 Region K Initially Prepared Water Plan (IPP). The Lower Colorado Regional Water Planning Group (LCRWPG) appreciates your concern for the development of comprehensive regional water plans and their role in Texas's future.

The LCRWPG considered your comments at the October 14th Region K planning group meeting. The final 2016 Region K Water Plan includes the new section on inflows to the Highland Lakes in Chapter 8.

We appreciate you taking the time to participate in the regional water planning process and provide comments on the 2016 Region K IPP. We encourage you to continue to participate in future planning cycles.

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

November 12, 2015

Dear Region K Stakeholder:

Thank you for your comments on the 2016 Region K Initially Prepared Water Plan (IPP). The Lower Colorado Regional Water Planning Group (LCRWPG) appreciates your concern for the development of comprehensive regional water plans and their role in Texas's future.

The LCRWPG considered your comment regarding the Goldthwaite Channel Dam at the October 14th Region K planning group meeting. The LCRWPG made the decision at the October 14th meeting to remove the Goldthwaite Channel Dam project as a recommended water management strategy in the 2016 Region K Water Plan.

We appreciate you taking the time to participate in the regional water planning process and provide comments on the 2016 Region K IPP. We encourage you to continue to participate in future planning cycles.

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

November 12, 2015

Dear Region K Stakeholder:

Thank you for your comments on the 2016 Region K Initially Prepared Water Plan (IPP). The Lower Colorado Regional Water Planning Group (LCRWPG) appreciates your concern for the development of comprehensive regional water plans and their role in Texas's future.

The LCRWPG considered your comment regarding the Hays County Pipeline project at the October 14th Region K planning group meeting. After discussion with Hays County officials and Region L, Region K modified the recommended pipeline strategy in the 2016 Region K Water Plan to reflect a main pipeline from Kyle to Wimberley, with a branch pipeline to Dripping Springs off of the main pipeline. Region K does not propose pipeline routes, but for plan costing purposes, the branch to Dripping Springs was assumed to follow FM 150. In addition, the alternative version of the Hays County pipeline that assumed the use of water purchased from Forestar was removed from the 2016 Region K Water Plan.

We appreciate you taking the time to participate in the regional water planning process and provide comments on the 2016 Region K IPP. We encourage you to continue to participate in future planning cycles.

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

November 12, 2015

Mr. David Wheelock, PE
Manager, Water Supply Planning
LCRA
P.O. Box 220
Austin, TX 78767

Dear Mr. Wheelock:

Thank you for your comments on the 2016 Region K Initially Prepared Water Plan (IPP). The Lower Colorado Regional Water Planning Group (LCRWPG) appreciates your concern for the development of comprehensive regional water plans and their role in Texas's future.

The LCRWPG considered your comments at the October 14th Region K planning group meeting. Your comments resulted in modifications to the final 2016 Region K Water Plan using your suggested language changes, with the exception of three comments requesting changes in Chapter 5 of the plan. No changes were made to the final 2016 Region K Water Plan as a result of your comments related to sprinkler irrigation on page 5-27, drought management costs on page 5-117, and Fayette County steam-electric shortages on page 5-37. Your comments may be considered further during the pre-planning meeting for the 5th regional water planning cycle to develop the 2021 Region K Water Plan. This meeting will likely be held in early 2016.

We appreciate you taking the time to participate in the regional water planning process and provide comments on the 2016 Region K IPP. We encourage you to continue to participate in future planning cycles.

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

November 12, 2015

Judge Mary Cunningham
Llano County Judge
801 Ford Street
Llano, TX 78643

Dear Judge Cunningham:

Thank you for your comments on the 2016 Region K Initially Prepared Water Plan (IPP). The Lower Colorado Regional Water Planning Group (LCRWPG) appreciates your concern for the development of comprehensive regional water plans and their role in Texas's future.

The LCRWPG considered your comments at the October 14th Region K planning group meeting. The final 2016 Region K Water Plan includes the addition of "The Highland Lakes: History and Social and Economic Importance" as a new Appendix to Chapter 1 of the final 2016 Region K Water Plan. Additionally, the Goldthwaite Channel Dam project has been removed as a recommended water management strategy in the final 2016 Region K Water Plan.

We appreciate you taking the time to participate in the regional water planning process and provide comments on the 2016 Region K IPP. We encourage you to continue to participate in future planning cycles.

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

November 12, 2015

Mr. Myron Hess
Manager, Texas Water Program / Counsel
National Wildlife Federation
mhess@nwf.org

Dear Mr. Hess:

Thank you for your comments on the 2016 Region K Initially Prepared Water Plan (IPP). The Lower Colorado Regional Water Planning Group (LCRWPG) appreciates your concern for the development of comprehensive regional water plans and their role in Texas's future.

The LCRWPG considered your comments at the October 14th Region K planning group meeting. Per your comment regarding the recommendation of unique stream segments, the LCRWPG has added language to the final 2016 Region K Water Plan recommending the unique stream segments that have been included in previous regional water plans. No other changes to the final 2016 Region K Water Plan were made based on your comments. Your comments may be considered further during the pre-planning meeting for the 5th regional water planning cycle to develop the 2021 Region K Water Plan. This meeting will likely be held in early 2016.

We appreciate you taking the time to participate in the regional water planning process and provide comments on the 2016 Region K IPP. We encourage you to continue to participate in future planning cycles.

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

November 12, 2015

Ms. Jennifer Walker
Water Resources Coordinator
Sierra Club, Lone Star Chapter
jennifer.walker@sierraclub.org

Dear Ms. Walker:

Thank you for your comments on the 2016 Region K Initially Prepared Water Plan (IPP). The Lower Colorado Regional Water Planning Group (LCRWPG) appreciates your concern for the development of comprehensive regional water plans and their role in Texas's future.

The LCRWPG considered your comments at the October 14th Region K planning group meeting. Per your comment regarding the recommendation of unique stream segments, the LCRWPG has added language to the final 2016 Region K Water Plan recommending the unique stream segments that have been included in previous regional water plans. No other changes to the final 2016 Region K Water Plan were made based on your comments. Your comments may be considered further during the pre-planning meeting for the 5th regional water planning cycle to develop the 2021 Region K Water Plan. This meeting will likely be held in early 2016.

We appreciate you taking the time to participate in the regional water planning process and provide comments on the 2016 Region K IPP. We encourage you to continue to participate in future planning cycles.

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

November 12, 2015

Mr. John Hoffman
STPNOC
jphoffman@stpegs.com

Dear Mr. Hoffman:

Thank you for your comments on the 2016 Region K Initially Prepared Water Plan (IPP). The Lower Colorado Regional Water Planning Group (LCRWPG) appreciates your concern for the development of comprehensive regional water plans and their role in Texas's future.

The LCRWPG considered your comment at the October 14th Region K planning group meeting. The LCRWPG approved the inclusion of your Water Right Permit Amendment project as a recommended water management strategy in the 2016 Region K Water Plan.

We appreciate you taking the time to participate in the regional water planning process and provide comments on the 2016 Region K IPP. We encourage you to continue to participate in future planning cycles.

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

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Region K Comment Response Letters Addressing Public Comments That Resulted in No Changes to Final 2016 Region K Water Plan

1. **Environment Texas Comment Response**
2. **Hill Country Alliance Comment Response**
3. **National Wildlife Federation Members Comment Response**
4. **Sierra Club Member Comment Response**
5. **Comment Response to Commenters for All Other Topics That Resulted in No Changes to the 2016 Region K**

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Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

November 12, 2015

Ms. Sara E. Smith, JD
Staff Attorney
Environment Texas
815 Brazos St. Suite 600
Austin, Texas 78701

Dear Ms. Smith:

Thank you for your comments on the 2016 Region K Initially Prepared Water Plan (IPP). The Lower Colorado Regional Water Planning Group (LCRWPG) appreciates your concern for the development of comprehensive regional water plans and their role in Texas's future.

The LCRWPG considered your comments at the October 14th Region K planning group meeting, but no changes were recommended to the 2016 Region K Water Plan. Your comments may be considered further during the pre-planning meeting for the 5th regional water planning cycle to develop the 2021 Region K Water Plan. This meeting will likely be held in early 2016.

We appreciate you taking the time to participate in the regional water planning process and provide comments on the 2016 Region K IPP. We encourage you to continue to participate in future planning cycles.

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

November 12, 2015

Mr. Charlie Flatten
Water Policy Program Manager
Hill Country Alliance
15315 Highway 71 West
Bee Cave, Texas 78738

Dear Mr. Flatten:

Thank you for your comments on the 2016 Region K Initially Prepared Water Plan (IPP). The Lower Colorado Regional Water Planning Group (LCRWPG) appreciates your concern for the development of comprehensive regional water plans and their role in Texas's future.

The LCRWPG considered your comments at the October 14th Region K planning group meeting, but no changes were recommended to the 2016 Region K Water Plan. Your comments may be considered further during the pre-planning meeting for the 5th regional water planning cycle to develop the 2021 Region K Water Plan. This meeting will likely be held in early 2016.

We appreciate you taking the time to participate in the regional water planning process and provide comments on the 2016 Region K IPP. We encourage you to continue to participate in future planning cycles.

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

November 12, 2015

Dear Region K Stakeholder:

Thank you for your comments on the 2016 Region K Initially Prepared Water Plan (IPP). The Lower Colorado Regional Water Planning Group (LCRWPG) appreciates your concern for the development of comprehensive regional water plans and their role in Texas's future.

The LCRWPG considered your comments at the October 14th Region K planning group meeting, but no changes were recommended to the 2016 Region K Water Plan. Your comments may be considered further during the pre-planning meeting for the 5th regional water planning cycle to develop the 2021 Region K Water Plan. This meeting will likely be held in early 2016.

We appreciate you taking the time to participate in the regional water planning process and provide comments on the 2016 Region K IPP. We encourage you to continue to participate in future planning cycles.

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

November 12, 2015

Dear Region K Stakeholder:

Thank you for your comments on the 2016 Region K Initially Prepared Water Plan (IPP). The Lower Colorado Regional Water Planning Group (LCRWPG) appreciates your concern for the development of comprehensive regional water plans and their role in Texas's future.

The LCRWPG considered your comments at the October 14th Region K planning group meeting, but no changes were recommended to the 2016 Region K Water Plan. Your comments may be considered further during the pre-planning meeting for the 5th regional water planning cycle to develop the 2021 Region K Water Plan. This meeting will likely be held in early 2016.

We appreciate you taking the time to participate in the regional water planning process and provide comments on the 2016 Region K IPP. We encourage you to continue to participate in future planning cycles.

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

Lower Colorado River Authority, Administrative Agent
P.O. Box 220, Austin, Texas 78767
(512) 473-3200, Fax (512) 473-4026

November 12, 2015

Dear Region K Stakeholder:

Thank you for your comments on the 2016 Region K Initially Prepared Water Plan (IPP). The Lower Colorado Regional Water Planning Group (LCRWPG) appreciates your concern for the development of comprehensive regional water plans and their role in Texas's future.

The LCRWPG considered your comments at the October 14th Region K planning group meeting, but no changes were recommended to the 2016 Region K Water Plan. Your comments may be considered further during the pre-planning meeting for the 5th regional water planning cycle to develop the 2021 Region K Water Plan. This meeting will likely be held in early 2016.

We appreciate you taking the time to participate in the regional water planning process and provide comments on the 2016 Region K IPP. We encourage you to continue to participate in future planning cycles.

Sincerely,

John E. Burke, Chairman
Lower Colorado Regional Water Planning Group

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CHAPTER 11 : IMPLEMENTATION AND COMPARISON TO THE PREVIOUS REGIONAL WATER PLAN

This chapter presents a discussion and survey of water management strategy projects that were recommended in the 2011 Regional Water Plan and have since been implemented, as well as providing a summary comparison of the 2016 Regional Water Plan to the 2011 Regional Water Plan with respect to population, demands, water availability and supplies, and water management strategies.

11.1 IMPLEMENTATION

In past planning cycles, recommended water management strategies from previous plans were not tracked to determine their status of implementation, other than to remove the strategy as recommended once the supply from the strategy became an existing supply. As part of the 2016 Region K Plan, the Texas Water Development Board (TWDB) is requiring a survey of 2011 Plan water management strategy implementation. This implementation survey requests information related to the implementation status of all water management strategies recommended in the 2011 Region K Plan.

The TWDB has created an implementation survey template that was used to collect the required information from the Water User Groups (WUGs) and Wholesale Water Providers in the region. Information was collected through survey data, discussions with planning group members, discussions with WUGs throughout the current planning cycle, and some research. *Appendix 11A* contains two versions of the Implementation Template used to record the survey results. *Table 11A.1* is a shortened summary version of the results presented for readability purposes. *Table 11A.2* is the full version of the TWDB template containing all of the information, presented to meet TWDB requirements.

In general, water management strategies related to return flows, conservation, reuse, drought management, and new water sale contracts and contract amendments have been implemented to some extent since the 2011 Region K Water Plan. Nearly 50 percent of the water management strategies recommended in the 2011 Region K Water Plan were found to have been implemented. Many of the implemented strategies have no associated capital costs and limited data available as to specific water supply or demand reduction volume numbers. Supply numbers that were provided in the surveys have been included in the results tables in *Appendix 11A*. Many of these particular strategies are on-going and will continue to be recommended and implemented during future planning cycles.

Results showed that only five water management strategies that were recommended in the 2011 Region K Water Plan and have capital costs have been implemented to the point of operation. These projects include the following:

- City of Austin Direct Reuse
- Purchase Water from the City of Austin for Hays County-Other
- Expansion of the Trinity Aquifer by the City of Goldthwaite
- Reuse by the Highland Lakes Communities

- Expansion of the Carrizo-Wilcox Aquifer by the City of Smithville

The two reuse projects are considered to be on-going, and reuse for the City of Austin and for WUGs surrounding the Highland Lakes will continue to be recommended in future planning cycles. Implementation costs were not readily available, but water supply volumes are included as provided.

A number of additional strategies recommended in the 2011 Region K Water Plan are underway, but not currently to the point of operation. This includes strategies that have permit applications submitted, or are in some stage of planning, design, or construction. The following projects have been started, but have not been completed:

- HCPUA Pipeline project for the City of Buda
- Development of the Saline Zone of the Edwards-BFZ Aquifer
- Goldthwaite Channel Dam
- HB 1437 On-Farm Conservation
- Development of the Hickory Aquifer by the City of Llano
- LCRA Off-Channel Reservoir
- Water Right Permit Amendment for Steam-Electric, Matagorda County

See *Appendix 11A* for additional information related to these and the rest of the water management strategies that were recommended in the 2011 Region K Water Plan.

11.2 COMPARISON TO THE PREVIOUS REGIONAL WATER PLAN

This section discusses how the 2016 Regional Water Plan compares to the 2011 Regional Water Plan, with respect to population, water demands, water supplies, and water management strategies.

11.2.1 Population Projections

Overall for Region K, there is a population projection increase of approximately 23,000 for Year 2020 between the 2011 Region K Plan and the 2016 Region K Plan. By 2060, the 2016 Region K Plan shows a population projection that is approximately 96,500 higher than the 2060 population projection in the 2011 Region K Plan. The year 2070 was not used for comparison purposes because the 2011 Region K Plan did not include the 2070 decade. The rate of population projection growth by planning decade is approximately 0.5% greater than was shown in the 2011 Region K Plan. Tabular data and bar graphs comparing the two (2) plans can be found in *Appendix 11B*.

Population estimates for each county have changed between the 2011 Region K Plan and the 2016 Region K Plan. The following counties have a higher population projection predicted by Year 2060 in the 2016 RWP: Bastrop, Colorado, Gillespie, Hays (partial), Travis, Wharton (partial), and Williamson (partial). The following counties have a smaller population projection predicted by Year 2060 in the 2016 Region

K Plan, as compared to the 2011 Region K Plan: Blanco, Burnet, Fayette, Llano, Matagorda, Mills, and San Saba.

Population projection growth rates have also changed between the 2011 Region K Plan and the 2016 Region K Plan. The following counties have a slower population projection growth rate in the 2016 Region K Plan, as compared to the 2011 Region K Plan: Blanco, Burnet, Fayette, Llano, San Saba, and Williamson (partial). The following counties have a faster population projection growth rate in the 2016 Region K Plan, as compared to the 2011 Region K Plan: Bastrop, Colorado, Gillespie, Hays (partial), Matagorda, Mills, Travis, and Wharton (partial).

These changes by county are summarized in *Table 11.1*.

Table 11.1 Comparison of 2016 Region K Plan and 2011 Region K Plan with respect to the 2060 Population Projections and Overall Projection Growth Rates by County

County	Population in Year 2060 (2016 RWP)	Population Growth Rate (2016 RWP)
Bastrop	Increase	Increase
Blanco	Decrease	Decrease
Burnet	Decrease	Decrease
Colorado	Increase	Increase
Fayette	Decrease	Decrease
Gillespie	Increase	Increase
Hays (partial)	Increase	Increase
Llano	Decrease	Decrease
Matagorda	Decrease	Increase
Mills	Decrease	Increase
San Saba	Decrease	Decrease
Travis	Increase	Increase
Wharton (partial)	Increase	Increase
Williamson (partial)	Increase	Decrease
Total (Region K)	**Increase**	**Increase**

11.2.2 Water Demand Projections

Overall for Region K, there is an increase in water demand of approximately 3,000 acre-feet/year for Year 2020 between the 2011 Region K Plan and the 2016 Region K Plan. By 2060, the 2016 Region K Plan shows a total water demand that is approximately 19,000 acre-feet/year higher than the 2060 total water demand in the 2011 Region K Plan. The year 2070 was not used for comparison purposes because the 2011 Region K Plan did not include the 2070 decade. The rate of water demand growth by planning decade is approximately 0.3% greater than was shown in the 2011 Region K Plan. Tabular data and bar graphs comparing the two (2) plans can be found in *Appendix 11B*.

Water demand projections for each usage category have changed between the 2011 Region K Plan and the 2016 Region K Plan. The following water usage categories have a higher water demand predicted by Year 2060 in the 2016 Region K Plan: Livestock, Irrigation, Manufacturing, and Mining.

The following water usage categories have a smaller water demand predicted by Year 2060 in the 2016 Region K Plan: Municipal and Steam-Electric Power Generation.

Water demand projection growth rates for each usage category have also changed between the 2011 Region K Plan and the 2016 Region K Plan. The following water usage categories had a slower water demand projection growth rate in the 2016 Region K Plan, as compared to the 2011 Region K Plan: Manufacturing and Steam-Electric Power Generation. Water demand projections for Livestock were constant across the planning decades and showed no growth in either plan.

The following water usage categories had a faster water demand projection growth rate in the 2016 Region K Plan: Municipal, Irrigation, and Mining.

These changes are summarized in *Table 11.2*.

Table 11.2 Water Demand Change by Water Usage Category in Year 2060 since 2011 RWP

Water Usage Category	Water Demand in Year 2060 (2016 Region K Plan)	Water Demand Growth Rate (2016 Region K Plan)
Municipal	Decrease	Increase
Livestock	Increase	No Change
Irrigation	Increase	Increase
Manufacturing	Increase	Decrease
Mining	Increase	Increase
Steam-Electric Power Generation	Decrease	Decrease
Total Water Demand	**Increase**	**Increase**

Table 11-3 identifies counties that have a higher projected water demand by Year 2060 in the 2016 Region K Plan than was shown in the 2011 Region K Plan. In addition, the usage category that has the greatest impact on that county's growth is shown in *Table 11.3*.

Table 11.3 Counties with Year 2060 Total Water Demand Increase from 2011 Region K Plan

County	Total Water Demand Increase in Year 2060 (acre-feet/year)	Greatest Water Usage Increase
Bastrop	8,136	Mining
Blanco	69	Irrigation
Burnet	6,093	Mining
Gillespie	1,160	Manufacturing
Hays (partial)	8,813	Municipal
San Saba	3,103	Irrigation
Travis	4,185	Manufacturing
Wharton (partial)	54,604	Irrigation

Table 11.4 identifies counties that have a lower projected water demand by Year 2060 than was shown in the 2011 Region K Plan. In addition, the usage category that has the greatest impact on each county's decrease is shown in *Table 11.4*.

Table 11.4 Counties with Year 2060 Total Water Demand Decrease from 2011 RWP

County	Total Water Demand Decrease in Year 2060 (acre-feet/year)	Greatest Water Usage Decrease
Colorado	-28,425	Mining
Fayette	-21,929	Steam-Electric Power
Llano	-14,398	Steam-Electric Power
Matagorda	-854	Steam-Electric Power
Mills	-85	Municipal
Williamson (partial)	-1,685	Municipal

11.2.3 Drought of Record and Hydrologic Assumptions

The Drought-of-Record for the 2016 Region K Water Plan remained the same as the 2011 Region K Water Plan, occurring from 1947-1957. The Region K Cutoff Model was used in both plans for determining the surface water availability numbers. In the 2011 Region K Plan, the period of record was from 1940-1998, with a critical dry year of 1956. For the 2016 Region K Plan, the period of record was extended through 2013, creating a new critical dry year of 2011.

11.2.4 Groundwater and Surface Water Availability and Water Supplies

Overall for Region K, the total water source availability in the 2016 Region K Plan has decreased from the availability in the 2011 Region K Plan. In the 2011 Region K Plan, the total water availability for 2020 was approximately 1.34 million acre-feet/year, with 72 percent surface water and 28 percent groundwater. The total water availability for 2060 was approximately 1.32 million acre-feet/year, with the same percentages of surface water and groundwater as 2020. In the 2016 Region K Plan, the total water availability for 2020 is approximately 1.29 million acre-feet/year, with 75 percent surface water and 25 percent groundwater. The total water availability for 2060 was approximately 1.31 million acre-feet/year, with 74 percent groundwater and 26 percent groundwater. The availability of reclaimed water increases over the decades in the 2016 Region K Plan, which is the reason for the increased total availability from 2020 to 2060.

Figure 11.1 shows a comparison of water availability by type of source, for 2020 and 2060, in the 2011 Region K Plan and the 2016 Region K Plan.

Figure 11.1 Comparison of Water Availability by Type of Source for 2020 and 2060

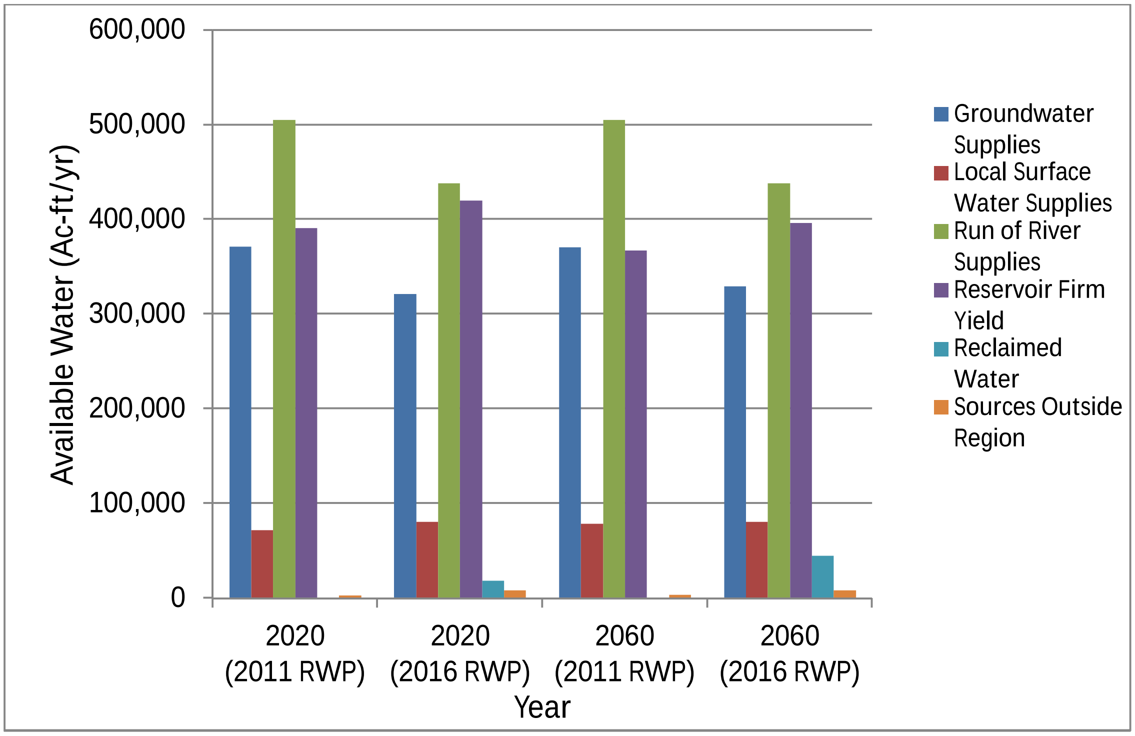
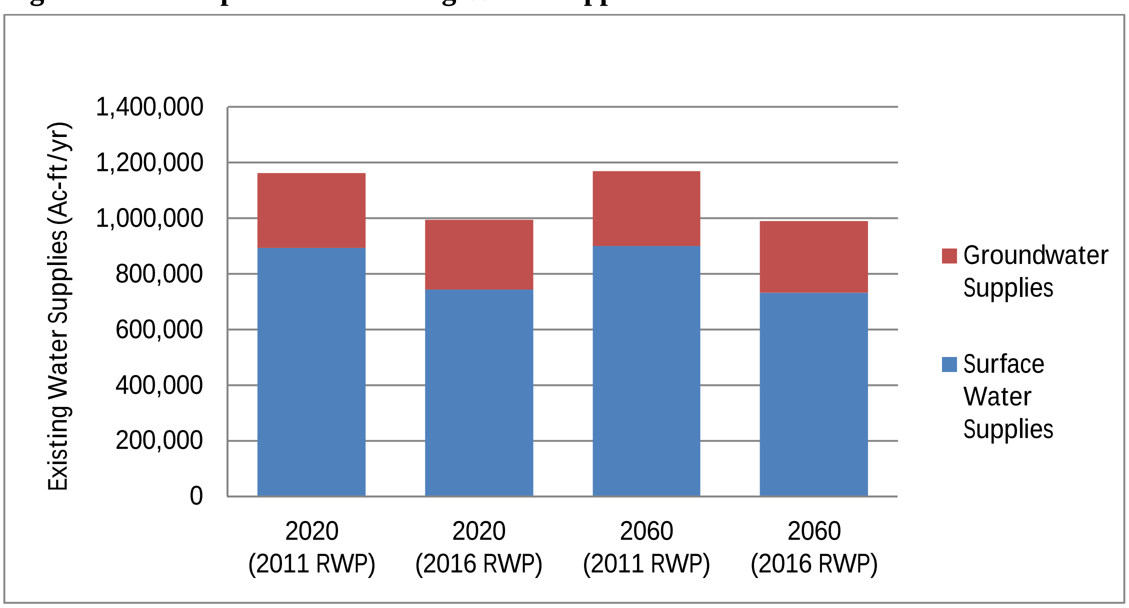


Figure 11.2 provides a comparison of the existing surface water and groundwater supplies in Region K for the 2011 Region K Plan and 2016 Region K Plan, shown for the 2020 and 2060 planning decades.

Figure 11.2 Comparison of Existing Water Supplies for 2020 and 2060



11.2.5 Water Needs

Water needs in the region are determined by comparing the demands to the existing supplies. Overall, water needs for Region K have increased in the 2016 Region K Plan as compared to the 2011 Region K Plan. Total increased needs for the region in 2060 are approximately 80,000 ac-ft/yr. A large portion of this increase is due to decreased available supply for irrigation, as determined by the Region K Cutoff Model for the 2016 Region K Plan. *Table 11.5* shows a comparison of the 2060 needs by county for the 2011 Region K Plan and the 2016 Region K Plan.

Table 11.5 Comparison of Water Needs by County for 2020 and 2060

County	2060 Water Need from 2011 Region K Plan (acre-feet/year)	2060 Water Need from 2016 Region K Plan (acre-feet/year)	Comparison (positive = increased need) (acre-feet/year)
Bastrop	28,145	32,730	4,585
Blanco	64	209	145
Burnet	8,136	8,769	633
Colorado	20,398	42,130	21,732
Fayette	29,069	3,824	(25,245)
Gillespie	-	566	566
Hays	13,255	16,970	3,715
Llano	2,627	534	(2,093)
Matagorda	148,959	170,093	21,134
Mills	787	587	(200)
San Saba	5	125	120
Travis	91,964	85,617	(6,347)
Wharton	26,852	87,545	60,693
Williamson	-	-	-
Total (Region K)	**370,261**	**449,699**	**79,438**

Firm water needs for both wholesale water providers in the region (LCRA and City of Austin) in 2060 decreased when comparing the 2016 Region K Plan to the 2011 Region K Plan. The decrease in needs for LCRA was related to an increase in firm availability numbers, while the decrease in needs for the City of Austin was related to a decrease in demand.

11.2.6 Recommended Water Management Strategies

Due to the removal of the LCRA-SAWS Water Project (LSWP) from consideration as a recommended water management strategy, as well as the ongoing drought and the new source of State funding known as SWIFT, the water management strategies identified in the 2016 Region K Plan are quite different from the identified water management strategies in the 2011 Region K Plan. The next two sections identify only the differences between the two plans.

