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May 8, 2015

Temple McKinnon  
Texas Water Development Board  
1700 North Congress Avenue  
P.O. Box 13231  
Austin, TX 7811-3231

RE: Region L 2012 State Water Plan Amendment Request (GBRA Lower Basin Storage Project)

Dear Ms. Temple:

Throughout the recent months, the South Central Texas Regional Water Planning Group (Region L) considered changes to its 2011 Regional Water Plan. In a letter dated April 30, 2014 (enclosed), the Guadalupe-Blanco River Authority (GBRA) requested support from the Region L Planning Group for its proposal to *substitute* the GBRA Lower Basin Storage Project alternative water management strategy (Option 2), which utilizes a 500 acre off-channel reservoir, for the GBRA Lower Basin Storage Project recommended water management strategy (Option 1), which utilizes a smaller 100 acre off-channel reservoir. The proposal to substitute Option 2 for Option 1 as the recommended water management strategy is intended to meet municipal and industrial water needs for the Gulf coastal region in the 2011 Region L Plan.

At its August 7, 2015, meeting, the Region L Planning Group authorized the San Antonio River Authority, as Administrator for Region L, to submit a request to the Executive Administrator of the Texas Water Development Board (TWDB) for pre-adoption review to determine whether the proposed amendment constitutes a substitution. As Region L Chair, I requested the pre-determination approval in a letter dated August 20, 2014 (enclosed). After reviewing the project package, the Executive Administrator confirmed in writing that substituting Option 2 for Option 1, as described herein, would satisfy TWDB as a valid substitution.

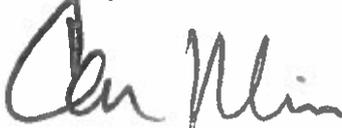
Accordingly, on November 6, 2014, the Region L Planning Group held a public meeting. The meeting consisted of 1) a presentation by the technical consultants on the GBRA Lower Basin Storage Project – 500 acre reservoir as a substitution for the GBRA Lower Basin Storage Project – 100 acre reservoir, 2) a brief discussion among the planning group members, and 3) an opportunity for public comment. During the public meeting, the planning group noted that the period for public comment would remain open until at least fourteen days after the public meeting, and to contact Cole Ruiz, San Antonio River Authority, for submittal of public comments. Mr. Ruiz's contact information was provided at the meeting and posted in accordance with 31 Tex. Admin. Code Section 357.21 two weeks prior to holding the public meeting. No public comments were submitted during the comment period. However, some comments were submitted during the planning group meeting on April 2, 2015 (enclosed).

On April 2, 2015, the Region L Planning Group held its regularly scheduled meeting, where the planning group approved the substitution of Option 1 with Option 2 as the recommended water management strategy to meet the Gulf coastal region's municipal and industrial water needs in the 2011 Region L Regional Water Plan. Additionally, the Region L Planning Group authorized SARA to request TWDB to amend the 2012 State Water Plan by substituting Option 2, the GBRA Lower Basin Storage Project – 500 acre reservoir, for Option 1, the GBRA Lower Basin Storage Project – 100 acre reservoir, as the recommended water management strategy to meet the Gulf coastal region's municipal and industrial water needs in the 2012 State Water Plan.

By this letter, I hereby submit the aforementioned request, on behalf of the Region L Planning Group, that TWDB amend the 2012 State Water Plan to reflect the recent changes made to the 2011 Region L Regional Water Plan described herein.

Please, contact Brian Perkins, HDR Engineering, or Cole Ruiz, SARA, with any questions you might have, or requests for additional information.

Sincerely,



Con Mims,  
Chair, Region L

Enclosures:    01 - Executive Summary\_Amended\_4-2-2015  
                     02 - Fact Sheet 4C.13 - 500 acres OCR\_Amended\_4-2-2015  
                     03 - Section 4B.1\_Amended\_4-2-2015  
                     04 - Section 4B.3\_Amended\_4-2-2015  
                     05 - Section 4C.13\_Amended\_4-2-2015  
                     06 - DB12 Additions\_Amended\_4-2-2015  
                     07 - Appendix D Table 1\_Amended\_4-2-2015  
                     08 - Appendix D Table 2\_Amended\_4-2-2015  
                     09 - Appendix D Table 3\_Amended\_4-2-2015  
                     10 - Region\_L\_FINAL\_Scoring\_Amended\_4-2-2015  
                     11 - 4-30-14\_GBRA Initial Amendment Requests-2011 Plan LBS 500  
                     12 - 8-20-15\_Amend Request EA Determination (GBRA LBS Subst)  
                     13 - GBRA Justification on GBRA LBS Substitution

Cc:                Steve Raabe, PE, Director, Technical Services (SARA)  
                     Brian Perkins, PE, Water Resources Engineer, HDR Engineering, Inc.  
                     Bill West, General Manager, Guadalupe-Blanco River Authority

natural resources, consistency comparisons among strategies, recreational effects, third party social and economic impacts of voluntary transfers, efficient use of existing supplies, and water quality considerations. The planning process for the South Central Texas Region is summarized in Figure ES-6.

### ES.8 South Central Texas Regional Water Plan

The South Central Texas Regional Water Plan includes recommended water management strategies that emphasize water conservation; maximize utilization of available resources, water rights, and reservoirs; engage the efficiency of conjunctive use of surface and groundwater; include new surface water appropriations while avoiding development of large mainstem reservoirs; and limit depletion of storage in aquifers. There are additional strategies that have significant support within the region, yet require further study regarding quantity of dependable water supply made available during severe drought, feasibility, and/or cost of implementation, that are also included in the Plan. **Water management strategies recommended to meet projected needs in the South Central Texas Region could produce new supplies in excess of 855884,000 acft/yr in 2060 and may be categorized by source as shown in Figure ES-7.**

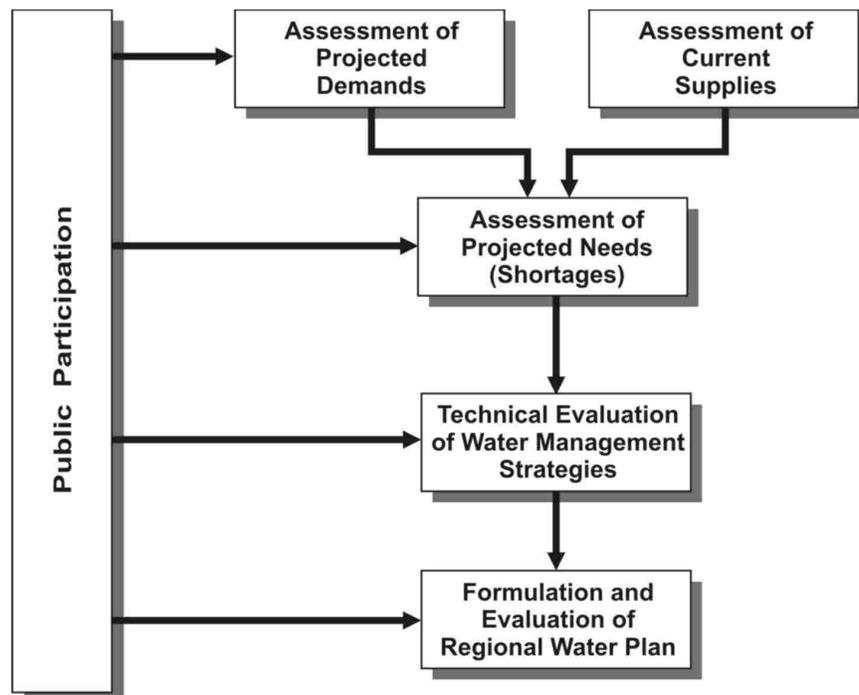
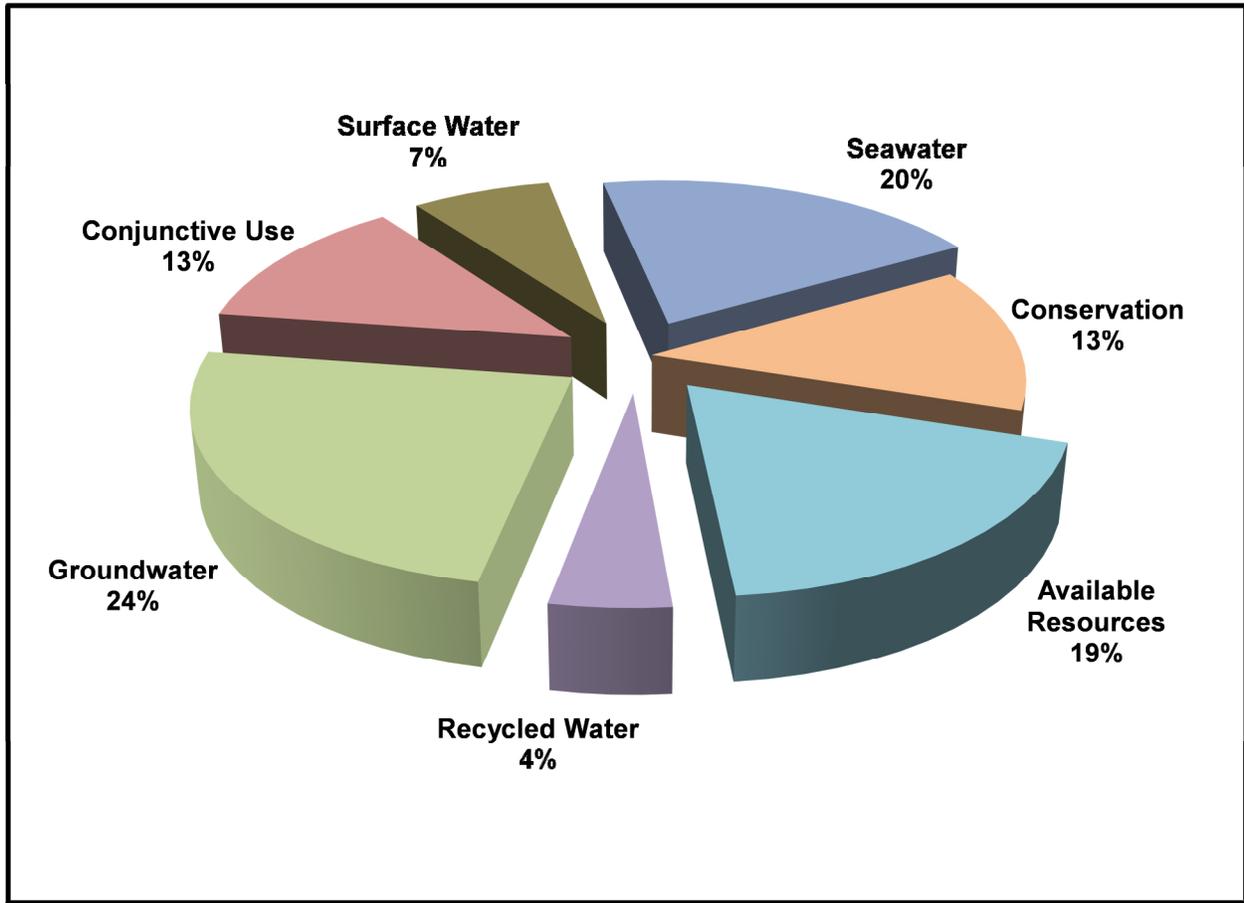


Figure ES-6. Regional Planning Process

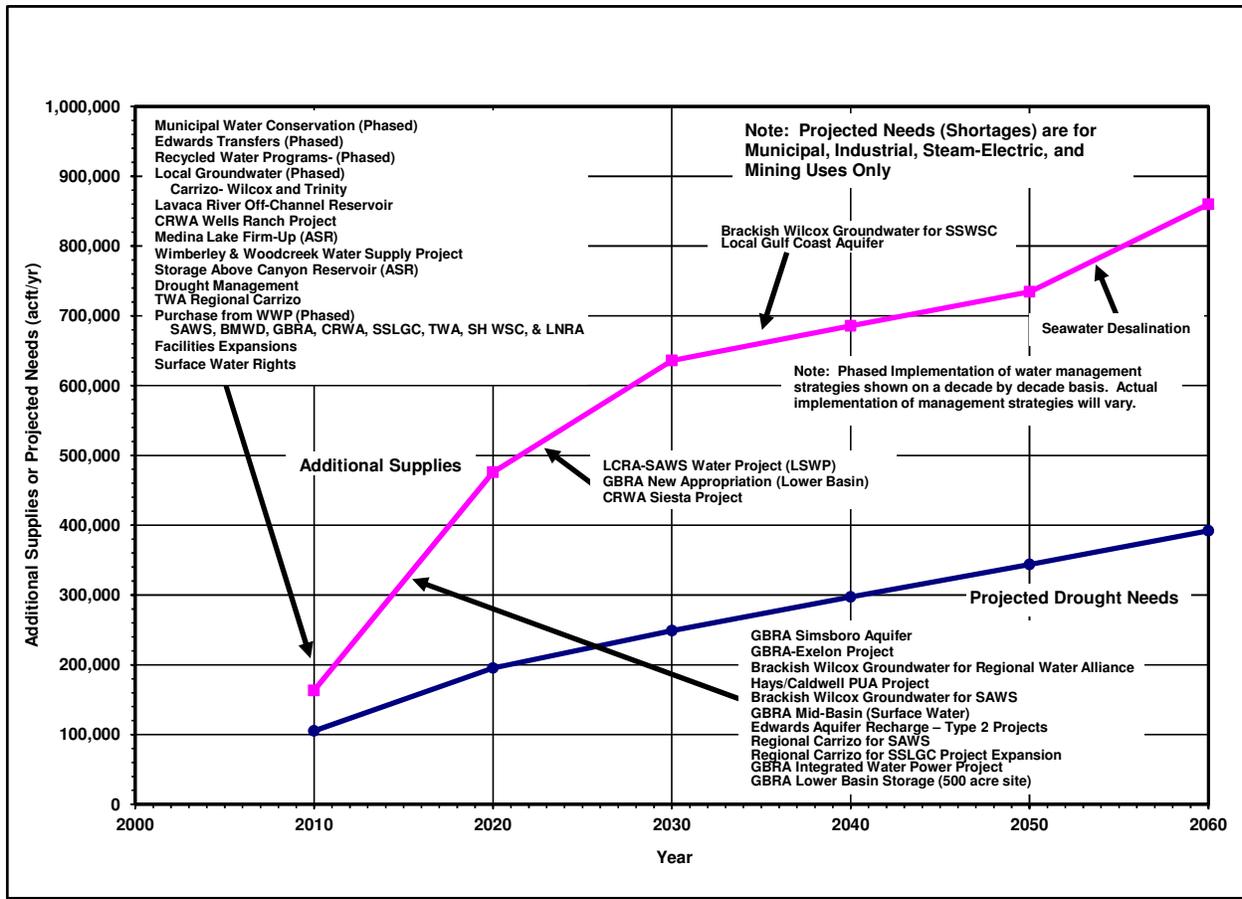


**Figure ES-7. Sources of New Supply**

Specific recommended water management strategies in the Plan are summarized by approximate timing of potential implementation in Figure ES-8. Water management strategies emphasizing conservation comprise about 1315.5 percent of recommended new supplies and include:

- Municipal Water Conservation (72,666 acft/yr @ \$648/acft/yr<sup>3</sup>);
- Irrigation Water Conservation (7,238 acft/yr @ \$143/acft/yr);
- Drought Management (41,240 acft/yr); and
- Mining Water Conservation (2,493 acft/yr).

<sup>3</sup> \$648/acft/yr is an average cost of municipal water conservation. Actual unit costs vary from WUG to WUG and from decade to decade.



**Figure ES-8. Phased Implementation of Water Management Strategies**

Water management strategies maximizing use of available resources, water rights, and reservoirs comprise about 1918.0 percent of recommended new supplies and include:

- Edwards Transfers (51,875 acft/yr @ \$454/acft/yr);
- GBRA-Exelon Project (49,126 acft/yr @ \$641/acft/yr);
- GBRA Lower Basin Storage (500100 acre site) (57,67428,369 acft/yr @ \$113104/acft/yr);
- Medina Lake Firm-Up (ASR) (9,933 acft/yr @ \$1,696/acft/yr);
- Wimberley & Woodcreek Water Supply Project (4,480 acft/yr @ \$2,453/acft/yr);
- Surface Water Rights<sup>4</sup>; and
- Facilities Expansions.

The Regional Water Plan includes the Recycled Water Programs water management strategy at 41,737 acft/yr which could represent approximately 45.2 percent of the recommended new supplies.

<sup>4</sup> As new supplies and associated costs have not been quantified, this strategy is more explicitly identified as an activity consistent with the 2011 Regional Water Plan.

Water management strategies that simultaneously develop groundwater supplies and limit depletion of storage in regional aquifers comprise about 2427.9 percent of recommended new supplies and include:

- GBRA Simsboro Project (49,777 acft/yr @ \$982/acft/yr)<sup>5</sup>;
- Local Groundwater Supplies (Carrizo<sup>6</sup>, Gulf Coast, and Trinity) (38,471 acft/yr @ \$687/acft/yr - \$1,823/acft/yr);
- Hays/Caldwell PUA Project (35,000 acft/yr @ \$1,245/acft/yr);
- TWA Regional Carrizo (27,000 acft/yr @ \$1,523/acft/yr);
- Brackish Wilcox Groundwater for SAWS (26,400 acft/yr @ \$1,245/acft/yr);
- Regional Carrizo for SAWS (11,687 acft/yr @ \$1,343/acft/yr);
- Brackish Wilcox Groundwater for Regional Water Alliance (14,700 acft/yr @ \$1,293/acft/yr);
- CRWA Wells Ranch Project (11,000 acft/yr @ \$725/acft/yr);
- Regional Carrizo for SSLGC Project Expansion (10,364 acft/yr @ \$608/acft/yr); and
- Brackish Wilcox Groundwater for SSWSC (1,120 acft/yr @ \$1,883/acft/yr).

Water management strategies that engage the efficiency of conjunctive use of surface and groundwater as well as maximize the use of available resources and water rights comprise approximately 1314.6 percent of recommended new supplies and include:

- LCRA-SAWS Water Project (90,000 acft/yr @ \$2,394/acft/yr);
- Edwards Aquifer Recharge – Type 2 Projects (21,577 acft/yr @ \$1,728/acft/yr); and
- CRWA Siesta Project (5,042 acft/yr @ \$1,421/acft/yr).