There are several recommended water management strategies that were in the 2011 Region K Plan, but are no longer recommended in the 2016 Region K Plan. Those strategies include the following:

- Additional Municipal Conservation
- Development of New Rice Varieties
- Conjunctive Use of Groundwater (Includes Overdrafts)
- Development of Ellenburger-San Saba Aquifer
- Development of Other Aquifer
- Development of Saline Zone of Edwards-BFZ Aquifer
- Expand Supply from STPNOC Reservoir
- Expansion of Other Aquifer
- Expansion of Queen City Aquifer
- Expansion of Yegua-Jackson Aquifer
- Goldthwaite Channel Dam
- LCRA Contract Reductions
- Purchase Water from COA
- Temporary Drought Period Use of Gulf Coast Aquifer
- Water Allocation
- Water Transfer

There are also many recommended water management strategies in the 2016 Region K Plan that are new and were not in the 2011 Region K Plan. They include the following:

- Conservation (Sprinkler Irrigation)
- Development of New Groundwater for Fayette Power Project
- Prairie Site Reservoir
- Mid-Basin Reservoir
- LCRA – Expand Use of Carrizo-Wilcox Aquifer in Bastrop County
- COA Aquifer Storage and Recovery
- Longhorn Dam Operation Improvements
- Rainwater Harvesting
- Long Lake Enhanced Storage
- COA Other Reuse
- Capture Local Inflows to Lady Bird Lake

- Indirect Potable Reuse through Lady Bird Lake
- Lake Austin Operations
- Expansion of Edwards-BFZ Aquifer
- Expansion of Marble Falls Aquifer
- Groundwater Importation – Hays County Pipeline
- BSEACD Edwards/Middle Trinity ASR
- BSEACD Saline Edwards ASR
- Buena Vista Regional Project
- East Lake Buchanan Regional Project
- Marble Falls Regional Project
- Water Purchase
- Brush Control
- Alternate Canal Delivery

11.2.7 Alternative Water Management Strategies

There are several alternative water management strategies included in the 2011 Region K Plan, but are no longer included as alternative strategies in the 2016 Region K Plan. Those strategies include the following:

- Desalination of Ellenburger-San Saba Aquifer
- Expansion of Gulf Coast Aquifer
- On-farm Conservation
- Irrigation Division Delivery System Improvements
- Conjunctive Use of Groundwater (Includes Overdrafts)
- Off-channel Storage in Additional Reservoirs

There are also several alternative water management strategies in the 2016 Region K Plan that are new and were not in the 2011 Region K Plan. They include the following:

- COA Brackish Groundwater Desalination (Down-dip)
- Reclaimed Water Bank Infiltration to Colorado Alluvium
- LCRA Aquifer Storage and Recovery
- Import Return Flows from Williamson County
- Supplement Bay and Estuary Inflows with Brackish Groundwater
- Baylor Creek Reservoir

- Direct Potable Reuse

APPENDIX 11A

IMPLEMENTATION SURVEY TEMPLATE FOR 2011 REGION K PLAN PROJECTS

Table 11A.1 - Summary of TWDB Template Containing Survey Results of Implementation Status of Water Management Strategies from the 2011 Region K Water Plan

Table 11A.2 - Full TWDB Template Containing Survey Results of Implementation Status of Water Management Strategies from the 2011 Region K Water Plan

Table 11A.1: Summary of TWDB Template Containing Survey Results of Implementation Status of Water Management Strategies from the 2011 Region K Water Plan

Sponsor	Recommended Water Management Strategy	Capital Cost	SS2010	Project Description	Infrastructure Type*	At what level of Implementation is the project?*	If not implemented, why?*	Initial Volume of Water Provided (acft/yr)	Funds Expended to Date ($)	Year the Project is Online?*	Is this a phased project?*	(Phased) Ultimate Volume (acft/yr)	(Phased) Ultimate Project Cost ($)	Year project reaches maximum capacity?*	What is the project funding source(s)?*	Included in the 2016 Plan?*
AQUA WSC	Additional municipal conservation	$0	0	Conservation- Municipal Conservation-Industrial	Other	Currently Operating		n/a	$0	2011	No			2070	Unknown	Yes
AQUA WSC	Drought management	$0	0	Conservation - Voluntary Irrigation Measures (Residential and Commercial)	No Infrastructure	Currently Operating		n/a	$0	2011	Yes	n/a		2060	Other	Yes
AQUA WSC	Expansion of Carrizo-Wilcox Aquifer	$6,248,640	0	Groundwater Expansion	Wells	Not Implemented	Too soon		$0							Yes
AUSTIN	City of Austin conservation	$0	11,030	Conservation - Municipal	Other	Currently Operating		11,030		2011	Yes	36,370	$0	2070		Yes
AUSTIN	City of Austin direct reuse (municipal and manufacturing)	$302,250,510	5,143	Direct Reuse	Pipeline	Currently Operating		5,143		2011	Yes	40,468	$228,113,592	2070		Yes
AUSTIN	City of Austin direct reuse (steam-electric)	$302,250,510	2,315	Direct Reuse	Pipeline	Currently Operating		2,315		2011	Yes	13,315	$74,136,918	2070		Yes
AUSTIN	City of Austin return flows	$0	27,188	accessing return flows in system	No Infrastructure	Currently Operating		27,188	$0	2011	Yes	39,528	0	2070		Yes
AUSTIN	Downstream return flows	$0	0	accessing return flows in system	No Infrastructure	Not Implemented	Too soon				Yes	2,375	0	2070		No
BARTON CREEK WEST WSC	Municipal conservation	$0	37	Conservation - Municipal	Other	Currently Operating		n/a		2011	Yes			2060		Yes
BARTON CREEK WEST WSC	Purchase water from West Travis County Regional Water Supply	$0	16	Increased contract	No Infrastructure	Not Implemented	Other									No
BASTROP	Expansion of other aquifer	$1,721,920	0	Groundwater Expansion	Wells	Not Implemented	Other									No
BASTROP	Municipal conservation	$0	146	Conservation - Municipal	Other	Currently Operating		n/a		2011	Yes			2060		Yes
BASTROP COUNTY WCID #2	Expansion of Carrizo-Wilcox Aquifer	$0	0	Groundwater Expansion	Wells	Not Implemented	Too soon									Yes
BEE CAVE VILLAGE	Municipal conservation	$0	106	Conservation - Municipal	Other	Currently Operating		n/a		2011	Yes			2060		Yes
BEE CAVE VILLAGE	Purchase water from West Travis County Regional Water Supply	$0	830	Increased contract	No Infrastructure	Not Implemented	Other									No
BERTRAM	Expansion of Ellenburger-San Saba Aquifer	$0	0	Groundwater Expansion	No Infrastructure	Not Implemented	Too soon									Yes
BERTRAM	Municipal conservation	$0	22	Conservation - Municipal	Other	Currently Operating		369.8	$0	2011	Yes			2060	Unknown	Yes
BRIARCLIFF VILLAGE	Amend LCRA contract	$0	0	Increased contract	No Infrastructure	Currently Operating		400								No
BRIARCLIFF VILLAGE	Municipal conservation	$0	16	Conservation - Municipal	Other	Currently Operating				2011	Yes			2060		Yes
BUDA	Development of Carrizo-Wilcox Aquifer	$6,807,200	0	HCPUA Pipeline	Pipeline	Feasibility Study Ongoing										Yes
BUDA	Development of saline zone of Edwards-Balcones Fault Zone Aquifer	$1,391,124	0	Groundwater Development	Wells	Feasibility Study Ongoing										Yes
CIMARRON PARK WATER COMPANY	Development of saline zone of Edwards-Balcones Fault Zone Aquifer	$1,669,349	0	Groundwater Development	Wells	Feasibility Study Ongoing										No
CIMARRON PARK WATER COMPANY	Drought management	$0	109	Reduction - Voluntary and Mandatory Irrigation Measures (Residential and Commercial)	No Infrastructure	Currently Operating		n/a	$0	2011	Yes	n/a	n/a	2070	Unknown	No
CIMARRON PARK WATER COMPANY	Municipal conservation	$0	24	Conservation - Municipal Conservation-Irrigation Conservation - Other	No Infrastructure	Currently Operating		n/a	$0	2011	Yes	o 106 gpcd	n/a	2070	Unknown	No

Table 11A-1: Summary of TWDB Template Containing Survey Results of Implementation Status of Water Management Strategies from the 2011 Region K Water Plan

Sponsor	Recommended Water Management Strategy	Capital Cost	SS2010	Project Description	Infrastructure Type*	At what level of Implementation is the project?*	If not implemented, why?*	Initial Volume of Water Provided (acft/yr)	Funds Expended to Date ($)	Year the Project is Online?*	Is this a phased project?*	(Phased) Ultimate Volume (acft/yr)	(Phased) Ultimate Project Cost ($)	Year project reaches maximum capacity?*	What is the project funding source(s)?*	Included in the 2016 Plan?*
CIMARRON PARK WATER COMPANY	Water allocation	$0	17	Water allocation	No Infrastructure	Not Implemented	Other									No
COTTONWOOD SHORES	Amend LCRA contract	$0	26	Increased contract	No Infrastructure	Currently Operating		495	$0							Yes
COUNTY-OTHER, BASTROP	Additional municipal conservation	$0	0	Conservation - Municipal	Other	Not Implemented	Too soon									No
COUNTY-OTHER, BASTROP	Development of Carrizo-Wilcox Aquifer	$5,434,871	0	Groundwater Development	Wells	Not Implemented	Too soon									No
COUNTY-OTHER, BASTROP	Expansion of Carrizo-Wilcox Aquifer	$4,280,640	0	Groundwater Development	Wells	Not Implemented	Too soon									Yes
COUNTY-OTHER, BLANCO	Development of Ellenburger-San Saba Aquifer	$1,977,110	0	Groundwater Development	Wells	Not Implemented	Too soon									No
COUNTY-OTHER, BURNET	Expansion of Ellenburger-San Saba Aquifer	$8,367,840	0	Groundwater Development	Wells	Not Implemented	Too soon									No
COUNTY-OTHER, BURNET	Expansion of Trinity Aquifer	$2,029,440	0	Groundwater Development	Wells	Not Implemented	Too soon									No
COUNTY-OTHER, COLORADO	Expansion of Gulf Coast Aquifer	$0	105	Groundwater Development	Wells	Not Implemented	Too soon									Yes
COUNTY-OTHER, FAYETTE	Expansion of Gulf Coast Aquifer	$0	0	Groundwater Development	Wells	Not Implemented	Too soon									Yes
COUNTY-OTHER, FAYETTE	Expansion of Sparta Aquifer	$0	123	Groundwater Development	Wells	Not Implemented	Too soon									No
COUNTY-OTHER, HAYS	Development of saline zone of Edwards-Balcones Fault Zone Aquifer	$16,693,491	0	Groundwater Development	Wells	Feasibility Study Ongoing										Yes
COUNTY-OTHER, HAYS	Purchase water from City of Austin	$2,280,200	1,100	Water purchase	Pipeline	All Phases Fully Implemented		1100	n/a	2013						No
COUNTY-OTHER, LLANO	Municipal conservation	$0	873	Conservation - Municipal	Other	Currently Operating				2012	Yes			2060		No
COUNTY-OTHER, MILLS	Expansion of Trinity Aquifer	$0	0	Groundwater Development	No Infrastructure	Not Implemented	Too soon									No
CREEDMOOR-MAHA WSC	New LCRA contracts	$0	0	New water contract	No Infrastructure	Not Implemented	Too soon									Yes
DRIPPING SPRINGS	Amend LCRA contract	$0	493	Increased contract	No Infrastructure	Not Implemented	Other									No
DRIPPING SPRINGS	Municipal conservation	$0	81	Conservation - Municipal Conservation-Irrigation	Other	Currently Operating		n/a	$0	2011	Yes	748	n/a	2070	Unknown	Yes
DRIPPING SPRINGS WSC	Amend LCRA contract	$0	0	Increased contract	No Infrastructure	Currently Operating		1126	N/A							No
ELGIN	Drought management	$0	0	Drought Management	No Infrastructure	Currently Operating		n/a								Yes
ELGIN	Expansion of Carrizo-Wilcox Aquifer	$2,082,880	0	Groundwater Development	Wells	Not Implemented	Too soon									Yes
ELGIN	Municipal conservation	$0	91	Conservation - Municipal	No Infrastructure	Currently Operating				2011	Yes			2060		No
ELGIN	New LCRA contracts	$17,556,000	0	New water contract	Water Treatment Pla	Not Implemented	Too soon									Yes
FAYETTE WSC	Development of other aquifer	$2,887,868	0	Groundwater Development	Wells	Not Implemented	Too soon									No
FAYETTE WSC	Expansion of Gulf Coast Aquifer	$676,480	0	Groundwater Development	Wells	Not Implemented	Other									No
GOFORTH WSC	Water transfer	$0	11	Water tranfer between basins	No Infrastructure	Currently Operating		11	$0	2011						No
GOLDTHWAITE	Drought management	$0	56	Reduction - Voluntary and Mandatory Irrigation Measures (Residential and Commercial)	No Infrastructure	Currently Operating		n/a	$0	2011	No	1745		2070	Unknown	Yes
GOLDTHWAITE	Expansion of Trinity Aquifer	$1,352,960	109	2 new GW wells	Wells	All Phases Fully Implemented		68	n/a	2012	No				Unknown	No
GOLDTHWAITE	Goldthwaite Channel Dam	$1,841,800	300	In-channel dam	Impoundment	Permit Application Submitted/Pending										No
GOLDTHWAITE	Municipal conservation	$0	47	Conservation - Municipal	Other	Currently Operating		n/a	$0	2013	Yes	h of 10 gpcd		2070	Unknown	Yes
GOLDTHWAITE	New LCRA contracts	$0	300	New water contract	No Infrastructure	Not Implemented	Other									No
GRANITE SHOALS	Amend LCRA contract	$0	0	Increased contract	No Infrastructure	Not Implemented	Too soon									Yes
IRRIGATION, BASTROP	Expansion of Queen City Aquifer	$0	98	Groundwater Development	Wells	Currently Operating		n/a	$0	2011						No
IRRIGATION, BASTROP	Temporary drought period use of Queen City Aquifer	$0	21	Groundwater use beyond the MAG	No Infrastructure	Not Implemented	Other									No

Sponsor	Recommended Water Management Strategy	Capital Cost	SS2010	Project Description	Infrastructure Type*	At what level of Implementation is the project?*	If not implemented, why?*	Initial Volume of Water Provided (acft/yr)	Funds Expended to Date ($)	Year the Project is Online?*	Is this a phased project?*	(Phased) Ultimate Volume (acft/yr)	(Phased) Ultimate Project Cost ($)	Year project reaches maximum capacity?*	What is the project funding source(s)?*	Included in the 2016 Plan?*
IRRIGATION, COLORADO	City of Austin return flows	$0	1,876	Accessing return flows in system	No Infrastructure	Currently Operating			$0	2011						Yes
IRRIGATION, COLORADO	Downstream return flows	$0	0	Accessing return flows in system	No Infrastructure	Not Implemented	Too soon									No
IRRIGATION, COLORADO	Irrigation district conveyance improvements	$0	0	Irrigation Conservation	Other	Currently Operating		3430		2011						Yes
IRRIGATION, FAYETTE	Expansion of Sparta Aquifer	$0	20	Groundwater Development	Wells	Not Implemented	Other									No
IRRIGATION, MATAGORDA	City of Austin return flows	$0	16,728	Accessing return flows in system	No Infrastructure	Currently Operating			$0	2011						Yes
IRRIGATION, MATAGORDA	Downstream return flows	$0	0	Accessing return flows in system	No Infrastructure	Not Implemented	Too soon									No
IRRIGATION, MATAGORDA	House Bill 1437 on-farm conservation	$3,207,034	0	On-farm conservation	Other	Not Implemented	Too soon									No
IRRIGATION, MATAGORDA	Irrigation district conveyance improvements	$0	0	Irrigation Conservation	Other	Currently Operating		4900		2011						Yes
IRRIGATION, MILLS	Expansion of Trinity Aquifer	$0	289	Groundwater Development	Wells	Currently Operating		667	n/a	2011						Yes
IRRIGATION, MILLS	Water allocation	$0	50	Reallocation of supplies	No Infrastructure	Currently Operating		50	$0	2011						No
IRRIGATION, WHARTON	City of Austin return flows	$0	61	Accessing return flows in system	No Infrastructure	Currently Operating			$0	2011						Yes
IRRIGATION, WHARTON	Downstream return flows	$0	0	Accessing return flows in system	No Infrastructure	Not Implemented	Too soon									No
IRRIGATION, WHARTON	House Bill 1437 on-farm conservation	$610,863	4,000	On-farm conservation	Other	Sponsor Has Taken Official Action to Initiate Project										No
IRRIGATION, WHARTON	Irrigation district conveyance improvements	$0	0	Irrigation Conservation	Other	Currently Operating		1470	n/a	2011						Yes
JONESTOWN	Amend LCRA contract	$0	129	Increased contract	No Infrastructure	Not Implemented	Other									No
KINGSLAND WSC	Amend LCRA contract	$0	250	Increased contract	No Infrastructure	Currently Operating		650	$0	2011						No
LAKE LBJ MUD	Municipal conservation	$0	135	Conservation - Municipal	Other	Not Implemented	Other									No
LAKEWAY	Amend LCRA contract	$0	1,285	Increased contract	No Infrastructure	Not Implemented	Too soon									No
LAKEWAY	Municipal conservation	$0	396	Conservation- Municipal Conservation - Irrigation Conservation - Other Conservation - Industrial	No Infrastructure	Currently Operating		n/a	$0	2011	Yes	reduction to 176 gpcd		2060	Unknown	Yes
LIVESTOCK, BURNET	Expansion of Trinity Aquifer	$226,780	23	Groundwater Development	Wells	Not Implemented	Other									No
LIVESTOCK, COLORADO	Expansion of Gulf Coast Aquifer	$246,500	25	Groundwater Development	Wells	Not Implemented	Other									No
LIVESTOCK, FAYETTE	Development of other aquifer	$216,920	22	Groundwater Development	Wells	Not Implemented	Other									No
LIVESTOCK, LLANO	Expansion of Hickory Aquifer	$611,320	62	Groundwater Development	Wells	Not Implemented	Other									No
LIVESTOCK, MATAGORDA	Expansion of Gulf Coast Aquifer	$552,160	56	Groundwater Development	Wells	Not Implemented	Other									No
LLANO	Development of Ellenburger-San Saba Aquifer	$3,624,413	478	Groundwater Development	Wells	Not Implemented	Other									No
LLANO	Development of Hickory Aquifer	$4,697,200	512	Groundwater Development	Wells	Sponsor Has Taken Official Action to Initiate Project										Yes
LLANO	Municipal conservation	$0	100	Conservation - Municipal	Other	Currently Operating		n/a		2011	Yes			2060		Yes
LOWER COLORADO RIVER AUTHORITY	Amend LCRA contract	$0	846	Increased contract	No Infrastructure	Currently Operating		n/a		2011	Yes			2060		Yes
LOWER COLORADO RIVER AUTHORITY	Aquifer storage and recovery	$168,711,000	0	Aquifer Storage and Recovery	Wells	Not Implemented	Too soon									Yes
LOWER COLORADO RIVER AUTHORITY	Conjunctive use of groundwater - includes overdraft	$0	0	Groundwater Development	No Infrastructure	All Phases Fully Implemented		n/a		2012						No
LOWER COLORADO RIVER AUTHORITY	Development of new rice varieties	$0	0	Conservation - Irrigation	No Infrastructure	Not Implemented	Other									No
LOWER COLORADO RIVER AUTHORITY	Enhanced municipal and industrial conservation	$0	0	Conservation - Municipal and Industrial	Other	Currently Operating		2700		2011	Yes			2060		Yes

Table 11A-1: Summary of TWDB Template Containing Survey Results of Implementation Status of Water Management Strategies from the 2011 Region K Water Plan

Sponsor	Recommended Water Management Strategy	Capital Cost	SS2010	Project Description	Infrastructure Type*	At what level of Implementation is the project?*	If not implemented, why?*	Initial Volume of Water Provided (acft/yr)	Funds Expended to Date ($)	Year the Project is Online?*	Is this a phased project?*	(Phased) Ultimate Volume (acft/yr)	(Phased) Ultimate Project Cost ($)	Year project reaches maximum capacity?*	What is the project funding source(s)?*	Included in the 2016 Plan?*
LOWER COLORADO RIVER AUTHORITY	Firm-up run-of-river with off-channel reservoir - LCRA/SAWS project (Region K Component)	$0	0	Lane City reservoir	Other	Under Construction										Yes
LOWER COLORADO RIVER AUTHORITY	LCRA Water Management Plan interruptible water supply	$0	255,493	Implementation of water management plan	No Infrastructure	All Phases Fully Implemented				2011						Yes
LOWER COLORADO RIVER AUTHORITY	On-farm conservation	$0	0	On-farm conservation		Currently Operating		see Irrigation		2011						Yes
LOWER COLORADO RIVER AUTHORITY	Reuse by Highland Lakes communities	$15,920,000	0	Reuse	Pipeline	Currently Operating		n/a	n/a	2011						No
MANOR	Municipal conservation	$0	102	Conservation - Municipal	Other	Currently Operating				2011	Yes			2060		No
MANOR	New LCRA contracts	$0	0	New water contract	No Infrastructure	Not Implemented	Too soon									No
MANUFACTURING, BASTROP	Expansion of Carrizo-Wilcox Aquifer	$0	8	Groundwater Development	No Infrastructure	Not Implemented	Too soon									Yes
MANUFACTURING, FAYETTE	Expansion of Gulf Coast Aquifer	$0	0	Groundwater Development	No Infrastructure	Not Implemented	Too soon									Yes
MANUFACTURING, FAYETTE	Expansion of Sparta Aquifer	$0	45	Groundwater Development	No Infrastructure	Not Implemented	Too soon									No
MANUFACTURING, HAYS	Development of Trinity Aquifer	$4,084,198	0	Groundwater Development	Wells	Not Implemented	Too soon									No
MANUFACTURING, HAYS	Drought management	$0	257	Drought Management	No Infrastructure	All Phases Fully Implemented				2011						No
MANUFACTURING, MATAGORDA	Temporary drought period use of Gulf Coast Aquifer	$0	0	Groundwater Development	No Infrastructure	Not Implemented	Other									No
MANUFACTURING, WHARTON	Expansion of Gulf Coast Aquifer	$0	0	Groundwater Development	No Infrastructure	Not Implemented	Too soon									No
MANVILLE WSC	New LCRA contracts	$0	0	New water contract	No Infrastructure	Not Implemented	Too soon									Yes
MARBLE FALLS	Amend LCRA contract	$0	0	Increased contract	No Infrastructure	Not Implemented										Yes
MARBLE FALLS	Municipal conservation	$0	199	Conservation - Municipal	Other	Currently Operating		n/a		2011	Yes			2060		Yes
MEADOWLAKES	Amend LCRA contract	$0	241	Increased contract	No Infrastructure	Not Implemented	Too soon									No
MEADOWLAKES	Municipal conservation	$0	77	Conservation - Municipal Conservation - Irrigation	Other	Currently Operating		n/a	$0	2011	Yes			2060	Unknown	Yes
MINING, BASTROP	Expansion of Carrizo-Wilcox Aquifer	$3,219,360	4,293	Groundwater Development	Wells	Not Implemented	Other									No
MINING, BURNET	Expansion of Ellenburger-San Saba Aquifer	$6,114,960	681	Groundwater Development	Wells	Not Implemented	Other									Yes
MINING, BURNET	Expansion of Trinity Aquifer	$0	7	Groundwater Development	No Infrastructure	Currently Operating		246	$0							No
MINING, COLORADO	Development of other aquifer	$0	4,269	Groundwater Development	No Infrastructure	Not Implemented	Too soon									No
MINING, COLORADO	Expansion of Gulf Coast Aquifer	$0	4,300	Groundwater Development	No Infrastructure	Currently Operating		2121	$0							No
MINING, FAYETTE	Expansion of Gulf Coast Aquifer	$0	0	Groundwater Development	No Infrastructure	Not Implemented	Too soon									Yes
MOUNTAIN CITY	Drought management	$0	39	Drought Management	No Infrastructure	All Phases Fully Implemented		n/a	n/a	2011						No
MOUNTAIN CITY	Municipal conservation	$0	2	Conservation - Municipal	Other	Currently Operating		n/a	n/a	2011						No
PFLUGERVILLE	Amend LCRA contract	$0	0	Increased contract	No Infrastructure	Not Implemented	Too soon									Yes
PFLUGERVILLE	Municipal conservation	$0	541	Conservation - Municipal Conservation - Irrigation Conservation - Other	Other	Currently Operating		n/a	$0	2011	Yes			2060	Unknown	Yes
POLONIA WSC	Expansion of Carrizo-Wilcox Aquifer	$0	0	Expand supply from groundwater	No Infrastructure	Not Implemented	Too soon									No
RICHLAND SUD	Municipal conservation	$0	13	Conservation - Municipal	No Infrastructure	Currently Operating		n/a								No
RIVER PLACE ON LAKE AUSTIN	Amend LCRA contract	$0	438	Increased contract	No Infrastructure	Not Implemented	Other									No

Table 11A-1: Summary of TWDB Template Containing Survey Results of Implementation Status of Water Management Strategies from the 2011 Region K Water Plan

Sponsor	Recommended Water Management Strategy	Capital Cost	SS2010	Project Description	Infrastructure Type*	At what level of Implementation is the project?*	If not implemented, why?*	Initial Volume of Water Provided (acft/yr)	Funds Expended to Date ($)	Year the Project is Online?*	Is this a phased project?*	(Phased) Ultimate Volume (acft/yr)	(Phased) Ultimate Project Cost ($)	Year project reaches maximum capacity?*	What is the project funding source(s)?*	Included in the 2016 Plan?*
RIVER PLACE ON LAKE AUSTIN	Municipal conservation	$0	132	Conservation - Municipal Conservation- Irrigation	Other	Currently Operating		424	$0	2011	Yes	339.2		2060	Other	Yes
ROLLINGWOOD	Municipal conservation	$0	31	Conservation - Municipal	Other	Currently Operating		n/a		2011	Yes			2060		Yes
ROLLINGWOOD	New LCRA contracts	$0	0	New water contract	No Infrastructure	Not Implemented	Too soon									Yes
ROUND ROCK	House Bill 1437 for Williamson County	$0	126	Water from BRA	No Infrastructure	Currently Operating		233	n/a							No
ROUND ROCK	Municipal conservation	$0	32	Conservation - Municipal	Other	Currently Operating		n/a	n/a	2011	Yes			2060		Yes
SCHULENBURG	Expansion of Yegua-Jackson Aquifer	$0	0	Expand supply from groundwater	No Infrastructure	Not Implemented	Too soon									No
SCHULENBURG	Municipal conservation	$0	43	Conservation - Municipal	Other	Currently Operating		n/a	n/a	2012	Yes			2060		Yes
SMITHVILLE	Development of Queen City Aquifer	$4,190,135	0	Groundwater Development	Wells	Not Implemented	Too soon									Yes
SMITHVILLE	Drought management	$0	0	Drought Management	No Infrastructure	Not Implemented	Too soon									Yes
SMITHVILLE	Expansion of Carrizo-Wilcox Aquifer	$1,041,440	49	Groundwater Development	Wells	Currently Operating		1018	n/a	2011						No
SMITHVILLE	Municipal conservation	$0	25	Conservation - Municipal	Other	Currently Operating		n/a	n/a	2012	Yes			2060		Yes
STEAM ELECTRIC POWER, BASTROP	Amend LCRA contract	$0	0	Increased contract	No Infrastructure	Not Implemented	Too soon									No
STEAM ELECTRIC POWER, FAYETTE	New LCRA contracts	$0	0	New water contract	No Infrastructure	Not Implemented	Too soon									No
STEAM ELECTRIC POWER, MATAGORDA	Blend brackish surface water in South Texas Project Nuclear Operating Company Reservoir	$0	0	Blend brackish surface water	No Infrastructure	Not Implemented	Other									Yes
STEAM ELECTRIC POWER, MATAGORDA	City of Austin return flows	$0	1,000	Accessing return flows in system	No Infrastructure	Currently Operating		n/a								Yes
STEAM ELECTRIC POWER, MATAGORDA	Downstream return flows	$0	0	Accessing return flows in system	No Infrastructure	Not Implemented	Too soon									No
STEAM ELECTRIC POWER, MATAGORDA	Expand supply from South Texas Project Nuclear Operating Company Reservoir	$0	193	Expand supply from reservoir	No Infrastructure	Not Implemented	Other									No
STEAM ELECTRIC POWER, MATAGORDA	New LCRA contracts	$0	0	New water contract	No Infrastructure	Not Implemented	Other									No
STEAM ELECTRIC POWER, MATAGORDA	Water right permit amendment	$0	0	Water right permit amendment	No Infrastructure	Permit Application Submitted/Pending										Yes
STEAM ELECTRIC POWER, WHARTON	Development of Gulf Coast Aquifer	$164,000	0	Groundwater Development	Wells	Not Implemented	Too soon									Yes
TRAVIS COUNTY WCID #18	Amend LCRA contract	$0	0	Increased contract	No Infrastructure	Currently Operating		1736	$0							No
WEST LAKE HILLS	Municipal conservation	$0	139	Conservation - Municipal	Other	Currently Operating		n/a		2011	Yes			2060		Yes
WEST LAKE HILLS	New LCRA contracts	$0	0	New water contract	No Infrastructure	Not Implemented	Too soon									Yes
WEST TRAVIS COUNTY REGIONAL WS	Municipal conservation	$0	17	Conservation - Municipal	Other	Not Implemented	Other									No
WHARTON	Municipal conservation	$0	41	Conservation - Municipal	No Infrastructure	Currently Operating		n/a	$0	2011	Yes			2070	Unknown	Yes
WINDERMERE UTILITY COMPANY	New LCRA contracts	$0	0	New water contract	No Infrastructure	Not Implemented	Too soon		$0							No

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Table 11A.2: Full TWDB Template Containing Survey Results of Implementation Status of Water Management Strategies from the 2011 Region K Water Plan

Sponsor Region	WMS Sponsor Entity Id	Sponsor	Recommended Water Management Strategy	DB Project Id	Capital Cost	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060	Y denotes strategies with supply volumes included in other strategies	Project Description	Infrastructure Type*	At what level of Implementation is the project?*	If not implemented, why?*	Initial Volume of Water Provided (acft/yr)	Funds Expended to Date ($)	Project Cost ($) (should include development and construction costs)	Year the Project is Online?*
K	194	AQUA WSC	Additional municipal conservation	756	$0	0	0	0	122	396	908	N	Conservation- Municipal Conservation-Industrial	Other	Currently Operating		n/a	$0		2011
K	194	AQUA WSC	Drought management	757	$0	0	0	0	0	0	898	N	Conservation - Voluntary Irrigation Measures (Residential and Commercial)	No Infrastructure	Currently Operating		n/a	$0	$0	2011
K	194	AQUA WSC	Expansion of Carrizo-Wilcox Aquifer	350	$6,248,640	0	0	602	3,709	6,109	7,850	N	Groundwater Expansion	Wells	Not Implemented	Too soon		$0		
K	7	AUSTIN	City of Austin conservation	344	$0	11,030	18,795	24,036	25,385	30,401	36,370	N	Conservation - Municipal	Other	Currently Operating		11,030			2011
K	7	AUSTIN	City of Austin direct reuse (municipal and manufacturing)	403	$302,250,510	5,143	13,620	22,077	30,268	36,218	40,468	N	Direct Reuse	Pipeline	Currently Operating		5,143			2011
K	7	AUSTIN	City of Austin direct reuse (steam-electric)	404	$302,250,510	2,315	3,315	7,315	8,315	12,315	13,315	N	Direct Reuse	Pipeline	Currently Operating		2,315			2011
K	7	AUSTIN	City of Austin return flows	384	$0	27,188	24,954	25,962	33,549	33,263	39,528	N	accessing return flows in system	No Infrastructure	Currently Operating		27,188	$0	0	2011
K	7	AUSTIN	Downstream return flows	386	$0	0	0	238	950	1,781	2,375	N	accessing return flows in system	No Infrastructure	Not Implemented	Too soon				
K	221	BARTON CREEK WEST WSC	Municipal conservation	220	$0	37	68	97	123	147	163	N	Conservation - Municipal	Other	Currently Operating		n/a			2011
K	221	BARTON CREEK WEST WSC	Purchase water from West Travis County Regional Water Supply	629	$0	16	0	0	0	0	0	N	Increased contract	No Infrastructure	Not Implemented	Other				
K	224	BASTROP	Expansion of other aquifer	365	$1,721,920	0	416	777	1,366	2,017	2,814	N	Groundwater Expansion	Wells	Not Implemented	Other				
K	224	BASTROP	Municipal conservation	220	$0	146	396	755	1,224	1,438	1,728	N	Conservation - Municipal	Other	Currently Operating		n/a			2011
K	225	BASTROP COUNTY WCID #2	Expansion of Carrizo-Wilcox Aquifer	350	$0	0	0	0	0	0	144	N	Groundwater Expansion	Wells	Not Implemented	Too soon				
K	233	BEE CAVE VILLAGE	Municipal conservation	220	$0	106	247	417	600	778	965	N	Conservation - Municipal	Other	Currently Operating		n/a			2011
K	233	BEE CAVE VILLAGE	Purchase water from West Travis County Regional Water Supply	629	$0	830	925	989	1,015	990	958	N	Increased contract	No Infrastructure	Not Implemented	Other				
K	245	BERTRAM	Expansion of Ellenburger-San Saba	354	$0	0	0	0	0	0	24	N	Groundwater Expansion	No Infrastructure	Not Implemented	Too soon				
K	245	BERTRAM	Municipal conservation	220	$0	22	54	80	91	96	106	N	Conservation - Municipal	Other	Currently Operating		369.8	$0		2011
K	289	BRIARCLIFF VILLAGE	Amend LCRA contract	348	$0	0	0	0	21	47	74	N	Increased contract	No Infrastructure	Currently Operating		400			
K	289	BRIARCLIFF VILLAGE	Municipal conservation	220	$0	16	39	61	66	70	75	N	Conservation - Municipal	Other	Currently Operating					2011
K	307	BUDA	Development of Carrizo-Wilcox	367	$6,807,200	0	1,687	1,687	1,687	1,687	1,687	N	HCPUA Pipeline	Pipeline	Feasibility Study Ongoing					
K	307	BUDA	Development of saline zone of Edwards-Balcones Fault Zone Aquifer	788	$1,391,124	0	0	0	0	0	500	N	Groundwater Development	Wells	Feasibility Study Ongoing					
K	356	CIMARRON PARK WATER COMPANY	Development of saline zone of Edwards-Balcones Fault Zone Aquifer	788	$1,669,349	0	0	250	350	500	600	N	Groundwater Development	Wells	Feasibility Study Ongoing					
K	356	CIMARRON PARK WATER COMPANY	Drought management	757	$0	109	109	109	109	109	109	N	Reduction - Voluntary and Mandatory Irrigation Measures (Residential and Commercial)	No Infrastructure	Currently Operating		n/a	$0		2011
K	356	CIMARRON PARK WATER COMPANY	Municipal conservation	220	$0	24	17	13	9	5	7	N	Conservation - Municipal Conservation-Irrigation Conservation - Other	No Infrastructure	Currently Operating		n/a	$0		2011

Table 11A-2: Full TWDB Template Containing Survey Results of Implementation Status of Water Management Strategies from the 2011 Region K Water Plan

Sponsor Region	WMS Sponsor Entity Id	Sponsor	Recommended Water Management Strategy	DB Project Id	Capital Cost	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060	Y denotes strategies with supply volumes included in other strategies	Project Description	Infrastructure Type*	At what level of Implementation is the project?*	If not implemented, why?*	Initial Volume of Water Provided (acft/yr)	Funds Expended to Date ($)	Project Cost ($) (should include development and construction costs)	Year the Project is Online?*
K	356	CIMARRON PARK WATER COMPANY	Water allocation	450	$0	17	110	0	0	0	0	N	Water allocation	No Infrastructure	Not Implemented	Other				
K	409	COTTONWOOD SHORES	Amend LCRA contract	348	$0	26	198	386	601	840	1,130	N	Increased contract	No Infrastructure	Currently Operating		495	$0	0	
K	422	COUNTY-OTHER, BASTROP	Additional municipal conservation	756	$0	0	0	0	400	631	936	N	Conservation - Municipal	Other	Not Implemented	Too soon				
K	422	COUNTY-OTHER, BASTROP	Development of Carrizo-Wilcox Aquifer	367	$5,434,871	0	0	0	0	975	1,246	N	Groundwater Development	Wells	Not Implemented	Too soon				
K	422	COUNTY-OTHER, BASTROP	Expansion of Carrizo-Wilcox Aquifer	350	$4,280,640	0	663	1,879	3,037	2,922	3,700	N	Groundwater Development	Wells	Not Implemented	Too soon				
K	427	COUNTY-OTHER, BLANCO	Development of Ellenburger-San Saba Aquifer	758	$1,977,110	0	0	0	0	41	64	N	Groundwater Development	Wells	Not Implemented	Too soon				
K	438	COUNTY-OTHER, BURNET	Expansion of Ellenburger-San Saba Aquifer	354	$8,367,840	0	0	0	418	804	1,179	N	Groundwater Development	Wells	Not Implemented	Too soon				
K	438	COUNTY-OTHER, BURNET	Expansion of Trinity Aquifer	363	$2,029,440	0	0	480	480	541	541	N	Groundwater Development	Wells	Not Implemented	Too soon				
K	456	COUNTY-OTHER, COLORADO	Expansion of Gulf Coast Aquifer	355	$0	105	109	106	97	93	90	N	Groundwater Development	Wells	Not Implemented	Too soon				
K	486	COUNTY-OTHER, FAYETTE	Expansion of Gulf Coast Aquifer	355	$0	0	0	0	32	25	16	N	Groundwater Development	Wells	Not Implemented	Too soon				
K	486	COUNTY-OTHER, FAYETTE	Expansion of Sparta Aquifer	362	$0	123	120	19	0	0	0	N	Groundwater Development	Wells	Not Implemented	Too soon				
K	516	COUNTY-OTHER, HAYS	Development of saline zone of Edwards-Balcones Fault Zone Aquifer	788	$16,693,491	0	250	2,500	2,500	5,000	6,000	N	Groundwater Development	Wells	Feasibility Study Ongoing					
K	516	COUNTY-OTHER, HAYS	Purchase water from City of Austin	374	$2,280,200	1,100	1,100	1,100	1,100	1,100	1,100	N	Water purchase	Pipeline	All Phases Fully Implemented		1100	n/a		2013
K	561	COUNTY-OTHER, LLANO	Municipal conservation	220	$0	873	1,150	1,408	1,568	1,724	1,890	N	Conservation - Municipal	Other	Currently Operating					2012
K	578	COUNTY-OTHER, MILLS	Expansion of Trinity Aquifer	363	$0	0	0	0	0	41	61	N	Groundwater Development	No Infrastructure	Not Implemented	Too soon				
K	670	CREEDMOOR-MAHA WSC	New LCRA contracts	346	$0	0	431	548	632	715	807	N	New water contract	No Infrastructure	Not Implemented	Too soon				
K	720	DRIPPING SPRINGS	Amend LCRA contract	348	$0	493	1,073	1,321	1,690	2,133	2,482	N	Increased contract	No Infrastructure	Not Implemented	Other				
K	720	DRIPPING SPRINGS	Municipal conservation	220	$0	81	277	470	549	661	748	N	Conservation - Municipal Conservation-Irrigation	Other	Currently Operating		n/a	$0		2011
K	721	DRIPPING SPRINGS WSC	Amend LCRA contract	348	$0	0	0	0	17	213	366	N	Increased contract	No Infrastructure	Currently Operating		1126	N/A	N/A	
K	757	ELGIN	Drought management	757	$0	0	0	0	0	0	265	N	Drought Management	No Infrastructure	Currently Operating		n/a			
K	757	ELGIN	Expansion of Carrizo-Wilcox Aquifer	350	$2,082,880	0	525	1,136	2,033	2,735	403	N	Groundwater Development	Wells	Not Implemented	Too soon				
K	757	ELGIN	Municipal conservation	220	$0	91	79	40	0	0	0	N	Conservation - Municipal	No Infrastructure	Currently Operating					2011
K	757	ELGIN	New LCRA contracts	346	$17,556,000	0	0	0	0	0	3,000	N	New water contract	Water Treatment Pla	Not Implemented	Too soon				
K	776	FAYETTE WSC	Development of other aquifer	371	$2,887,868	0	0	79	291	548	889	N	Groundwater Development	Wells	Not Implemented	Too soon				
K	776	FAYETTE WSC	Expansion of Gulf Coast Aquifer	355	$676,480	0	257	473	491	514	544	N	Groundwater Development	Wells	Not Implemented	Other				
K	843	GOFORTH WSC	Water transfer	447	$0	11	21	30	37	43	48	N	Water tranfer between basins	No Infrastructure	Currently Operating		11	$0		2011
K	844	GOLDTHWAITE	Drought management	757	$0	56	56	56	56	56	56	N	Reduction - Voluntary and Mandatory Irrigation Measures (Residential and Commercial)	No Infrastructure	Currently Operating		n/a	$0		2011
K	844	GOLDTHWAITE	Expansion of Trinity Aquifer	363	$1,352,960	109	123	232	232	325	288	N	2 new GW wells	Wells	All Phases Fully Implemented		68	n/a		2012
K	844	GOLDTHWAITE	Goldthwaite Channel Dam	380	$1,841,800	300	300	300	300	300	300	N	In-channel dam	Impoundment	Permit Application Submitted/Pending					
K	844	GOLDTHWAITE	Municipal conservation	220	$0	47	100	147	187	223	259	N	Conservation - Municipal	Other	Currently Operating		n/a	$0	n/a	2013
K	844	GOLDTHWAITE	New LCRA contracts	346	$0	300	300	300	300	300	300	Y	New water contract	No Infrastructure	Not Implemented	Other				
K	857	GRANITE SHOALS	Amend LCRA contract	348	$0	0	0	0	0	14	95	N	Increased contract	No Infrastructure	Not Implemented	Too soon				
K	989	IRRIGATION, BASTROP	Expansion of Queen City Aquifer	360	$0	98	40	40	31	24	17	N	Groundwater Development	Wells	Currently Operating		n/a	$0		2011
K	989	IRRIGATION, BASTROP	Temporary drought period use of Queen City Aquifer	787	$0	21	10	0	0	0	0	N	Groundwater use beyond the MAG	No Infrastructure	Not Implemented	Other				

Table 11A-2: Full TWDB Template Containing Survey Results of Implementation Status of Water Management Strategies from the 2011 Region K Water Plan

Sponsor Region	WMS Sponsor Entity Id	Sponsor	Recommended Water Management Strategy	DB Project Id	Capital Cost	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060	Y denotes strategies with supply volumes included in other strategies	Project Description	Infrastructure Type*	At what level of Implementation is the project?*	If not implemented, why?*	Initial Volume of Water Provided (acft/yr)	Funds Expended to Date ($)	Project Cost ($) (should include development and construction costs)	Year the Project is Online?*
K	1022	IRRIGATION, COLORADO	City of Austin return flows	384	$0	1,876	2,206	2,836	3,464	3,790	4,761	N	Accessing return flows in system	No Infrastructure	Currently Operating			$0		2011
K	1022	IRRIGATION, COLORADO	Downstream return flows	386	$0	0	0	19	84	168	223	N	Accessing return flows in system	No Infrastructure	Not Implemented	Too soon				
K	1022	IRRIGATION, COLORADO	Irrigation district conveyance improvements	391	$0	0	22,338	22,338	22,338	22,338	22,338	N	Irrigation Conservation	Other	Currently Operating		3430			2011
K	1051	IRRIGATION, FAYETTE	Expansion of Sparta Aquifer	362	$0	20	18	16	14	12	10	N	Groundwater Development	Wells	Not Implemented	Other				
K	1131	IRRIGATION, MATAGORDA	City of Austin return flows	384	$0	16,728	17,360	19,882	24,076	26,290	28,715	N	Accessing return flows in system	No Infrastructure	Currently Operating			$0		2011
K	1131	IRRIGATION, MATAGORDA	Downstream return flows	386	$0	0	0	193	761	1,413	1,883	N	Accessing return flows in system	No Infrastructure	Not Implemented	Too soon				
K	1131	IRRIGATION, MATAGORDA	House Bill 1437 on-farm conservation	399	$3,207,034	0	0	0	0	10,800	21,000	N	On-farm conservation	Other	Not Implemented	Too soon				
K	1131	IRRIGATION, MATAGORDA	Irrigation district conveyance improvements	391	$0	0	15,250	15,250	15,250	15,250	15,250	N	Irrigation Conservation	Other	Currently Operating		4900			2011
K	1137	IRRIGATION, MILLS	Expansion of Trinity Aquifer	363	$0	289	275	241	180	193	186	N	Groundwater Development	Wells	Currently Operating		667	n/a		2011
K	1137	IRRIGATION, MILLS	Water allocation	450	$0	50	0	0	0	0	0	N	Reallocation of supplies	No Infrastructure	Currently Operating		50	$0		2011
K	1205	IRRIGATION, WHARTON	City of Austin return flows	384	$0	61	121	182	241	302	362	N	Accessing return flows in system	No Infrastructure	Currently Operating			$0		2011
K	1205	IRRIGATION, WHARTON	Downstream return flows	386	$0	0	0	1	5	13	19	N	Accessing return flows in system	No Infrastructure	Not Implemented	Too soon				
K	1205	IRRIGATION, WHARTON	House Bill 1437 on-farm conservation	399	$610,863	4,000	4,000	4,000	4,000	4,000	4,000	N	On-farm conservation	Other	Sponsor Has Taken Official Action to Initiate Project					
K	1205	IRRIGATION, WHARTON	Irrigation district conveyance improvements	391	$0	0	27,412	27,412	27,412	27,412	27,412	N	Irrigation Conservation	Other	Currently Operating		1470	n/a		2011
K	1240	JONESTOWN	Amend LCRA contract	348	$0	129	233	329	416	481	554	N	Increased contract	No Infrastructure	Not Implemented	Other				
K	1266	KINGSLAND WSC	Amend LCRA contract	348	$0	250	251	252	253	254	257	N	Increased contract	No Infrastructure	Currently Operating		650	$0	0	2011
K	1294	LAKE LBJ MUD	Municipal conservation	220	$0	135	290	420	541	666	777	N	Conservation - Municipal	Other	Not Implemented	Other				
K	1302	LAKEWAY	Amend LCRA contract	348	$0	1,285	1,675	1,934	2,041	2,041	2,041	N	Increased contract	No Infrastructure	Not Implemented	Too soon				
K	1302	LAKEWAY	Municipal conservation	220	$0	396	938	1,579	2,297	3,017	3,765	N	Conservation- Municipal Conservation - Irrigation Conservation - Other Conservation - Industrial	No Infrastructure	Currently Operating		n/a	$0		2011
K	1358	LIVESTOCK, BURNET	Expansion of Trinity Aquifer	363	$226,780	23	23	23	23	23	23	N	Groundwater Development	Wells	Not Implemented	Other				
K	1376	LIVESTOCK, COLORADO	Expansion of Gulf Coast Aquifer	355	$246,500	25	25	25	25	25	25	N	Groundwater Development	Wells	Not Implemented	Other				
K	1406	LIVESTOCK, FAYETTE	Development of other aquifer	371	$216,920	22	22	22	22	22	22	N	Groundwater Development	Wells	Not Implemented	Other				
K	1481	LIVESTOCK, LLANO	Expansion of Hickory Aquifer	357	$611,320	62	62	62	62	62	62	N	Groundwater Development	Wells	Not Implemented	Other				
K	1492	LIVESTOCK, MATAGORDA	Expansion of Gulf Coast Aquifer	355	$552,160	56	56	56	56	56	56	N	Groundwater Development	Wells	Not Implemented	Other				
K	1587	LLANO	Development of Ellenburger-San Saba Aquifer	369	$3,624,413	478	478	478	478	478	478	N	Groundwater Development	Wells	Not Implemented	Other				
K	1587	LLANO	Development of Hickory Aquifer	878	$4,697,200	512	488	406	331	261	196	N	Groundwater Development	Wells	Sponsor Has Taken Official Action to Initiate Project					
K	1587	LLANO	Municipal conservation	220	$0	100	205	299	383	468	558	N	Conservation - Municipal	Other	Currently Operating		n/a			2011
K	87	LOWER COLORADO RIVER AUTHORITY	Amend LCRA contract	348	$0	846	925	989	1,015	990	958	N	Increased contract	No Infrastructure	Currently Operating		n/a			2011
K	87	LOWER COLORADO RIVER AUTHORITY	Aquifer storage and recovery	808	$168,711,000	0	0	0	10,000	10,000	10,000	N	Aquifer Storage and Recovery	Wells	Not Implemented	Too soon				
K	87	LOWER COLORADO RIVER AUTHORITY	Conjunctive use of groundwater - includes overdraft	392	$0	0	62,000	62,000	62,000	62,000	62,000	N	Groundwater Development	No Infrastructure	All Phases Fully Implemented		n/a			2012
K	87	LOWER COLORADO RIVER AUTHORITY	Development of new rice varieties	395	$0	0	40,800	40,800	40,800	40,800	40,800	N	Conservation - Irrigation	No Infrastructure	Not Implemented	Other				
K	87	LOWER COLORADO RIVER AUTHORITY	Enhanced municipal and industrial conservation	806	$0	0	0	2,000	10,000	20,000	20,000	N	Conservation - Municipal and Industrial	Other	Currently Operating		2700			2011

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K	87	LOWER COLORADO RIVER AUTHORITY	Firm-up run-of-river with off-channel reservoir - LCRA/SAWS project (Region K Component)	398	$0	0	0	0	0	0	47,000	N	Lane City reservoir	Other	Under Construction					
K	87	LOWER COLORADO RIVER AUTHORITY	LCRA Water Management Plan interruptible water supply	387	$0	255,493	196,568	137,643	78,718	19,793	0	N	Implementation of water management plan	No Infrastructure	All Phases Fully Implemented					2011
K	87	LOWER COLORADO RIVER AUTHORITY	On-farm conservation	388	$0	0	34,150	34,150	34,150	34,150	34,150	N	On-farm conservation		Currently Operating		see Irrigation			2011
K	87	LOWER COLORADO RIVER AUTHORITY	Reuse by Highland Lakes communities	807	$15,920,000	0	500	2,000	5,000	5,000	5,000	N	Reuse	Pipeline	Currently Operating		n/a	n/a		2011
K	1620	MANOR	Municipal conservation	220	$0	102	235	393	490	522	557	N	Conservation - Municipal	Other	Currently Operating					2011
K	1620	MANOR	New LCRA contracts	346	$0	0	705	780	900	1,030	1,160	N	New water contract	No Infrastructure	Not Implemented	Too soon				
K	1627	MANUFACTURING, BASTROP	Expansion of Carrizo-Wilcox Aquifer	350	$0	8	17	28	38	46	60	N	Groundwater Development	No Infrastructure	Not Implemented	Too soon				
K	1669	MANUFACTURING, FAYETTE	Expansion of Gulf Coast Aquifer	355	$0	0	0	0	2	20	43	N	Groundwater Development	No Infrastructure	Not Implemented	Too soon				
K	1669	MANUFACTURING, FAYETTE	Expansion of Sparta Aquifer	362	$0	45	70	94	115	117	119	N	Groundwater Development	No Infrastructure	Not Implemented	Too soon				
K	1690	MANUFACTURING, HAYS	Development of Trinity Aquifer	370	$4,084,198	0	0	75	200	301	400	N	Groundwater Development	Wells	Not Implemented	Too soon				
K	1690	MANUFACTURING, HAYS	Drought management	757	$0	257	257	257	257	257	257	N	Drought Management	No Infrastructure	All Phases Fully Implemented					2011
K	1729	MANUFACTURING, MATAGORDA	Temporary drought period use of Gulf Coast Aquifer	786	$0	0	0	0	0	0	47	N	Groundwater Development	No Infrastructure	Not Implemented	Other				
K	1786	MANUFACTURING, WHARTON	Expansion of Gulf Coast Aquifer	355	$0	0	0	0	0	0	8	N	Groundwater Development	No Infrastructure	Not Implemented	Too soon				
K	1797	MANVILLE WSC	New LCRA contracts	346	$0	0	0	831	2,184	2,584	3,034	N	New water contract	No Infrastructure	Not Implemented	Too soon				
K	1798	MARBLE FALLS	Amend LCRA contract	348	$0	0	0	56	304	275	248	N	Increased contract	No Infrastructure	Not Implemented					
K	1798	MARBLE FALLS	Municipal conservation	220	$0	199	510	920	1,415	1,879	2,405	N	Conservation - Municipal	Other	Currently Operating		n/a			2011
K	1821	MEADOWLAKES	Amend LCRA contract	348	$0	241	382	506	593	593	593	N	Increased contract	No Infrastructure	Not Implemented	Too soon				
K	1821	MEADOWLAKES	Municipal conservation	220	$0	77	194	351	537	710	897	N	Conservation - Municipal Conservation - Irrigation	Other	Currently Operating		n/a	$0		2011
K	1852	MINING, BASTROP	Expansion of Carrizo-Wilcox Aquifer	350	$3,219,360	4,293	4,297	4,298	0	0	0	N	Groundwater Development	Wells	Not Implemented	Other				
K	1867	MINING, BURNET	Expansion of Ellenburger-San Saba Aquifer	354	$6,114,960	681	756	788	811	829	873	N	Groundwater Development	Wells	Not Implemented	Other				
K	1867	MINING, BURNET	Expansion of Trinity Aquifer	363	$0	7	10	12	22	24	25	N	Groundwater Development	No Infrastructure	Currently Operating		246	$0		
K	1883	MINING, COLORADO	Development of other aquifer	371	$0	4,269	4,269	4,269	4,269	4,269	4,269	N	Groundwater Development	No Infrastructure	Not Implemented	Too soon				
K	1883	MINING, COLORADO	Expansion of Gulf Coast Aquifer	355	$0	4,300	3,810	2,977	1,842	423	598	N	Groundwater Development	No Infrastructure	Currently Operating		2121	$0		
K	1908	MINING, FAYETTE	Expansion of Gulf Coast Aquifer	355	$0	0	4	22	28	29	29	N	Groundwater Development	No Infrastructure	Not Implemented	Too soon				
K	2089	MOUNTAIN CITY	Drought management	757	$0	39	39	39	39	39	39	N	Drought Management	No Infrastructure	All Phases Fully Implemented		n/a	n/a		2011
K	2089	MOUNTAIN CITY	Municipal conservation	220	$0	2	0	0	0	0	0	N	Conservation - Municipal	Other	Currently Operating		n/a	n/a		2011
K	2196	PFLUGERVILLE	Amend LCRA contract	348	$0	0	0	0	0	3	995	N	Increased contract	No Infrastructure	Not Implemented	Too soon				
K	2196	PFLUGERVILLE	Municipal conservation	220	$0	541	748	810	844	915	986	N	Conservation - Municipal Conservation - Irrigation Conservation - Other	Other	Currently Operating		n/a	$0		2011
K	2218	POLONIA WSC	Expansion of Carrizo-Wilcox Aquifer	350	$0	0	2	7	16	23	30	N	Expand supply from groundwater	No Infrastructure	Not Implemented	Too soon				
K	2266	RICHLAND SUD	Municipal conservation	220	$0	13	22	19	15	14	15	N	Conservation - Municipal	No Infrastructure	Currently Operating		n/a			
K	2278	RIVER PLACE ON LAKE AUSTIN	Amend LCRA contract	348	$0	438	528	392	268	156	55	N	Increased contract	No Infrastructure	Not Implemented	Other				

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Sponsor Region	WMS Sponsor Entity Id	Sponsor	Recommended Water Management Strategy	DB Project Id	Capital Cost	SS2010	SS2020	SS2030	SS2040	SS2050	SS2060	Y denotes strategies with supply volumes included in other strategies	Project Description	Infrastructure Type*	At what level of Implementation is the project?*	If not implemented, why?*	Initial Volume of Water Provided (acft/yr)	Funds Expended to Date ($)	Project Cost ($) (should include development and construction costs)	Year the Project is Online?*
K	2278	RIVER PLACE ON LAKE AUSTIN	Municipal conservation	220	$0	132	295	431	549	661	762	N	Conservation - Municipal Conservation- Irrigation	Other	Currently Operating		424	$0		2011
K	2292	ROLLINGWOOD	Municipal conservation	220	$0	31	60	85	109	132	143	N	Conservation - Municipal	Other	Currently Operating		n/a			2011
K	2292	ROLLINGWOOD	New LCRA contracts	346	$0	0	373	373	373	373	373	N	New water contract	No Infrastructure	Not Implemented	Too soon				
K	123	ROUND ROCK	House Bill 1437 for Williamson County	377	$0	126	246	349	426	536	645	Y	Water from BRA	No Infrastructure	Currently Operating		233	n/a		
K	123	ROUND ROCK	Municipal conservation	220	$0	32	93	179	243	277	312	N	Conservation - Municipal	Other	Currently Operating		n/a	n/a		2011
K	2337	SCHULENBURG	Expansion of Yegua-Jackson Aquifer	789	$0	0	0	0	0	0	9	N	Expand supply from groundwater	No Infrastructure	Not Implemented	Too soon				
K	2337	SCHULENBURG	Municipal conservation	220	$0	43	104	157	159	167	184	N	Conservation - Municipal	Other	Currently Operating		n/a	n/a		2012
K	2367	SMITHVILLE	Development of Queen City Aquifer	768	$4,190,135	0	0	0	0	0	580	N	Groundwater Development	Wells	Not Implemented	Too soon				
K	2367	SMITHVILLE	Drought management	757	$0	0	0	0	0	0	288	N	Drought Management	No Infrastructure	Not Implemented	Too soon				
K	2367	SMITHVILLE	Expansion of Carrizo-Wilcox Aquifer	350	$1,041,440	49	311	526	946	1,115	733	N	Groundwater Development	Wells	Currently Operating		1018	n/a		2011
K	2367	SMITHVILLE	Municipal conservation	220	$0	25	0	0	0	0	0	N	Conservation - Municipal	Other	Currently Operating		n/a	n/a		2012
K	2403	STEAM ELECTRIC POWER, BASTROP	Amend LCRA contract	348	$0	0	0	0	1,280	2,780	2,780	N	Increased contract	No Infrastructure	Not Implemented	Too soon				
K	2421	STEAM ELECTRIC POWER, FAYETTE	New LCRA contracts	346	$0	0	0	0	20,975	20,975	26,885	N	New water contract	No Infrastructure	Not Implemented	Too soon				
K	2452	STEAM ELECTRIC POWER, MATAGORDA	Blend brackish surface water in South Texas Project Nuclear Operating Company Reservoir	804	$0	0	17,505	17,505	17,505	17,505	17,625	N	Blend brackish surface water	No Infrastructure	Not Implemented	Other				
K	2452	STEAM ELECTRIC POWER, MATAGORDA	City of Austin return flows	384	$0	1,000	1,000	1,000	1,000	1,000	1,000	N	Accessing return flows in system	No Infrastructure	Currently Operating		n/a			
K	2452	STEAM ELECTRIC POWER, MATAGORDA	Downstream return flows	386	$0	0	0	9	36	68	90	N	Accessing return flows in system	No Infrastructure	Not Implemented	Too soon				
K	2452	STEAM ELECTRIC POWER, MATAGORDA	Expand supply from South Texas Project Nuclear Operating Company	829	$0	193	0	0	0	0	0	N	Expand supply from reservoir	No Infrastructure	Not Implemented	Other				
K	2452	STEAM ELECTRIC POWER, MATAGORDA	New LCRA contracts	346	$0	0	30,000	30,000	30,000	30,000	30,000	N	New water contract	No Infrastructure	Not Implemented	Other				
K	2452	STEAM ELECTRIC POWER, MATAGORDA	Water right permit amendment	803	$0	0	5,500	5,500	5,500	5,500	5,500	N	Water right permit amendment	No Infrastructure	Permit Application Submitted/Pending					
K	2478	STEAM ELECTRIC POWER, WHARTON	Development of Gulf Coast Aquifer	805	$164,000	0	0	0	0	0	82	N	Groundwater Development	Wells	Not Implemented	Too soon				
K	2536	TRAVIS COUNTY WCID #18	Amend LCRA contract	348	$0	0	0	0	4	135	283	N	Increased contract	No Infrastructure	Currently Operating		1736	$0	0	
K	2599	WEST LAKE HILLS	Municipal conservation	220	$0	139	303	495	677	870	1,074	N	Conservation - Municipal	Other	Currently Operating		n/a			2011
K	2599	WEST LAKE HILLS	New LCRA contracts	346	$0	0	1,833	2,049	2,178	2,320	2,471	N	New water contract	No Infrastructure	Not Implemented	Too soon				
K	2602	WEST TRAVIS COUNTY REGIONAL WS	Municipal conservation	220	$0	17	9	0	0	0	0	N	Conservation - Municipal	Other	Not Implemented	Other				
K	2609	WHARTON	Municipal conservation	220	$0	41	29	18	8	4	4	N	Conservation - Municipal	No Infrastructure	Currently Operating		n/a	$0		2011
K	2631	WINDERMERE UTILITY COMPANY	New LCRA contracts	346	$0	0	2,222	2,201	2,180	2,180	2,180	N	New water contract	No Infrastructure	Not Implemented	Too soon		$0		

Table 11A-2: Full TWDB Template Containing Survey Results of Implementation Status of Water Management Strategies from the 2011 Region K Water Plan

Sponsor Region	WMS Sponsor Entity Id	Sponsor	Recommended Water Management Strategy	Is this a phased project?*	(Phased) Ultimate Volume (acft/yr)	(Phased) Ultimate Project Cost ($)	Year project reaches maximum capacity?*	What is the project funding source(s)?*	Included in the 2016 Plan?*	Comments
K	194	AQUA WSC	Additional municipal conservation	No			2070	Unknown	Yes	Infrastructure Type: Municipal and Industrial Water Audits, Leak Detection/Repairs, Conservation Pricing, Awareness Campaign, and School
K	194	AQUA WSC	Drought management	Yes	n/a		2060	Other	Yes	Residential and Commercial voluntary irrigation measures to reduce daily water demands.
K	194	AQUA WSC	Expansion of Carrizo-Wilcox Aquifer						Yes	
K	7	AUSTIN	City of Austin conservation	Yes	36,370	$0	2070		Yes	Implemented - On-going
K	7	AUSTIN	City of Austin direct reuse (municipal and manufacturing)	Yes	40,468	$228,113,592	2070		Yes	Implemented - On-going
K	7	AUSTIN	City of Austin direct reuse (steam-electric)	Yes	13,315	$74,136,918	2070		Yes	Implemented - On-going
K	7	AUSTIN	City of Austin return flows	Yes	39,528	0	2070		Yes	Implemented - On-going
K	7	AUSTIN	Downstream return flows	Yes	2,375	0	2070		No	Implemented - On-going
K	221	BARTON CREEK WEST WSC	Municipal conservation	Yes			2060		Yes	
K	221	BARTON CREEK WEST WSC	Purchase water from West Travis County Regional Water Supply						No	West Travis County Regional Water System no longer exists
K	224	BASTROP	Expansion of other aquifer						No	Not implemented - looking at Carrizo Wilcox
K	224	BASTROP	Municipal conservation	Yes			2060		Yes	
K	225	BASTROP COUNTY WCID #2	Expansion of Carrizo-Wilcox Aquifer						Yes	
K	233	BEE CAVE VILLAGE	Municipal conservation	Yes			2060		Yes	
K	233	BEE CAVE VILLAGE	Purchase water from West Travis County Regional Water Supply						No	West Travis County Regional Water System no longer exists
K	245	BERTRAM	Expansion of Ellenburger-San Saba						Yes	
K	245	BERTRAM	Municipal conservation	Yes			2060	Unknown	Yes	Infrastructure Type: Leak Detection/Repairs, Conservation Pricing, and Awareness Campaign.
K	289	BRIARCLIFF VILLAGE	Amend LCRA contract						No	Contract increase since last plan
K	289	BRIARCLIFF VILLAGE	Municipal conservation	Yes			2060		Yes	
K	307	BUDA	Development of Carrizo-Wilcox						Yes	
K	307	BUDA	Development of saline zone of Edwards-Balcones Fault Zone Aquifer						Yes	
K	356	CIMARRON PARK WATER COMPANY	Development of saline zone of Edwards-Balcones Fault Zone Aquifer						No	
K	356	CIMARRON PARK WATER COMPANY	Drought management	Yes	n/a	n/a	2070	Unknown	No	Infrastructure type Voluntary Measures: Discontinuation of monthly flusing of water mains, public landscaping irrigation restrictions, residential landscaping irrigation limits, and commercial Irrigation limits. Mandatory Measures: Residential landscaping irrigation restrictions (once a week watering), no outdoor spraying (drip application only), limits on outdoor water use (no water features), prohibition on washing down sidewalks, parking lots and other hard-surface areas, prohibition of flushing gutters, prohibition of water use for washing vehicles, prohibition of applications for new/additional/expanded or increased-in size water service connections/meters/service
K	356	CIMARRON PARK WATER COMPANY	Municipal conservation	Yes	o 106 gpcd	n/a	2070	Unknown	No	Infrastructure type Municipal: water system audits, leak detection/repairs, prohibition on wasting water, conservation pricing, and conservation campaign. School eduction and water reuse (implemented in August 2008 not currently used) Outdoor water use: Permanent irrigation watering schedule, and outdoor landscape incentives. Landscape irrigation audit requirement, landscape requirements for new development, and irrigation standards (implemented in August 2008 not currently used) Indoor Water use:

Table 11A-2: Full TWDB Template Containing Survey Results of Implementation Status of Water Management Strategies from the 2011 Region K Water Plan