Water management strategies that involve new surface water appropriations while avoiding development of large mainstem reservoirs comprise approximately 78.2 percent of recommended new supplies and include:

- Lavaca River Off-Channel Reservoir (26,242 acft/yr @ \$701/acft/yr);
- GBRA Mid-Basin Project (Surface Water) (25,000 acft/yr @ \$2,204/acft/yr);
- GBRA New Appropriation (Lower Basin) (11,300 acft/yr @ \$1,953/acft/yr); and
- Storage Above Canyon Reservoir (ASR) (3,140 acft/yr @ \$1,772/acft/yr).

<sup>5</sup> The new firm supply associated with this strategy was reduced from 50,000 acft/yr to 49,777 acft/yr to resolve a potential inter-regional conflict with Region G. This small change did not warrant revision of Section 4C.21. A portion of the new firm supply for this strategy to be obtained from the Carrizo-Wilcox Aquifer in Bastrop County is identified as an “overdraft” to resolve a potential inter-regional conflict with Region K. See the response to TWDB Level I Comment No. 52 in Section 10 for additional information.

<sup>6</sup> The portion of the new firm supply for this strategy to be obtained by Bexar Metropolitan Water District from the Carrizo-Wilcox Aquifer in Bexar County is identified as a “temporary overdraft.” See the response to TWDB Level I Comment No. 52 in Section 10 for additional information.

Finally, the Regional Water Plan includes the development of ~~a two~~ Seawater Desalination water management strategies: ~~y at a~~ 84,012 acft/yr (75 mgd) (\$2,284/acft/yr) water management strategy and the GBRA Integrated Water Power Project at 100,000 acft/yr (\$2,290/acft/yr) which could represent approximately ~~20+0.5~~ percent of the recommended new supplies.

The South Central Texas Regional Water Planning Group identifies the following as alternative water management strategies that have been technically evaluated in accordance with TWDB rules and may, subject to an appropriate amendment process defined by TWDB rules, replace a recommended water management strategy in the 2011 Regional Water Plan:

- Lower Guadalupe Water Supply Project for Upstream GBRA Needs (60,000 acft/yr @ \$1,921/acft/yr);
- GBRA Lower Basin Storage (~~100500~~ acre site) (~~28,36959,569~~ acft/yr @ \$~~104109~~/acft/yr);
- Lower Guadalupe Water Supply Project for Upstream GBRA Needs at Reduced Capacity (35,000 acft/yr @ \$2,565/acft/yr);
- GBRA Mid-Basin Project (Conjunctive Use) (25,000 acft/yr @ \$1,779/acft/yr);
- Regional Carrizo for Guadalupe Basin (GBRA) (25,000 acft/yr @ \$1,280/acft/yr);
- Medina Lake Firm-Up (OCR) (9,078 acft/yr @ \$1,197/acft/yr);
- Local Groundwater Supplies (Barton Springs Edwards) (1,358 acft/yr @ \$203/acft/yr);
- Calhoun County Brackish Groundwater Project (1,344 acft/yr @ \$2,679/acft/yr); and
- Local Groundwater Supplies (Carrizo) (Yancey WSC) (1,210 acft/yr @ \$517/acft/yr).

The Regional Water Plan includes several water management strategies that require further study and funding prior to recommendation for implementation. Several of these strategies employ technologies that have been used previously, but further research is necessary to determine the cost of implementation, optimal scale and location, and quantity of dependable water supply that would be available in severe drought. These strategies are:

- Brush Management;
- Weather Modification;
- Rainwater Harvesting;
- Storage Above Canyon Reservoir (Off-Channel);
- Edwards Aquifer Recharge & Recirculation Systems;
- Palmetto Bend – Stage II (LNRA);
- Seawater Desalination for Guadalupe River Basin;

- Mesa Water Supply Project (SAWS);
- SAWS Other Water Supplies (Planned RFP);
- Regional Carrizo for BMWD;
- Regional Carrizo for SSLGC Project Expansion – Wilson County Option;
- CRWA Dunlap Project; and
- Balancing Storage (ASR and/or Surface)<sup>7</sup>.

Although specific quantities of new supply dependable in drought have not been determined for these strategies, it is understood that their implementation will contribute positively to storage and system management of many diverse strategies in the Regional Water Plan. The SCTRWPG recommends that State funding be made available to cooperatively support the refinement and implementation of these strategies.

There are significant quantities of projected water supply needs or shortages in the region for municipal, industrial, steam-electric, and mining uses. As indicated in Figure ES-8, implementation of a number of water management strategies on an expedited basis will be necessary to avoid significant hardship, water rationing, and/or cessation of discharge from Comal Springs in the event of severe drought during the next decade. Substantial water supply needs or shortages are also projected for irrigation use in the South Central Texas Region. However, based upon present economic conditions for agriculture and the fact that there are no really low-cost water supplies to be developed, the SCTRWPG has determined that it is not economically feasible to meet projected irrigation needs at this time, since the net farm income to pay for water is less than the costs of water at the potential sources.

Implementation of the 2011 South Central Texas Regional Water Plan will result in the development of new water supplies that will be reliable in the event of a repeat of the most severe drought on record. It is evident in Figure ES-8 that implementation of all recommended water management strategies is not likely to be necessary in order to meet projected needs within the planning period. The SCTRWPG explicitly recognizes the difference between additional supplies and projected needs as System Management Supplies and has recommended water management strategies over and above those apparently needed to meet projected demands in the Regional Water Plan for the following reasons:

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<sup>7</sup> As new supplies and associated costs have not been quantified, this strategy is more explicitly identified as an activity consistent with the 2011 Regional Water Plan.

- To recognize both the long lead times and the uncertainty associated with risk factors that may prevent implementation of water management strategies and necessitate replacement strategies;
- To preserve flexibility for water user groups or wholesale water suppliers to select the most feasible projects among several consistent with the Regional Plan and, therefore, ensure that such projects are potentially eligible for permitting and funding;
- To serve as additional supplies in the event that rules, regulations, or other restrictions limit use of any planned strategies; and/or
- To ensure adequate supplies in the event of a drought more severe than that which occurred historically.

Costs associated with the implementation and long-term operations and maintenance of water management strategies have been estimated in accordance with TWDB rules and general guidelines and reflect regional water treatment capacity and balancing storage facilities sufficient to meet peak daily and seasonal water demands in the larger urban areas. **Total estimated project cost (in 2008 dollars) for the recommended water management strategies for municipal supply that will likely require long-term financing for implementation is about \$7.68.9 billion.** Annual unit costs for recommended water management strategies for municipal supply in the 2011 South Central Texas Regional Water Plan (in 2008 dollars) are estimated to range from a low of about ~~\$113.104~~/acft/yr (\$0.352 per 1,000 gallons) for GBRA Lower Basin Storage to a high of about \$2,429/acft/yr (\$7.45 per 1,000 gallons) for the Wimberley/Woodcreek Water Supply Project and average about ~~\$131.5~~~~\$1,209~~/acft/yr (~~\$4.04~~~~\$3.71~~ per 1,000 gallons). No costs have been included for projects that are presently under construction, alternative water management strategies, and potentially feasible water management strategies requiring further study.

The South Central Texas Regional Water Planning Group has identified the following environmental benefits and concerns associated with the implementation of the Regional Water Plan.

### **ES.9 Environmental Benefits**

- Substantial commitment to water conservation through adoption of an aggressive water conservation water management strategy effectively reduces projected water shortages thereby delaying or eliminating the need for implementation of other water management strategies having greater associated environmental impacts. Implementation of economically appropriate drought management strategies, as determined at the water user group level, may provide similar benefits while projects delivering reliable water supplies to meet projected needs are permitted and constructed.

- Development of new water supply sources for Bexar, Comal, and Hays Counties reduces reliance on the Edwards Aquifer during drought thereby contributing to maintenance of springflow and protection of endangered species. The Regional Water Plan recognizes the on-going efforts of the participants in the Edwards Aquifer Recovery Implementation Program (EARIP) to develop a Habitat Conservation Plan which will help to define the requirements for maintenance of springflow and protection of endangered species and meet with approval from the U.S. Fish & Wildlife Service.
- Implementation of the 2011 Regional Water Plan is likely to result in increased instream flows in the San Antonio River. These increases in flow are attributable to increases in treated effluent from all wastewater discharges (most notably associated with projected growth in Bexar County) and increases in springflow (associated with Edwards Aquifer Recharge Type 2 Projects).
- Edwards Aquifer Recharge Enhancement through the construction of Type 2 recharge dams contributes not only to municipal water supply, but also to maintenance of springflow, protection of endangered species in and below the springs, increased instream flows, and increased freshwater inflows to the Guadalupe Estuary.
- The 2011 Regional Water Plan emphasizes beneficial use of existing surface water rights thereby minimizing the development of new water supply sources and associated environmental impacts. Examples include reliance on presently under-utilized water rights held by the Guadalupe-Blanco River Authority (GBRA) and Dow Chemical Company (Dow) below the confluence of the Guadalupe and San Antonio Rivers and by the Lower Colorado River Authority (LCRA) on the Lower Colorado River. Enhanced use of existing surface water rights accounts for approximately one-quarter of the total new water supplies for municipal, industrial, steam-electric, and mining uses by 2060.
- The Regional Water Plan avoids large-scale development of new mainstem reservoirs having associated terrestrial and aquatic habitat and cultural resources impacts and focuses on smaller, off-channel reservoirs.
- Inclusion of Edwards Aquifer transfers from irrigation use to municipal use through lease/purchase of pumpage rights and development of conserved water through installation of LEPA irrigation systems results in substantial increases in municipal water supply without construction of additional transmission and storage facilities having associated environmental effects.
- Inclusion of groundwater development has limited associated environmental effects as compared to those typically associated with development of new surface water supply reservoirs.
- Inclusion of Seawater Desalination [and the GBRA Integrated Water Power Project](#) is perceived to have fewer associated environmental effects, as compared to those typically associated with development of new (fresh) surface water supplies.

### **ES.10 Environmental Concerns**

- Potential reductions in freshwater inflows to bays and estuaries, including associated effects on wetland and marsh habitats and marine species, are identified as matters of concern. Primary concerns focus upon the potential effects of the LCRA-SAWS

Water Project on freshwater inflows to Matagorda Bay and the GBRA New Appropriation (Lower Basin) on freshwater inflows to the Guadalupe Estuary. It is important to note, however, that as part of the studies directed through the LCRA-SAWS Definitive Agreement, the Matagorda Bay inflow criteria and the Aquatic Habitat Instream Flow studies were studied thoroughly and shown to meet the legislative directives of protecting Bay Health and the Lower Colorado River aquatic systems. Concerns have also been expressed that increased uses of existing water rights may reduce freshwater inflows to bays and estuaries.

- Concentration of Edwards Aquifer pumpage closer to Comal Springs as a result of implementation of Edwards Transfers tends to reduce discharge from Comal Springs.
- Potential conflicts with stream segments identified by TPWD as ecologically significant are associated with the LCRA-SAWS Water Project, Edwards Recharge – Type 2 Projects, GBRA New Appropriation (Lower Basin), Lavaca River Off-Channel Reservoir, and Storage Above Canyon (ASR).
- Potential effects on small springs and instream flows below these springs may be associated with the development of groundwater supplies.
- Intake siting, brine discharge location(s), and potential effects on marine habitat and species, as well as large demands for electrical power, are environmental concerns associated with Seawater Desalination [and the GBRA Integrated Water Power Project](#).

### **ES.11 Regional Water Plan Summary**

Recommended water management strategies to meet the projected needs of each city, utility, water user group, and wholesale water provider in the South Central Texas Region are summarized by county in Table ES-4.

### **ES.12 Summary of the First Biennium Studies**

#### **ES.12.1 Study 1 – Lower Guadalupe Water Supply Project for Upstream GBRA Needs**

The purpose of Study 1 was to further analyze and refine the Lower Guadalupe Water Supply Project for GBRA Needs (LGWSP for GBRA Needs), a water management strategy recommended to meet projected needs in the 2006 South Central Texas Regional Water Plan (SCTRWP). Further analyses were precipitated by issues that arose during final preparation of the 2006 SCTRWP and interpretation of language in House Bill 3776 of the 80<sup>th</sup> Texas Legislature.

The results of Study 1 provided information of relevance to the SCTRWP for consideration of a refined LGWSP for Upstream GBRA Needs as a recommended or alternative water management strategy (WMS) in the 2011 SCTRWP. Ultimately, both the LGWSP for Upstream GBRA Needs WMS (Section 4C.12) and the LGWSP for Upstream GBRA Needs at

**Table ES-4 (Concluded)**

County/Water User Group	Demand		Need (Shortage)		Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS	
	2010 (acft)	2060 (acft)	2010 (acft)	2060 (acft)		2010 (acft)	2060 (acft)
Guadalupe-Blanco River Authority					GBRA Lower Basin Storage		57,674
					GBRA New Appropriation (Lower Basin)		11,500
					Western Canyon WTP Expansion		5,600
					GBRA Integrated Water Power Project		100,000
Bexar Met	43,439	57,954	16,638	35,418	Municipal Water Conservation <sup>2</sup>		
					Edwards Transfers	3,000	3,000
					Local Trinity	2,016	2,016
					Local Carrizo	4,030	16,129
					Medina Lake Firm-Up (ASR – 15 wells)	9,933	9,933
Canyon Regional Water Authority	21,054	53,534	7,920	40,400	Purchase from WWP (CRWA)	2,800	8,250
					Municipal Water Conservation <sup>2</sup>		
					Wells Ranch Project Phase I	5,200	5,200
					Wells Ranch Project Phase II	5,800	5,800
					Purchase from WWP (GBRA)		5,000
					Brackish Wilcox Groundwater for RWA		11,200
					Siesta Project		5,042
Lavaca-Navidad River Authority			10,046	10,489	Hays/Caldwell PUA Project		10,260
					Municipal Water Conservation <sup>2</sup>		
Schertz-Seguin Local Government Corp.	12,704	21,071	0	4,935	Lavaca River Off-Channel Reservoir	26,242	26,242
					Municipal Water Conservation <sup>2</sup>		
Springs Hill WSC	3,384	5,365	0	0	Regional Carrizo for SSLGC Project Expansion		10,364
					Brackish Wilcox Groundwater for RWA		2,000
					Municipal Water Conservation <sup>2</sup>		
Texas Water Alliance	0	18,480	0	18,480	Purchase from WWP (TWA)		3,000
					Brackish Wilcox Groundwater for RWA		1,500
				Municipal Water Conservation <sup>2</sup>			
				TWA Regional Carrizo	27,000	27,000	

<sup>1</sup> Historical per capita water use data unavailable or insufficient for calculation of yield.

<sup>2</sup> Municipal Water Conservation

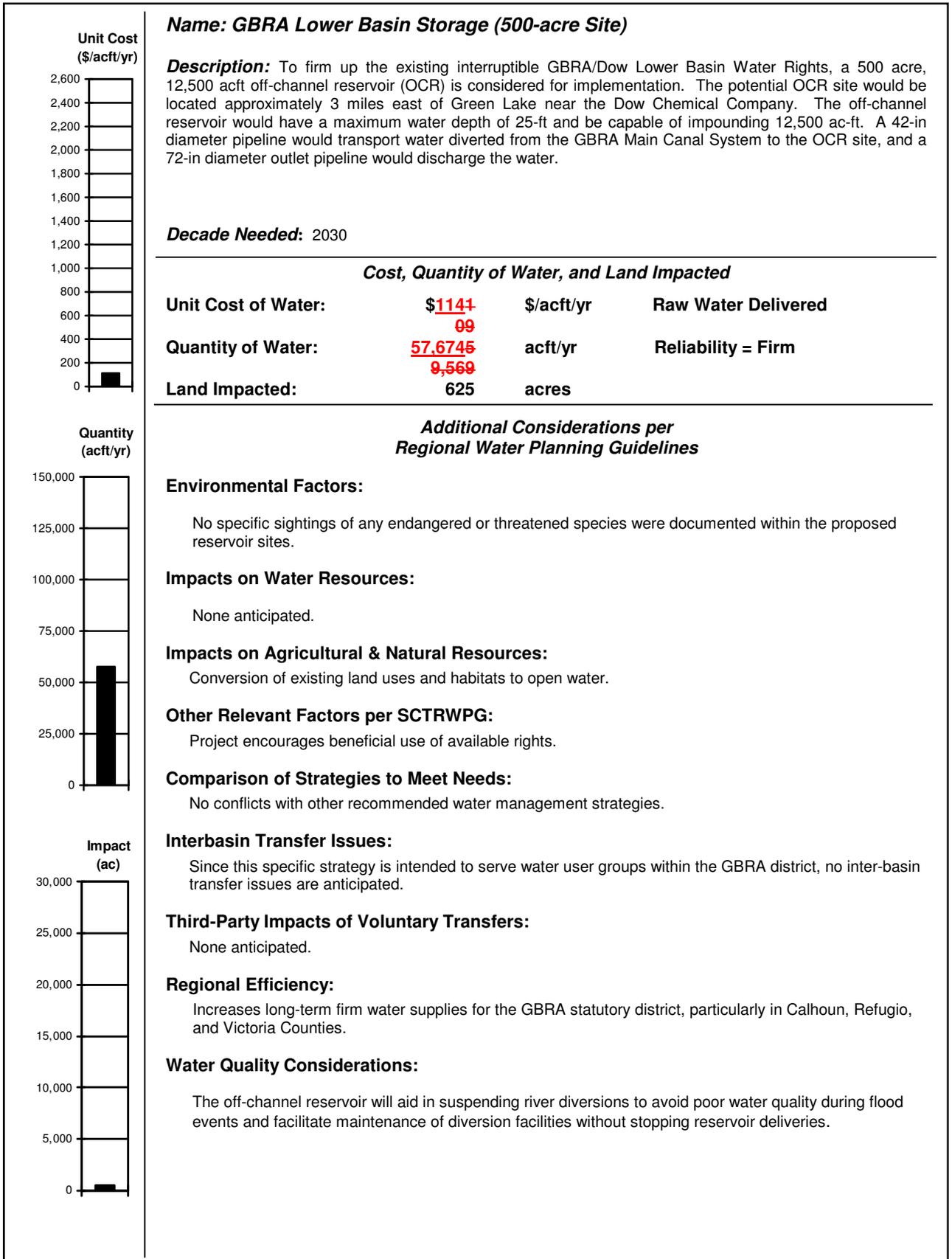
### ES.12.2 Study 2 – Brackish Groundwater Supply Evaluation

Study 2 included evaluations of example brackish groundwater projects in: (1) the Gulf Coast Aquifer with projects in southern Calhoun County and Refugio County for the City of Woodsboro and potential developments near Copano Bay; and (2) the Wilcox and Edwards Aquifers in the vicinity of southern Bexar County for municipal supplies in Bexar County. These three aquifers and diverse locations were related, in part, as illustrative examples for evaluation of brackish groundwater as municipal water supply. Evaluations of these water management strategies were intended to demonstrate the range of technical considerations and potential costs associated with development of this water source in Region L.