Sponsor Region	WMS Sponsor Entity Id	Sponsor	Recommended Water Management Strategy	Is this a phased project?*	(Phased) Ultimate Volume (acft/yr)	(Phased) Ultimate Project Cost ($)	Year project reaches maximum capacity?*	What is the project funding source(s)?*	Included in the 2016 Plan?*	Comments
K	356	CIMARRON PARK WATER COMPANY	Water allocation						No	Contract increase since last plan
K	409	COTTONWOOD SHORES	Amend LCRA contract						Yes	
K	422	COUNTY-OTHER, BASTROP	Additional municipal conservation						No	
K	422	COUNTY-OTHER, BASTROP	Development of Carrizo-Wilcox Aquifer						No	
K	422	COUNTY-OTHER, BASTROP	Expansion of Carrizo-Wilcox Aquifer						Yes	
K	427	COUNTY-OTHER, BLANCO	Development of Ellenburger-San Saba Aquifer						No	
K	438	COUNTY-OTHER, BURNET	Expansion of Ellenburger-San Saba Aquifer						No	
K	438	COUNTY-OTHER, BURNET	Expansion of Trinity Aquifer						No	
K	456	COUNTY-OTHER, COLORADO	Expansion of Gulf Coast Aquifer						Yes	
K	486	COUNTY-OTHER, FAYETTE	Expansion of Gulf Coast Aquifer						Yes	
K	486	COUNTY-OTHER, FAYETTE	Expansion of Sparta Aquifer						No	
K	516	COUNTY-OTHER, HAYS	Development of saline zone of Edwards-Balcones Fault Zone Aquifer						Yes	
K	516	COUNTY-OTHER, HAYS	Purchase water from City of Austin						No	
K	561	COUNTY-OTHER, LLANO	Municipal conservation	Yes			2060		No	
K	578	COUNTY-OTHER, MILLS	Expansion of Trinity Aquifer						No	
K	670	CREEDMOOR-MAHA WSC	New LCRA contracts						Yes	
K	720	DRIPPING SPRINGS	Amend LCRA contract						No	
K	720	DRIPPING SPRINGS	Municipal conservation	Yes	748	n/a	2070	Unknown	Yes	Infrastructure Type Municipal: Leak detection and repair, prohibition on wasting water, and water conservation pricing (implemented March 2013) Outdoor water use: permanent irrigation watering
K	721	DRIPPING SPRINGS WSC	Amend LCRA contract						No	
K	757	ELGIN	Drought management						Yes	
K	757	ELGIN	Expansion of Carrizo-Wilcox Aquifer						Yes	
K	757	ELGIN	Municipal conservation	Yes			2060		No	
K	757	ELGIN	New LCRA contracts						Yes	
K	776	FAYETTE WSC	Development of other aquifer						No	
K	776	FAYETTE WSC	Expansion of Gulf Coast Aquifer						No	
K	843	GOFORTH WSC	Water transfer						No	
K	844	GOLDTHWAITE	Drought management	No	1745		2070	Unknown	Yes	Infrastructure Type Voluntary Measures: a. Discontinuation of monthly flushing of water mains, public landscaping irrigation restrictions, residential landscaping irrigation limits, and commercial irrigation limits. Mandatory Measures: No outdoor spraying, drip application only Other: No outdoor use during 2011 drought *All listed
K	844	GOLDTHWAITE	Expansion of Trinity Aquifer	No				Unknown	No	
K	844	GOLDTHWAITE	Goldthwaite Channel Dam						No	
K	844	GOLDTHWAITE	Municipal conservation	Yes	n of 10 gpcd		2070	Unknown	Yes	Infrastructure Type Municipal: leak detection and repair, conservation pricing, conservation campaign, and school
K	844	GOLDTHWAITE	New LCRA contracts						No	
K	857	GRANITE SHOALS	Amend LCRA contract						Yes	
K	989	IRRIGATION, BASTROP	Expansion of Queen City Aquifer						No	
K	989	IRRIGATION, BASTROP	Temporary drought period use of Queen City Aquifer						No	

Table 11A-2: Full TWDB Template Containing Survey Results of Implementation Status of Water Management Strategies from the 2011 Region K Water Plan

Sponsor Region	WMS Sponsor Entity Id	Sponsor	Recommended Water Management Strategy	Is this a phased project?*	(Phased) Ultimate Volume (acft/yr)	(Phased) Ultimate Project Cost ($)	Year project reaches maximum capacity?*	What is the project funding source(s)?*	Included in the 2016 Plan?*	Comments
K	1022	IRRIGATION, COLORADO	City of Austin return flows						Yes	
K	1022	IRRIGATION, COLORADO	Downstream return flows						No	
K	1022	IRRIGATION, COLORADO	Irrigation district conveyance improvements						Yes	
K	1051	IRRIGATION, FAYETTE	Expansion of Sparta Aquifer						No	
K	1131	IRRIGATION, MATAGORDA	City of Austin return flows						Yes	
K	1131	IRRIGATION, MATAGORDA	Downstream return flows						No	
K	1131	IRRIGATION, MATAGORDA	House Bill 1437 on-farm conservation						No	
K	1131	IRRIGATION, MATAGORDA	Irrigation district conveyance improvements						Yes	
K	1137	IRRIGATION, MILLS	Expansion of Trinity Aquifer						Yes	
K	1137	IRRIGATION, MILLS	Water allocation						No	
K	1205	IRRIGATION, WHARTON	City of Austin return flows						Yes	
K	1205	IRRIGATION, WHARTON	Downstream return flows						No	
K	1205	IRRIGATION, WHARTON	House Bill 1437 on-farm conservation						No	
K	1205	IRRIGATION, WHARTON	Irrigation district conveyance improvements						Yes	
K	1240	JONESTOWN	Amend LCRA contract						No	
K	1266	KINGSLAND WSC	Amend LCRA contract						No	
K	1294	LAKE LBJ MUD	Municipal conservation						No	
K	1302	LAKEWAY	Amend LCRA contract						No	
K	1302	LAKEWAY	Municipal conservation	Yes	reduction to 176 gpcd		2060	Unknown	Yes	Infrastructure Type Municipal: Water system audits, prohibition on wasting water, and conservation pricing. Outdoor: Permanent irrigation watering schedule. Indoor water use: Incentive program for indoor plubming retrofit.
K	1358	LIVESTOCK, BURNET	Expansion of Trinity Aquifer						No	
K	1376	LIVESTOCK, COLORADO	Expansion of Gulf Coast Aquifer						No	
K	1406	LIVESTOCK, FAYETTE	Development of other aquifer						No	
K	1481	LIVESTOCK, LLANO	Expansion of Hickory Aquifer						No	
K	1492	LIVESTOCK, MATAGORDA	Expansion of Gulf Coast Aquifer						No	
K	1587	LLANO	Development of Ellenburger-San Saba Aquifer						No	
K	1587	LLANO	Development of Hickory Aquifer						Yes	In process
K	1587	LLANO	Municipal conservation	Yes			2060		Yes	
K	87	LOWER COLORADO RIVER AUTHORITY	Amend LCRA contract	Yes			2060		Yes	
K	87	LOWER COLORADO RIVER AUTHORITY	Aquifer storage and recovery						Yes	
K	87	LOWER COLORADO RIVER AUTHORITY	Conjunctive use of groundwater - includes overdraft						No	
K	87	LOWER COLORADO RIVER AUTHORITY	Development of new rice varieties						No	
K	87	LOWER COLORADO RIVER AUTHORITY	Enhanced municipal and industrial conservation	Yes			2060		Yes	

Table 11A-2: Full TWDB Template Containing Survey Results of Implementation Status of Water Management Strategies from the 2011 Region K Water Plan

Sponsor Region	WMS Sponsor Entity Id	Sponsor	Recommended Water Management Strategy	Is this a phased project?*	(Phased) Ultimate Volume (acft/yr)	(Phased) Ultimate Project Cost ($)	Year project reaches maximum capacity?*	What is the project funding source(s)?*	Included in the 2016 Plan?*	Comments
K	87	LOWER COLORADO RIVER AUTHORITY	Firm-up run-of-river with off-channel reservoir - LCRA/SAWS project (Region K Component)						Yes	Reservoir. Construction Underway.
K	87	LOWER COLORADO RIVER AUTHORITY	LCRA Water Management Plan interruptible water supply						Yes	
K	87	LOWER COLORADO RIVER AUTHORITY	On-farm conservation						Yes	
K	87	LOWER COLORADO RIVER AUTHORITY	Reuse by Highland Lakes communities						No	
K	1620	MANOR	Municipal conservation	Yes			2060		No	
K	1620	MANOR	New LCRA contracts						No	
K	1627	MANUFACTURING, BASTROP	Expansion of Carrizo-Wilcox Aquifer						Yes	
K	1669	MANUFACTURING, FAYETTE	Expansion of Gulf Coast Aquifer						Yes	
K	1669	MANUFACTURING, FAYETTE	Expansion of Sparta Aquifer						No	
K	1690	MANUFACTURING, HAYS	Development of Trinity Aquifer						No	
K	1690	MANUFACTURING, HAYS	Drought management						No	
K	1729	MANUFACTURING, MATAGORDA	Temporary drought period use of Gulf Coast Aquifer						No	
K	1786	MANUFACTURING, WHARTON	Expansion of Gulf Coast Aquifer						No	
K	1797	MANVILLE WSC	New LCRA contracts						Yes	
K	1798	MARBLE FALLS	Amend LCRA contract						Yes	
K	1798	MARBLE FALLS	Municipal conservation	Yes			2060		Yes	
K	1821	MEADOWLAKES	Amend LCRA contract						No	
K	1821	MEADOWLAKES	Municipal conservation	Yes			2060	Unknown	Yes	Infrastructure Type Municipal: Leak detection and repairs (implemented 6/2012), conservation pricing, conservation campaign (implemented 10/2012), and water resuse (implemented 1974). Outdoor water use: permanant irrigation watering schedule (implemented 10/2012), and irrigation
K	1852	MINING, BASTROP	Expansion of Carrizo-Wilcox Aquifer						No	
K	1867	MINING, BURNET	Expansion of Ellenburger-San Saba Aquifer						Yes	
K	1867	MINING, BURNET	Expansion of Trinity Aquifer						No	
K	1883	MINING, COLORADO	Development of other aquifer						No	
K	1883	MINING, COLORADO	Expansion of Gulf Coast Aquifer						No	
K	1908	MINING, FAYETTE	Expansion of Gulf Coast Aquifer						Yes	
K	2089	MOUNTAIN CITY	Drought management						No	
K	2089	MOUNTAIN CITY	Municipal conservation						No	
K	2196	PFLUGERVILLE	Amend LCRA contract						Yes	
K	2196	PFLUGERVILLE	Municipal conservation	Yes			2060	Unknown	Yes	Infrastructure Type Municipal: Leak detection and repair (implemented 2001), prohibition on wasting water (implemented 2012), conservation pricing (implemented 2000), awareness campaign (implemented 2011), school education (implemented 2012), and water resuse (implemented 2000). Irrigation: Permanant irrigation watering schedule (implemented 2011), and irrigation standards
K	2218	POLONIA WSC	Expansion of Carrizo-Wilcox Aquifer						No	
K	2266	RICHLAND SUD	Municipal conservation						No	
K	2278	RIVER PLACE ON LAKE AUSTIN	Amend LCRA contract						No	

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Sponsor Region	WMS Sponsor Entity Id	Sponsor	Recommended Water Management Strategy	Is this a phased project?*	(Phased) Ultimate Volume (acft/yr)	(Phased) Ultimate Project Cost ($)	Year project reaches maximum capacity?*	What is the project funding source(s)?*	Included in the 2016 Plan?*	Comments
K	2278	RIVER PLACE ON LAKE AUSTIN	Municipal conservation	Yes	339.2		2060	Other	Yes	Infrastructure Type Municipal: Water system audits (implemented 07-2013), leak detection and repair (implemented 07-2013), prohibition on wasting water (implemented 09-2013), conservation pricing (implemented 11-2013), conservation campaign (implemented 08-2013), and water resuse (implemented 11-24-1992). Outdoor water use: permanent irriation watering
K	2292	ROLLINGWOOD	Municipal conservation	Yes			2060		Yes	
K	2292	ROLLINGWOOD	New LCRA contracts						Yes	
K	123	ROUND ROCK	House Bill 1437 for Williamson County						No	
K	123	ROUND ROCK	Municipal conservation	Yes			2060		Yes	
K	2337	SCHULENBURG	Expansion of Yegua-Jackson Aquifer						No	
K	2337	SCHULENBURG	Municipal conservation	Yes			2060		Yes	
K	2367	SMITHVILLE	Development of Queen City Aquifer						Yes	
K	2367	SMITHVILLE	Drought management						Yes	
K	2367	SMITHVILLE	Expansion of Carrizo-Wilcox Aquifer						No	
K	2367	SMITHVILLE	Municipal conservation	Yes			2060		Yes	
K	2403	STEAM ELECTRIC POWER, BASTROP	Amend LCRA contract						No	
K	2421	STEAM ELECTRIC POWER, FAYETTE	New LCRA contracts						No	
K	2452	STEAM ELECTRIC POWER, MATAGORDA	Blend brackish surface water in South Texas Project Nuclear Operating Company Reservoir						Yes	
K	2452	STEAM ELECTRIC POWER, MATAGORDA	City of Austin return flows						Yes	
K	2452	STEAM ELECTRIC POWER, MATAGORDA	Downstream return flows						No	
K	2452	STEAM ELECTRIC POWER, MATAGORDA	Expand supply from South Texas Project Nuclear Operating Company						No	
K	2452	STEAM ELECTRIC POWER, MATAGORDA	New LCRA contracts						No	
K	2452	STEAM ELECTRIC POWER, MATAGORDA	Water right permit amendment						Yes	
K	2478	STEAM ELECTRIC POWER, WHARTON	Development of Gulf Coast Aquifer						Yes	Wellfield
K	2536	TRAVIS COUNTY WCID #18	Amend LCRA contract						No	
K	2599	WEST LAKE HILLS	Municipal conservation	Yes			2060		Yes	
K	2599	WEST LAKE HILLS	New LCRA contracts						Yes	
K	2602	WEST TRAVIS COUNTY REGIONAL WS	Municipal conservation						No	West Travis County Regional Water System no longer exists.
K	2609	WHARTON	Municipal conservation	Yes			2070	Unknown	Yes	Infrastructure Type Municipal: water system audits (implemented 2014), leak detection and repairs, prohibition on wasting water, conservation pricing, and awareness
K	2631	WINDERMERE UTILITY COMPANY	New LCRA contracts						No	

APPENDIX 11B

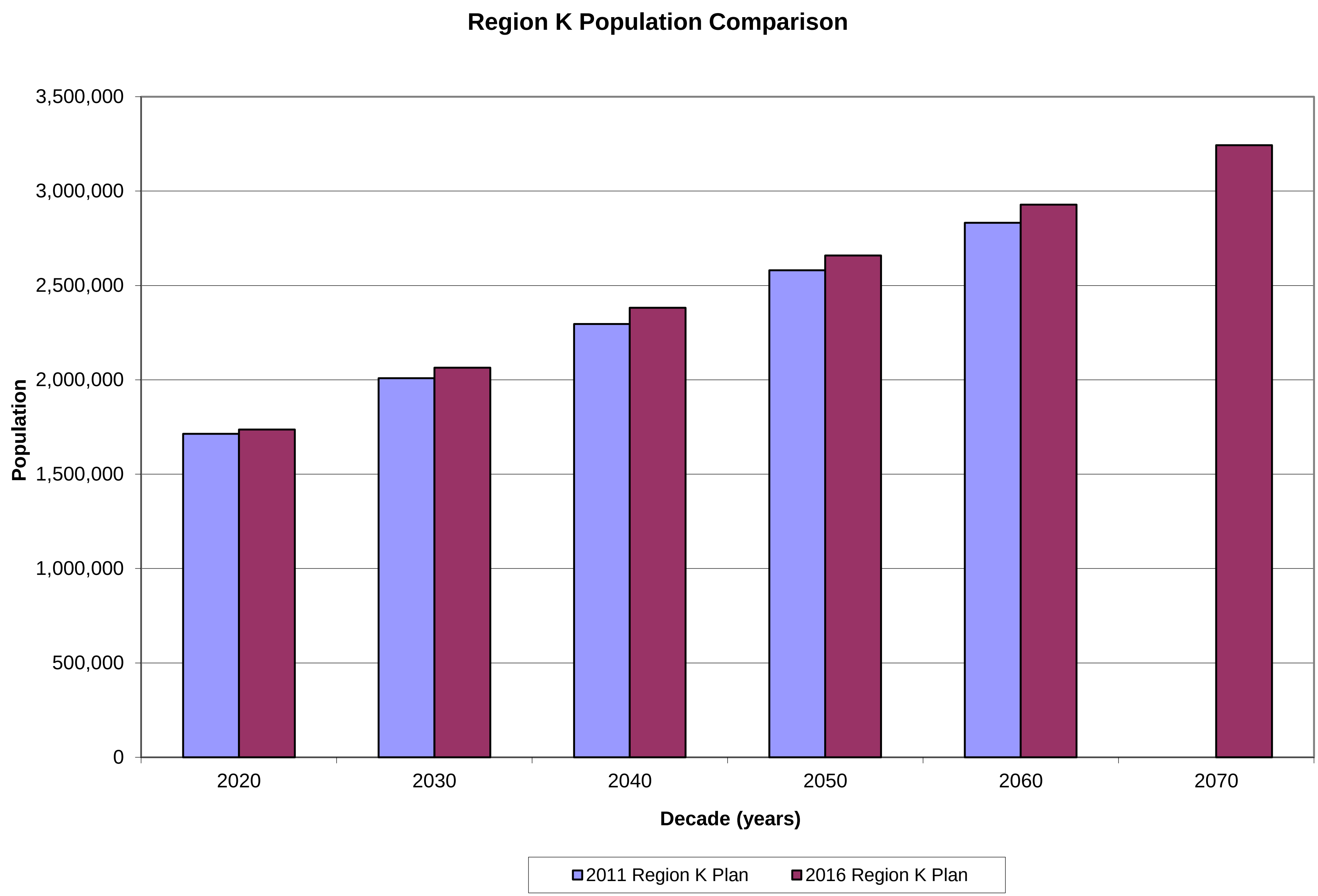
COMPARISON TABLES AND GRAPHS FOR POPULATION AND DEMAND PROJECTIONS

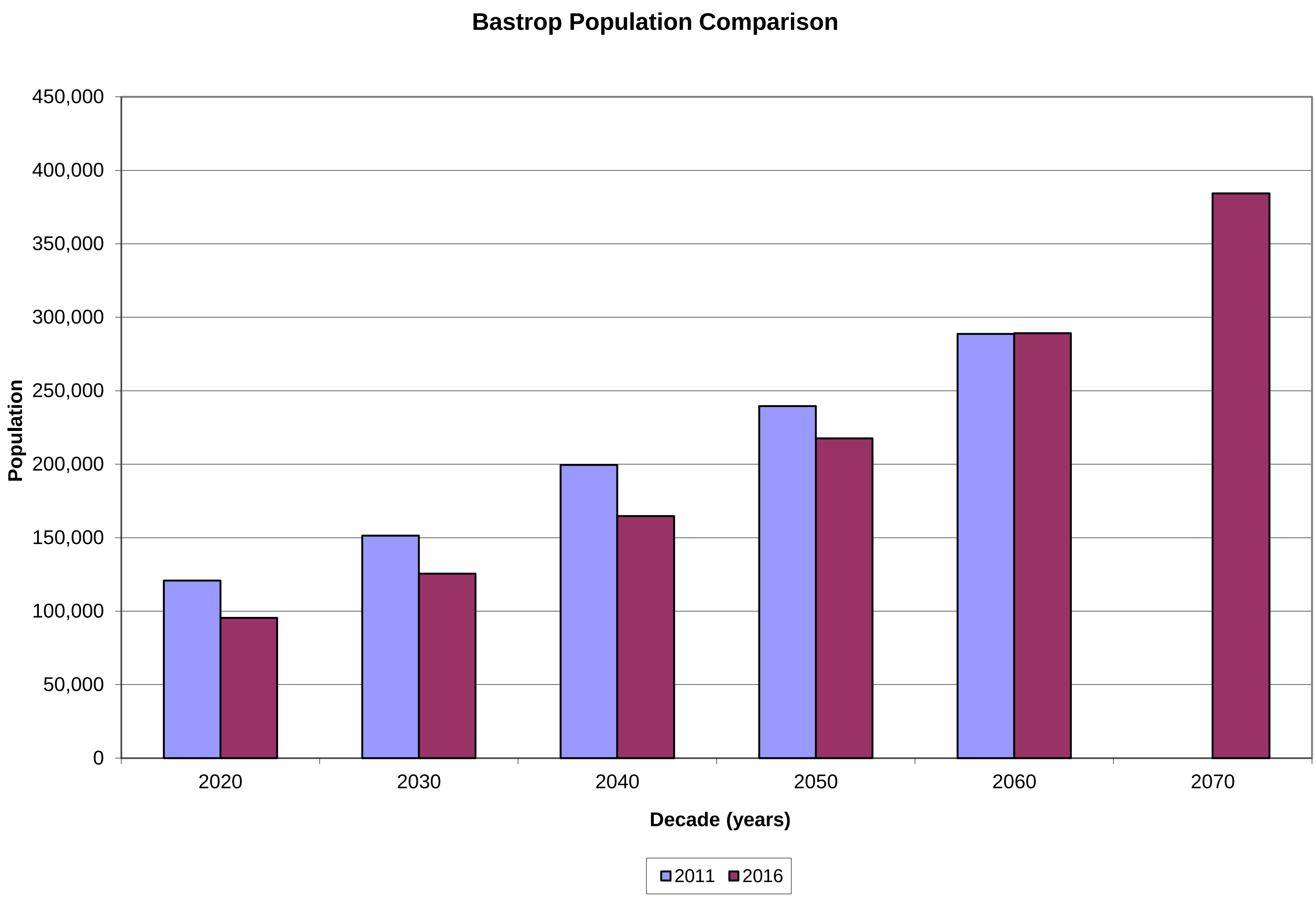
Region K Population

RWP	2010	2020	2030	2040	2050	2060	2070
Region K							
2016		1,737,227	2,064,522	2,381,949	2,658,492	2,928,400	3,243,127
2011	1,412,834	1,714,281	2,008,141	2,295,627	2,580,534	2,831,937	
Difference		22,946	56,381	86,322	77,958	96,463	
% Change		1.3	2.8	3.8	3.0	3.4	
Bastrop							
2016		95,487	125,559	164,648	217,608	289,140	384,244
2011	84,449	120,739	151,364	199,548	239,589	288,683	
Difference		-25,252	-25,805	-34,900	-21,981	457	
% Change		-20.9	-17.0	-17.5	-9.2	0.2	
Blanco							
2016		13,015	15,475	16,917	17,672	18,175	18,472
2011	9,946	11,756	13,487	15,002	16,641	18,544	
Difference		1,259	1,988	1,915	1,031	-369	
% Change		10.7	14.7	12.8	6.2	-2.0	
Burnet							
2016		53,114	64,268	73,673	82,668	90,571	97,426
2011	47,160	61,191	78,133	94,716	105,095	115,056	
Difference		-8,077	-13,865	-21,043	-22,427	-24,485	
% Change		-13.2	-17.7	-22.2	-21.3	-21.3	
Colorado							
2016		21,884	22,836	23,544	24,582	25,449	26,293
2011	21,239	22,591	23,311	23,424	23,900	24,324	
Difference		-707	-475	120	682	1,125	
% Change		-3.1	-2.0	0.5	2.9	4.6	
Fayette							
2016		28,373	32,384	35,108	37,351	39,119	40,476
2011	24,826	28,808	32,363	35,259	38,933	44,120	
Difference		-435	21	-151	-1,582	-5,001	
% Change		-1.5	0.1	-0.4	-4.1	-11.3	
Gillespie							
2016		26,795	28,852	30,548	32,536	34,365	36,142
2011	25,258	29,117	30,861	30,861	30,861	30,861	
Difference		-2,322	-2,009	-313	1,675	3,504	
% Change		-8.0	-6.5	-1.0	5.4	11.4	
Hays							
2016		55,584	73,243	94,747	121,629	152,007	186,579
2011	46,143	69,377	88,887	108,495	132,051	150,574	
Difference		-13,793	-15,644	-13,748	-10,422	1,433	
% Change		-19.9	-17.6	-12.7	-7.9	1.0	

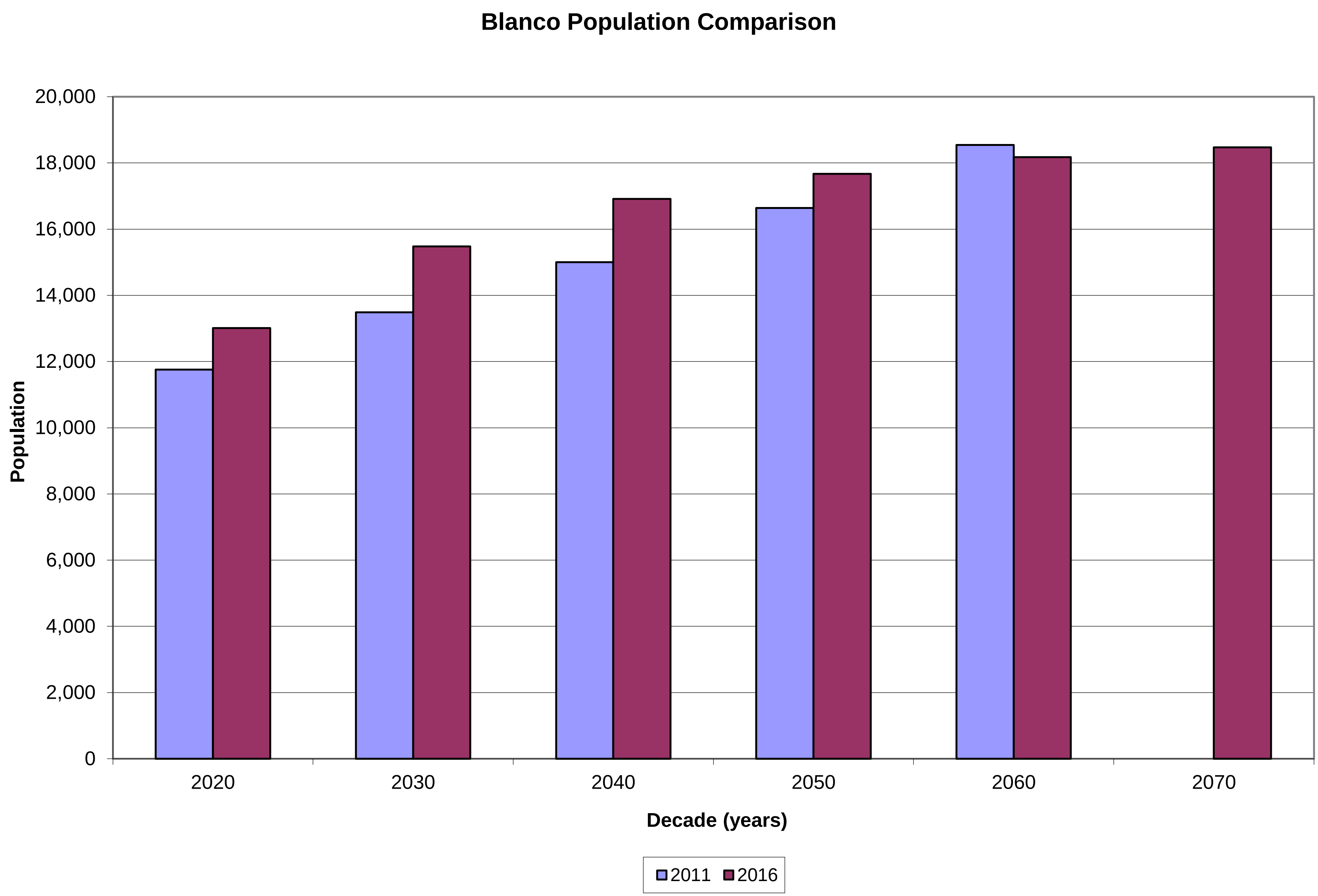
Region K Population

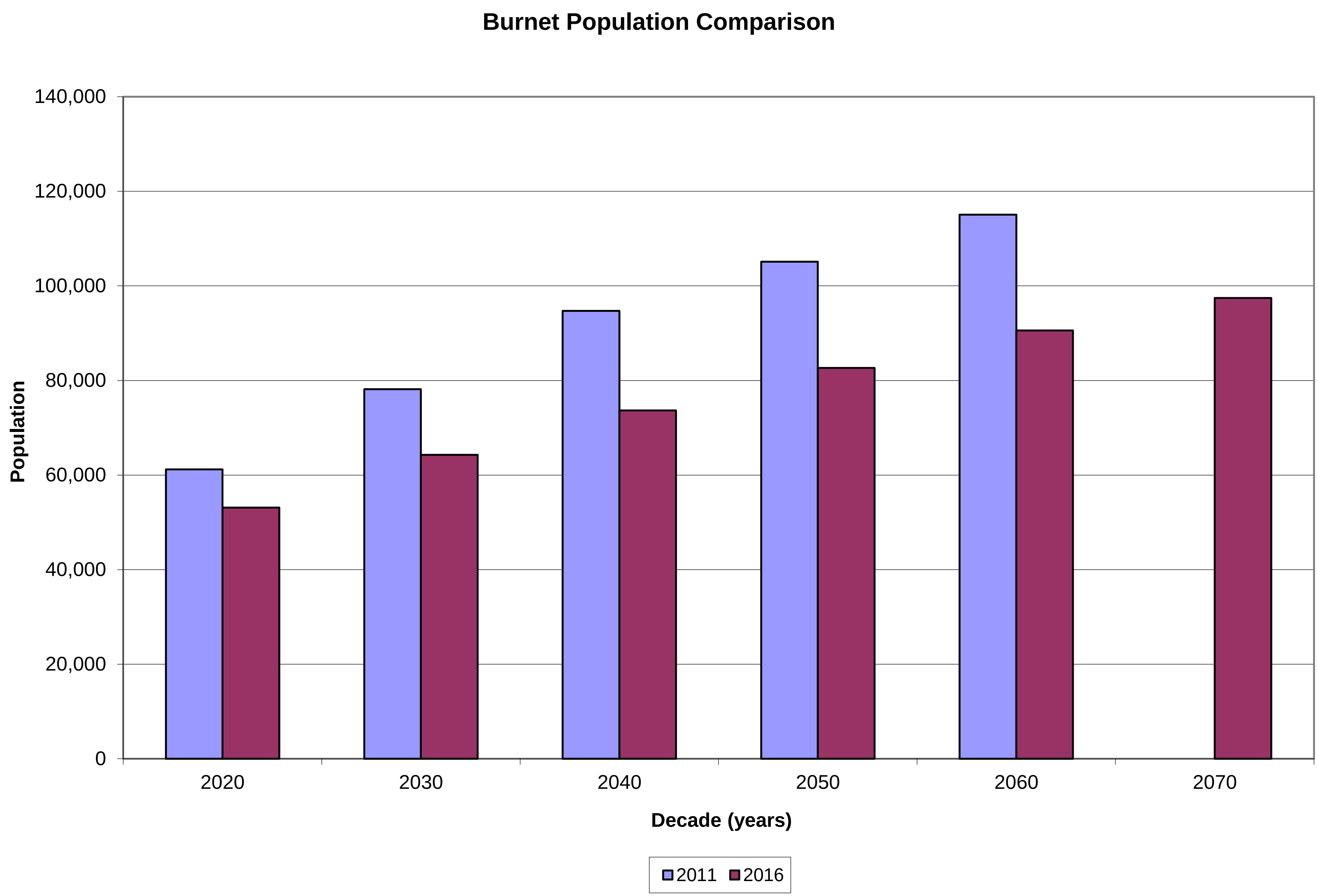
RWP	2010	2020	2030	2040	2050	2060	2070
Llano							
2016		21,291	22,453	22,422	22,035	22,779	23,549
2011	21,284	23,007	23,471	23,932	24,393	24,855	
Difference		-1,716	-1,018	-1,510	-2,358	-2,076	
% Change		-7.5	-4.3	-6.3	-9.7	-8.4	
Matagorda							
2016		39,166	41,226	42,548	43,570	44,296	44,815
2011	40,506	43,295	44,991	45,925	45,925	45,925	
Difference		-4,129	-3,765	-3,377	-2,355	-1,629	
% Change		-9.5	-8.4	-7.4	-5.1	-3.5	
Mills							
2016		4,912	5,076	5,213	5,417	5,625	5,859
2011	5,466	5,815	6,107	5,930	6,329	6,497	
Difference		-903	-1,031	-717	-912	-872	
% Change		-15.5	-16.9	-12.1	-14.4	-13.4	
San Saba							
2016		6,484	6,793	6,833	6,722	6,879	7,039
2011	6,387	6,746	7,059	7,332	7,365	7,409	
Difference		-262	-266	-499	-643	-530	
% Change		-3.9	-3.8	-6.8	-8.7	-7.2	
Travis							
2016		1,273,260	1,508,642	1,732,860	1,897,769	2,033,120	2,185,909
2011	1,003,253	1,201,256	1,402,153	1,583,068	1,770,347	1,918,135	
Difference		72,004	106,489	149,792	127,422	114,985	
% Change		6.0	7.6	9.5	7.2	6.0	
Wharton							
2016		27,184	28,928	30,322	31,529	32,643	33,629
2011	28,260	29,872	30,911	31,508	31,523	31,188	
Difference		-2,688	-1,983	-1,186	6	1,455	
% Change		-9.0	-6.4	-3.8	0.0	4.7	
Williamson							
2016		70,678	88,787	102,566	117,404	134,232	152,695
2011	48,657	60,711	75,043	90,627	107,582	125,766	
Difference		9,967	13,744	11,939	9,822	8,466	
% Change		16.4	18.3	13.2	9.1	6.7	