Based on preliminary information on brackish groundwater and water supply needs in the three areas of interest, the following four strategies were identified for the use of brackish groundwater. They are:

- Gulf Coast Aquifer in southern Calhoun County for potential new development in the vicinity of Seadrift and Port O'Connor;
- Gulf Coast Aquifer in southeastern Refugio County that would replace the conventional groundwater supply for the City of Woodsboro and potential new developments near Copano Bay;

## 2011 South Central Texas Regional Water Plan Water Management Strategy Summary Sheet

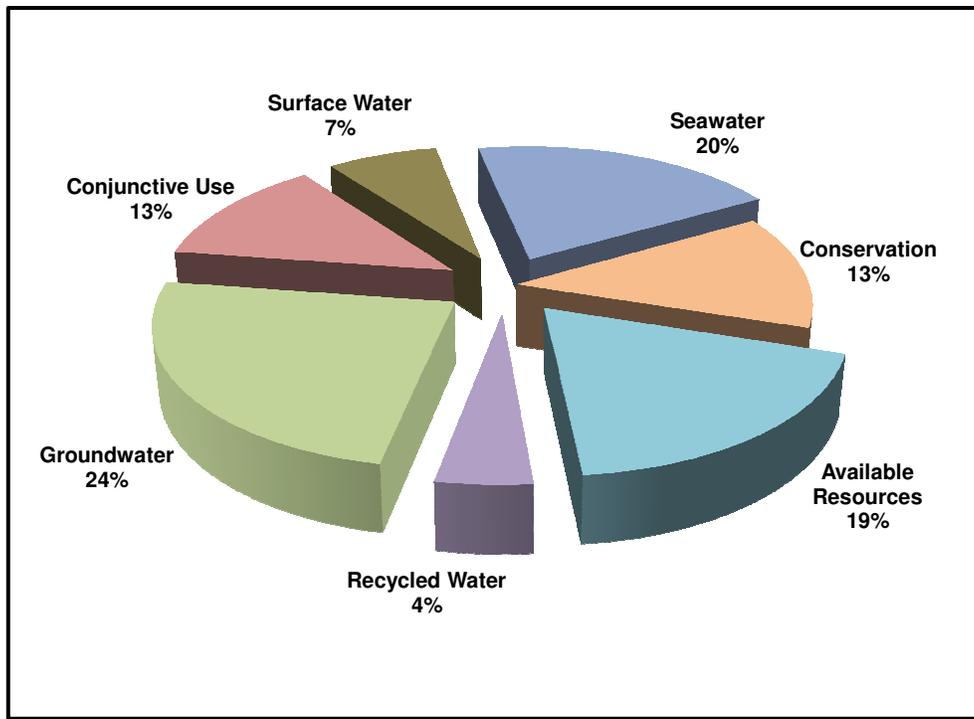


- 4) Refined scope of work with due consideration of comments received and obtained TWDB approval on August 25, 2008.
- 5) Current water planning information, including specific water management strategies of interest, was solicited from water user groups in June 2009.
  - a) Solicitation for planning information included a draft list of water management strategies deemed potentially feasible to meet projected needs.
  - b) Draft list generally included the recommended water management strategies in the 2006 SCTRWP, strategies included in the Technical Consultant Scope of Work, and/or other strategies perceived to be of interest to water user groups.
  - c) Water user groups were encouraged to classify each water management strategy on their draft list as recommended, alternative, or rejected.
- 6) Considering information responsive to the solicitation and information from required technical evaluations, draft lists of potentially feasible water management strategies were prepared and comments received during the August 2009 meeting of the SCTRWPG.
- 7) Refined lists of potentially feasible water management strategies recommended to meet water user group needs were compiled for SCTRWPG consideration in November and December 2009 and SCTRWPG approval for publication in the Initially Prepared 2011 SCTRWP in February 2010.

#### **4B.1 Water Management Strategies**

##### **4B.1.1 Regional Summary**

The South Central Texas Regional Water Plan includes recommended water management strategies that emphasize water conservation; maximize utilization of available resources, water rights, and reservoirs; engage the efficiency of conjunctive use of surface and groundwater, avoid development of large new reservoirs; and limit depletion of storage in aquifers. There are additional strategies that have significant support within the region, yet require further study regarding quantity of dependable water supply made available during severe drought, feasibility, and/or cost of implementation, that are also included in the Plan. Water management strategies recommended to meet projected needs in the South Central Texas Region could produce new supplies in excess of ~~884755~~,000 acft/yr in 2060 and may be categorized by source as shown in Figure 4B.1-2. The plan does not propose any changes to existing water contracts or option agreements. Further, the plan was created in close cooperation with each Wholesale Water Provider in the region, and no strategy contained in the plan would adversely affect any existing water contracts or option agreements.



**Figure 4B.1-2. Sources of New Supply in 2060**

Specific recommended water management strategies in the Plan are summarized by approximate timing of potential implementation in Figure 4B.1-3 and Appendix D, and by geographic location in Figure 4B.1-4. Water management strategies emphasizing conservation comprise about ~~1345.5~~ percent of recommended new supplies and include:

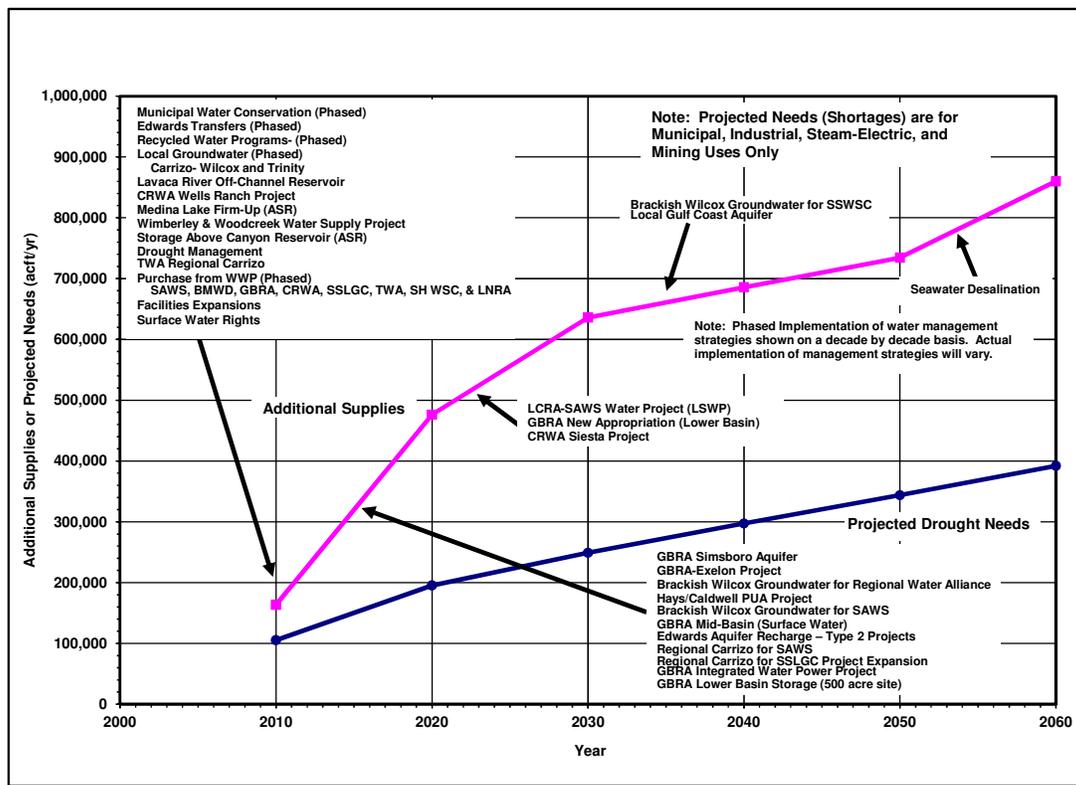
- Municipal Water Conservation (72,666 acft/yr @ \$648/acft/yr<sup>2</sup>);
- Irrigation Water Conservation (7,238 acft/yr @ \$143/acft/yr);
- Drought Management (41,240 acft/yr); and
- Mining Water Conservation (2,493 acft/yr).

Water management strategies maximizing use of available resources, water rights, and reservoirs comprise about ~~1948.0~~ percent of recommended new supplies and include:

- Edwards Transfers (51,875 acft/yr @ \$454/acft/yr);
- GBRA-Exelon Project (49,126 acft/yr @ \$641/acft/yr);
- GBRA Lower Basin Storage (~~500100~~ acre site) (~~57.67428,369~~ acft/yr @ ~~\$113\$104~~/acft/yr);
- Medina Lake Firm-Up (ASR) (9,933 acft/yr @ \$1,696/acft/yr);

<sup>2</sup> \$648/acft/yr is an average cost of municipal water conservation. Actual unit costs vary from WUG to WUG and from decade to decade.

- Wimberley & Woodcreek Water Supply Project (4,480 acft/yr @ \$2,453/acft/yr);
- Surface Water Rights<sup>3</sup>; and
- Facilities Expansions.



**Figure 4B.1-3. Phased Implementation of Water Management Strategies**

The Regional Water Plan includes the Recycled Water Programs water management strategy at 41,737 acft/yr which could represent approximately 45.2 percent of the recommended new supplies.

Water management strategies that simultaneously develop groundwater supplies and limit depletion of storage in regional aquifers comprise about 2427.9 percent of recommended new supplies and include:

- GBRA Simsboro Project (49,777 acft/yr @ \$982/acft/yr)<sup>4</sup>;

<sup>3</sup> As new supplies and associated costs have not been quantified, this strategy is more explicitly identified as an activity consistent with the 2011 Regional Water Plan.

<sup>4</sup> The new firm supply associated with this strategy was reduced from 50,000 acft/yr to 49,777 acft/yr to resolve a potential inter-regional conflict with Region G. This small change did not warrant revision of Section 4C.21. A portion of the new firm supply for this strategy to be obtained from the Carrizo-Wilcox Aquifer in Bastrop County is

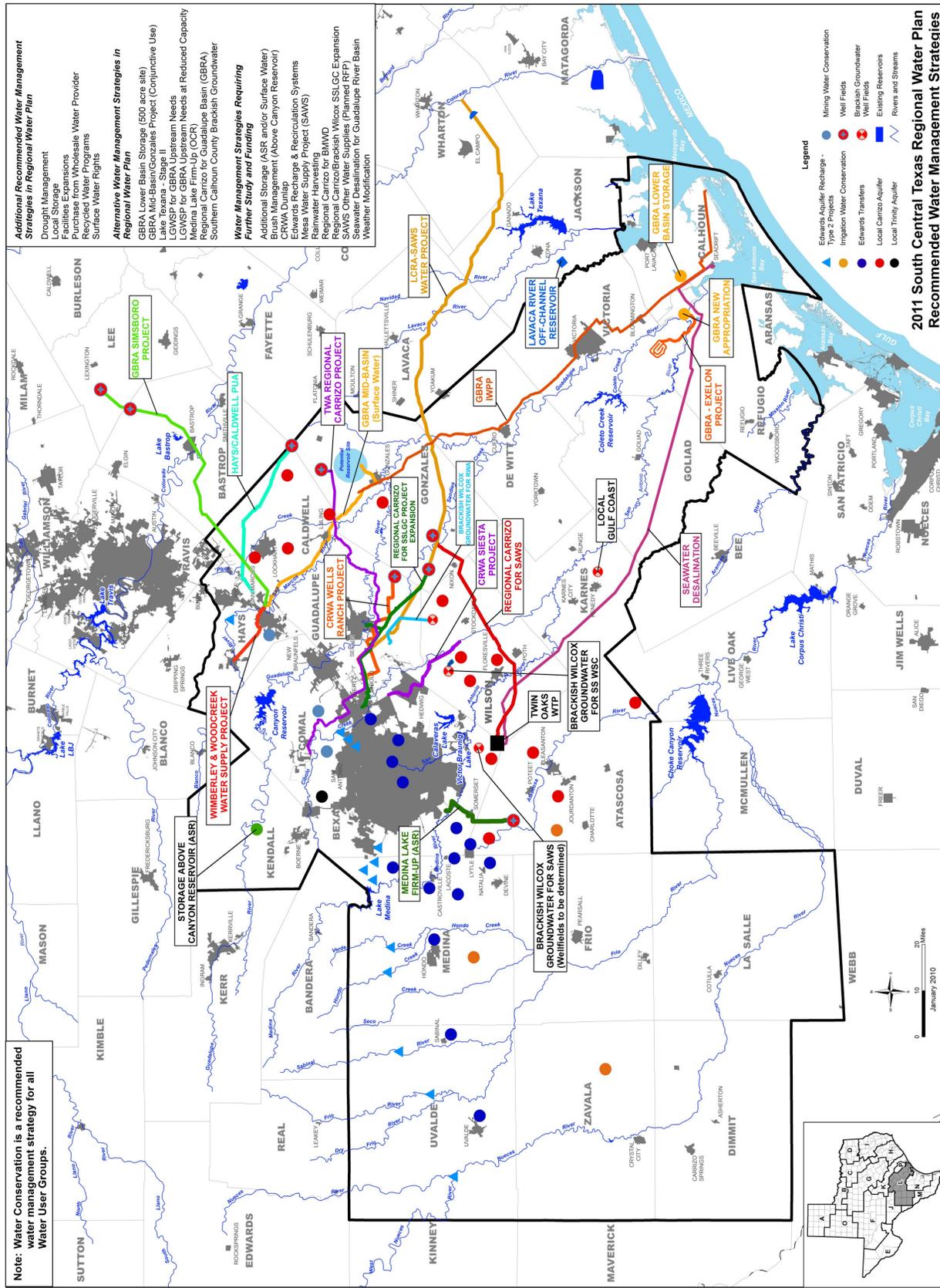


Figure 4B.1-4. Recommended Water Management Strategies

Level I Comment No. 52 in Section 10 for additional information.

- Local Groundwater Supplies (Carrizo, Gulf Coast, and Trinity) (38,471 acft/yr @ \$687/acft/yr - \$1,823/acft/yr);
- Hays/Caldwell PUA Project (35,000 acft/yr @ \$1,245/acft/yr);
  - TWA Regional Carrizo (27,000 acft/yr @ \$1,523/acft/yr);
  - Brackish Wilcox Groundwater for SAWS (26,400 acft/yr @ \$1,245/acft/yr);
  - Regional Carrizo for SAWS (11,687 acft/yr @ \$1,343/acft/yr);
  - Brackish Wilcox Groundwater for Regional Water Alliance (14,700 acft/yr @ \$1,293/acft/yr);
  - CRWA Wells Ranch Project (11,000 acft/yr @ \$725/acft/yr);
  - Regional Carrizo for SSLGC Project Expansion (10,364 acft/yr @ \$608/acft/yr); and
  - Brackish Wilcox Groundwater for SSWSC (1,120 acft/yr @ \$1,883/acft/yr).

Water management strategies that engage the efficiency of conjunctive use of surface and groundwater as well as maximize the use of available resources and water rights comprise approximately ~~1314.6~~ percent of recommended new supplies and include:

- LCRA-SAWS Water Project (90,000 acft/yr @ \$2,394/acft/yr);
- Edwards Aquifer Recharge – Type 2 Projects (21,577 acft/yr @ \$1,728/acft/yr); and
- CRWA Siesta Project (5,042 acft/yr @ \$1,421/acft/yr).

Water management strategies that involve new surface water appropriations while avoiding development of large mainstem reservoirs comprise approximately ~~78.2~~ percent of recommended new supplies and include:

- Lavaca River Off-Channel Reservoir (26,242 acft/yr @ \$701/acft);
- GBRA Mid-Basin Project (Surface Water) (25,000 acft/yr @ \$2,204/acft/yr);
- GBRA New Appropriation (Lower Basin) (11,300 acft/yr @ \$1,953/acft/yr); and
- Storage Above Canyon Reservoir (ASR) (3,140 acft/yr @ \$1,772/acft/yr).

Finally, the Regional Water Plan includes the development of two Seawater Desalination water management strategies: an 84,012 acft/yr (75 mgd) (\$2,284/acft/yr) water management strategy and the GBRA Integrated Water Power Project at 100,000 acft/yr (\$2,290/acft/yr) which could represent approximately 20.4 percent of the recommended new supplies.