Region K Population Comparison
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
Population
2020
2030
2040
2050
2060
2070
Decade (years)
2011 Region K Plan
2016 Region K Plan

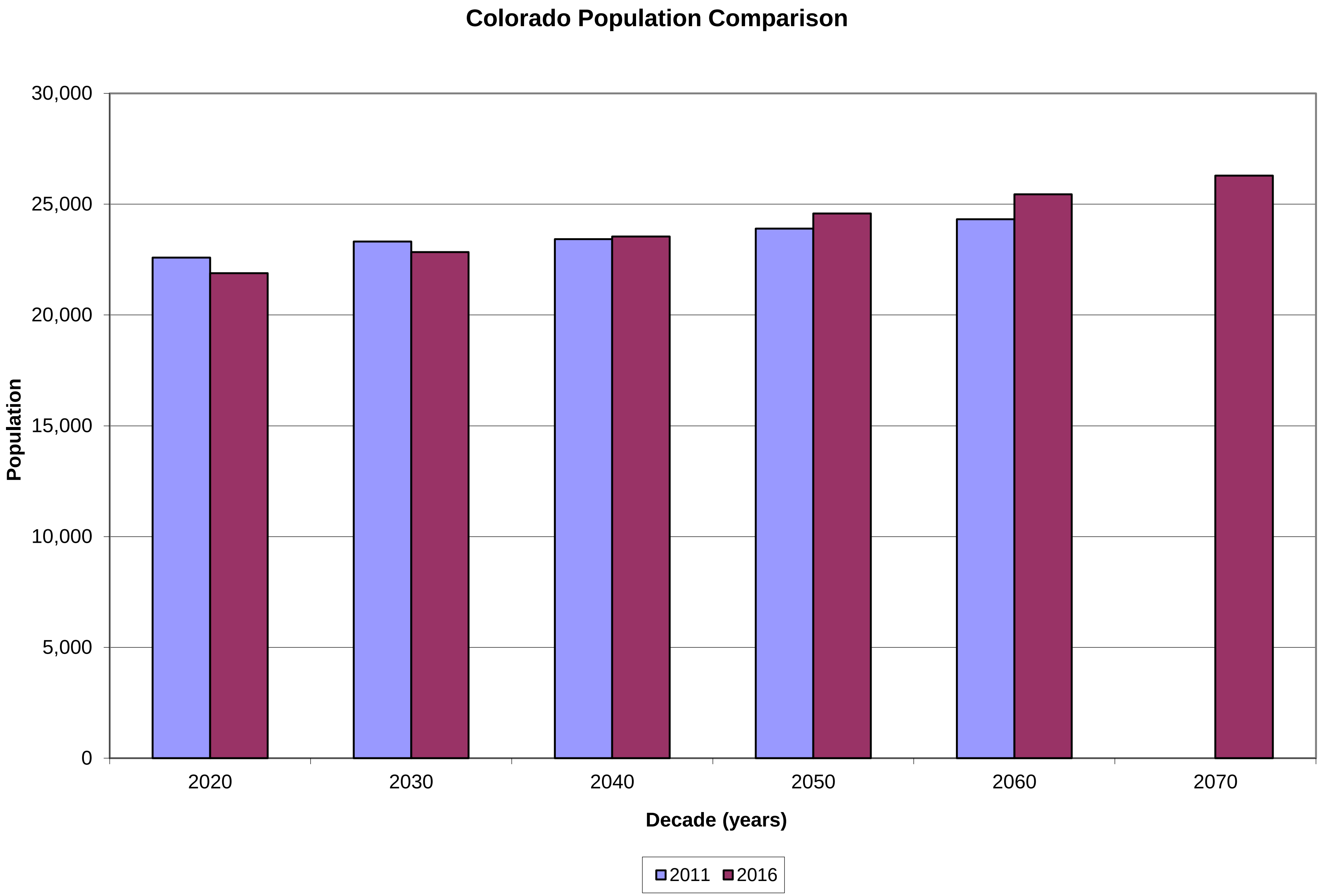


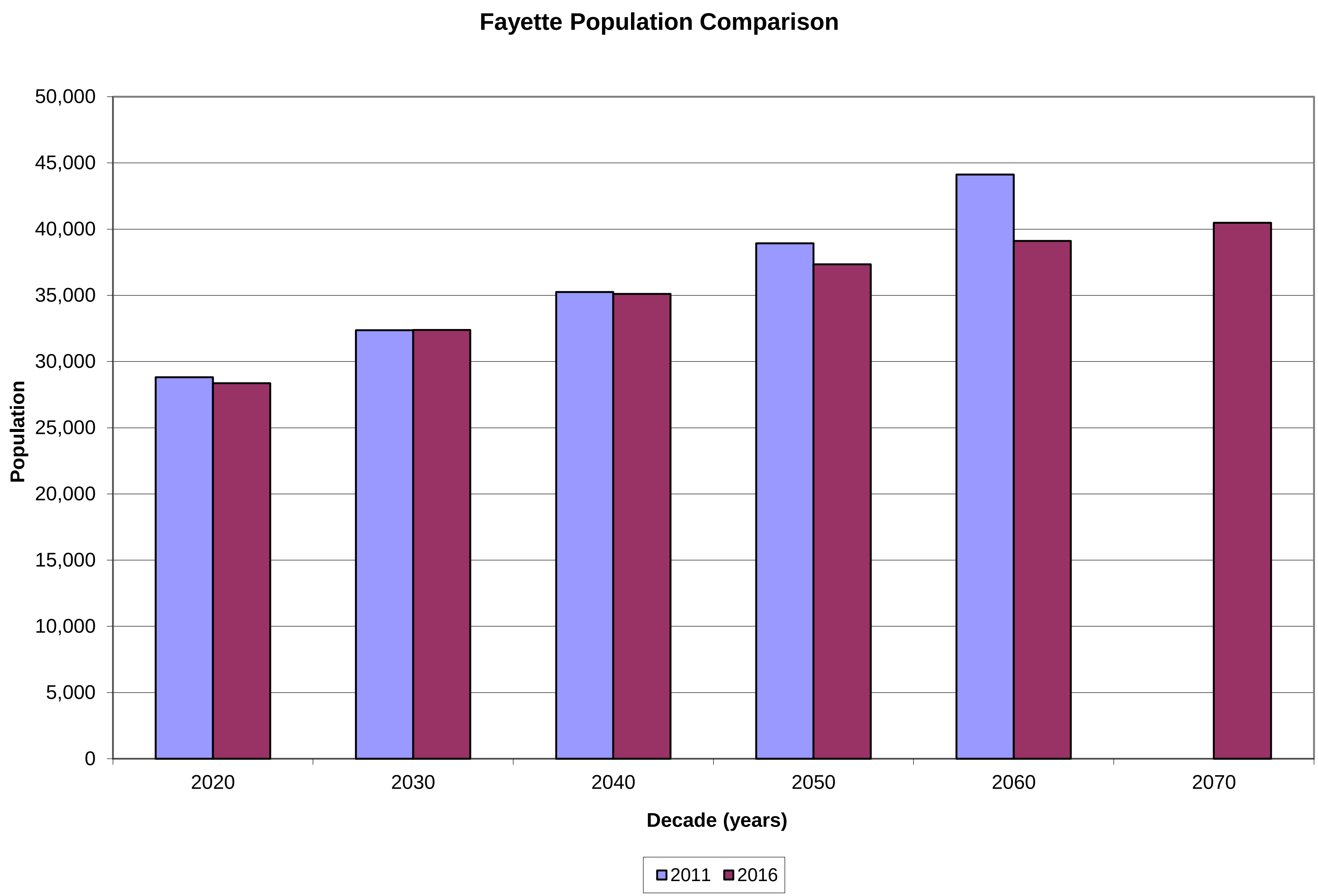
Bastrop Population Comparison
450,000
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
Population
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016


Blanco Population Comparison
20,000
18,000
16,000
14,000
12,000
10,000
8,000
6,000
4,000
2,000
0
Population
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016

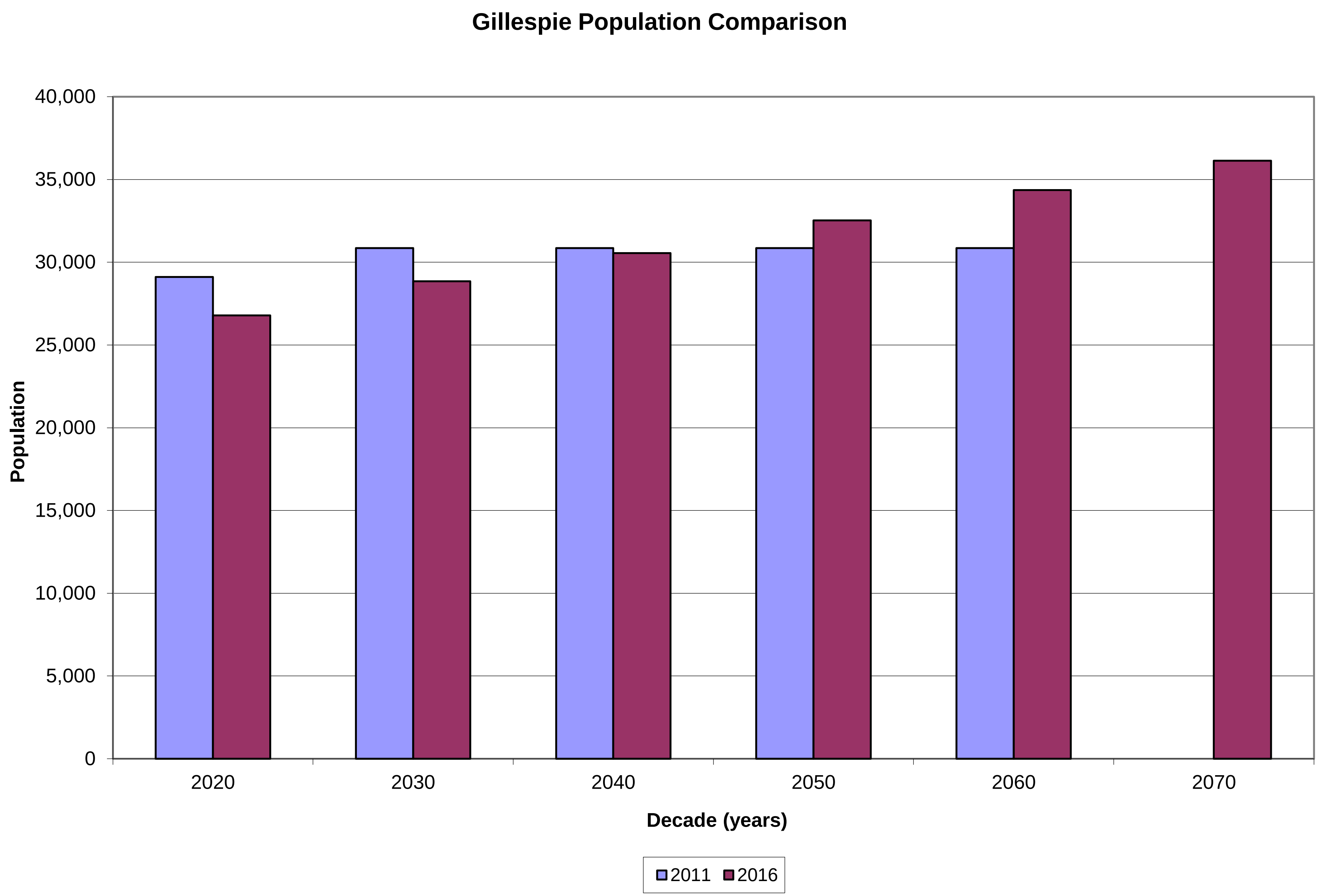


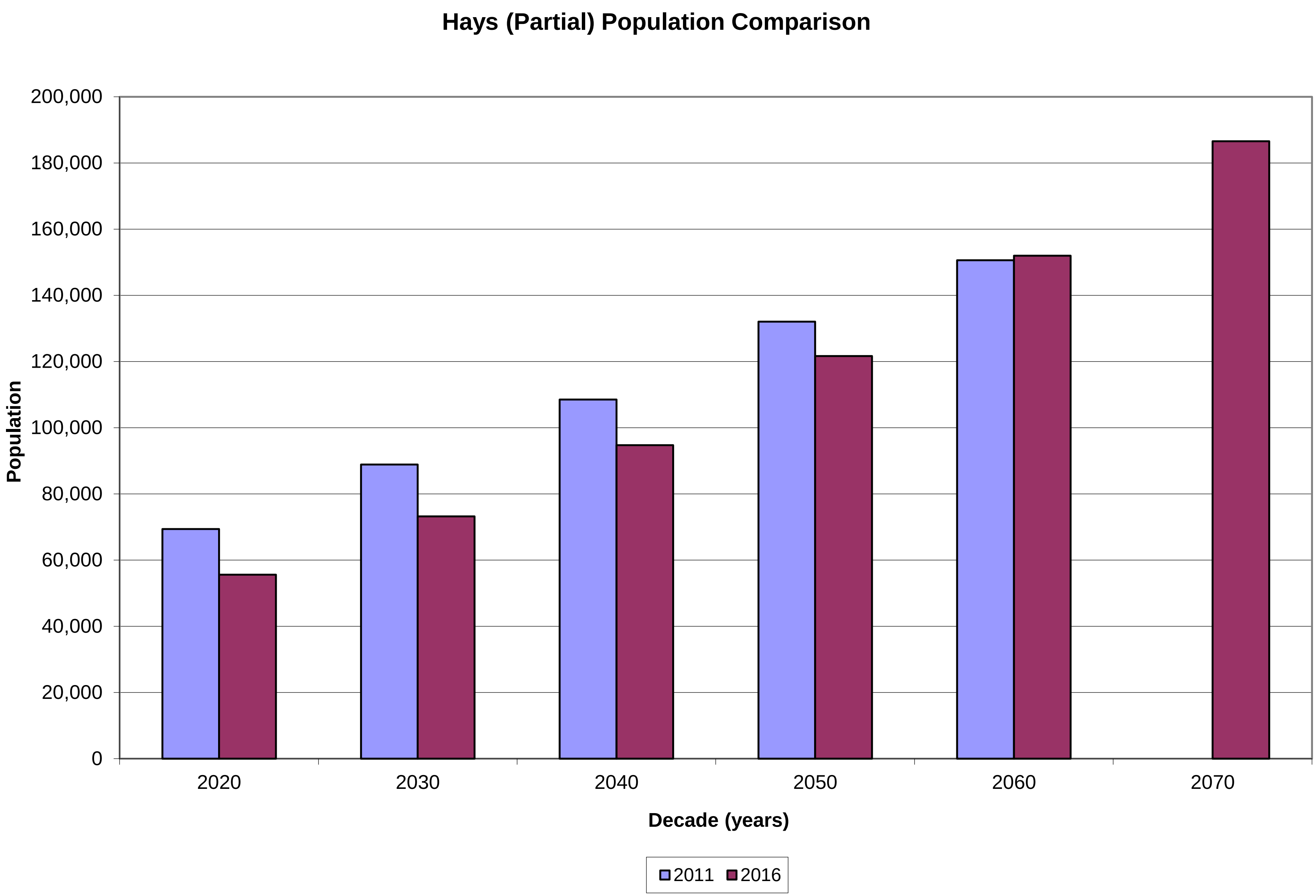
Burnet Population Comparison
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Population
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016

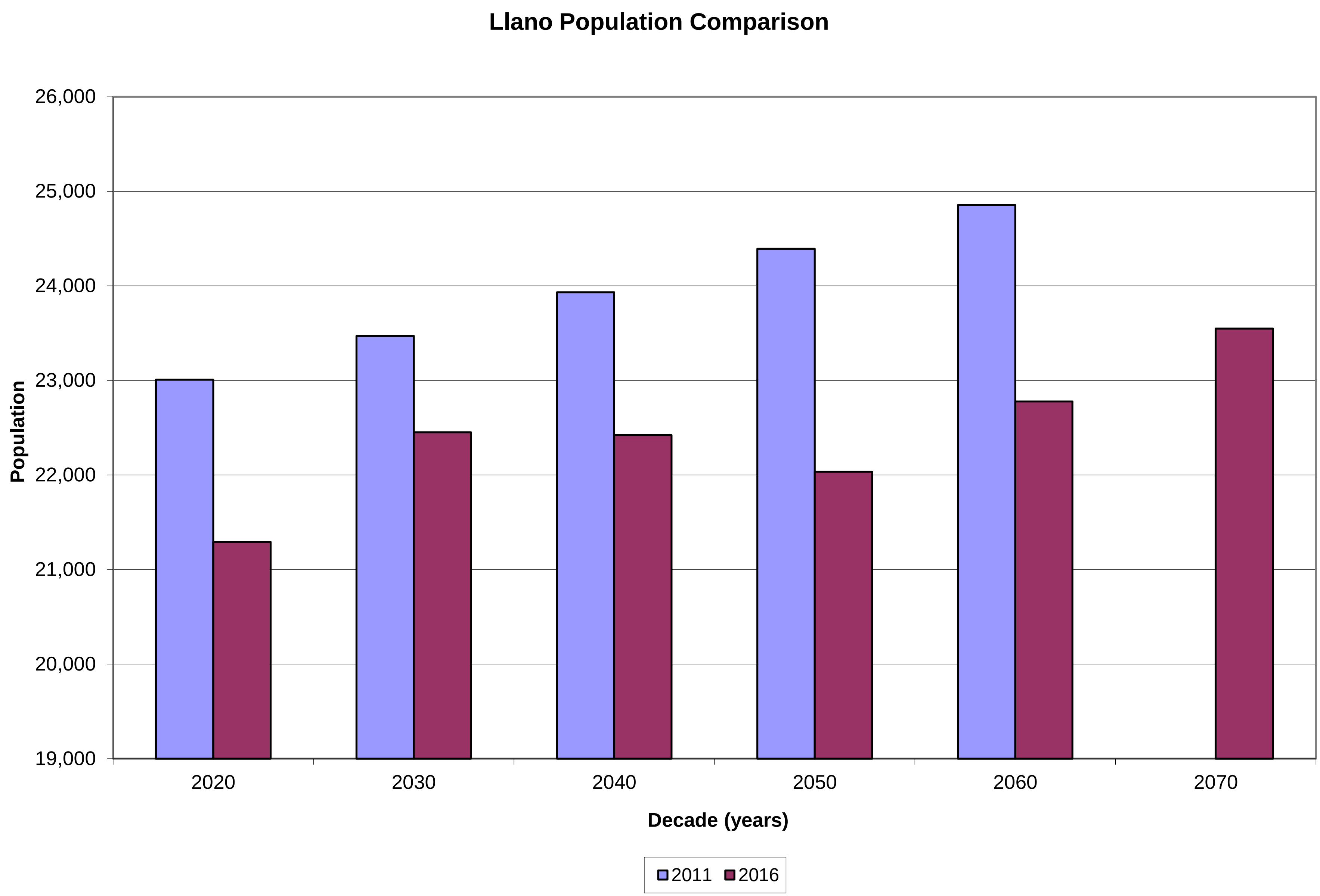

Colorado Population Comparison
30,000
25,000
20,000
15,000
10,000
5,000
0
Population
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016



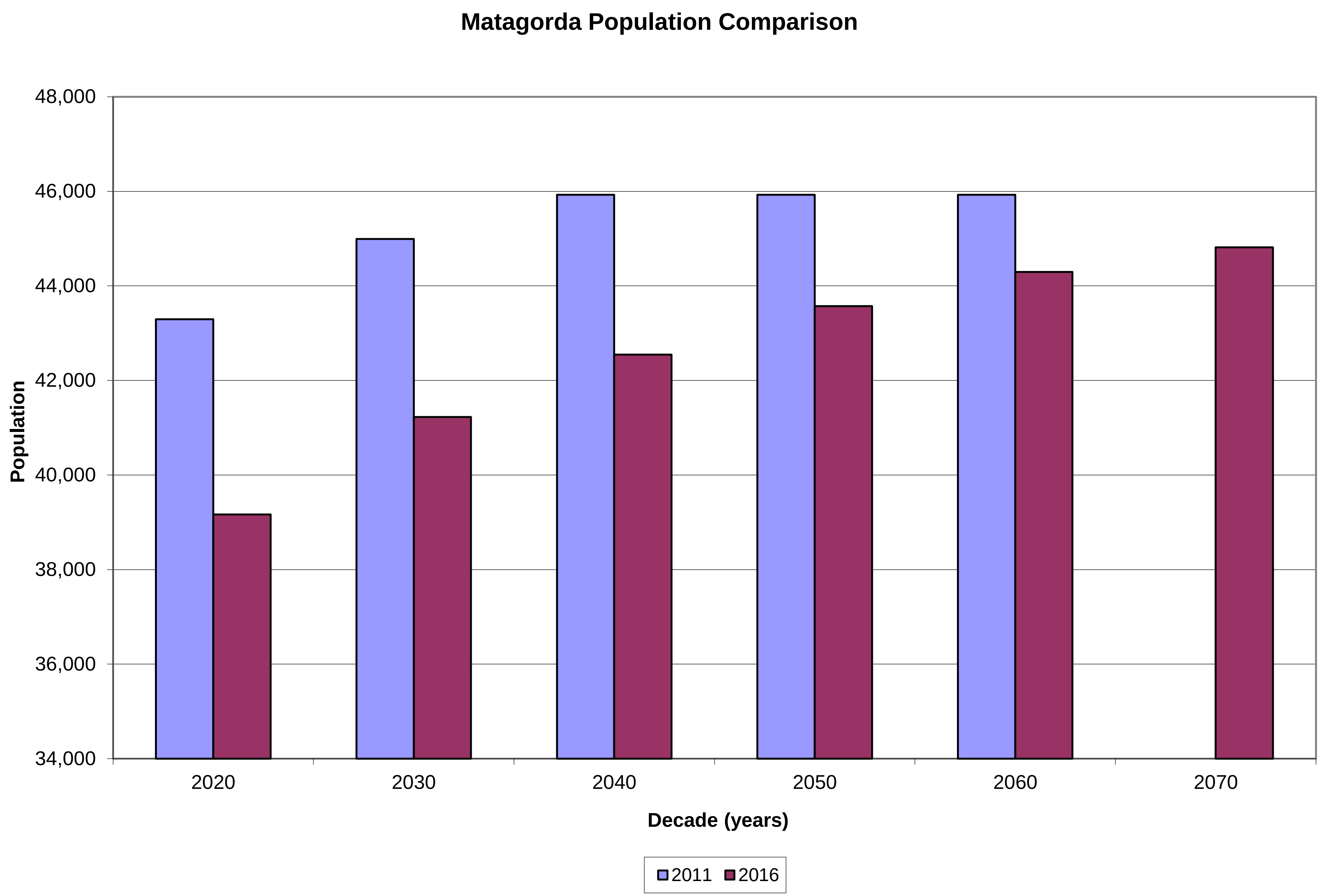
Fayette Population Comparison
50,000
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Population
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016

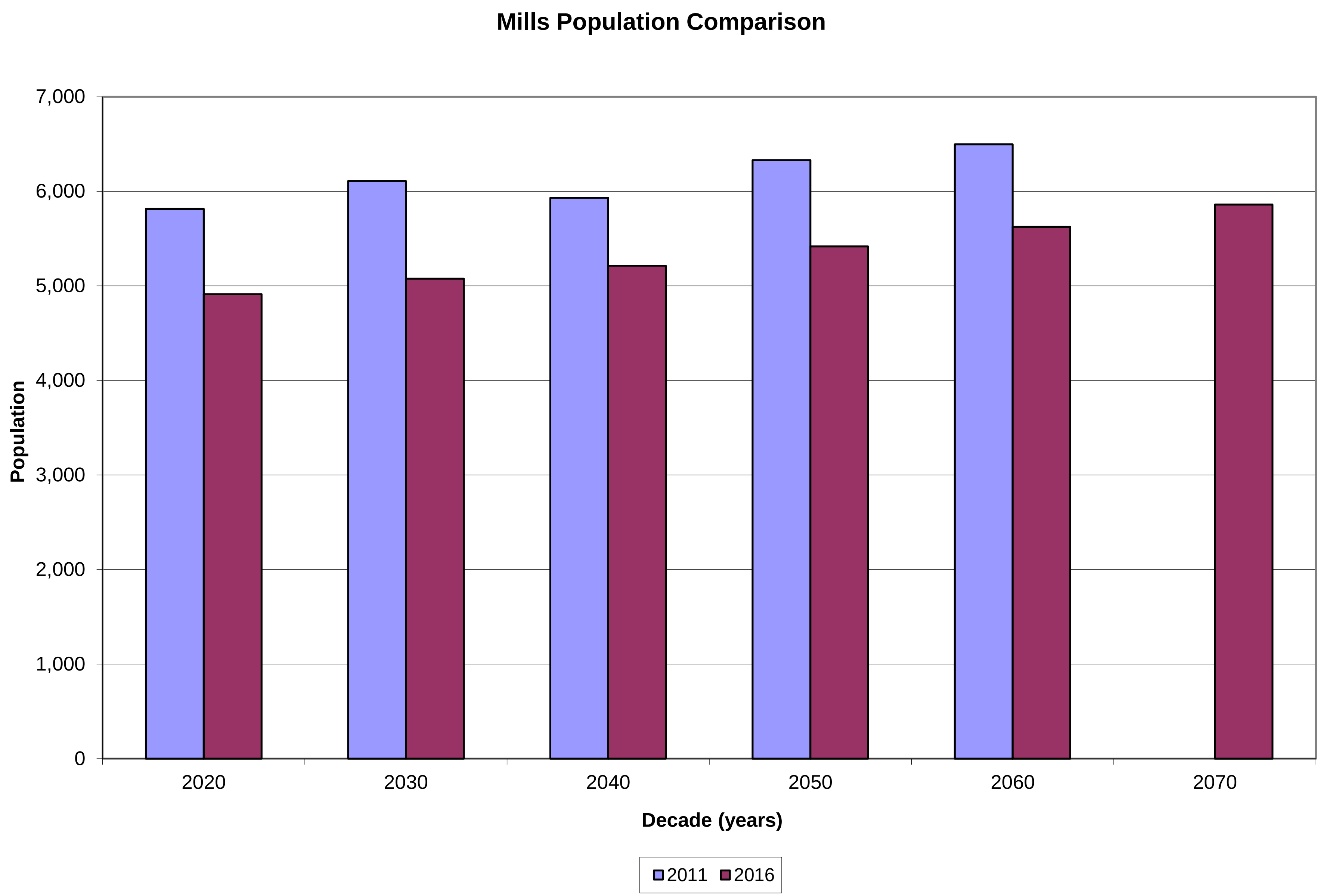

Gillespie Population Comparison
Population
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016


Hays (Partial) Population Comparison
200,000
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Population
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016