~~Finally, the Regional Water Plan includes the development of a Seawater Desalination water management strategy at 84,012 acft/yr (75 mgd) (\$2,284/acft/yr) which could represent approximately 10.5 percent of the recommended new supplies.~~

The South Central Texas Regional Water Planning Group identifies the following as alternative water management strategies that have been technically evaluated in accordance with TWDB rules and may, subject to an appropriate amendment process defined by TWDB rules, replace a recommended water management strategy in the 2011 Regional Water Plan:

- Lower Guadalupe Water Supply Project for Upstream GBRA Needs (60,000 acft/yr @ \$1,921/acft/yr);
- GBRA Lower Basin Storage (~~100,500~~ acre site) (~~28,369,595,569~~ acft/yr @ ~~\$104,5109~~/acft/yr);
- Lower Guadalupe Water Supply Project for Upstream GBRA Needs at Reduced Capacity (35,000 acft/yr @ \$2,565/acft/yr);
- GBRA Mid-Basin Project (Conjunctive Use) (25,000 acft/yr @ \$1,779/acft/yr);
- Regional Carrizo for Guadalupe Basin (GBRA) (25,000 acft/yr @ \$1,280/acft/yr);
- Medina Lake Firm-Up (OCR) (9,078 acft/yr @ \$1,197/acft/yr);
- Local Groundwater Supplies (Barton Springs Edwards) (1,358 acft/yr @ \$203/acft/yr);
- Calhoun County Brackish Groundwater Project (1,344 acft/yr @ \$2,679/acft/yr); and
- Local Groundwater Supplies (Carrizo) (Yancey WSC) (1,210 acft/yr @ \$517/acft/yr).

The Regional Water Plan includes several water management strategies that require further study and funding prior to implementation. Several of these strategies rely upon technologies that have been used previously, but further research is necessary to determine the cost of implementation, optimal scale and location, and quantity of dependable water supply that would be available in severe drought. These strategies are:

- Brush Management;
- Weather Modification;
- Rainwater Harvesting;
- Storage Above Canyon Reservoir (Off-Channel);
- Edwards Aquifer Recharge & Recirculation Systems;
- Palmetto Bend – Stage II (LNRA);
- Seawater Desalination for Guadalupe River Basin;
- Mesa Water Supply Project (SAWS);
- SAWS Other Water Supplies (Planned RFP);
- Regional Carrizo for BMWD;
- Regional Carrizo for SSLGC Project Expansion – Wilson County Option;
- CRWA Dunlap Project; and

- Balancing Storage (ASR and/or Surface)<sup>5</sup>.

Although specific quantities of new, dependable supply during drought have not been determined for these strategies, it is understood that their implementation will contribute positively to storage and system management of many diverse strategies in the Regional Water Plan. The SCTRWPG recommends that State funding be made available to cooperatively support the refinement and implementation of these strategies.

The 2011 South Central Texas Regional Water Plan also recognizes Edwards Aquifer Recharge and Recirculation Systems (R&R) as a water management strategy requiring further evaluation. As it did in the 2006 Regional Water Plan, the SCTRWPG recommends State and local funding for research at a level that ensures due consideration of this strategy.

There are significant quantities of projected water supply needs or shortages in the region for municipal, industrial, steam-electric, and mining uses. As indicated in Figure 4B.1-3, implementation of a number of water management strategies on an expedited basis will be necessary to avoid significant hardship, water rationing, and/or cessation of discharge from Comal Springs in the event of severe drought during the next decade. Substantial water supply needs or shortages are also projected for irrigation use in the South Central Texas Region. The Irrigation water Conservation Water Management Strategy is projected to meet approximately 42 percent of projected irrigation needs (shortages) in 2010, and 65 percent in 2060. However, based upon present economic conditions for agriculture and the fact that there are no really low-cost water supplies to be developed, the SCTRWPG has determined that it is not economically feasible to meet all projected irrigation needs in Zavala County at this time, since the net farm income to pay for water is less than the costs of water at the potential sources, to say nothing of the cost delivered to farms where water is needed.

Implementation of the 2011 South Central Texas Regional Water Plan will result in the development of new water supplies that will be reliable in the event of a repeat of the most severe drought on record. However, it is evident in Figure 4B.1-3 that implementation of all recommended water management strategies is not likely to be necessary in order to meet projected needs within the planning period. The SCTRWPG explicitly recognizes the difference between additional supplies and projected needs as System Management Supplies and has

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<sup>5</sup> As new supplies and associated costs have not been quantified, this strategy is more explicitly identified as an activity consistent with the 2011 Regional Water Plan.

recommended the associated water management strategies in the Regional Water Plan for the following reasons:

- To recognize both the long lead times and the uncertainty associated with risk factors that may prevent implementation of water management strategies and necessitate replacement strategies;
- To preserve flexibility for water user groups or wholesale water suppliers to select the most feasible projects among several consistent with the Regional Plan and therefore ensure that such projects are potentially eligible for permitting and funding;
- To serve as additional supplies in the event that rules, regulations, or other restrictions limit use of any planned strategies; and/or
- To ensure adequate supplies in the event of a drought more severe than that which occurred historically.

Costs associated with the implementation and long-term operations and maintenance of water management strategies have been estimated in accordance with TWDB rules and general guidelines and reflect regional water treatment capacity and balancing storage facilities sufficient to meet peak daily and seasonal water demands in the larger urban areas. Total estimated project cost (in 2008 dollars) for the recommended water management strategies for municipal supply that will likely require long-term financing for implementation is about ~~\$8.9~~~~\$7.6~~ billion. Annual unit costs for recommended water management strategies for municipal supply in the 2011 South Central Texas Regional Water Plan (in 2008 dollars) are estimated to range from a low of about ~~\$113~~~~\$104~~/acft/yr (\$0.3~~52~~ per 1,000 gallons) for GBRA Lower Basin Storage to a high of about \$2,429/acft/yr (\$7.45 per 1,000 gallons) for the Wimberley/Woodcreek Water Supply Project and average about ~~\$1315~~~~\$1,209~~/acft/yr (~~\$4.04~~~~\$3.71~~ per 1,000 gallons). No costs have been included for facilities expansions and potentially feasible water management strategies requiring further study.

#### **4B.1.2 Water Management Strategy Descriptions**

A brief description of each of the water management strategies included in the 2011 South Central Texas Regional Water Plan is included in the following text. Descriptions include the dependable (firm) water supply during drought and an estimated annual unit cost (in September 2008 dollars) for water at full operating capacity during the debt service period (if applicable).

including Calhoun, Refugio, and Victoria Counties. Volume II, Section 4C.12 includes a detailed discussion of this alternative water management strategy.<sup>10</sup>

#### **4B.1.2.17 GBRA Lower Basin Storage**

The Guadalupe-Blanco River Authority (GBRA) and Dow Chemical Company (Dow), individually and collectively, own surface water rights in the lower Guadalupe – San Antonio River Basin (the GBRA Lower Basin Water Rights) authorizing diversions totaling 175,501 acre-feet per year (acft/yr). Water available for diversion under these rights is governed by the complex interactions of natural, anthropogenic, and legal factors including rainfall, runoff, springflow, evaporation, aquifer recharge, diversions by other water right owners, reservoir operations, off-channel storage, treated effluent from municipal and industrial water users, terms and conditions of the water rights, and the prior appropriation doctrine as enforced by the South Texas Watermaster of the Texas Commission on Environmental Quality (TCEQ). Given that the GBRA Lower Basin Water Rights point of diversion near Tivoli is below the San Antonio River confluence and that they are senior in priority to most upstream water rights, it is recognized that they are quite reliable but not firm. In order to firm up the existing interruptible GBRA/Dow lower basin water rights, a 100 acre or 500 acre off-channel reservoir is considered for implementation. The two proposed OCR sites would be located approximately 3 miles east of Green Lake near the Dow Chemical Company. The off-channel reservoirs would have a maximum water depth of 25-ft and be capable of impounding 2,500 acft and 12,500 acft of water at the 100 acre and 500 acre OCR sites respectively. The recommended ~~500~~100-acre site could firm-up an additional ~~57,674~~~~28,369~~ acft/yr, while the alternative ~~100~~500-acre site could firm-up an additional ~~28,369~~~~59,569~~ acft/yr. Volume II, Section 4C.13 includes a detailed discussion of this water management strategy.

#### **4B.1.2.18 GBRA New Appropriation (Lower Basin)**

The GBRA New Appropriation (Lower Basin) water management strategy involves diversion of up to 189,484 acft/yr under a new appropriation from the Guadalupe River in Calhoun County using existing gravity-flow diversion facilities located immediately upstream of GBRA's Saltwater Barrier and Diversion Dam at a rate of diversion not to exceed 500 cfs

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<sup>10</sup> If fresh groundwater from the lower Guadalupe Basin is added to this strategy, then the plan must be amended in order for the modified strategy to be recommended for implementation.

from wells completed in this aquifer, and thereby extend the capabilities of this aquifer to support the demands that are projected to be placed upon it.

#### **4B.1.2.45 Recharge and Recirculation Studies**

The Recharge and Recirculation water management strategy involves artificial recharge of the Edwards Aquifer, capture of the resulting increased springflows, and returning these quantities of water to further recharge the aquifer. Artificial recharge could be done using runoff from the Edwards Plateau, water imported from other watersheds, the subsequent increment of springflow resulting from artificial recharge, and/or a combination of these sources. The purpose of this strategy is to maintain springflows at satisfactory levels to protect the habitats of endangered species that exist in the springs and specified reaches of spring fed streams, while at the same time increasing the quantity of water that can be withdrawn from the aquifer to meet the needs of water user groups. The quantities of water that could be withdrawn from the aquifer depend upon the quantities of recharge, the location(s) at which the recharge is made to the aquifer, levels of the aquifer at the time of recharge, residence time of recharged water in the aquifer, and perhaps other factors that are not known or well understood. The major reason for the Recharge and Recirculation strategy is to use the aquifer to store and distribute water to water user groups that have already established themselves in proximity to the aquifer.

#### **4B.1.2.46 Mesa Water Supply Project (SAWS)**

This strategy involves the production of groundwater from the Ogallala and Simsboro Aquifers and surface water from the Brazos River and transmission of same via pipelines and the bed and banks of the Brazos River to San Antonio. The SCTRWPG recognizes this as a potential water management strategy requiring further evaluation and study prior to implementation.

#### **4B.1.2.47 Seawater Desalination**

The GBRA Integrated Water Power Project water management strategy involves the long-term development of intake and treatment facilities of seawater from the Gulf of Mexico and transmission of treated water to Calhoun, Victoria, DeWitt, and Gonzales Counties. This water management strategy utilizes a source of water that is essentially unlimited; however, costs of treatment and location for brine discharge (as may affect marine habitat and species) remain concerns. Planned implementation of this strategy will provide a dependable annual supply of

[approximately 100,000 acft by 2020 at an estimated unit cost of \\$2,290/acft/yr. Volume II, Section 4C.37 includes a detailed discussion of this recommended water management strategy.](#)

#### **4B.1.3 Summary of Key Information**

Pursuant to 31 TAC§357.7(a)(7), regional water plan development shall include evaluations of water management strategies providing certain key information pursuant to TWDB criteria. Key information regarding the 2011 South Central Texas Regional Water Plan is summarized by subject area below.

##### **4B.1.3.1 Quantity, Reliability, and Cost**

- Plan reflects substantial commitment to Water Conservation throughout the South Central Texas Region, thereby encouraging efficient utilization of existing water supplies and reducing quantities of new supply needed.
- Plan includes reliable new water supplies sufficient to meet projected drought needs for municipal, industrial, steam-electric power, and mining uses through the year 2060.
- Plan recognizes that water management strategies such as brush management, weather modification, rainwater harvesting, and small recharge dams contribute positively to storage and system management of diverse sources of supply.
- Unit costs associated with new supplies delivered to each water user group range from \$104/acft/yr to \$2,429/acft/yr and average about \$~~1,209~~1,315/acft/yr or \$~~3.71~~4.04 per 1,000 gallons based on September 2008 dollars.

##### **4B.1.3.2 Environmental Factors**

- See Section 7.3 for summary of environmental benefits and concerns.

##### **4B.1.3.3 Impact on Water Resources**

- Plan implementation results in no unmitigated reductions in water available to existing rights.
- Long-term reductions in water levels in the Carrizo-Wilcox Aquifer.

##### **4B.1.3.4 Impacts on Agricultural and Natural Resources**

- Inclusion of water management strategies to meet projected irrigation needs (shortages) in full is estimated to be economically infeasible at this time. Irrigation Water Conservation through the installation of Low Energy Precision Application (LEPA) systems is recommended to offset a portion of projected irrigation needs (shortages) in four counties.

#### 4B.3.4 Guadalupe-Blanco River Authority (GBRA)

Current water supply for GBRA is obtained from Canyon Reservoir and run-of-river rights. GBRA is projected to need additional water supplies soon after year 2010 to meet the Wholesale Water Provider's projected demands; however, certain portions of the GBRA system are projected to have a shortage (need) at year 2010. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that GBRA implement the following water supply plan to meet the projected needs for GBRA (Table 4B.3.4-1).

- Municipal Water Conservation to be implemented or enhanced in the immediate future. This strategy has been assigned to each individual Water User Group (WUG) based on the Municipal Conservation water management strategy recommended by the SCTRWPG.
- Wimberley and Woodcreek Water Supply Project to be implemented prior to 2010. This strategy can provide an additional 1,120 acft/yr upon implementation soon after 2010 and an additional 4,480 acft/yr for 2020 through 2060.
- GBRA Simsboro Aquifer<sup>9,10</sup> to be implemented prior to 2020. This strategy can provide an additional 30,000 acft/yr for 2020, increasing to 49,777 acft/yr of supply for the years 2050 through 2060.
- GBRA Mid-Basin (Surface Water) to be implemented prior to 2020. This strategy can provide an additional 25,000 acft/yr for 2020 through 2060.
- Storage Above Canyon Reservoir (ASR) to be implemented prior to 2020. This strategy can provide an additional 3,140 acft/yr for 2020 through 2060.
- GBRA-Exelon Project to be implemented prior to 2020. This strategy can provide an additional 49,126 acft/yr for 2020 through 2060.
- GBRA Lower Basin Storage (~~500400~~ acre Site)<sup>11</sup> to be implemented prior to ~~2020~~2030. This strategy can provide an additional ~~57,674~~26,452 acft/yr for ~~2020~~2030 through 2060.
- GBRA New Appropriation (Lower Basin) to be implemented prior to 2030. This strategy can provide an additional 11,500 acft/yr for 2030 through 2060.
- Western Canyon WTP Expansion to be implemented prior to 2050. This strategy can provide an additional 5,600 acft/yr for 2050 through 2060.

<sup>9</sup> Source of water is Simsboro Aquifer in Regions K and G with delivery to the San Marcos WTP.

<sup>10</sup> Part or all of the water needed by this Water Management Strategy (WMS) is anticipated to be supplied from locations within the jurisdiction of a groundwater conservation district (District) and may exceed the amount of available water identified in the District's approved management plan, or may for other reasons not be permitted by the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, cannot be implemented as part of this WMS unless and until all necessary permits are received from the District. The amount of water needed by this WMS that exceeds the available water in the District's management plan, or for other reasons is not permitted by the District, introduces an added element of uncertainty to reliance upon this WMS and, therefore, additional management supplies may be needed for this WMS.

<sup>11</sup> Firm yield estimate based on off-channel storage of ~~12,500~~2,500 acft.

- [GBRA Integrated Water Power Project to be implemented prior to 2020. This strategy can provide an additional 100,000 acft/yr for 2020 through 2070.](#)

The following are alternative water management strategies: Lower Guadalupe Water Supply Project (LGWSP) for Upstream GBRA Needs, GBRA Lower Basin Storage (100,500 acre Site), Regional Carrizo for Guadalupe Basin (GBRA), GBRA Mid-Basin (Conjunctive Use), and Calhoun County Brackish Groundwater.

**Table 4B.3.4-1.  
Recommended Water Supply Plan for GBRA**

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)*	0	10,226	23,808	36,564	51,163	67,580
<b>Recommended Plan</b>						
Municipal Water Conservation <sup>1</sup>	—	—	—	—	—	—
Wimberley and Woodcreek Water Supply Project	1,120	4,480	4,480	4,480	4,480	4,480
GBRA Simsboro Aquifer	—	30,000	30,000	30,000	49,777	49,777
GBRA Mid-Basin (Surface Water)	—	25,000	25,000	25,000	25,000	25,000
Storage Above Canyon Reservoir (ASR)	—	3,140	3,140	3,140	3,140	3,140
GBRA-Exelon Project	—	49,126	49,126	49,126	49,126	49,126
GBRA Lower Basin Storage	—	<del>57,674</del>	<del>57,674</del> 8,369	<del>57,674</del> 8,369	<del>57,674</del> 8,369	<del>57,674</del> 8,369
GBRA New Appropriation (Lower Basin)	—	—	11,300	11,300	11,300	11,300
Western Canyon WTP Expansion	—	—	—	—	5,600	5,600
<a href="#">GBRA Integrated Water Power Project (IWPP)</a>		<a href="#">100,000</a>				
<b>Total New Supply</b>	<b>4,480</b>	<del>264,940</del> <del>107,266</del>	<del>176,240</del> <del>146,935</del>	<del>176,240</del> <del>146,935</del>	<del>201,617</del> <del>172,312</del>	<del>201,617</del> <del>172,312</del>
* Projected needs in upper portion of GBRA district are offset by management supplies in the lower portion of the GBRA district.						
<sup>1</sup> Assigned by Water User Group based on Municipal Conservation water management strategy recommended by SCTRWPG.						

Estimated costs of the recommended plan to meet the GBRA projected needs are shown in Table 4B.3.4-2.

**Table 4B.3.4-2.  
Recommended Plan Costs by Decade for GBRA**

<i>Plan Element</i>	<i>2010</i>	<i>2020</i>	<i>2030</i>	<i>2040</i>	<i>2050</i>	<i>2060</i>
<b>Municipal Water Conservation<sup>1</sup></b>						
Annual Cost (\$/yr)	—	—	—	—	—	—
Unit Cost (\$/acft)	—	—	—	—	—	—
<b>Wimberley and Woodcreek Water Supply Project</b>						
Annual Cost (\$/yr)	\$2,747,360	\$10,989,440	\$9,253,000	\$9,253,000	\$9,253,000	\$9,253,000
Unit Cost (\$/acft)	\$2,453	\$2,453	\$2,065	\$2,065	\$2,065	\$2,065
<b>GBRA Simsboro Aquifer</b>						
Annual Cost (\$/yr)	—	\$29,460,000	\$29,460,000	\$11,580,000	\$19,300,000	\$19,300,000
Unit Cost (\$/acft)	—	\$982	\$982	\$386	\$386	\$386
<b>GBRA Mid-Basin (Surface Water)</b>						
Annual Cost (\$/yr)	—	\$46,975,000	\$46,975,000	\$16,200,000	\$16,200,000	\$9,250,000
Unit Cost (\$/acft)	—	\$1,879	\$1,879	\$648	\$648	\$370
<b>Storage Above Canyon Reservoir (ASR)</b>						
Annual Cost (\$/yr)	—	\$5,564,080	\$5,564,080	\$1,843,180	\$1,843,180	\$1,843,180
Unit Cost (\$/acft)	—	\$1,772	\$1,772	\$587	\$587	\$587
<b>GBRA-Exelon Project</b>						
Annual Cost (\$/yr)	—	\$31,735,396	\$31,735,396	\$22,990,968	\$22,990,968	\$11,004,224
Unit Cost (\$/acft)	—	\$646	\$646	\$468	\$468	\$224
<b>GBRA Lower Basin Storage</b>						
Annual Cost (\$/yr)	—	<del>\$6,519,000</del>	<del>\$6,519,000</del>	<del>\$4,347,000</del>	<del>\$4,347,000</del>	<del>\$827,000</del>
Unit Cost (\$/acft)	—	<del>\$113</del>	<del>\$113</del>	<del>\$75</del>	<del>\$75</del>	<del>\$14</del>
<b>GBRA New Appropriation (Lower Basin)</b>						
Annual Cost (\$/yr)	—	—	\$21,585,000	\$21,585,000	\$2,521,000	\$2,521,000
Unit Cost (\$/acft)	—	—	\$1,910	\$1,910	\$223	\$223
<b>Western Canyon WTP Expansion</b>						
Annual Cost (\$/yr)	—	—	—	—	\$1,764,000	\$1,764,000
Unit Cost (\$/acft)	—	—	—	—	\$315	\$315
<b>GBRA Integrated Water Power Project</b>						
Annual Cost (\$/yr)	—	<del>\$228,997,000</del>	<del>\$228,997,000</del>	<del>\$117,189,000</del>	<del>\$117,189,000</del>	<del>\$117,189,000</del>
Unit Cost (\$/acft)	—	<del>\$2,549,290</del>	<del>\$2,290,549</del>	<del>\$1,172,87</del>	<del>\$1,172,87</del>	<del>\$1,172,87</del>

<sup>1</sup> These costs have been assigned to the individual Water User Groups.

**4B.3.5 Lavaca-Navidad River Authority (LNRA)**

Lavaca-Navidad River Authority obtains its supply from Lake Texana Stage I and is projected to have shortages throughout the planning period. Working within the planning criteria established by the SCTRWPG and the TWDB, it is recommended that LNRA implement the following water supply plan to meet the projected needs for LNRA (Table 4B.3.5-1).

- Lavaca River Off-Channel Reservoir to be implemented prior to 2010. This strategy can provide an additional 26,242 acft/yr of supply, starting in 2020 and continuing through 2060.
- Facilitate temporary reallocation of presently contracted supplies to meet projected needs of Point Comfort until addition firm supplies are developed.

**Table 4B.3.5-1.  
Recommended and Alternative Water Supply Plan for LNRA**

	2010 (acft/yr)	2020 (acft/yr)	2030 (acft/yr)	2040 (acft/yr)	2050 (acft/yr)	2060 (acft/yr)
Projected Need (Shortage)*	10,046	10,145	10,322	10,499	10,489	10,489
<b>Recommended Plan</b>						
Lavaca River Off-Channel Reservoir	26,242	26,242	26,242	26,242	26,242	26,242
<b>Total New Supply</b>	<b>26,242</b>	<b>26,242</b>	<b>26,242</b>	<b>26,242</b>	<b>26,242</b>	<b>26,242</b>
<small>* Projected needs are reported only for the portion of LNRA service area within Calhoun County in Region L. 10,000 acft/yr of the projected need is for Formosa Plastics Corporation based on information provided by LNRA during an inter-regional coordination meeting held on April 8, 2009. The remainder is for Point Comfort.</small>						

Estimated costs of the recommended and alternative plan to meet the LNRA projected needs are shown in Table 4B.3.5-2.

## 4C.13 GBRA Lower Basin Storage Project

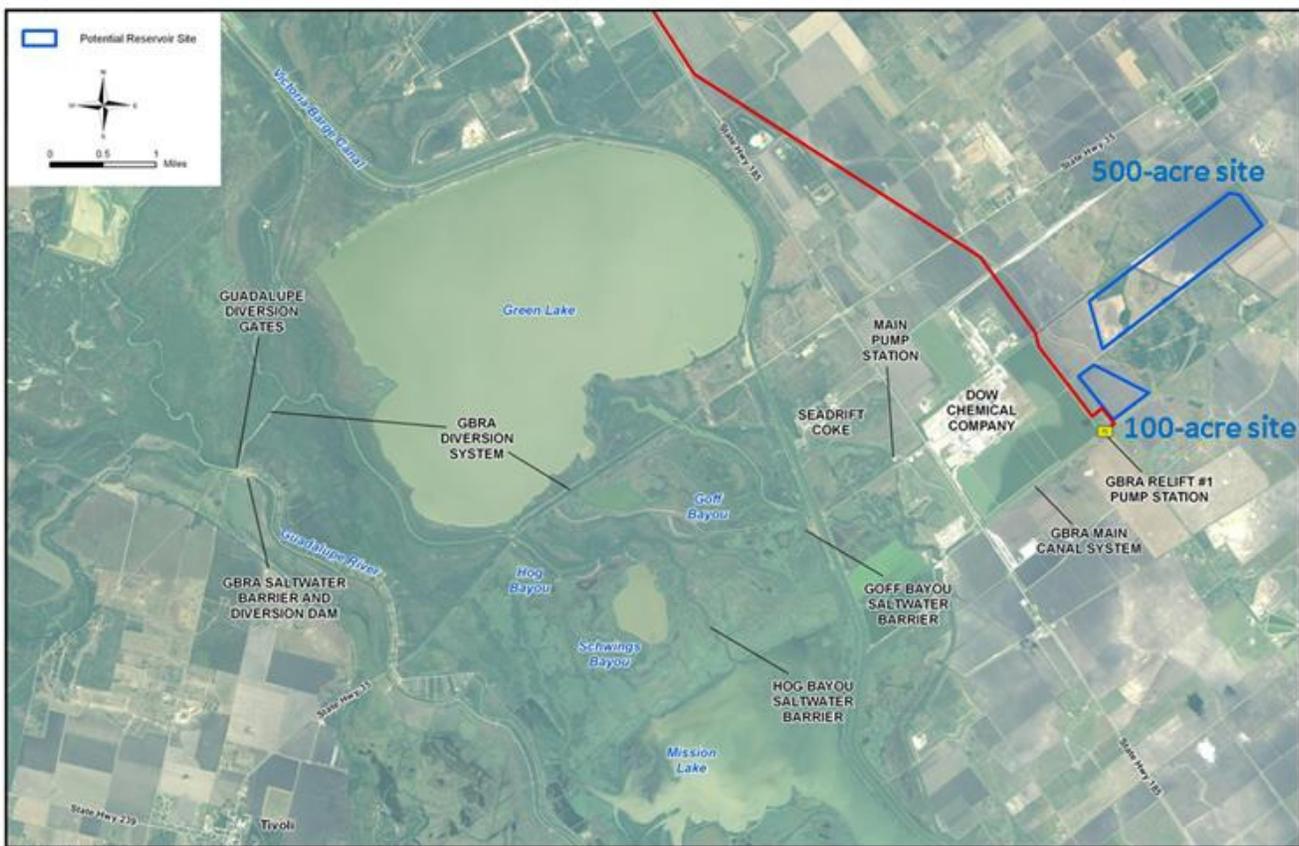
### 4C.13.1 Description of Water Management Strategy

The Guadalupe-Blanco River Authority (GBRA) and Dow Chemical Company (Dow), individually and collectively, own surface water rights in the lower Guadalupe – San Antonio River Basin (the GBRA Lower Basin Water Rights) authorizing diversions totaling 175,501 acre-feet per year (acft/yr). Table 4C.13-1 lists the individual water rights owned by GBRA and Dow and provides their individual permit number, certificate of adjudication number, priority date, annual diversion, authorized uses, and ownership. Water available for diversion under these rights is governed by the complex interactions of natural, anthropogenic, and legal factors including rainfall, runoff, springflow, evaporation, aquifer recharge, diversions by other water right owners, reservoir operations, off-channel storage, treated effluent from municipal and industrial water users, terms and conditions of the water rights, and the prior appropriation doctrine as enforced by the South Texas Watermaster of the Texas Commission on Environmental Quality (TCEQ). Given that the GBRA Lower Basin Water Rights point of diversion near Tivoli is below the San Antonio River confluence and that they are senior in priority to most upstream water rights, it is recognized that they are quite reliable but not firm.

**Table 4C.13-1.  
GBRA Lower Basin Water Rights**

<i>Certificate of Adjudication</i>	<i>Priority Date</i>	<i>Annual Diversion (acft/yr)</i>	<i>Authorized Uses</i>	<i>Ownership</i>
18-5173	2/3/1941	2,500	Irrigation/Industrial	GBRA/Dow
18-5174	6/15/1944	1,870	Irrigation/Industrial	GBRA/Dow
18-5175	2/13/1951	940	Irrigation/Industrial/ Mining/Livestock	GBRA/Dow
18-5176	6/21/1951	9,944	Irrigation/Industrial/ Municipal	GBRA/Dow
18-5177	1/3/1944	10,000	Irrigation/Industrial/ Municipal	Dow
	1/3/1944	32,615	Irrigation/Industrial/ Municipal	GBRA/Dow
	1/26/1948	8,632	Irrigation/Industrial	GBRA/Dow
18-5178	1/7/1952	106,000	Irrigation/Industrial/ Municipal	GBRA/Dow
18-3863	3/1/1951	3,000	Irrigation/Industrial/ Municipal	GBRA
18-5484	5/15/1964	N/A	Diversion Dam & Salt Water Barrier	GBRA

To firm up the existing interruptible GBRA Lower Basin Water Rights, a 100 acre or 500 acre off-channel reservoir (OCR) is considered for implementation. Two potential OCR sites are located approximately 3 miles east of Green Lake adjacent to Dow facilities. The locations of the two sites are illustrated in Figure 4C.13-1. The off-channel reservoirs have an assumed maximum water depth of 25-ft and would be capable of impounding 2,500 ac-ft and 12,500 ac-ft of water at the 100 acre and 500 acre OCR sites, respectively. A 42-in diameter pipeline would transport water diverted from the GBRA Main Canal System to the OCR sites and a 72-in diameter outlet pipeline would discharge the water.



**Figure 4C.13-1. GBRA Lower Basin Storage Off-Channel Storage Locations**

#### **4C.13.2 Water Availability**

##### **4C.13.2.1 Technical Assumptions for Water Availability Calculations**

Initial water availability calculations were performed using the Guadalupe – San Antonio River Basin Water Availability Model (GSA WAM)<sup>1</sup> as modified and refined for use in development of the 2001, 2006, and 2011 South Central Texas Regional Water Plans<sup>2,3</sup> and water supply analyses for a proposed nuclear power plant in Victoria County.<sup>4</sup> The GSA WAM is a monthly time-step computer model used to estimate regulated streamflow and water available for diversion under existing water rights on a priority basis subject to technical assumptions regarding natural, anthropogenic, and legal factors. Technical assumptions used for the applications of the GSA WAM summarized herein include:

- a) Surface water rights modeled at full consumptive amounts per certificates of adjudication and permits.
- b) Permitted Edwards Aquifer pumpage of 572,000 acft/yr with critical period withdrawal reductions as outlined in SB3 of the 80<sup>th</sup> Texas Legislature.
- c) Subordination of all senior Guadalupe River hydropower water rights to Canyon Reservoir.
- d) 1934-2006 historical simulation period for the GSA WAM using simplified approximation techniques to extend basic hydrologic data from 1990 through 2006.<sup>5</sup>
- e) Treated effluent quantities throughout the river basin reported for calendar year 1997 after accounting for San Antonio Water System (SAWS) direct reuse contracts under their recycled water program. These effluent quantities were used in surface water availability analyses for the 2006 South Central Texas Regional Water Plan and differ **very little** from those for the 2011 Plan.
- f) Multiple regulated streamflow extractions from each GSA WAM simulation were necessary to account for the effects of diversions by Invista/DuPont (CA# 18-3861) on firm supply available to the GBRA Lower Basin Water Rights on a daily basis. The only large non-GBRA water right in the lower basin having a priority date senior to some (and junior to other) GBRA Lower Basin Water Rights is held by Invista/DuPont.

<sup>1</sup> HDR Engineering, Inc., “Water Availability in the Guadalupe – San Antonio River Basin,” Texas Natural Resource Conservation Commission (Contract# 9880059200), December 1999.

<sup>2</sup> South Central Texas Regional Water Planning Group, “South Central Texas Regional Water Planning Area, 2001 Regional Water Plan,” Texas Water Development Board, San Antonio River Authority, HDR Engineering, Inc., et al., January 2001.

<sup>3</sup> South Central Texas Regional Water Planning Group, “South Central Texas Regional Water Planning Area, 2006 Regional Water Plan,” Texas Water Development Board, San Antonio River Authority, HDR Engineering, Inc., et al., January 2006.

<sup>4</sup> HDR Engineering, Inc., “Simplified Extension of Hydrologic Data in the Guadalupe – San Antonio River Basin and Approximate Daily Estimates of Water Availability,” Guadalupe-Blanco River Authority, Exelon Generation Company, February 12, 2009.

<sup>5</sup> Ibid.

### 4C.13.2.2 Monthly Assessments of Reliability and Water Available

The combined annual water available under the GBRA Lower Basin Water Rights calculated by the GSA WAM is summarized in Figure 4C.13-2. As shown in Figure 4C.13-2, the full annual amount of 175,501 acft/yr is reliable in 85 percent of the years during the simulation period and the minimum annual amount of water available under the GBRA Lower Basin Water Rights is 145,665 acft/yr in 1956. The reliability of the GBRA Lower Basin Water Rights is summarized in Figure 4C.13-3 in terms of the percentage of time (months during the simulation period) that a percentage of the desired monthly amount of the total 175,501 acft/yr authorized diversion is available. As shown in Figure 4C.13-3, desired diversions are available in more than 97 percent of the months during the simulation period.

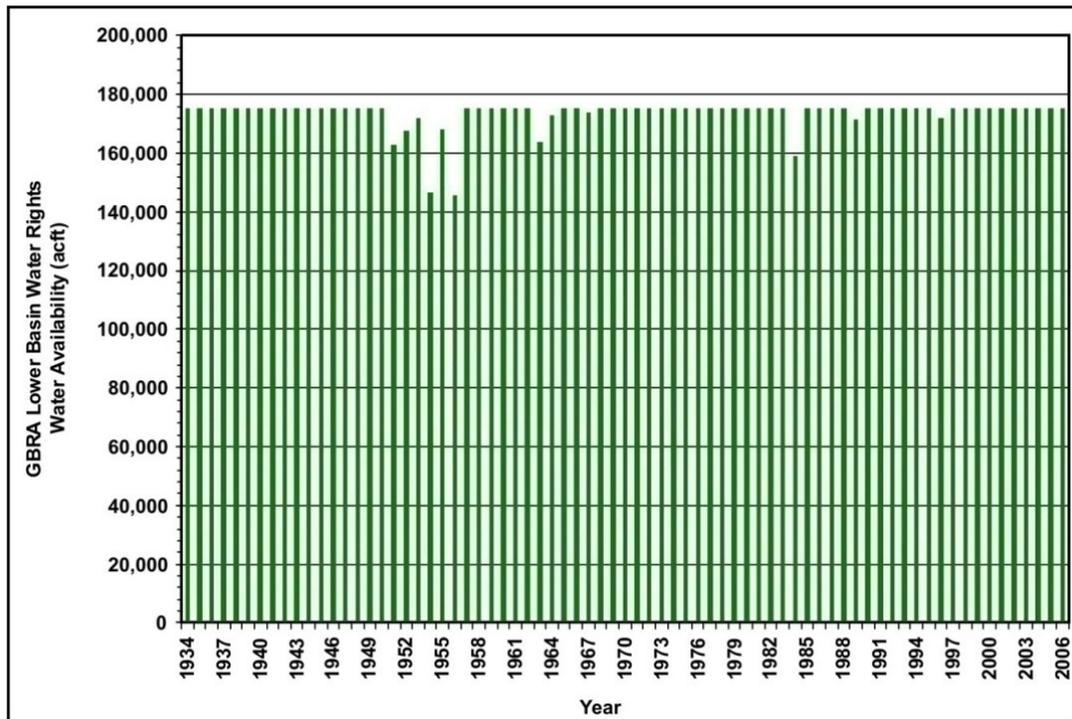
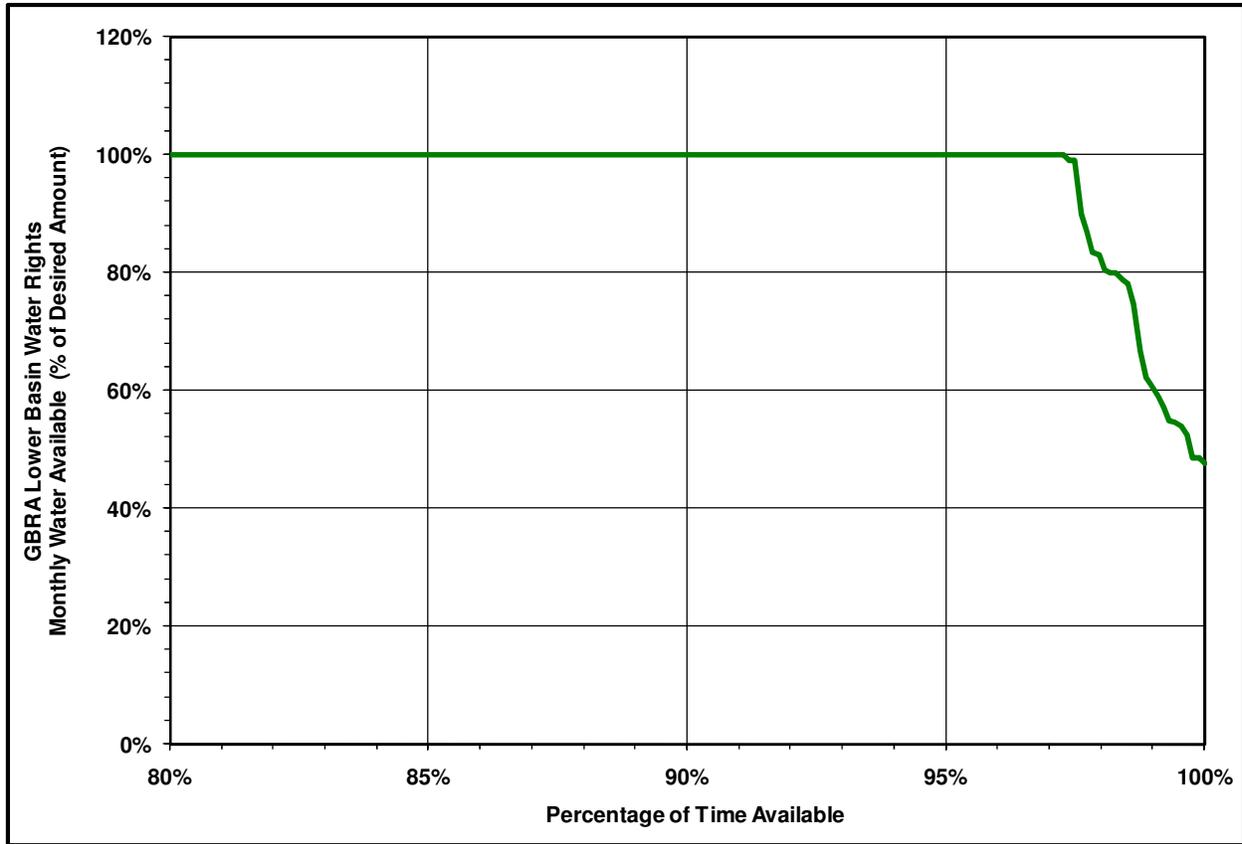