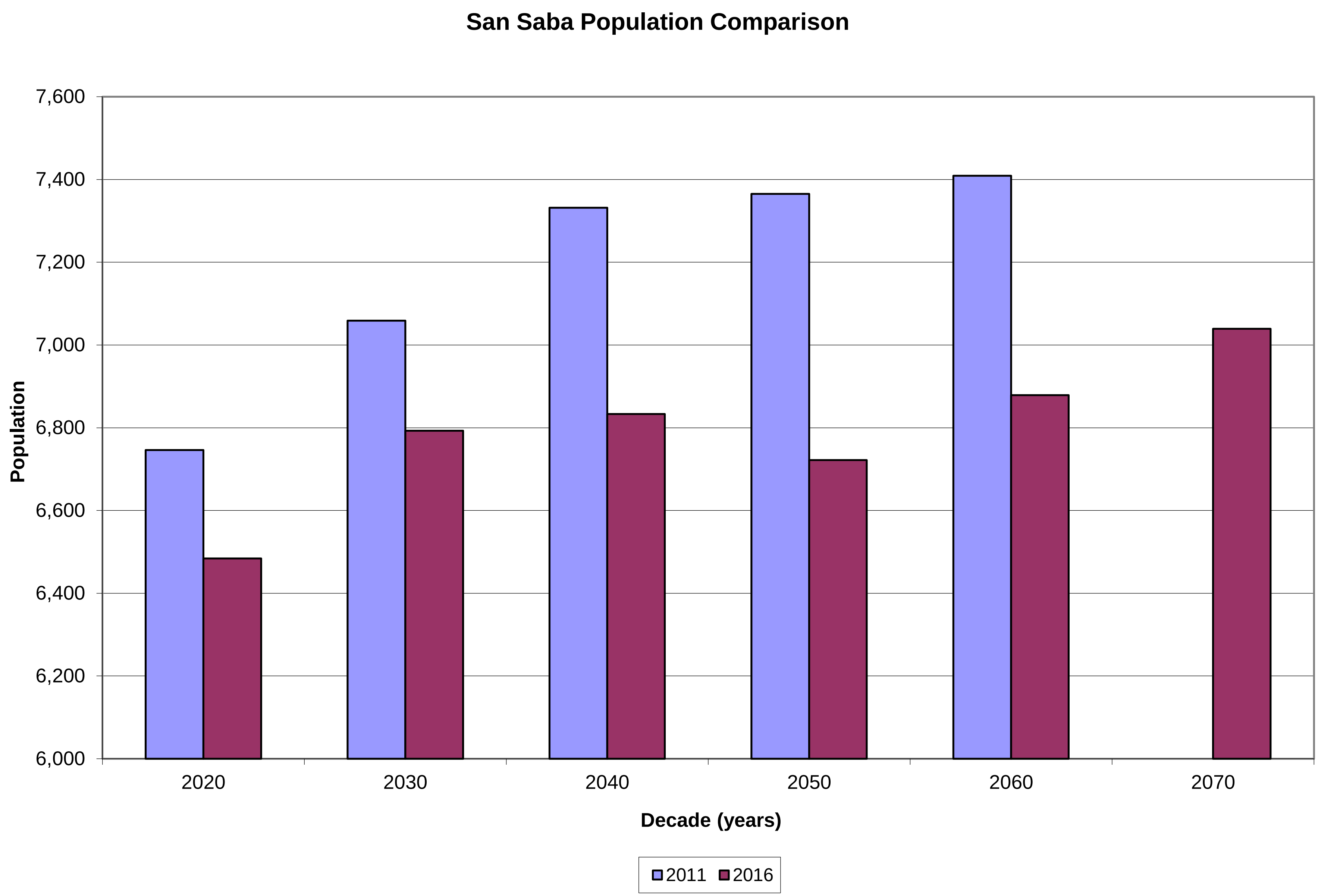


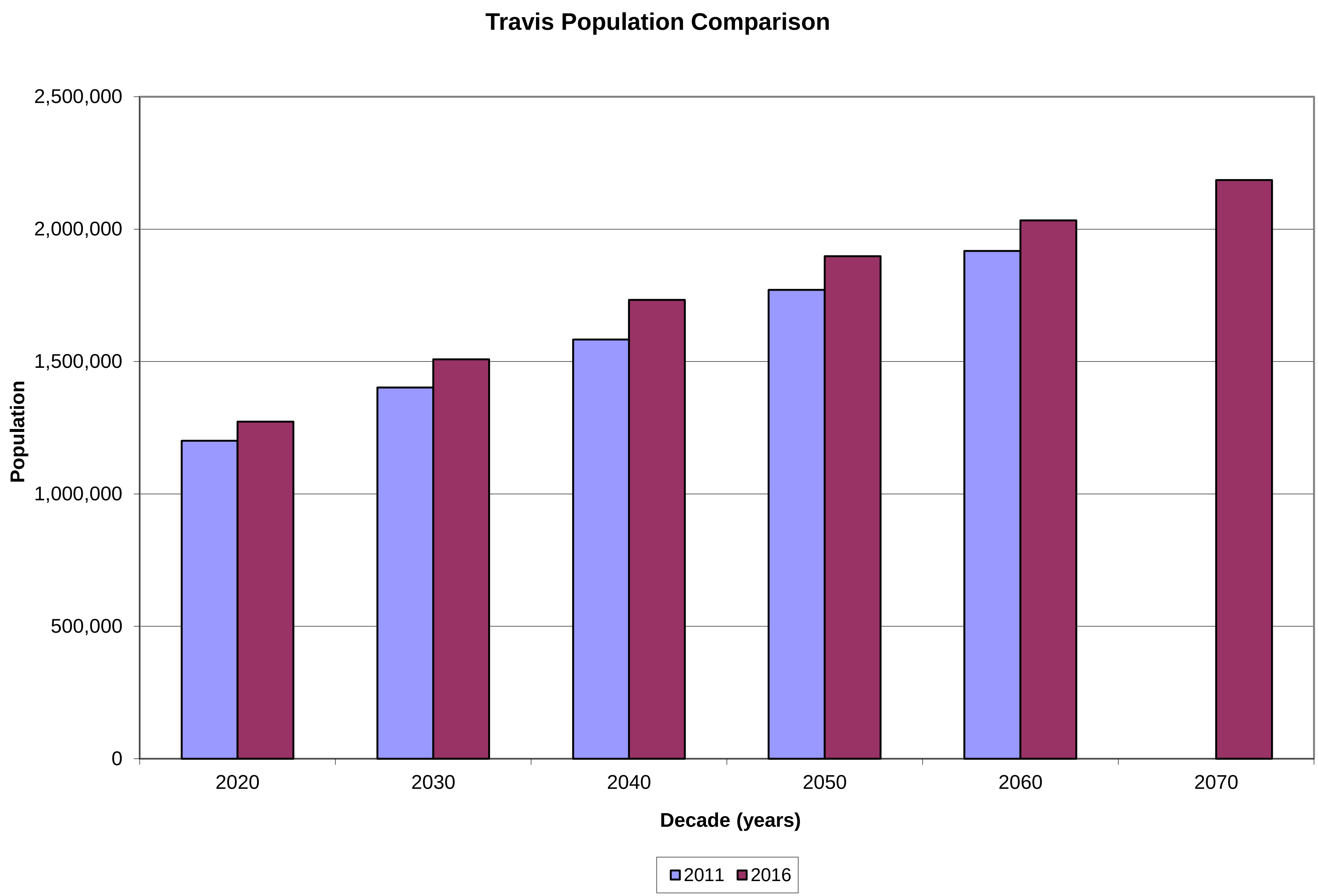
Llano Population Comparison
26,000
25,000
24,000
23,000
22,000
21,000
20,000
19,000
Population
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016


Matagorda Population Comparison
48,000
46,000
44,000
42,000
40,000
38,000
36,000
34,000
Population
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016

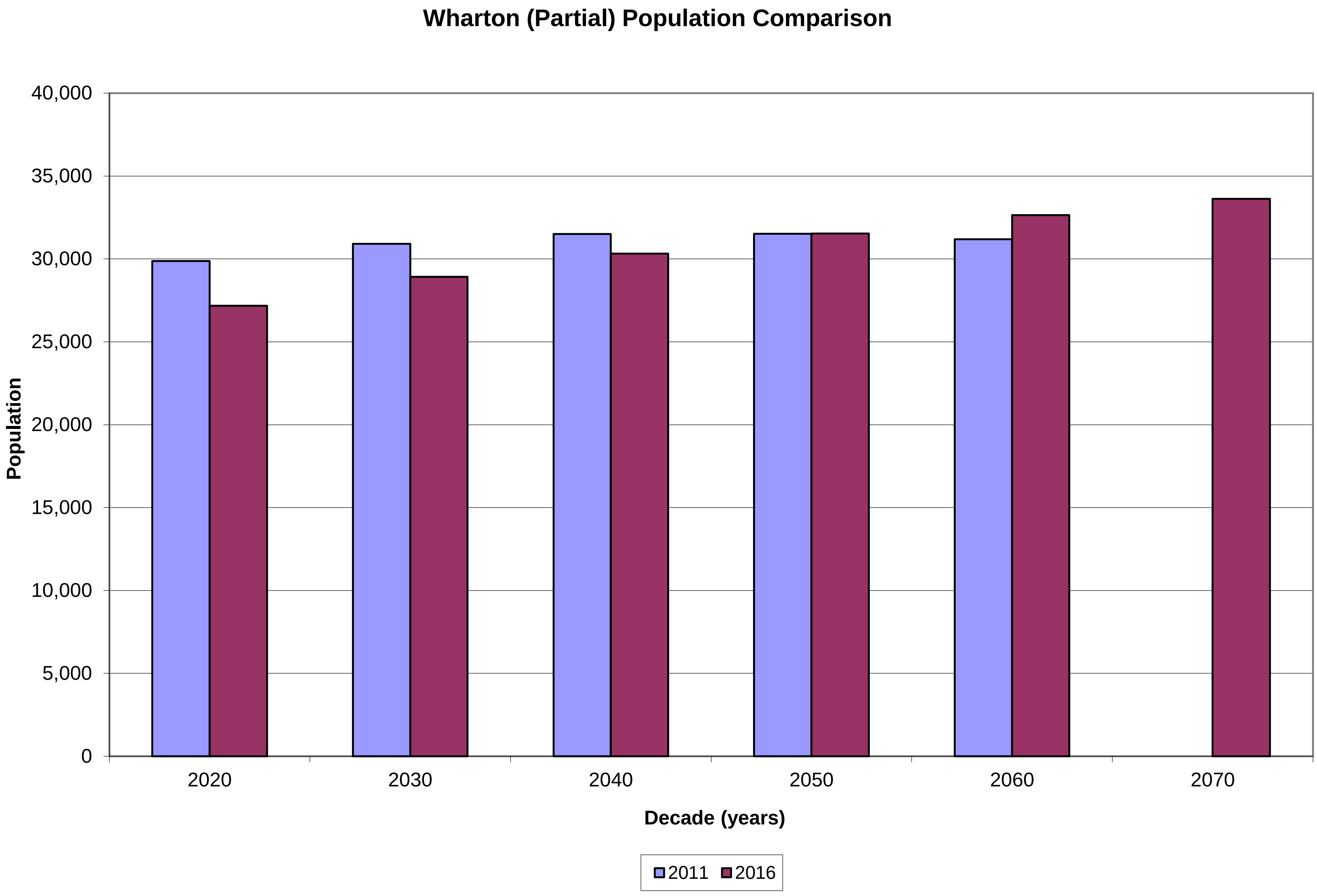


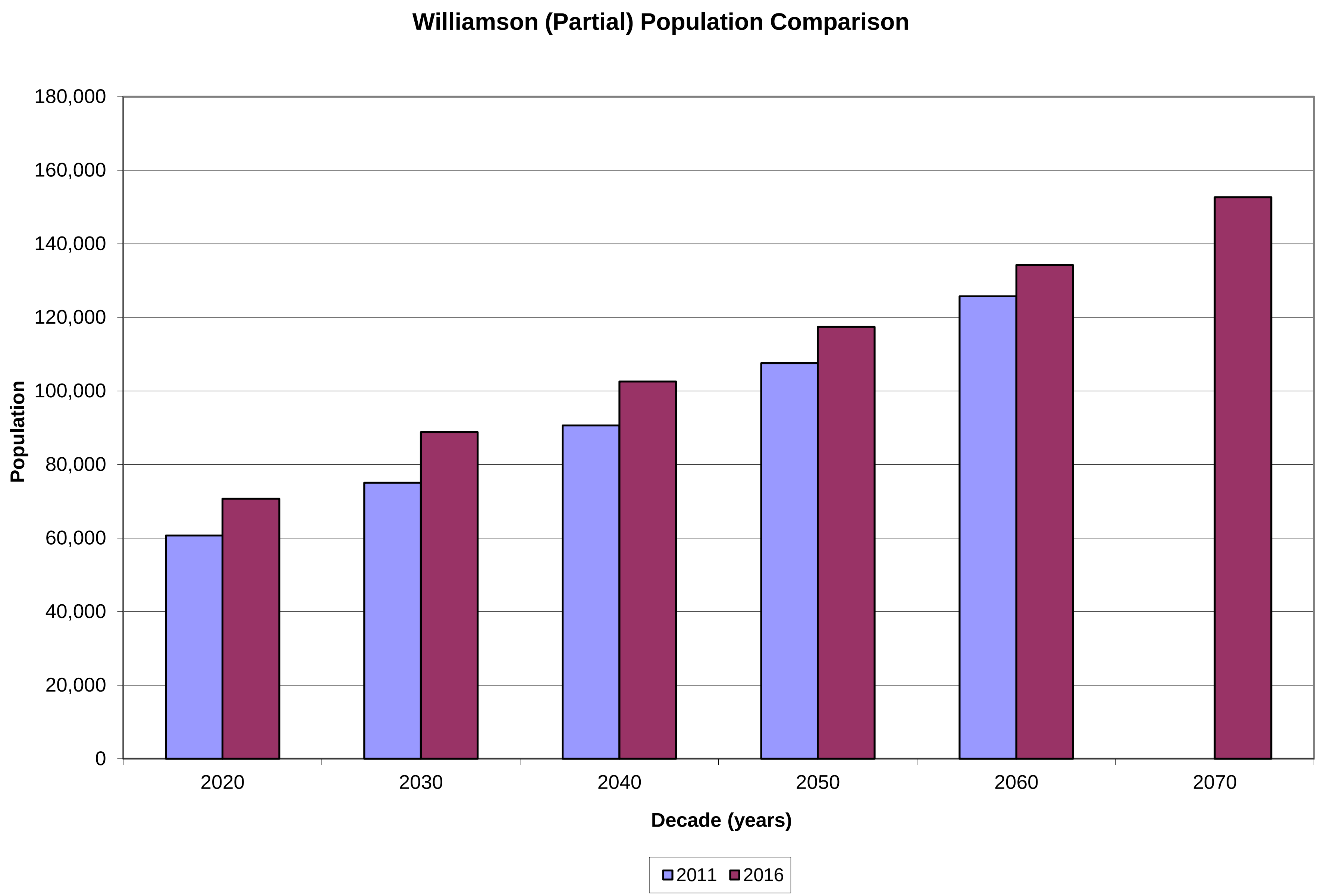
Mills Population Comparison
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Population
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016


San Saba Population Comparison
7,600
7,400
7,200
7,000
6,800
6,600
6,400
6,200
6,000
Population
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016



Travis Population Comparison
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
Population
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016


Wharton (Partial) Population Comparison
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Population
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016


Williamson (Partial) Population Comparison
Population
180,000
160,000
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016

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Water Demands* (in acre-feet per year) by WUG Category
Region K

RWP	2010	2020	2030	2040	2050	2060	2070
Municipal							
2016		306,560	359,194	411,761	458,588	505,009	558,949
2011	268,643	321,972	373,430	423,051	472,778	516,348	
Difference		-15,412	-14,236	-11,290	-14,190	-11,339	
% Change		-4.8	-3.8	-2.7	-3.0	-2.2	
Livestock							
2016		14,012	14,012	14,012	14,012	14,012	14,012
2011	13,395	13,395	13,395	13,395	13,395	13,395	
Difference		617	617	617	617	617	
% Change		4.6	4.6	4.6	4.6	4.6	
Irrigation							
2016		607,433	590,740	574,530	558,789	543,507	528,715
2011	589,705	567,272	545,634	524,809	504,695	468,763	
Difference		40,161	45,106	49,721	54,094	74,744	
% Change		7.1	8.3	9.5	10.7	15.9	
Manufacturing							
2016		56,019	70,050	86,259	96,283	106,487	117,851
2011	38,162	44,916	56,233	69,264	77,374	85,698	
Difference		11,103	13,817	16,995	18,909	20,789	
% Change		24.7	24.6	24.5	24.4	24.3	
Mining							
2016		20,848	26,104	27,991	29,757	31,893	34,961
2011	30,620	31,252	31,613	26,964	27,304	27,598	
Difference		-10,404	-5,509	1,027	2,453	4,295	
% Change		-33.3	-17.4	3.8	9.0	15.6	
Steam-Electric Power Generation							
2016		178,453	185,235	187,410	194,802	200,413	207,319
2011	146,167	201,353	210,713	258,126	263,715	270,732	
Difference		-22,900	-25,478	-70,716	-68,913	-70,319	
% Change		-11.4	-12.1	-27.4	-26.1	-26.0	

*All values are presented in acre-feet per year

Total Water Demand							
2016		1,183,325	1,245,335	1,301,963	1,352,231	1,401,321	1,461,807
2011	1,086,692	1,180,160	1,231,018	1,315,609	1,359,261	1,382,534	
Difference		3,165	14,317	-13,646	-7,030	18,787	
% Change		0.3	1.2	-1.0	-0.5	1.4	

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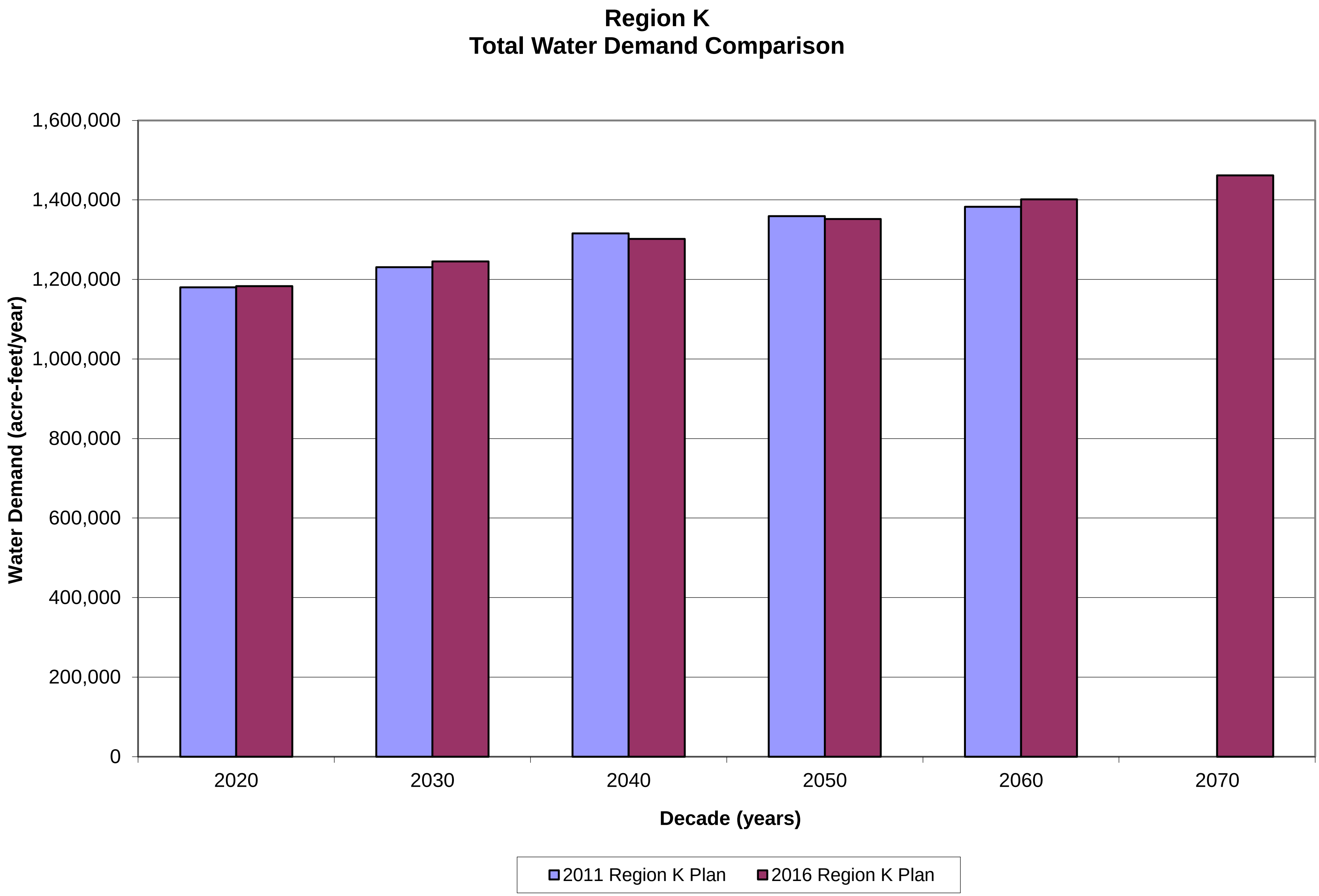
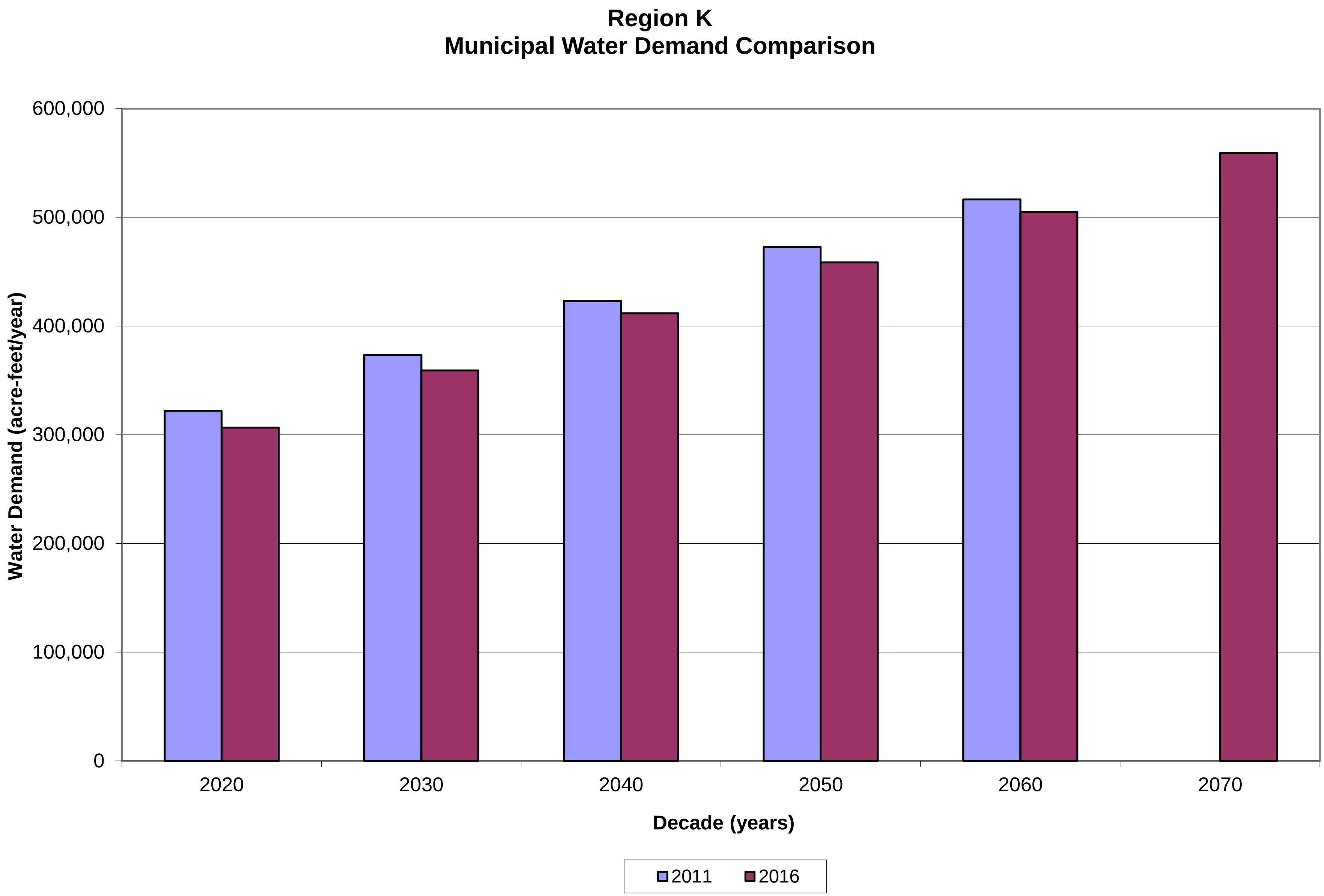
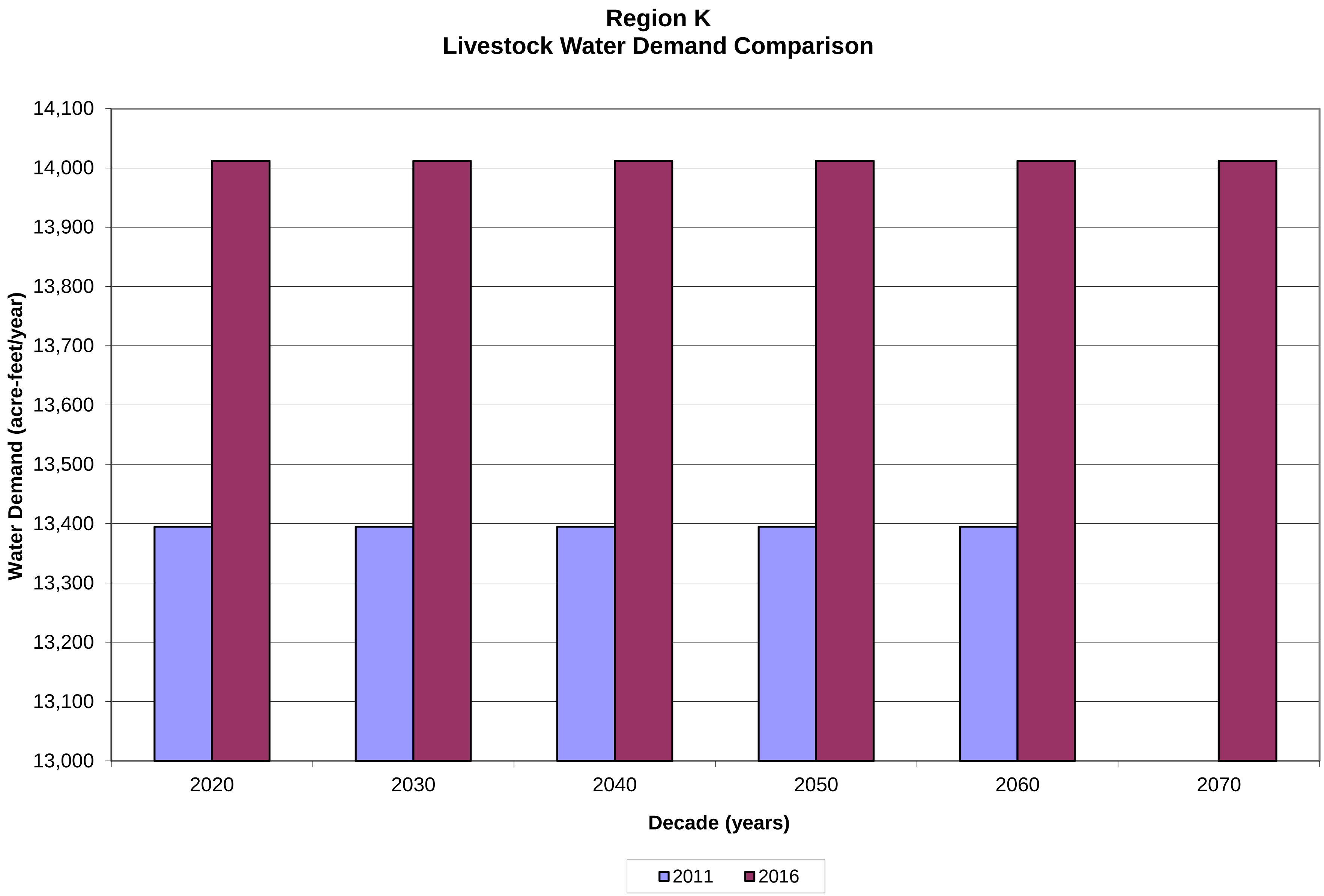
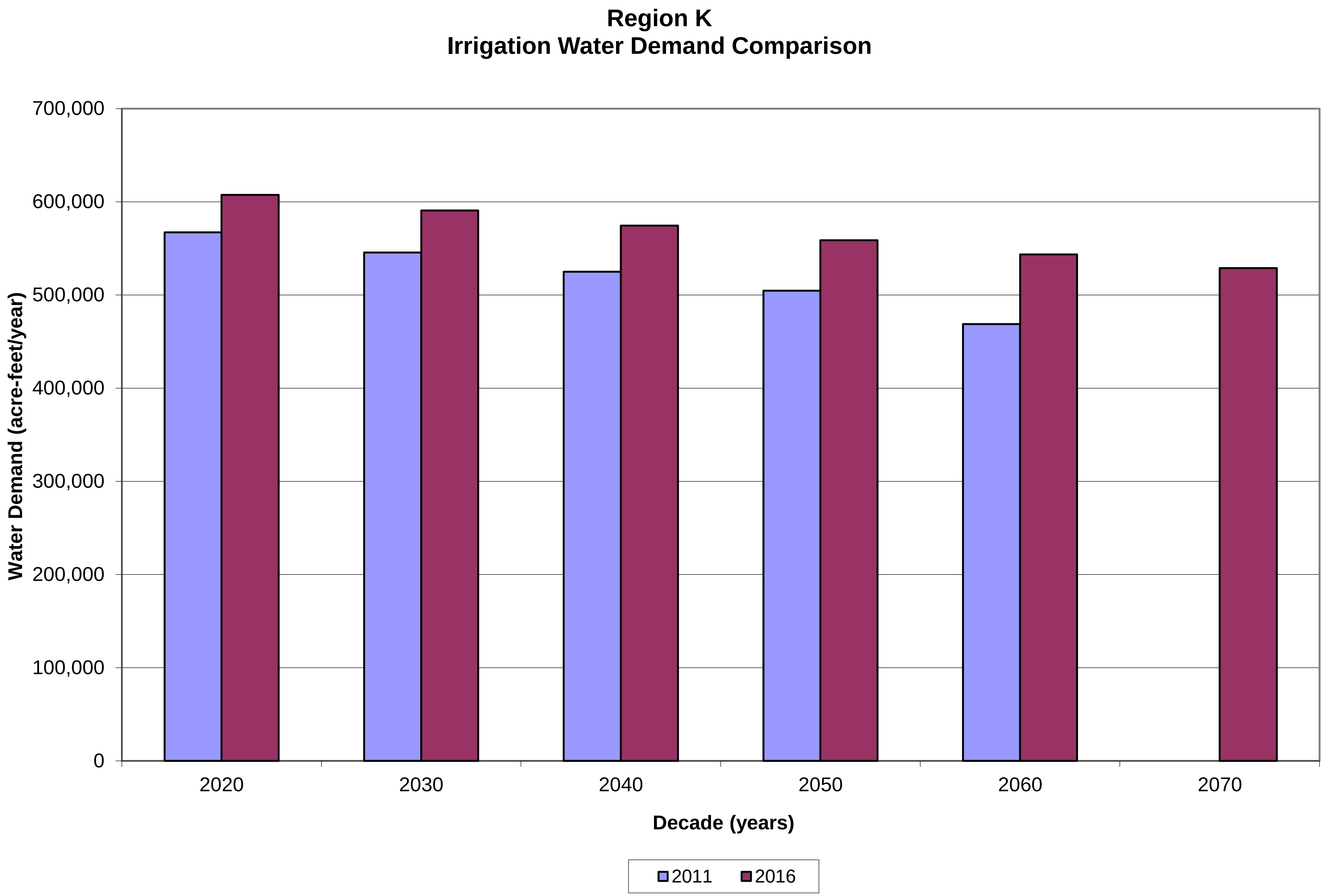


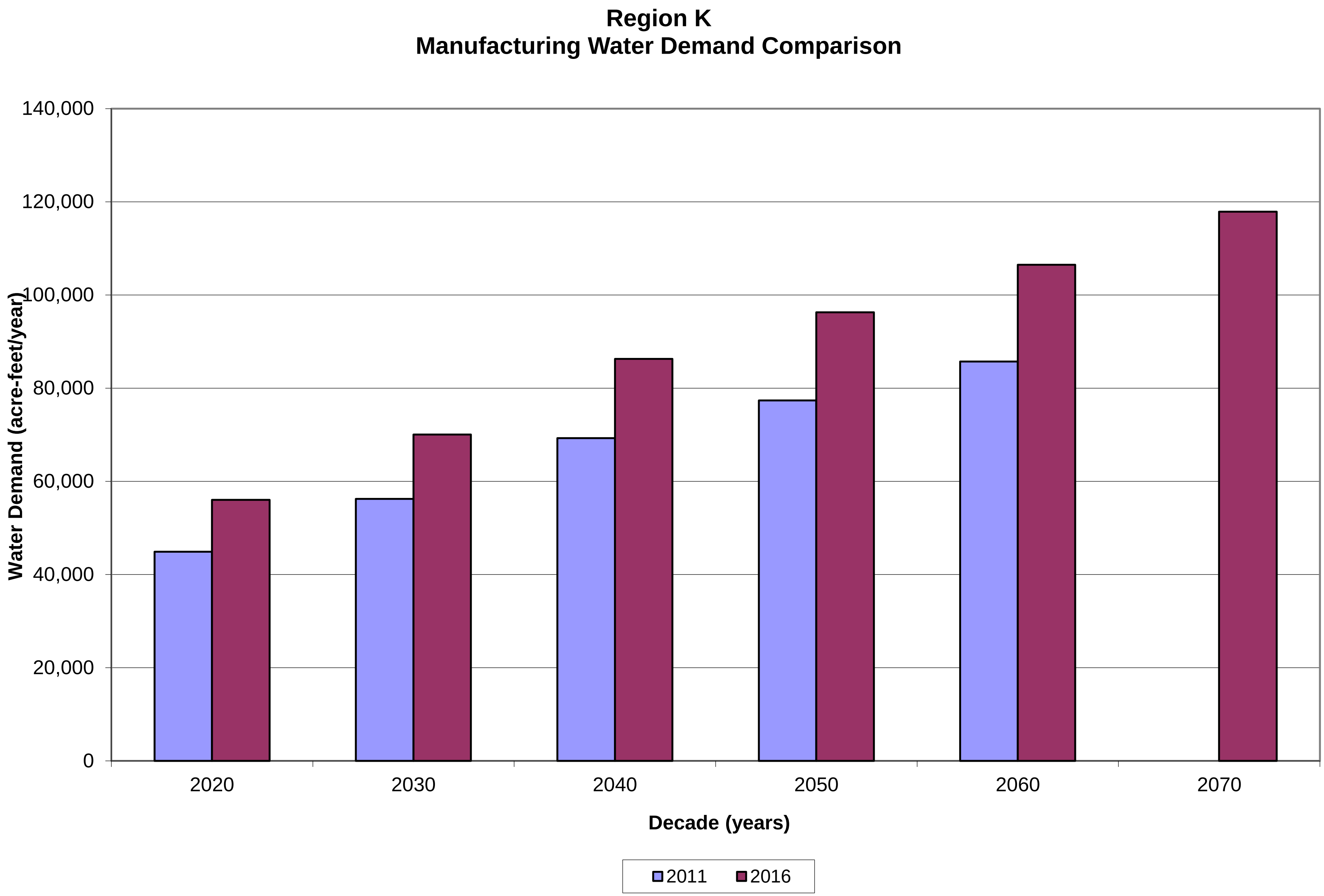
Region K
Total Water Demand Comparison
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
Decade (years)
2011 Region K Plan
2016 Region K Plan