Figure 4C.13-2. GBRA Lower Basin Water Rights Annual Water Availability



**Figure 4C.13-3. GBRA Lower Basin Water Rights Monthly Reliability**

**4C.13.2.3 Firm Water Supply**

As the GSA WAM is a monthly time-step model and flows in the lower Guadalupe River can, at times, be quite variable from day to day, it is important for GBRA planning purposes to refine the monthly estimates of water availability presented in Section 4C.13.2.2 and quantify water supplies that are reliable or firm on a daily basis. A specially-designed Microsoft Excel workbook was developed and applied to disaggregate monthly regulated streamflow values from the GSA WAM to daily values using historical daily streamflow patterns and obtain estimates of firm water supply available under the GBRA Lower Basin Water Rights on a daily basis. Historical daily streamflow patterns representative of the Guadalupe River near Tivoli are based on flows for the Guadalupe River at Victoria (USGS# 08176500), Coletto Creek near Victoria (USGS# 08177500), and the San Antonio River at Goliad (USGS# 08188500) during the 1990

through 2006 period and obtained from project files for a 1998 study<sup>6</sup> for the 1934 through 1989 period. These daily streamflow values were then used, along with applicable seasonal diversion patterns associated with type of use, to determine the firm supply available under the GBRA Lower Basin Water Rights on a daily basis. The firm water supply that is reliable on a daily basis throughout the most severe drought on record is shown in Figure 4C.13-4, along with comparable annual and monthly amounts based solely on monthly GSA WAM output. It is important to note that the firm supply in Figure 4C.13-4 does not account for any storage between diversion from the Guadalupe River and ultimate users. Dow, Seadrift Coke, Ineous Nitriles, and the Port Lavaca Water Treatment Plant do, however, have on-site storage that could be drawn upon for relatively short periods during which water from the river is limited or unavailable. Hence, firm water supply on a daily basis is actually incrementally greater than the amount shown in Figure 4C.13-4.

#### **4C.13.2.4 Firm Water Supply Enhancement with Off-Channel Storage**

Firm water supplies available on a daily basis under the GBRA Lower Basin Water Rights can be enhanced with development and integration of off-channel storage. Analyses of potential enhancement of firm water supplies with off-channel storage are based on:

- a) Water availability calculated on a daily basis.
- b) Simplified off-channel reservoir operations simulations assuming maximum and minimum water depths of 25 feet and 3.5 feet, respectively.
- c) Delivery of water into the off-channel reservoir at a maximum rate of 50 cfs.
- d) Historical net evaporation from the GSA WAM.

Firm water supply could be increased from 41,548 acft/yr to 69,917 acft/yr (28,369 acft/yr increase) with the addition of the 100 acre, 2,500 acft off-channel storage reservoir. The 500 acre, 12,500 acft off-channel reservoir could increase the firm water supply from 41,548 acft/yr to 101,117 acft/yr (59,569 acft/yr increase).<sup>7</sup>

<sup>6</sup> HDR Engineering, Inc., "Guadalupe - San Antonio River Basin Model Modifications & Enhancements," Trans-Texas Water Program, West Central Study Area, Texas Water Development Board, San Antonio River Authority, et. al., March 1998.

<sup>7</sup> [Basing calculations on treated wastewater quantities adjusted for direct recycled water commitments as reported for 2006 \(instead of 1997\), addition of the 12,500 acft off-channel reservoir could increase the firm water supply from 41,543 acft/yr to 99,217 acft/yr \(57,674 acft/yr increase\).](#)

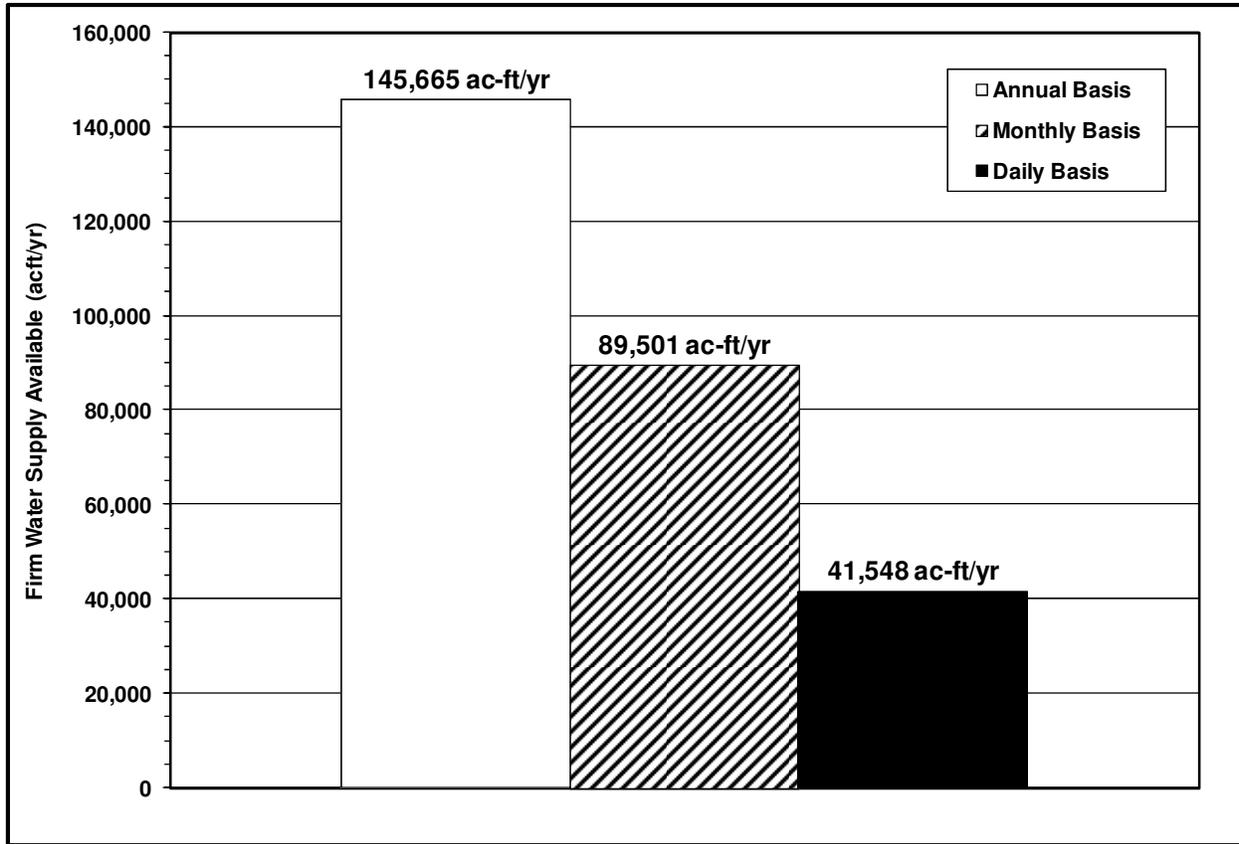


Figure 4C.13-4. Firm Water Supply on a Time-Step Basis

**4C.13.3 Environmental Issues**

The potential off-channel storage reservoir sites are located in Calhoun County, approximately two miles east of the intersection of State Highway (SH) 35 and SH 185. The approximate surface areas of these reservoirs are 100 and 500 acres. The total areas disturbed by the reservoir, embankments, and appurtenant facilities are approximately 125 and 625 acres, respectively.

Land uses found within the project areas include primarily farm, pasture, and range areas. U.S. Geological Survey land use and land cover data indicates that the project area contains approximately 65 percent cropland and pasture, and 35 percent shrub and brush rangeland.

The potential reservoir sites are located in the Gulf Coastal Plains of Texas Physiographic Province, specifically in the subprovince of the Coastal Prairies. This area is locally characterized as a nearly flat prairie composed of deltaic sands and muds which terminates at the

Gulf of Mexico and includes topography changes of less than one foot per mile. Elevation levels in the Coastal Prairies range from 0 to 300 feet above mean sea level.

#### **4C.13.3.1 Vegetation**

The potential reservoir sites are located within the Gulf Prairies and Marshes Vegetational Area. Gulf Prairies have slow surface drainage and elevations that range from sea level to 250 feet. These areas include nearly level and virtually undissected plains. Originally the Gulf Prairies were composed of tallgrass prairie and post oak savannah. However, tree species such as honey mesquite, and acacia, along with other trees and shrubs have increased in this area forming dense thickets in many places. Typical oak species found in this area include live oak (*Quercus virginiana*) and post oak (*Q. stellata*), in addition to huisache (*Acacia smallii*), black-brush (*A. rigidula*), and a dwarf shrub; bushy sea-ox-eye (*Borrchia frutescens*). Principal climax grasses of the Gulf Prairies include gulf cordgrass (*Spartina spartinae*), indiangrass (*Sorghastrum nutans*), and big bluestem (*Andropogon gerardii* var. *gerardii*). Prickly pear (*Opunita*) are common within this area along with forbs including asters (*Aster sp.*), poppy mallows (*Callirhoe sp.*), bluebonnets (*Lupinus sp.*), and evening primroses (*Oenothera sp.*). Gulf Marshes range from sea level to a few feet in elevation, and include low, wet marshy coast areas commonly covered with saline water. These salty areas support numerous species of sedges (*Carex* and *Cyperus sp.*), bulrushes (*Scirpus sp.*), rushes (*Juncus sp.*), and grasses. Aquatic forbs found in these areas generally include pepperweeds (*Lepidium sp.*), smartweeds (*Polygonum sp.*), cattails (*Typha domingensis*) and spiderworts (*Tradescantia sp.*) among others. Upland game and waterfowl find these low marshy areas to be excellent natural wildlife habitat.

#### **4C.13.3.2 Threatened and Endangered Species**

The Federal Endangered Species Act of 1973, as amended, prohibits the “take” of any threatened or endangered species. The term “take” under the ESA means “to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct.” The term “harm” was further defined to include “significant habitat modification or degradation where it actually kills or injures wildlife by significantly impairing essential behavioral patterns, including breeding, feeding or sheltering.” Designation of critical habitat areas has been established for the public knowledge where the publishing of such information would not cause harm to the species. Additional federal protection is extended to migratory

birds, and bald and golden eagles under the Migratory Bird Treaty Act (MBTA) as amended, and the Bald and Golden Eagle Protection Act. Protection is also afforded to Texas state-listed species. The Texas Parks and Wildlife Department (TPWD) enforces the state regulations.

The MBTA protects most bird species, including, but not limited to, cranes, ducks, geese, shorebirds, hawks, and songbirds. Migratory bird pathways, stopover habitats, wintering areas, and breeding areas may occur within and adjacent to the proposed reservoir sites, and may be associated with wetlands, ponds, shorelines, riparian corridors, fallow fields and grasslands, and woodland and forested areas. Construction activities could disturb migratory bird habitats and/or species' activities.

Reasonable and prudent measures should be taken to avoid and minimize the potential effects of project activities on threatened and endangered species as well as bald eagles. Species' locations, activities, and habitat requirements should be considered based on U.S. Fish and Wildlife Service and TPWD recommendations.

#### **4C.13.3.3 County-Listed Species**

In Calhoun County, there may occur 32 state-listed endangered or threatened species and 17 federally-listed endangered or threatened wildlife species, according to the county lists of rare species published by the TPWD. A list of these species, their preferred habitat, and potential occurrence in Calhoun County is provided in Table 4C.13-2.

Inclusion in Table 4C.13-2 does not imply that a species will occur within the project area, but only acknowledges the potential for occurrence in Calhoun County. A more intensive field reconnaissance would be necessary to confirm and identify specific suitable habitat that may be present in the project area. In addition to county lists, HDR also reviewed the Texas Natural Diversity Database (TXNDD) map data for known occurrences of listed species within or near the proposed reservoir sites. This information indicated that there were reported sightings of the bald eagle (*Haliaeetus leucocephalus*), listed as a threatened species by the State within the surrounding area. No specific sightings of any endangered or threatened species were documented within the proposed reservoir sites. The presence or absence of potential habitat within an area does not confirm the presence or absence of a listed species. No species specific surveys were conducted in the project area for this report.

**Table 4C.13-2.  
Endangered, Threatened, and Species of Concern for Calhoun County**

Common Name	Scientific Name	Impact Value	Multiplier Based on Status	Adjusted Impact	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
						USFWS	TPWD	
<b>AMPHIBIANS</b>								
Black-spotted newt	<i>Notophthalmus meridionalis</i>	1	2	2	Usually found in wet or sometimes wet areas in the Gulf Coastal Plain south of the San Antonio River.		T	Resident
Sheep frog	<i>Hypopachus variolosus</i>	1	2	2	Found in grassland and savanna; moist sites in arid areas.		T	Resident
<b>BIRDS</b>								
Bald eagle	<i>Haliaeetus leucocephalus</i>	0	2	0	Found primarily near rivers and large lakes.	DL	T	Possible Migrant
Brown pelican	<i>Pelecanus occidentalis</i>	0	3	0	Largely coastal and near shore areas.	DL	E	Resident
Eskimo curlew	<i>Numenius borealis</i>	0	3	0	Historic, nonbreeding.	LE	E	Historic Resident
Henslow's Sparrow	<i>Ammodramus henslowii</i>	1	1	1	Found in weedy fields or cut-over areas			Resident
Mountain Plover	<i>Charadrius montanus</i>	1	1	1	Non-breeding, shortgrass plains and fields			Nesting/Migrant
Northern Aplomado Falcon	<i>Falco femoralis septentrionalis</i>	0	3	0	Found in open country, especially savanna and open woodland.	LE	E	Resident
American Peregrine Falcon	<i>Falco peregrinus anatum</i>	0	2	0	Migrant and local breeder in West Texas.	DL	T	Possible Migrant
Arctic Peregrine Falcon	<i>Falco peregrinus tundrius</i>	0	1	0	Migrant throughout the state.	DL		Possible Migrant
Piping plover	<i>Charadrius melodus</i>	0	2	0	Wintering migrant along the Texas Gulf Coast.	LT	T	Migrant
Reddish Egret	<i>Egretta rufescens</i>	1	2	2	Resident of Texas Gulf coast.		T	Resident
Snowy Plover	<i>Charadrius alexandrinus</i>	0	1	0	Potential migrant, winters along coast			Migrant
Sooty Tern	<i>Sterna fuscata</i>	1	2	2	Usually flies or hovers over water.		T	Resident
Southeastern Snowy Plover	<i>Charadrius alexandrinus tenuirostris</i>	0	1	0	Wintering migrant along the Texas Gulf Coast.			Migrant
Western Burrowing Owl	<i>Athene cunicularia hypugaea</i>	1	1	1	Open grasslands, especially prairie, plains and savanna			Resident
White-faced Ibis	<i>Plegadis chihi</i>	1	2	2	Prefers freshwater marshes.		T	Resident
White-tailed Hawk	<i>Buteo albicaudatus</i>	0	2	0	Found near the coast on prairies.		T	Resident
Whooping Crane	<i>Grus americana</i>	1	3	3	Potential migrant	LE	E	Potential Migrant

Table 4C.13-2 (Continued)

Common Name	Scientific Name	Impact Value	Multiplier Based on Status	Adjusted Impact	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
						USFWS	TPWD	
Wood Stork	<i>Mycteria americana</i>	1	2	2	Forages in prairie ponds, ditches, and shallow standing water formerly nested in TX		T	Migrant
<b>FISH</b>								
American eel	<i>Anguilla rostrata</i>	1	1	1	Coastal waterways below reservoirs to gulf.			Resident
Opossum pipefish	<i>Micropis brachyurus</i>	1	2	2	Adults found in fresh or low salinity waters.		T	Resident
Smalltooth sawfish	<i>Pristis pectinata</i>	1	3	3	Found in bays, estuaries or river mouths.	LE	E	Resident
<b>MAMMALS</b>								
Black Bear	<i>Ursus americanus</i>	0	2	0	Inhabits bottomland hardwoods	T/SA;NL	T	Historic Resident
Jaguarundi	<i>Herpailurus yaguarondi</i>	0	3	0	Found in thick brushlands near water.	LE	E	Resident
Louisiana black bear	<i>Ursus americanus luteolus</i>	0	2	0	Possible transient.	LT	T	Transient
Ocelot	<i>Leopardus pardalis</i>	0	3	0	Found in dense chaparral thickets; mesquite-thorn scrub and live oak motts.	LE	E	Resident
Plains Spotted Skunk	<i>Spilogale putorius interrupta</i>	1	1	1	Prefers wooded, brushy areas.			Resident
Red Wolf	<i>Canis rufus</i>	0	3	0	Extirpated.	LE	E	Historic Resident
West Indian manatee	<i>Trichechus manatus</i>	0	3	0	Gulf and bay systems.	LE	E	Resident
<b>MUSSELS</b>								
Creeper (squawfoot)	<i>Strophitus undulatus</i>	1	1	1	Small to large streams			Resident
Pistolgrip	<i>Tritogonia verrucosa</i>	1	1	1	Aquatic, stable substrate. Red through San Antonio river basins.			Resident
<b>PLANTS</b>								
Threeflower broomweed	<i>Thurovia triflora</i>	1	1	1	Endemic: near coast.			Resident
<b>REPTILES</b>								
Atlantic hawksbill sea turtle	<i>Eretmochelys imbricate</i>	0	3	0	Found in Gulf and bay systems.	LE	E	Resident
Green sea turtle	<i>Chelonia mydas</i>	0	2	0	Gulf and bay systems.	LT	T	Resident
Gulf Saltmarsh snake	<i>Nerodia clarkii</i>	1	1	1	Found on saline flats.			Resident
Kemp's Ridley sea turtle	<i>Lepidochelys kempii</i>	0	3	0	Found in gulf and bay systems.	LE	E	Resident
Leatherback sea turtle	<i>Dermochelys coriacea</i>	0	3	0	Gulf and bay systems.	LE	E	Resident
Loggerhead sea turtle	<i>Caretta caretta</i>	0	2	0	Gulf and bay systems for juveniles, ocean for adults.	LT	T	Resident

**Table 4C.13-2 (Concluded)**

Common Name	Scientific Name	Impact Value	Multiplier Based on Status	Adjusted Impact	Summary of Habitat Preference	Listing Entity		Potential Occurrence in County
						USFWS	TPWD	
Texas diamondback terrapin	<i>Malaclemys terrapin littoralis</i>	1	1	1	Found in coastal marshes and tidal flats.			Resident
Texas Horned Lizard	<i>Phrynosoma cornutum</i>	1	2	2	Varied, sparsely vegetated uplands.		T	Resident
Texas scarlet snake	<i>Cemophora coccinea lineri</i>	1	2	2	Mixed hardwood scrub on sandy soils.		T	Resident
Texas Tortoise	<i>Gopherus berlandieri</i>	1	2	2	Open brush w/ grass understory.		T	Resident
Timber/Canebrake Rattlesnake	<i>Crotalus horridus</i>	1	2	2	Floodplains, upland pine, deciduous woodlands, riparian zones.		T	Resident

Source: TPWD, Annotated County List of Rare Species, Calhoun County, Updated May 4, 2009.

- DL Delisted
- PDL Proposed for Delisting
- LE Federally listed endangered
- LT Federally listed threatened
- T/SA;NL Threatened by similarity of appearance but not listed
- Not Federally or State Listed but considered a species of concern
- E State Endangered
- T State Threatened

**4C.13.3.4 Cultural Resources**

A review of the Texas Historical Commission Texas Historic Sites Atlas data base indicated that there are no historical markers, National Register Properties, or cemeteries listed within 500 feet of or within the proposed reservoir sites.

A request was made for archeological site records recorded within 500 feet of the proposed reservoir sites from the Texas Historical Commission’s (THC) restricted Texas Archeological Sites Atlas. Information received from the THC indicates that there are no recorded sites found within the project area on the Green Lake, or Port Lavaca West quad maps. Although no sites have been recorded within the project area, this does not necessarily mean that sites are not present.

**4C.13.4 Engineering and Costing**

The cost estimates for the two off-channel reservoir sites of this water management strategy are shown in Tables 4C.13-3 and 4C.13-4. Included in the costs for the off-channel

**Table 4C.13-3.**  
**Cost Estimate Summary**  
**GBRA Lower Basin Storage Project for 100 acre, 2,500 ac-ft OCR**  
**September 2008 Prices**

<i>Item</i>	<i>Estimated Costs for Facilities (September 2008)</i>
<b>Capital Costs</b>	
Off-Channel Reservoir (2,500 acft, 100 acres)	\$12,938,000
Intake and Pump Station (360 HP, 34 MGD)	\$7,897,000
Transmission Pipeline (42-in dia., 994 ft)	\$1,566,000
Outlet Pipeline (72-in dia., 994 ft)	<u>\$786,000</u>
<b>Total Capital Cost</b>	<b>\$23,187,000</b>
Engineering, Legal Costs and Contingencies	\$7,998,000
Environmental & Archaeology Studies and Mitigation	\$317,000
Land Acquisition and Surveying (100 acres)	\$ 304,000
Interest During Construction (2 years)	<u>\$1,994,000</u>
<b>Total Project Cost</b>	<b>\$33,800,000</b>
<b>Annual Costs</b>	
Debt Service (6 percent, 20 years)	\$1,249,000
Reservoir Debt Service (6 percent, 40 years)	\$1,294,000
Operation and Maintenance	
Intake, Pipeline, Pump Station	\$221,000
Off-Channel Reservoir	\$194,000
Pumping Energy Costs (46,592 kW-hr @ 0.09 \$/kW-hr)	\$4,000
<b>Total Annual Cost</b>	<b>\$ 2,962,000</b>
<b>Available Project Yield (acft/yr)</b>	28,369
<b>Annual Cost of Water (\$ per acft)</b>	\$104
<b>Annual Cost of Water (\$ per 1,000 gallons)</b>	\$0.32

**Table 4C.13-4.**  
**Cost Estimate Summary**  
**GBRA Lower Basin Storage Project for 500 acre, 12,500 ac-ft OCR**  
**September 2008 Prices**

<i>Item</i>	<i>Estimated Costs for Facilities (September 2008)</i>
<b>Capital Costs</b>	
Off-Channel Reservoir (12,500 acft, 500 acres)	\$34,230,000
Intake and Pump Station (360 HP, 34 MGD)	\$7,897,000
Transmission Pipeline (42-in dia., 6,979 ft)	\$5,440,000
Outlet Pipeline (72-in dia., 6875 ft)	<u>\$4,660,000</u>
<b>Total Capital Cost</b>	<b>\$52,227,000</b>
Engineering, Legal Costs and Contingencies	\$17,774,000
Environmental & Archaeology Studies and Mitigation	\$1,473,000
Land Acquisition and Surveying (500 acres)	\$1,520,000
Interest During Construction (2 years)	<u>\$4,882,000</u>
<b>Total Project Cost</b>	<b>\$77,876,000</b>
<b>Annual Costs</b>	
Debt Service (6 percent, 20 years)	\$2,172,000
Reservoir Debt Service (6 percent, 40 years)	\$3,520,000
Operation and Maintenance	
Intake, Pipeline, Pump Station	\$298,000
Off-Channel Reservoir	\$513,000
Pumping Energy Costs (181,400 kW-hr @ 0.09 \$/kW-hr)	\$16,000
<b>Total Annual Cost</b>	<b>\$6,519,000</b>
<b>Available Project Yield (acft/yr)</b>	59,569
<b>Annual Cost of Water (\$ per acft)</b>	\$109
<b>Annual Cost of Water (\$ per 1,000 gallons)</b>	\$0.34

reservoirs are raw water intakes and pump stations, transmission pipelines, and outlet pipelines. The OCR options also include cost of the reservoir and dam. Depending upon the location(s) and type(s) of use for water supplies associated with the off-channel reservoir, additional facilities and costs could include pipelines to customers and treatment. Inundated land and mitigation land acquisition and operation and maintenance costs were developed in accordance with the standard cost estimating procedures summarized in Appendix A.

The costs presented in Tables 4C.13-3 and 4C.13-4 are based on the firm yield increase associated with the implementation of each off-channel reservoir. The total project and annual costs, including debt service and operation and maintenance are \$33,800,000 and \$2,962,000 for the 2,500 acft OCR and \$77,876,000 and \$6,519,000 for the 12,500 acft OCR, respectively. These annual costs translate to unit costs of \$104 per acft and \$109 per acft for the 2,500 acft and 12,500 acft off-channel reservoirs, respectively. Basing calculations on treated wastewater quantities adjusted for direct recycled water commitments as reported for 2006 (instead of 1997), addition of the 12,500 acft off-channel reservoir could increase the firm water supply by 57,674 acft/yr at an annual unit cost of \$113 per acft.

#### **4C.13.5 Implementation Issues**

An institutional arrangement may be needed to implement this project including financing on a regional basis.

1. It will be necessary to obtain this permit:
  - a. TCEQ storage permit.
2. Permitting, at a minimum, will require these studies:
  - a. Habitat mitigation plan.
  - b. Environmental studies.
  - c. Cultural resources.
3. Land will need to be acquired through either negotiations or condemnation.
4. Relocations for these reservoir sites are expected to minimal, if any.

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**WMS Project**

<b>Sponsor Region:</b>	L
<b>WMS Project ID:</b>	L13.1
<b>WMS Project Name:</b>	GBRA Lower Basin Storage Project
<b>WMS Description:</b>	Off-Channel Reservoir & Appurtenant Facilities for Impoundment of Water Available Under Existing Rights
<b>WMS Type:</b>	N: NEW SURFACE WATER OR GROUNDWATER SOURCE
<b>WMS Infrastructure:</b>	Off-Channel Reservoir & Appurtenant Facilities
<b>Additional RWPGs:</b>	None
<b>Include in State Water Plan:</b>	Y

**Source(s)**

Source Region	Source Name	County Name	Basin Name	Source ID	Source Type
L	Guadalupe River	Calhoun	Guadalupe	99918029	SURFACE WATER
<b>Is Source Supply selected for Rollup?</b>				Y	
<b>Is Source Cost selected for Rollup?</b>				Y	

<b>County Name:</b>	Calhoun	<b>Water Quality Improvements</b>	N
<b>County ID:</b>	029	<b>Online Date</b>	2020
<b>Basin Name:</b>	Guadalupe	<b>WMS Funding Date</b>	2020
<b>Basin ID:</b>	18		
<b>Include in State Water Plan?</b>			Y
<b>Include WMS Source Total Yield numbers in WMS Project Totla Yield Rollup?</b>			Y
<b>Include WMS Source Cost numbers in WMS Project Cost Rollup?</b>			Y

1.	<b>Sponsor Region:</b>	<b>WWP Name:</b>					
	L	Guadalupe-Blanco River Authority					
		<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>
	<b>Total Strategy Water Supply Volume for this WWP:</b>	0	57,674	57,674	57,674	57,674	57,674

<b>Recommendation Type?</b>	<b>Is Used to Meet Need?</b>			<b>IBT?</b>		
Recommended	Y			N		
<b>Include WWP WMS Cost numbers in WMS Source Cost Rollup?</b>				Y		
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>
<b>WWP WMS Annual Cost:</b>	\$0	\$6,519,000	\$6,519,000	\$4,347,000	\$4,347,000	\$827,000
<b>WWP Capital Costs:</b>	\$77,876,000					
<b>Term of Debt Service:</b>	20					

**Appendix D, Table 1  
2011 South Central Texas Regional Water Plan  
Water Management Strategies (RevB)**

	Section	Description	Short-term Unit Cost* (\$/acft/yr)	Long-term Unit Cost* (\$/acft/yr)	Quantity of Water (acft/yr)	First Decade Needed	Notes
Recommended Water Management Strategies	4C.1	Municipal Water Conservation	\$ 648	-	72,570	2010	Unit Cost and Quantity at 2060.
	4C.3	Edwards Transfers	\$ 454	-	51,875	2010	
	4C.22	Local Groundwater Supplies (Carrizo)	\$ 687	\$ 258	33,874	2010	Quantity is cumulative of all Recommended WMS. Unit cost is average unit cost.
	4C.36	TWA Regional Carrizo	\$ 1,523	\$ 512	27,000	2010	
	4C.5	Recycled Water Programs	Varies	Varies	26,756	2010	
	4C.34	Lavaca River Off-Channel Reservoir	\$ 701	\$ 100	26,242	2010	LNRA WMS
	4C.1	Irrigation Water Conservation	\$ 143	-	20,709	2010	Maximum potential for Atascosa, Medina, & Zavala Counties.
	4C.2	Drought Management	Varies	Varies	41,240	2010	
	4C.27	CRWA Wells Ranch Project	\$ 725	\$ 672	11,000	2010	
	4C.30	Medina Lake Firm-Up (ASR)	\$ 1,696	\$ 450	9,933	2010	15 Wells size
	4C.22	Local Groundwater Supplies (Trinity)	\$ 710	\$ 116	4,436	2010	Quantity is cumulative of all Recommended WMS. Unit cost is average unit cost.
	4C.8	Wimberley and Woodcreek Water Supply Project	\$ 2,429	\$ 1,772	4,480	2010	
	4C.9	Storage Above Canyon Reservoir (ASR)	\$ 1,772	\$ 587	3,140	2010	Meets needs Kendall County Rural
	4C.1	Mining Water Conservation	Varies	Varies	2,492	2010	
	4C.6	Facilities Expansions	-	-	-	2010	
	4C.32	Surface Water Rights	-	-	-	2010	Acquisition of existing rights only. As new supplies and associated costs have not been quantified, this strategy is more explicitly identified as an activity consistent with the 2011 Regional Water Plan.
	4C.21	GBRA Simsboro Project	\$ 982	\$ 386	49,777	2020	
	4C.10	GBRA-Exelon Project	\$ 641	\$ 224	49,126	2020	River Diversion
	4C.20	Hays/Caldwell PUJ Project	\$ 1,245	\$ 439	35,000	2020	CRWA, San Marcos, Kyle, & Buda
	4C.23	Brackish Wilcox Groundwater for SAWS	\$ 1,245	\$ 465	26,400	2020	
	4C.15	GBRA Mid-Basin (Surface Water)	\$ 2,204	\$ 405	25,000	2020	
	4C.4	Edwards Aquifer Recharge – Type 2 Projects	\$ 2,005	\$ 340	21,577	2020	Includes full spectrum of potential projects.
	4C.24	Brackish Wilcox Groundwater for Regional Water Alliance	\$ 1,293	\$ 536	14,700	2020	13.1 MGD Capacity
	4C.18	Regional Carrizo for SAWS	\$ 1,343	\$ 324	11,687	2020	
	4C.19	Regional Carrizo for SSLGC Project Expansion	\$ 608	\$ 293	10,364	2020	
	4C.29	LCRA-SAWS Water Project	\$ 2,394	\$ 555	90,000	2030	
	4C.13	GBRA Lower Basin Storage (500 acre site)	\$ 113	\$ 14	57,674	2020	
	4C.14	GBRA New Appropriation (Lower Basin)	\$ 1,953	\$ 239	11,300	2030	100,000 acft Off-Channel Storage Size
	4C.28	CRWA Siesta Project	\$ 1,421	\$ 497	5,042	2030	
	4C.25	Brackish Wilcox Groundwater for SSWSC	\$ 1,883	\$ 766	1,120	2040	
	4C.22	Local Groundwater Supplies (Gulf Coast)	\$ 1,823	\$ 637	161	2040	City of Kenedy
	4C.31	Seawater Desalination	\$ 2,284	\$ 941	84,012	2060	San Antonio Bay source.
	4C.37	GBRA Integrated Water Power Project	\$ 2,290	\$ 1,172	100,000	2020	Gulf of Mexico source
		Varies	Varies	*	2010	* Quantity already accounted for in other WMSs	
		Varies	Varies	*	2010	* Quantity already accounted for in other WMSs	
		Varies	Varies	*	2010	* Quantity already accounted for in other WMSs	
		Varies	Varies	*	2010	* Quantity already accounted for in other WMSs	
		Varies	Varies	*	2010	* Quantity already accounted for in other WMSs	
		Varies	Varies	*	2010	* Quantity already accounted for in other WMSs	
		Varies	Varies	*	2010	* Quantity already accounted for in other WMSs	
		Varies	Varies	*	2010	* Quantity already accounted for in other WMSs	
Alternative Water Management Strategies	4C.12	LGWSP for Upstream GBRA Needs	\$ 1,921	\$ 476	60,000		
	4C.13	GBRA Lower Basin Storage (100 acre site)	\$ 104	\$ 15	28,369	2020	
	4C.11	LGWSP for Upstream GBRA Needs at Reduced Capacity	\$ 2,565	\$ 726	35,000		
	4C.16	GBRA Mid-Basin Project (Conjunctive Use)	\$ 1,779	\$ 425	25,000		
	4C.17	Regional Carrizo for Guadalupe Basin (GBRA)	\$ 1,280	\$ 454	25,000		
	4C.30	Medina Lake Firm-Up (OCR)	\$ 1,197	\$ 199	9,078		Site 3
	4C.22	Local Groundwater Supplies (Barton Springs Edwards)	\$ 203	\$ 47	1,358		Goforth WSC
	4C.26	Calhoun County Brackish Groundwater Project	\$ 2,679	\$ 1,064	1,344		
	4C.22	Local Groundwater Supplies (Carrizo) (Yancy WSC)	\$ 517	\$ 99	1,210		Yancy WSC
			Varies	Varies			
Water Management Strategies Requiring Further Study & Funding	4C.33	Balancing Storage (ASR and/or Surface)					
	4C.7	Brush Management (Above Canyon Reservoir)	\$ 897	\$ 244	5,500		25% Participation
	4C.9	Storage Above Canyon Reservoir (Off-Channel)					
	4C.35	Palmetto Bend - Stage II	\$ 887	\$ 84	22,964		LNRA WMS
		CRWA Dunlap Project					
		Edwards Recharge and Recirculation Systems					
		Mesa Water Supply Project (SAWS)					
		Rainwater Harvesting					
		Regional Carrizo for BMWD					
		Regional Carrizo for SSLGC Project Expansion - Wilson County Option					
		SAWS Other Water Supplies (Planned RFP)					
		Seawater Desalination for Guadalupe River Basin					
	Weather Modification						