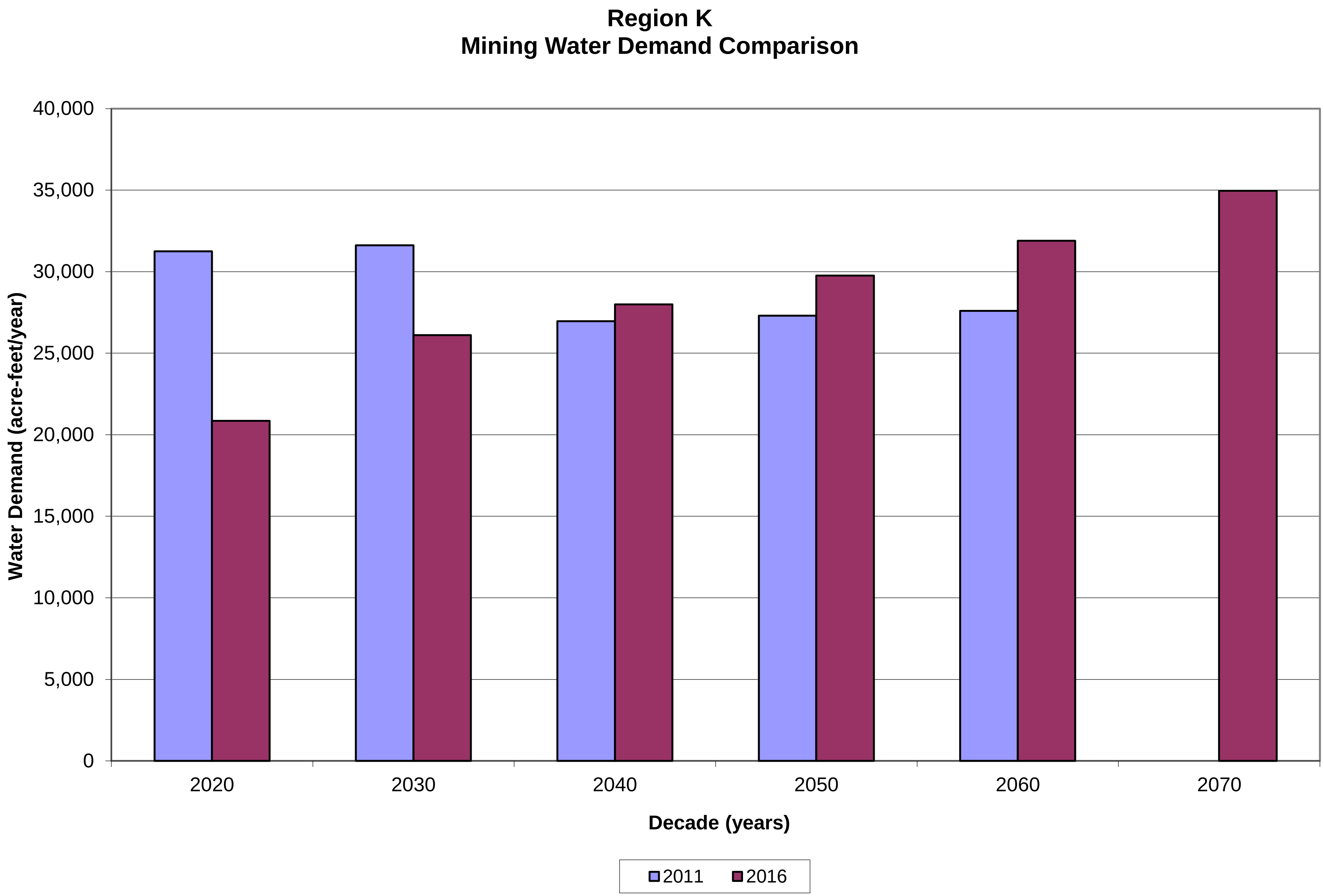

Region K
Municipal Water Demand Comparison
Water Demand (acre-feet/year)
600,000
500,000
400,000
300,000
200,000
100,000
0
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016

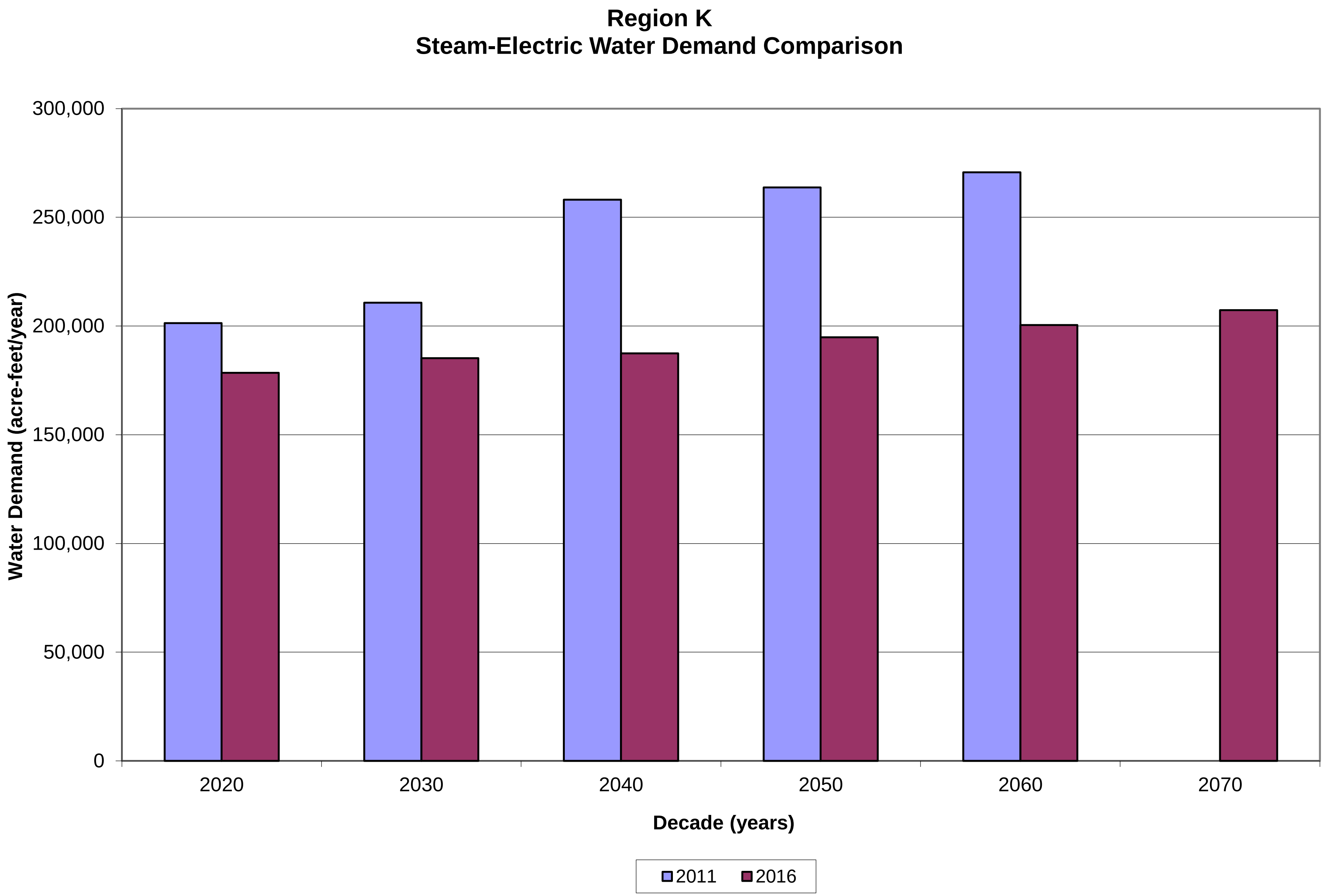

Region K
Livestock Water Demand Comparison
Water Demand (acre-feet/year)
14,100
14,000
13,900
13,800
13,700
13,600
13,500
13,400
13,300
13,200
13,100
13,000
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016

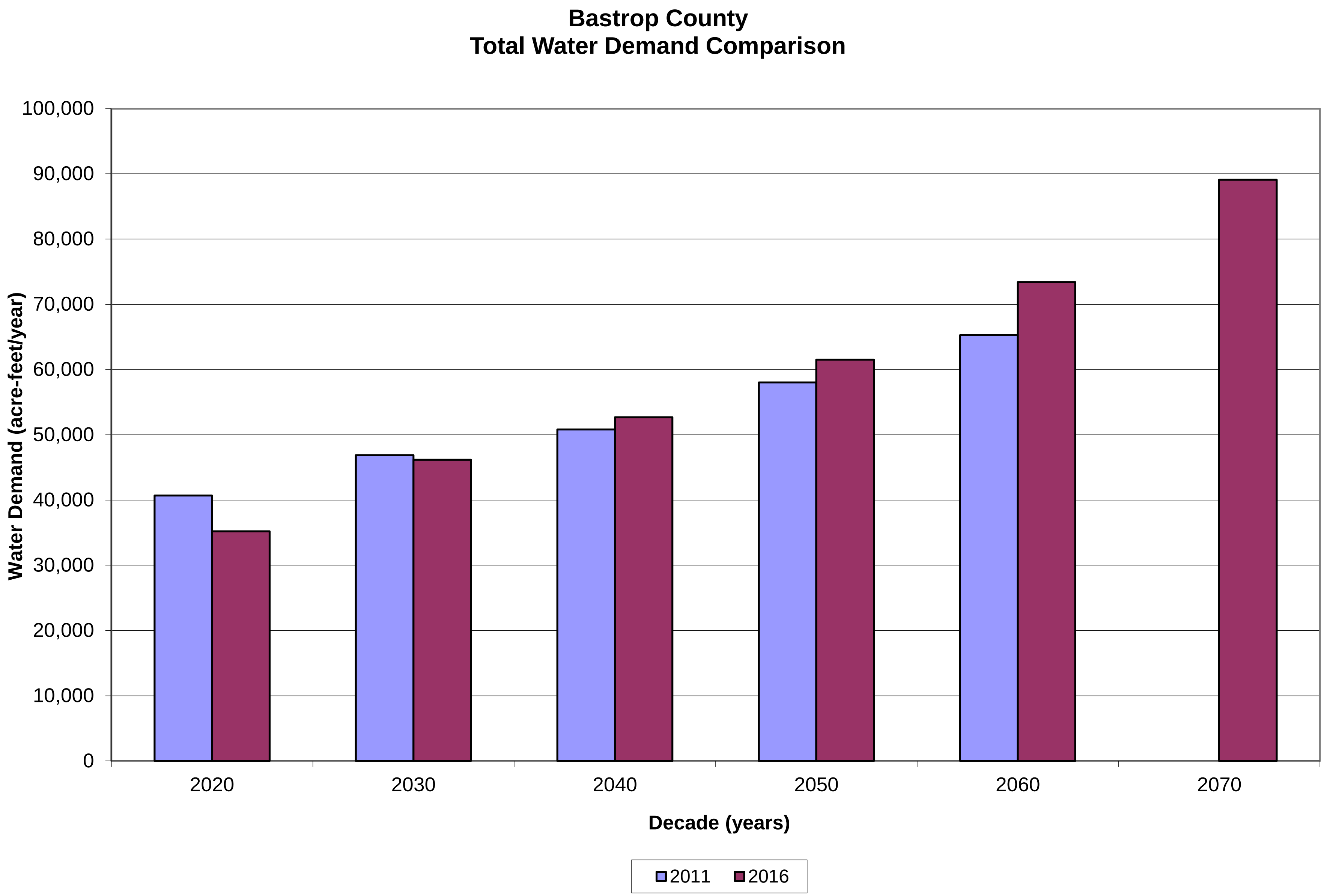


Region K
Irrigation Water Demand Comparison
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016

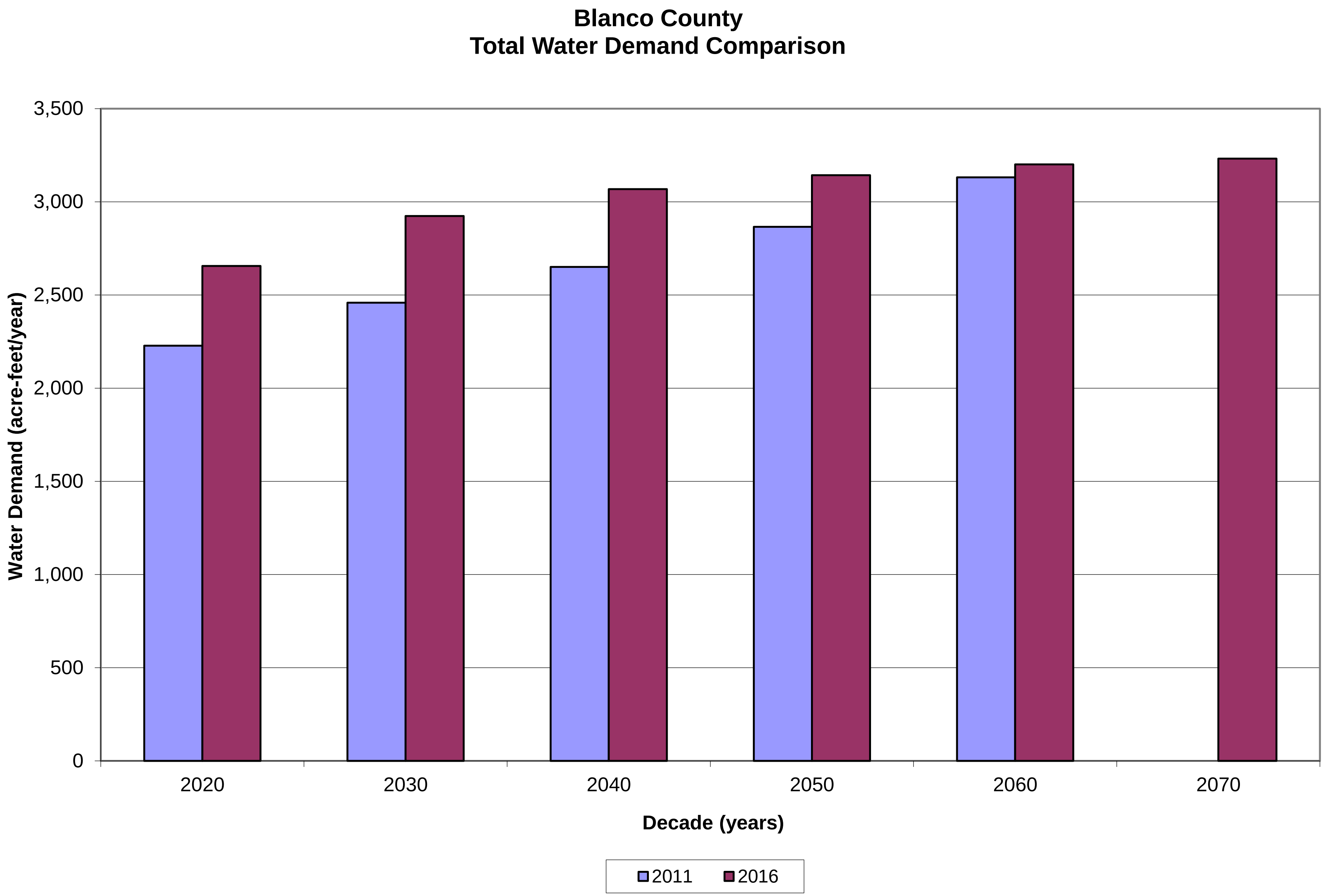

Region K
Manufacturing Water Demand Comparison
140,000
120,000
100,000
80,000
60,000
40,000
20,000
0
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016

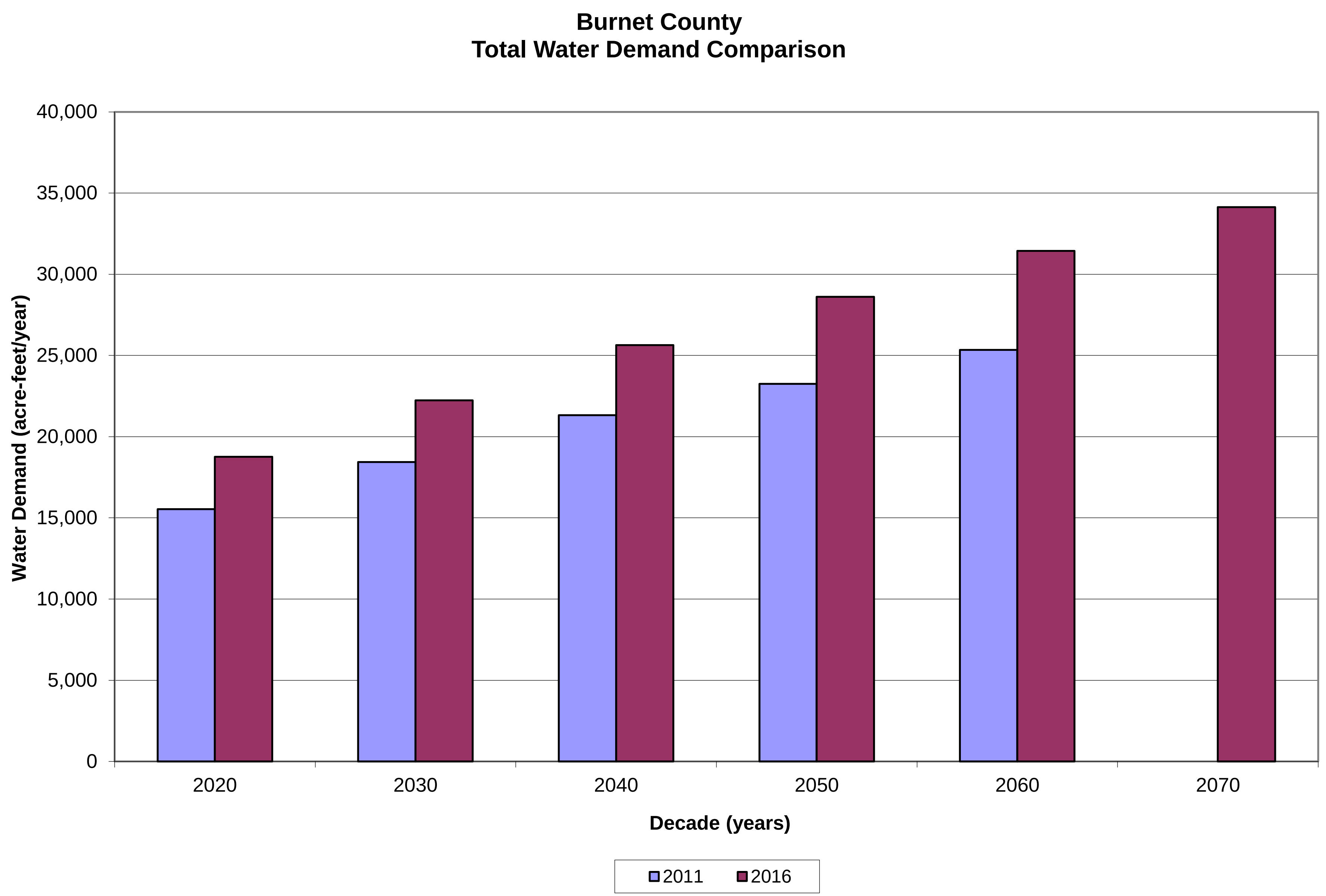

Region K
Mining Water Demand Comparison
Water Demand (acre-feet/year)
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016


Region K
Steam-Electric Water Demand Comparison
300,000
250,000
200,000
150,000
100,000
50,000
0
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016



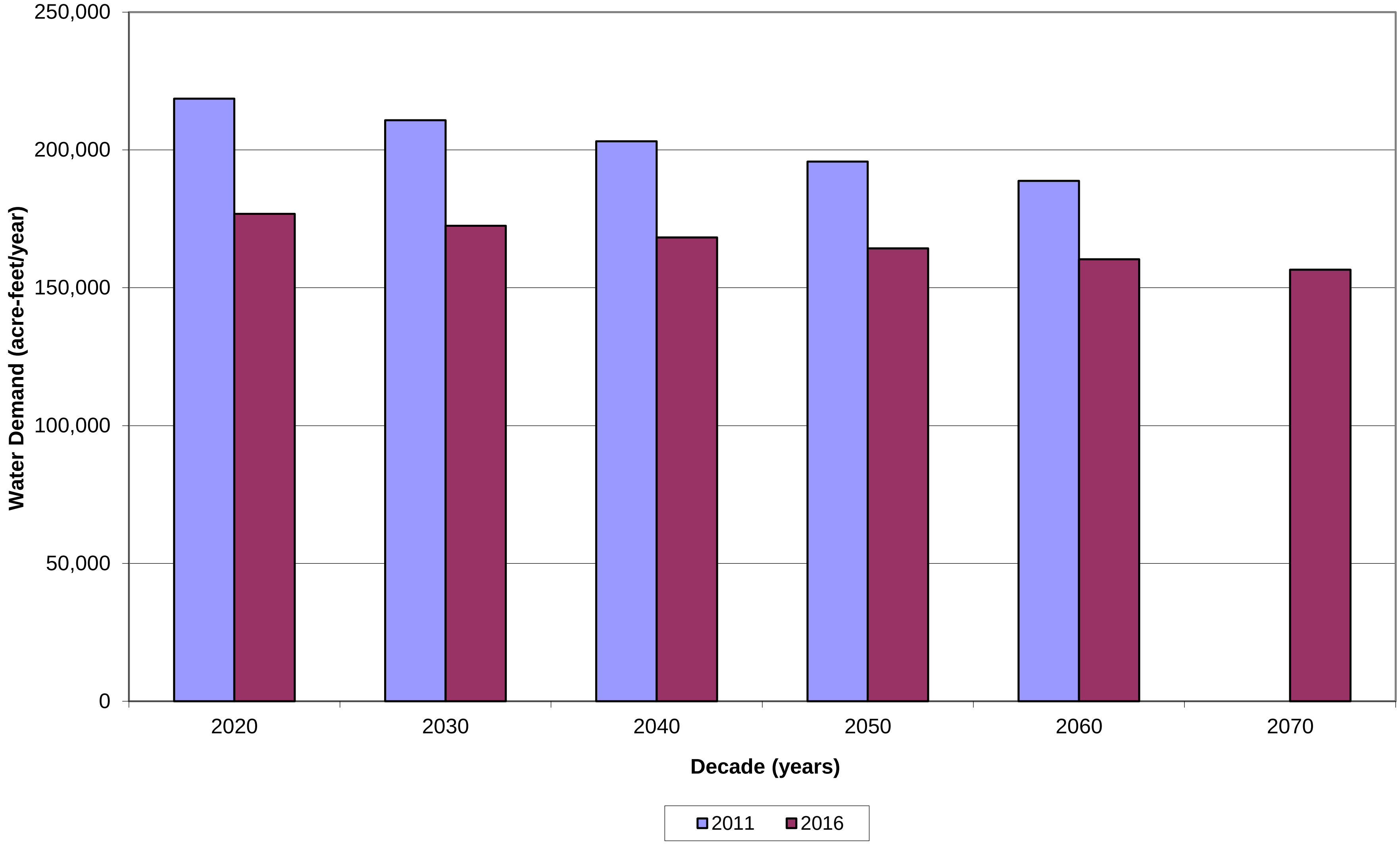
Bastrop County
Total Water Demand Comparison
100,000
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016

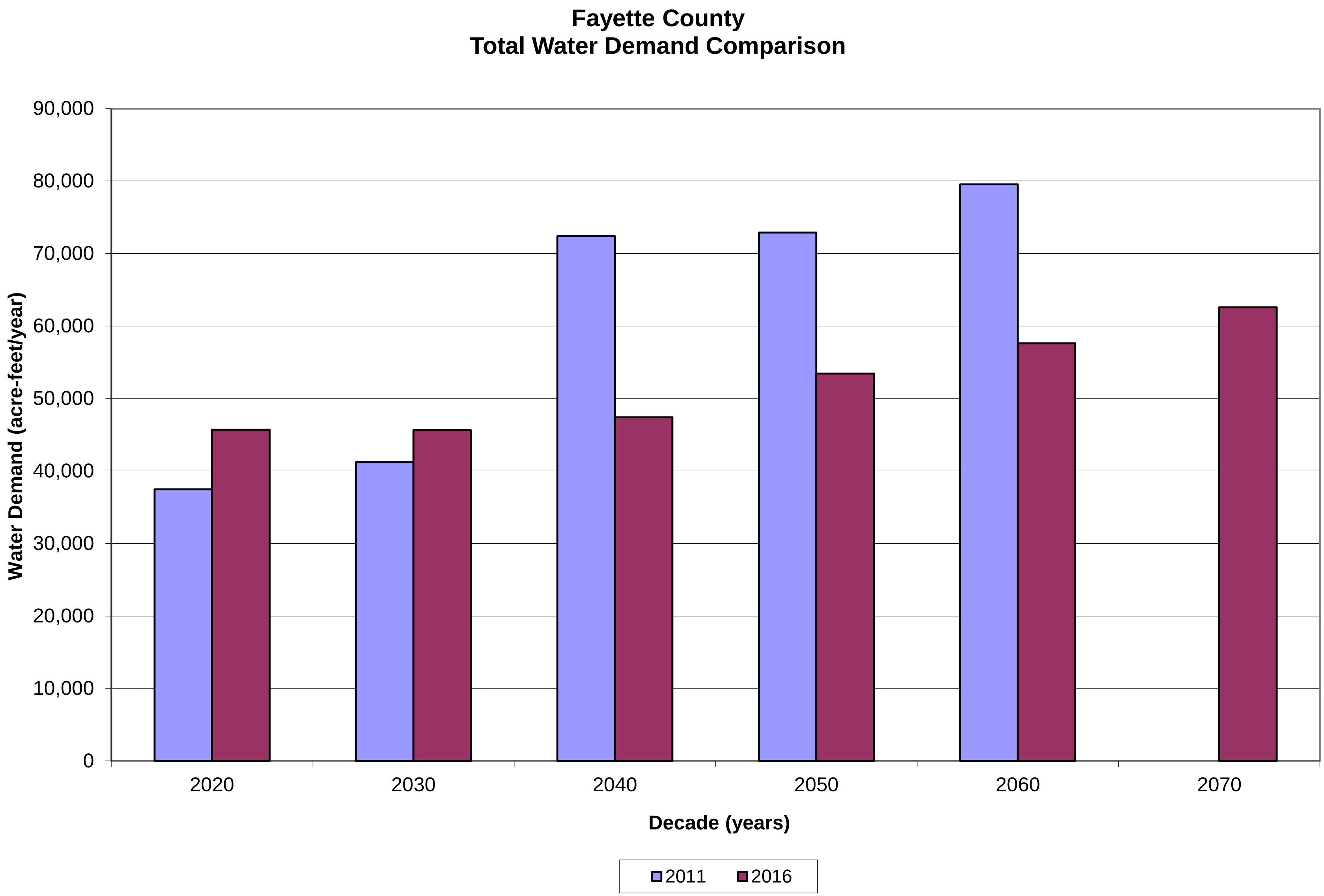

Blanco County
Total Water Demand Comparison
Water Demand (acre-feet/year)
3,500
3,000
2,500
2,000
1,500
1,000
500
0
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016

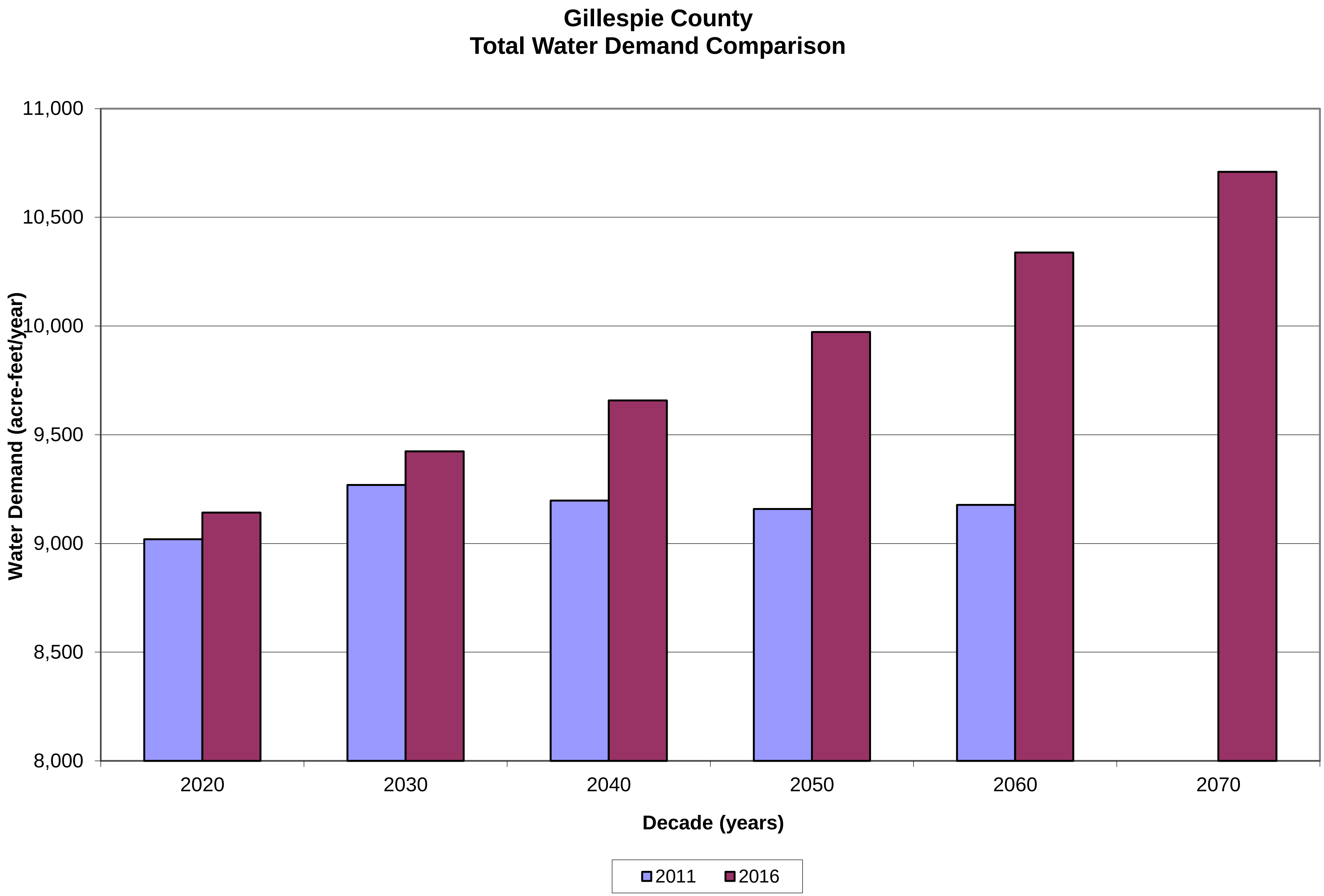


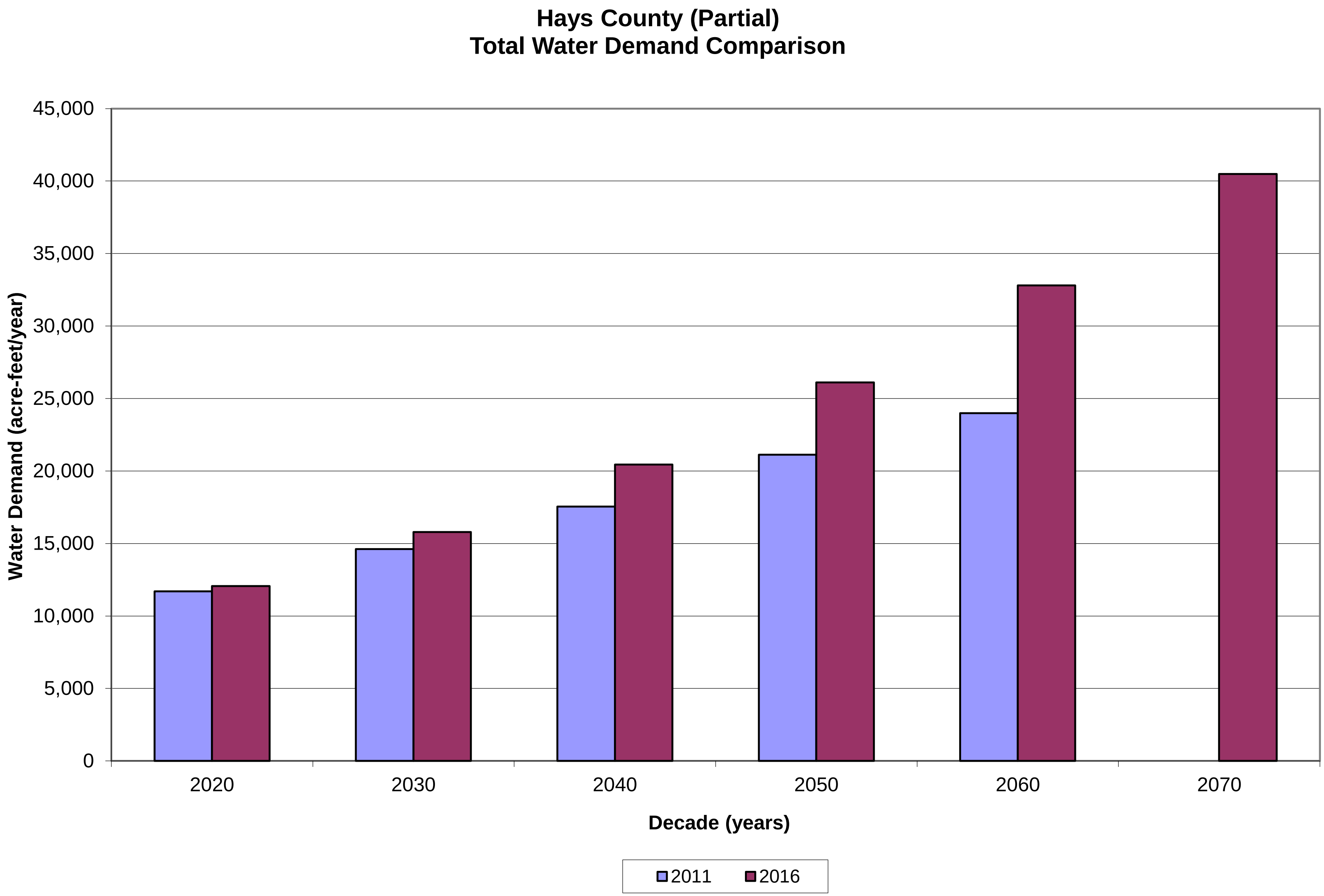
Burnet County
Total Water Demand Comparison
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016

Colorado County
Total Water Demand Comparison

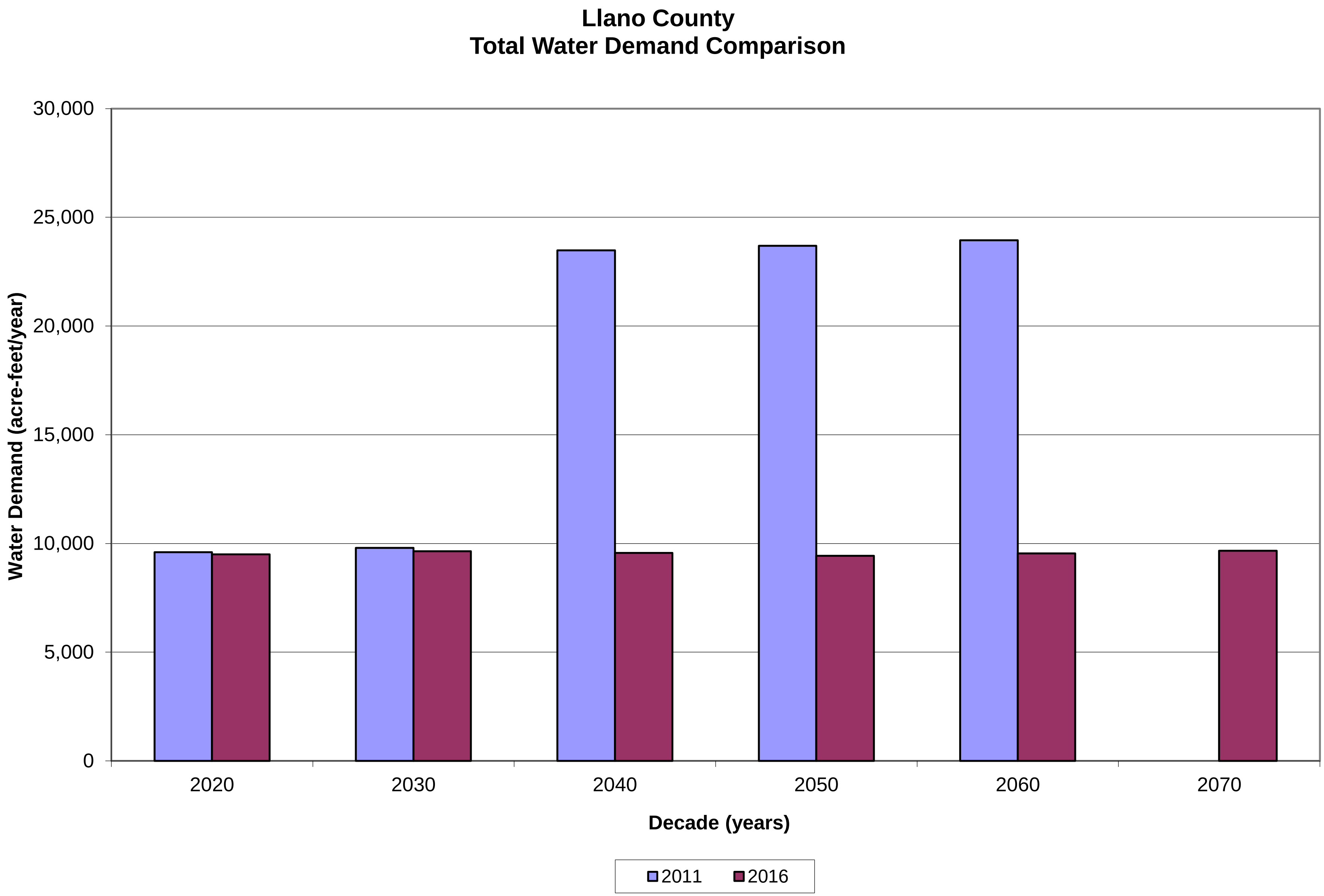


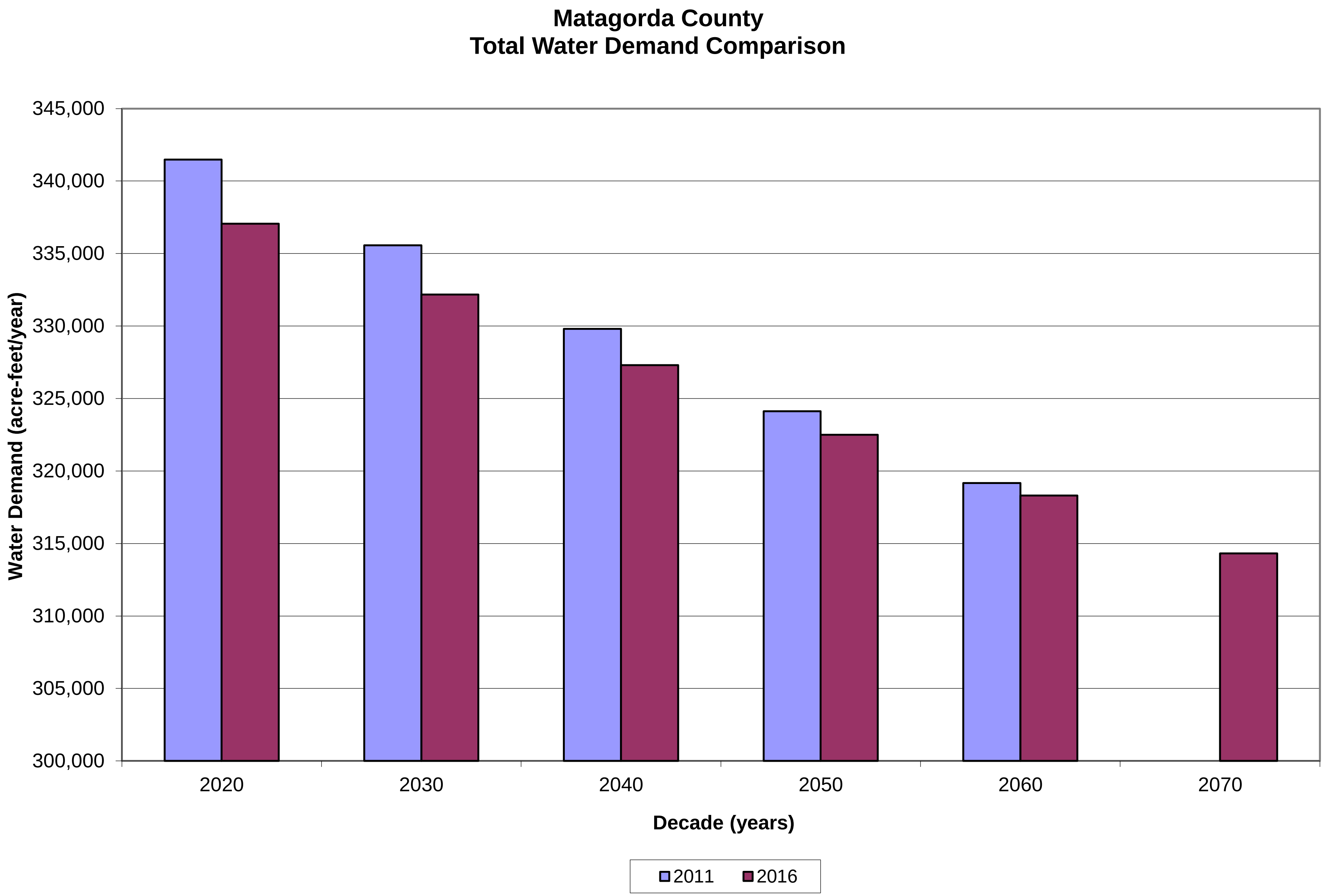

Fayette County
Total Water Demand Comparison
90,000
80,000
70,000
60,000
50,000
40,000
30,000
20,000
10,000
0
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016


Gillespie County
Total Water Demand Comparison
11,000
10,500
10,000
9,500
9,000
8,500
8,000
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016

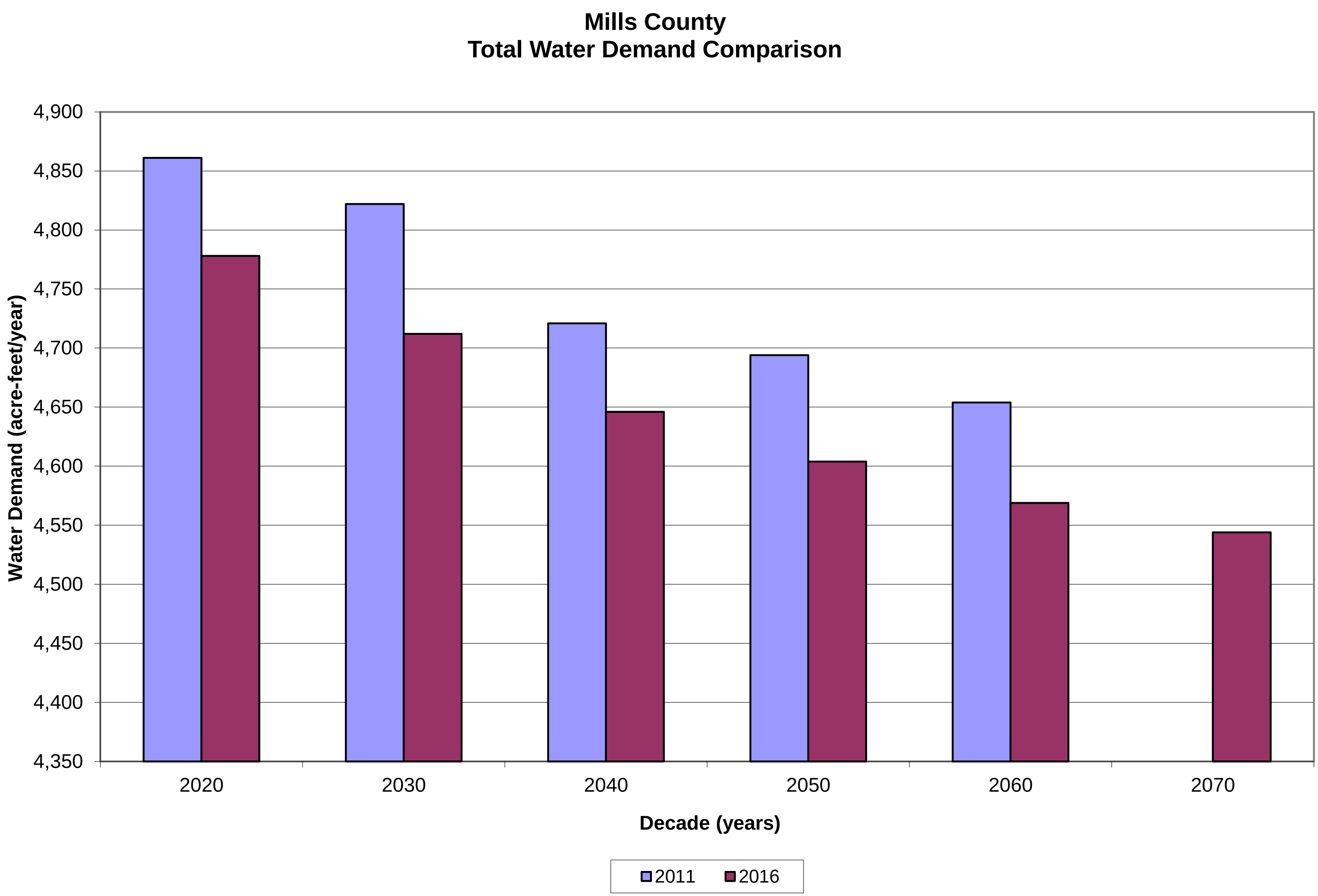


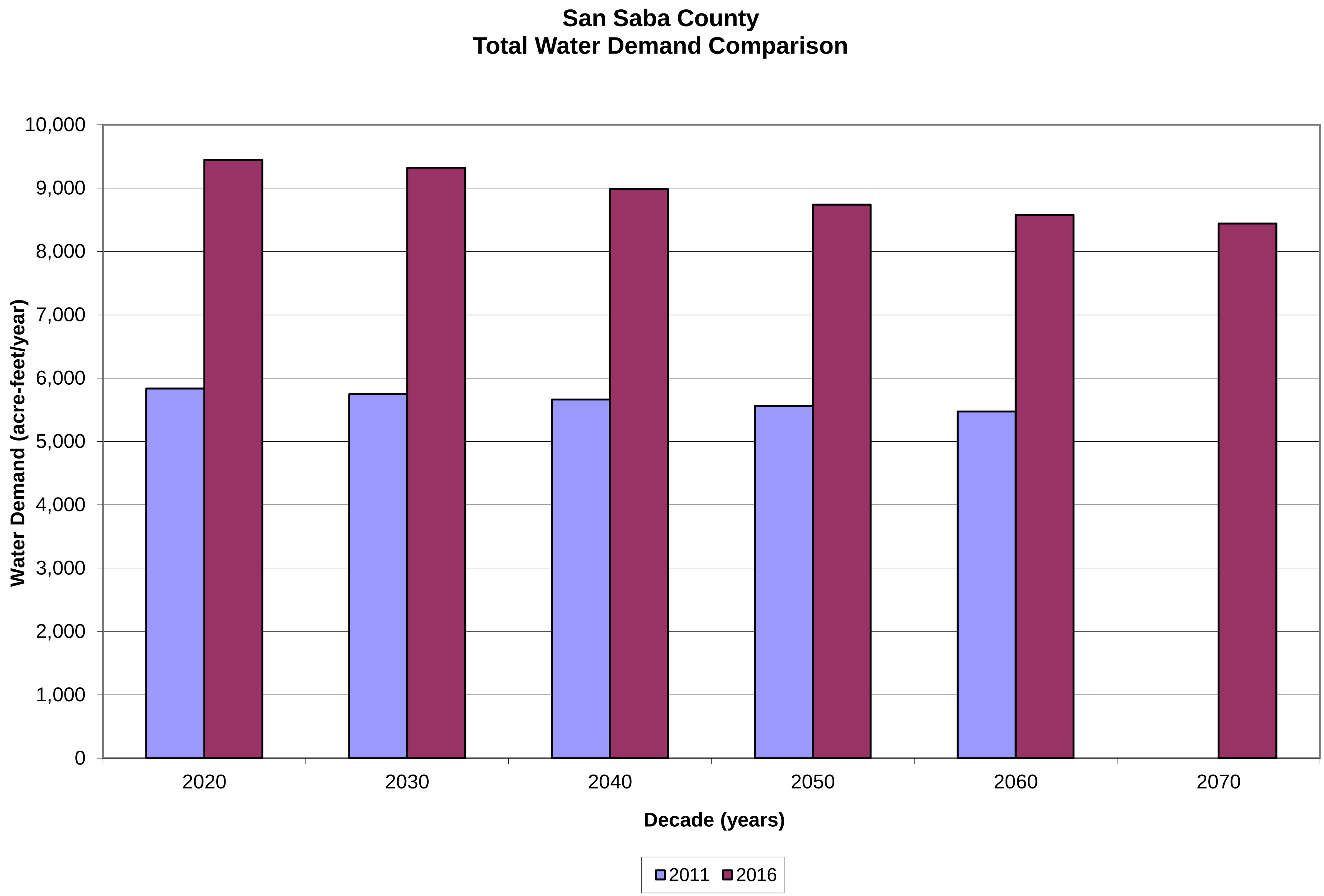
Hays County (Partial)
Total Water Demand Comparison
Water Demand (acre-feet/year)
45,000
40,000
35,000
30,000
25,000
20,000
15,000
10,000
5,000
0
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016

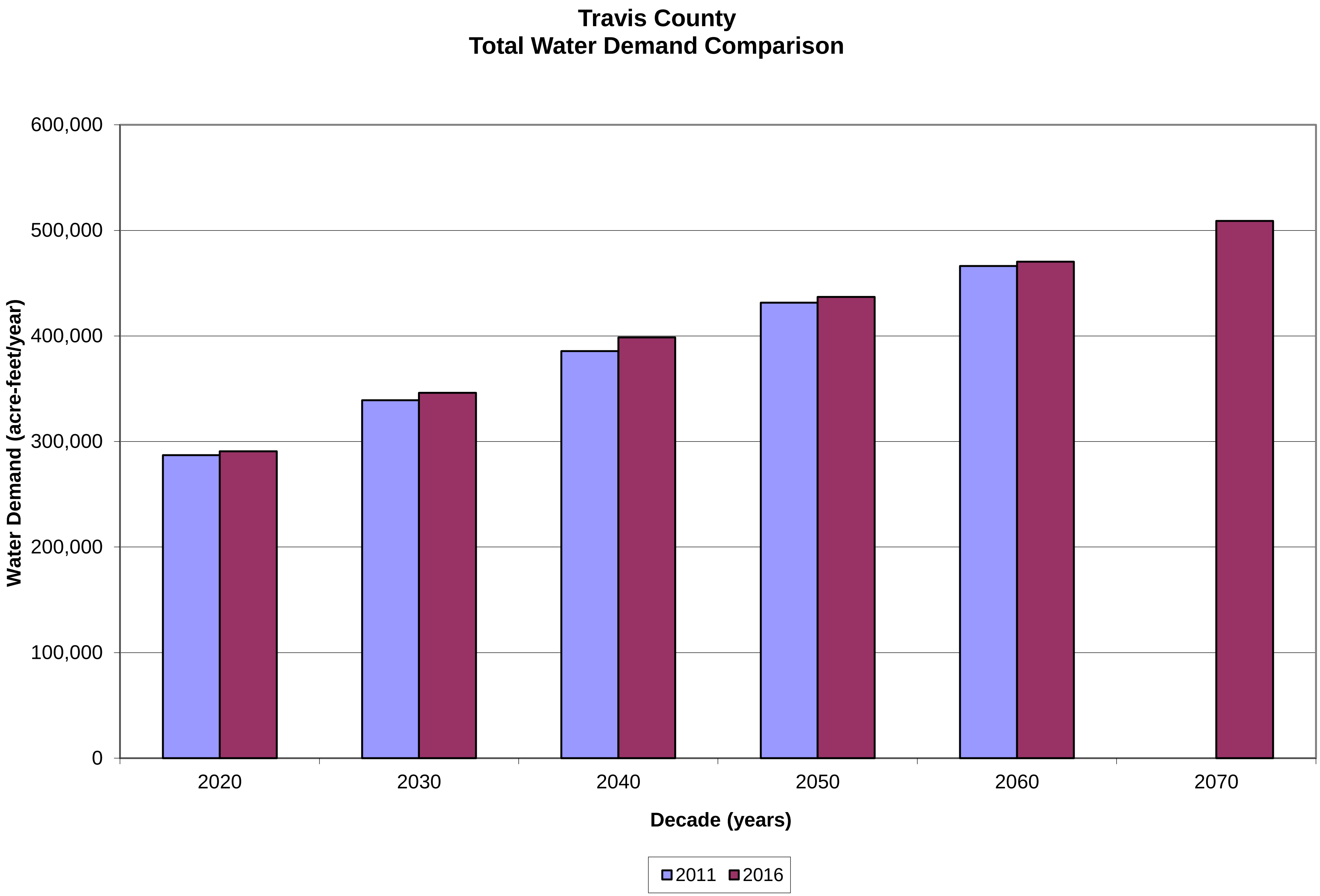

Llano County
Total Water Demand Comparison
30,000
25,000
20,000
15,000
10,000
5,000
0
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016



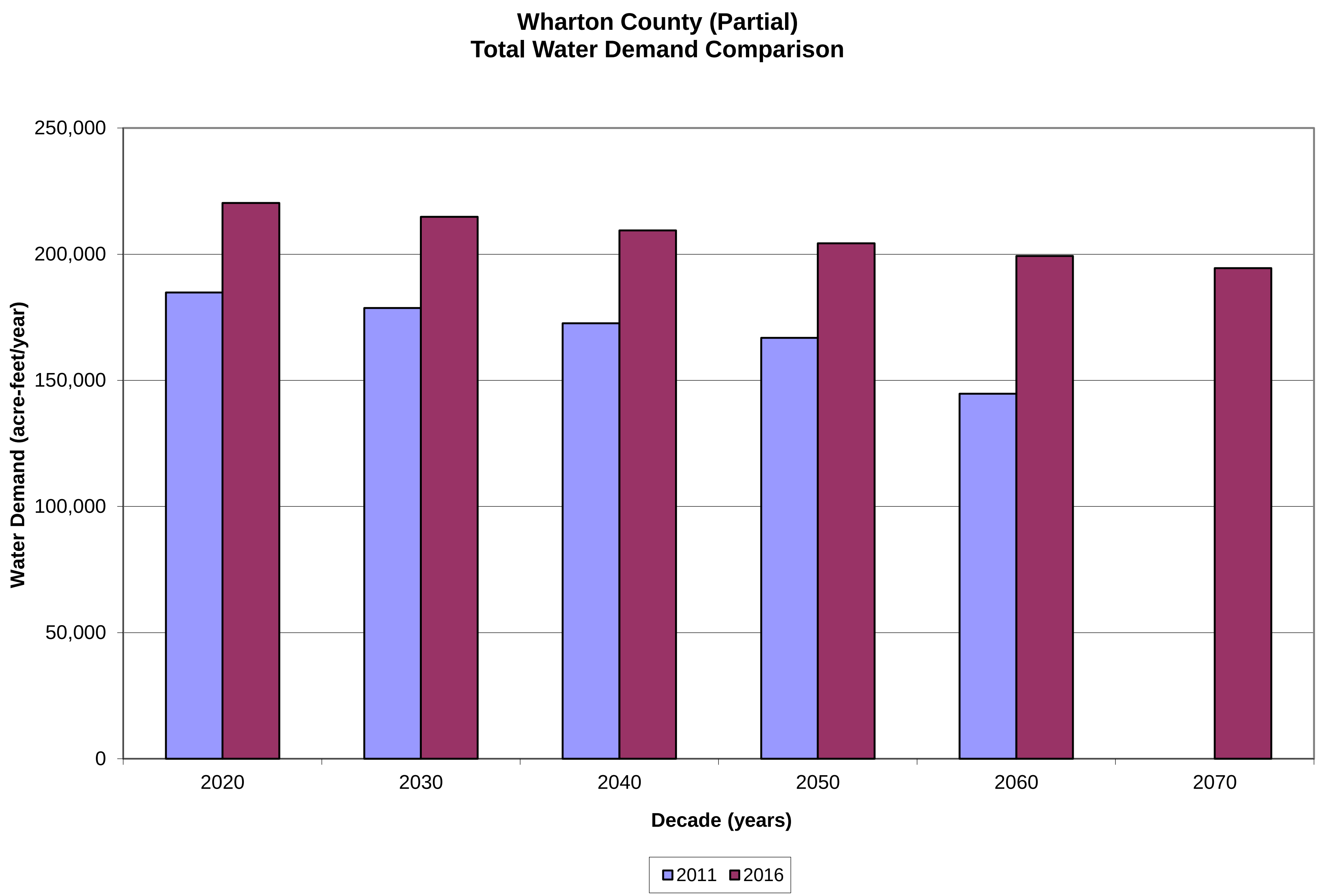
Matagorda County
Total Water Demand Comparison
345,000
340,000
335,000
330,000
325,000
320,000
315,000
310,000
305,000
300,000
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016

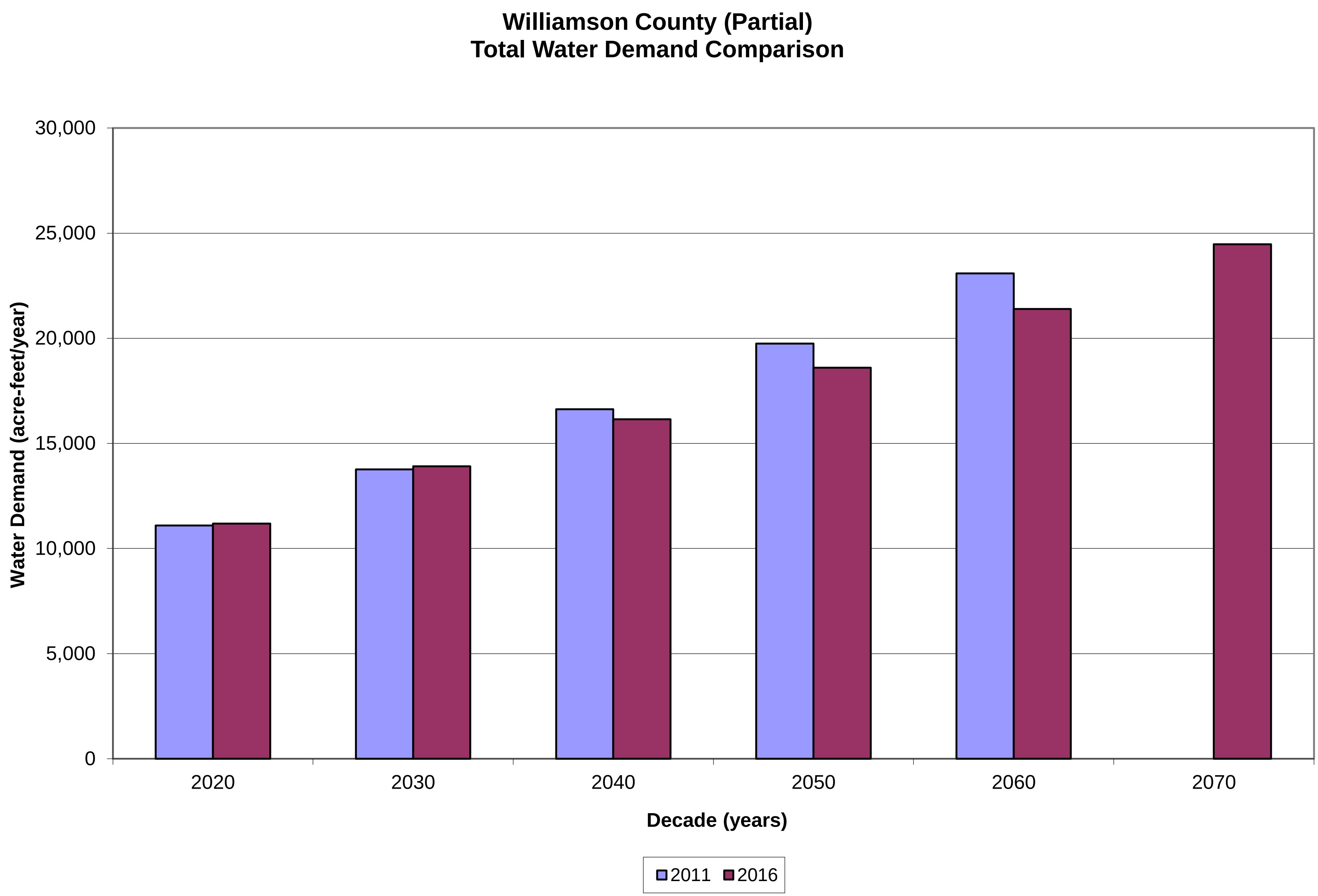

Mills County
Total Water Demand Comparison
Water Demand (acre-feet/year)
4,900
4,850
4,800
4,750
4,700
4,650
4,600
4,550
4,500
4,450
4,400
4,350
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016


San Saba County
Total Water Demand Comparison
10,000
9,000
8,000
7,000
6,000
5,000
4,000
3,000
2,000
1,000
0
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016



Travis County
Total Water Demand Comparison
600,000
500,000
400,000
300,000
200,000
100,000
0
Water Demand (acre-feet/year)
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016


Wharton County (Partial)
Total Water Demand Comparison
Water Demand (acre-feet/year)
250,000
200,000
150,000
100,000
50,000
0
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016


Williamson County (Partial)
Total Water Demand Comparison
Water Demand (acre-feet/year)
30,000
25,000
20,000
15,000
10,000
5,000
0
2020
2030
2040
2050
2060
2070
Decade (years)
2011
2016

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