\*Cost in September 2008 dollars

Recommended Water Management Strategy Total for Municipal, Industrial, Steam-Electric, and Mining Uses Only =

-737,000 acft/yr -866,000 acft/yr

## Appendix D, Table 2

### 2011 South Central Texas Regional Water Plan

### Recommended Water Management Strategies (RevB)

Region	Section	Description	Total Capital Costs	First Decade Estimated Annual Average Unit Cost (\$/acft/yr)	Water Supply Volume (acre-feet per year)						Year 2060 Estimated Annual Average Unit Cost (\$/acft/yr)
					2010	2020	2030	2040	2050	2060	
L	4C.1	Municipal Water Conservation	-	\$ 648	13,231	22,742	31,616	40,528	53,925	72,570	-
L	4C.1	Irrigation Water Conservation	\$1,035,034	\$ 143	20,087	17,561	14,429	11,421	8,543	7,238	-
L	4C.1	Mining Water Conservation	-	Varies	521	726	1,771	1,991	2,292	2,492	Varies
L	4C.2	Drought Management	-	Varies	41,240	0	0	0	0	0	Varies
L	4C.3	Edwards Transfers	\$23,551,250	\$ 454	45,896	47,479	48,931	49,870	50,855	51,875	-
L	4C.4	Edwards Aquifer Recharge – Type 2 Projects	\$527,643,000	\$ 2,005	0	13,451	13,451	13,451	13,451	21,577	\$ 340
L	4C.5	Recycled Water Programs	\$465,339,000	Varies	21,666	26,046	30,151	34,178	37,706	41,737	Varies
L	4C.6	Facilities Expansions	\$144,560,579	-	0	0	0	0	0	0	-
L	4C.8	Wimberley and Woodcreek Water Supply Project	\$33,771,000	\$ 2,429	1,120	4,480	4,480	4,480	4,480	4,480	\$ 1,772
L	4C.9	Storage Above Canyon Reservoir (ASR)	\$37,326,000	\$ 1,772	0	3,140	3,140	3,140	3,140	3,140	\$ 587
L	4C.10	GBRA-Exelon Project	\$280,598,000	\$ 646	0	49,126	49,126	49,126	49,126	49,126	\$ 224
L	4C.13	GBRA Lower Basin Storage (500 acre site)	\$77,876,000	\$ 113	0	57,674	57,674	57,674	57,674	57,674	\$ 14
L	4C.14	GBRA New Appropriation (Lower Basin)	\$246,849,000	\$ 1,910	0	0	11,300	11,300	11,300	11,300	\$ 223
L	4C.15	GBRA Mid-Basin (Surface Water)	\$546,941,000	\$ 1,879	0	25,000	25,000	25,000	25,000	25,000	\$ 370
L	4C.18	Regional Carrizo for SAWS	\$136,550,000	\$ 1,343	0	11,687	11,687	11,687	11,687	11,687	\$ 324
L	4C.19	Regional Carrizo for SSLGC Project Expansion	\$28,189,000	\$ 568	0	10,364	10,364	10,364	10,364	10,364	\$ 331
L	4C.20	Hays/Caldwell PUA Project	\$323,296,000	\$ 1,245	0	12,000	12,000	35,000	35,000	35,000	\$ 439
L	4C.21	GBRA Simsboro Project	\$330,782,000	\$ 982	0	30,000	30,000	30,000	49,777	49,777	\$ 386
L	4C.22	Local Groundwater Supplies (Carrizo)	\$166,718,000	\$ 687	6,773	11,610	15,440	17,255	23,947	33,874	\$ 258
L	4C.22	Local Groundwater Supplies (Gulf Coast)	\$2,194,000	\$ 1,823	0	0	0	161	161	161	\$ 637
L	4C.22	Local Groundwater Supplies (Trinity)	\$30,224,000	\$ 710	2,016	3,146	3,468	3,630	3,952	4,436	\$ 116
L	4C.23	Brackish Wilcox Groundwater for SAWS	\$236,220,000	\$ 1,245	0	12,000	21,000	26,400	26,400	26,400	\$ 465
L	4C.24	Brackish Wilcox Groundwater for RWA	\$127,753,000	\$ 1,293	0	0	7,600	7,600	13,200	14,700	\$ 536
L	4C.25	Brackish Wilcox Groundwater for SSWSC	\$14,357,000	\$ 1,883	0	0	0	1,120	1,120	1,120	\$ 766
L	4C.27	CRWA Wells Ranch Project	\$34,910,000	\$ 725	11,000	11,000	11,000	11,000	11,000	11,000	\$ 672
L	4C.28	CRWA Siesta Project	\$53,481,000	\$ 1,421	0	0	1,000	5,042	5,042	5,042	\$ 497
L	4C.29	LCRA-SAWS Water Project	\$1,986,684,000	\$ 2,394	0	0	90,000	90,000	90,000	90,000	\$ 829
L	4C.30	Medina Lake Firm-Up (ASR)	\$146,237,000	\$ 1,696	9,933	9,933	9,933	9,933	9,933	9,933	\$ 450
L	4C.31	Seawater Desalination	\$1,293,827,000	\$ 2,284	0	0	0	0	0	84,012	\$ 941
L	4C.34	Lavaca River Off-Channel Reservoir	\$224,183,000	\$ 701	26,242	26,242	26,242	26,242	26,242	26,242	\$ 100
L	4C.36	TWA Regional Carrizo	\$313,060,000	\$ 1,523	0	27,000	27,000	27,000	27,000	27,000	\$ 512
L	4C.37	GBRA Integrated Water Power Project	\$1,282,426,000	\$ 2,290	0	100,000	100,000	100,000	100,000	100,000	\$ 1,172

**Appendix D, Table 3 (Continued)**

County/Water User Group	Demand		Need (Shortage)		Recommended Management Strategies to Meet Needs (Shortages)	Amount from WMS	
	2010 (acft)	2060 (acft)	2010 (acft)	2060 (acft)		2010 (acft)	2060 (acft)
<b>Victoria County</b>	<b>Table 2-12</b>		<b>Table 4A-1</b>		<b>Section 4B.2.19</b>		
Victoria	11,924	14,360	0	0	Municipal Water Conservation	874	2,485
Rural	2,666	3,674	0	310	Municipal Water Conservation		32
					Purchase from WWP (GBRA)		310
Industrial	28,726	43,520	0	14,441	Purchase from WWP (GBRA)		14,441
Steam-Electric	4,052	53,178	1,791	51,076	Purchase from WWP (GBRA - Exelon)		49,126
					Purchase from WWP (GBRA)	1,791	1,950
					Steam Electric Water Conservation	500	500
Mining	3,944	6,041	0	0			
Irrigation	9,936	4,759	0	0			
Livestock	1,085	1,085	0	0			
<b>Wilson County</b>	<b>Table 2-12</b>		<b>Table 4A-1</b>		<b>Section 4B.2.20</b>		
Floresville	1,805	3,000	0	433	Municipal Water Conservation	136	714
					Local Carrizo Aquifer		484
La Vernia	278	764	0	0	Municipal Water Conservation	21	227
					Purchase from WWP (CRWA)	400	400
Oak Hills WSC	693	2,160	0	298	Municipal Water Conservation		136
					Local Carrizo Aquifer		323
Poth	348	585	0	0	Municipal Water Conservation	20	64
SS WSC	1,563	5,030	223	3,690	Municipal Water Conservation		221
					Local Carrizo Aquifer	807	4,033
					Purchase from WWP (CRWA)		690
					Brackish Wilcox Groundwater for SS WSC		1120
					Drought Management	78	
Stockdale	350	558	0	0	Municipal Water Conservation	27	171
Sunko WSC	613	1,326	0	16	Municipal Water Conservation	3	92
					Local Carrizo Aquifer		161
Rural	609	2,006	0	33	Municipal Water Conservation		116
Industrial	1	1	0	0			
Steam-Electric	0	0	0	0			
Mining	242	218	0	0			
Irrigation	11,296	6,330	0	0			
Livestock	1,808	1,808	0	0			
<b>Zavala County</b>	<b>Table 2-12</b>		<b>Table 4A-1</b>		<b>Section 4B.2.21</b>		
Crystal City	2,247	2,370	0	0	Municipal Water Conservation	192	1,002
Rural	864	1,371	0	0	Municipal Water Conservation	42	149
Industrial	1,043	1,315	0	0			
Steam-Electric	0	0	0	0			
Mining	122	130	0	0			
Irrigation	71,800	58,692	54,600	41,492	Irrigation Water Conservation	6,948	6,948
Livestock	756	756	0	0			
<b>Wholesale Water Providers</b>	<b>Tables 2-13 through 2-19</b>		<b>Table 4A-3</b>		<b>Section 4B.3</b>		
San Antonio Water System	217,954	328,442	73,600	193,264	Municipal Water Conservation <sup>2</sup>		
					Drought Management	37,622	0
					Edwards Transfers	35,935	35,935
					ASR Project and Phased Expansion	3,800	16,000
					Recycled Water Program Expansion	15,127	15,127
					Regional Carrizo for Bexar County		11,687
					Edwards Aquifer Recharge – Type 2 Projects		21,577
					Brackish Groundwater Desalination (Wilcox)		26,400
					LCRA/SAWS Water Project		90,000
					Seawater Desalination		84,012
Guadalupe-Blanco River Authority	137,065	279,484	0	67,580	Municipal Water Conservation <sup>2</sup>		
					Wimberley and Woodcreek Water Supply Project	4,480	
					Simsboro Groundwater Project		49,777
					GBRA Mid-Basin/Gonzales Project (Surface Water)		25,000
					Storage Above Canyon Reservoir (ASR)		3,140
					GBRA/Exelon Project		49,126
					GBRA Lower Basin Storage		57,674
					GBRA New Appropriation (Lower Basin)		11,500
					<b>GBRA Integrated Water Power Project</b>		<b>100,000</b>
				Western Canyon WTP Expansion		5,600	
Bexar Met	43,439	57,954	16,638	35,418	Municipal Water Conservation <sup>2</sup>		
					Edwards Transfers	3,000	3,000
					Local Trinity	2,016	2,016
					Local Carrizo	4,030	16,129
					Medina Lake Firm-Up (ASR – 15 wells)	9,933	9,933
					Purchase from WWP (CRWA)	2,800	8,250

April 30, 2014

Mr. Con Mims, Chair  
South Central Texas Regional Water Planning Group  
c/o San Antonio River Authority  
P. O. Box 839980  
San Antonio, Texas 78283-9980

RE: Agenda Item for Next Region L Meeting – GBRA Lower Basin Storage Project

Dear Chair Mims:

The Guadalupe-Blanco River Authority (GBRA) provided two options to meet municipal and industrial water needs for the Gulf coastal region in the 2011 Region L Plan. Option 1 involved the construction of a 100 acre off-channel reservoir while Option 2 involved the construction of a 500 acre off-channel reservoir with a larger associated firm yield. Ultimately, the smaller Option 1 (100 acre) project was included as a recommended water management strategy in the 2011 Region L Plan and the 2012 State Water Plan. The somewhat larger Option 2 (500 acre) project was included as an alternative water management strategy.

Pursuant to Texas Administrative Code, Title 31, Part 10, Chapter 357, Sub-chapter E, Rule §357.51(e), GBRA respectfully requests the support of the Regional Water Planning Group in substitution of Option 2 for Option 1 in the 2011 Region L Plan. Option 2 is capable of meeting the same needs as Option 1, plus additional needs which GBRA seeks to meet in the future. As both Options 1 and 2 are based on existing water rights that presently include authorization of storage up to 150,000 acre-feet (e.g., 6,000 acres at 25 foot depth), we are hopeful that this substitution will be relatively straightforward. It is our understanding that proposed substitutions must receive written approval from the Executive Administrator of the Texas Water Development Board prior to substitution by the RWPG. Hence, we respectfully request that you solicit such Executive Administrator approval in the immediate future and schedule necessary RWPG consideration and action at the next meeting in August 2014.

Should you need additional information, please contact me at your earliest convenience.

Sincerely,



W. E. West, Jr.  
General Manager

Main Office: 933 East Court Street ~ Seguin, Texas 78155  
830-379-5822 ~ 800-413-4130 ~ 830-379-9718 fax ~ [www.gbra.org](http://www.gbra.org)



**GBRA**

**Guadalupe-Blanco River Authority**  
*flowing solutions*

**EXECUTIVE COMMITTEE**

Con Mims  
*Chair / River Authorities*  
Tim Andruss  
*Vice-Chair / Water Districts*  
Gary Middleton  
*Secretary / Municipalities*  
Donna Balin  
*At-Large / Environmental*  
Kevin Janak  
*At-Large/ Electric Generating/Utilities*

August 20, 2014

Kevin Patteson  
Executive Administrator  
Texas Water Development Board  
1700 North Congress Avenue  
P.O. Box 13231  
Austin, TX 78711-3231

**MEMBERS**

Gene Camargo  
*Water Utilities*  
Rey Chavez  
*Industries*  
Alan Cockerell  
*Agriculture*  
Will Conley  
*Counties*  
Don Dietzmann  
*GMA 9*  
Art Dohmann  
*GMA 15*  
Blair Fitzsimons  
*Agriculture*  
Vic Hilderbran  
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*Counties*  
Russell Labus  
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*Industries*  
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Roland Ruiz  
*Water Districts*  
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Suzanne Scott  
*River Authorities*  
Greg Sengelmann  
*Water Districts*  
Milton Stolte  
*Agriculture*  
Thomas Taggart  
*Municipalities*  
Dianne Wassenich  
*Public*  
Bill West  
*River Authorities*

RE: Local Water Planning Amendment Request (GBRA Lower Basin Storage Project Proposed Substitution)

Dear Mr. Patteson:

At its August 7, 2014 South Central Texas Regional Water Planning Group (Region L) meeting, the Planning Group considered specific changes to the 2011 Regional Water Plan.

Pursuant to Texas Administrative Code, Title 31, Part 10, Chapter 357, Sub-chapter E, Rule §357.51(e) the Guadalupe-Blanco River Authority (GBRA) requested the support of the Region L Planning Group for its proposal to substitute an alternative water management strategy for a recommended water management strategy in the 2011 Regional Water Plan to meet the municipal and industrial water needs of the Gulf coastal region.

The 2011 Regional Water Plan includes two similar water management strategies. One involves construction of a 100 acre off-channel reservoir, identified as the recommended water management strategy. The second involves construction of a 500 acre off-channel reservoir, identified as the alternative water management strategy

At its August 7, 2014 meeting, the Planning Group authorized the San Antonio River Authority (SARA), as Administrator for Region L, to submit this request to you for pre-adoption review to determine if the proposed amendment is a "Substitution," as defined by the aforementioned Texas Administrative Code.

Subject to your determination, GBRA is expected to ask Region L to submit the proposed substitution to the Texas Water Development Board at Region L's November 6, 2014 meeting.

On behalf of the Region L Planning Group, I hereby request written determination of the proposed amendment as a "substitution," defined by the Texas Administrative Code.

In addition, confirmation should be obtained from the TWDB that, once you determine the type of amendment, the planning group can formally and finally adopt the amendment to the 2011 Regional Water Plan at the November 6, 2014 planning group meeting.



c/o San Antonio River Authority  
P.O. Box 839980  
San Antonio, Texas 78283-9980

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If you disagree with our assessment of this proposed substitution, please let me know what classification of amendment this should be.

Should you have any questions, please contact Cole Ruiz at (210) 302-3293 or Brian Perkins at (512) 912-5173.

Sincerely,

Con Mims  
Chair, Region L

Enclosure (1)

cc: David Meesey, Manager, Regional Water Planning (TWDB)  
Steve Raabe, PE, Director, Technical Services (SARA)  
Brian Perkins, PE, Water Resources Engineer, HDR Engineering, Inc.

## GBRA Lower Basin Storage Requested Amendment of the 2011 Region L Water Plan

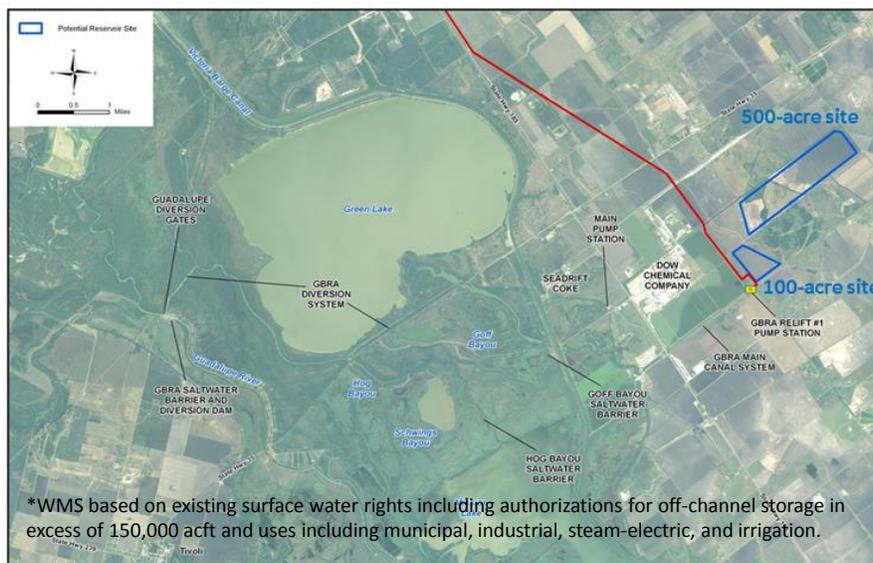
- **2011 Region L Water Plan:**
  - Recommended WMS = “100-acre site” w/ capacity of 2,500 acft and yield of 28,369 acft/yr @ \$104/acft/yr for raw water in the reservoir and/or GBRA Main Canal to meet municipal, industrial, steam-electric, and/or other needs
  - Alternative WMS = “500-acre site” w/ capacity of 12,500 acft and yield of 59,569 acft/yr @ \$109/acft/yr for raw water in the reservoir and/or GBRA Main Canal to meet municipal, industrial, steam-electric, and/or other needs
- **Requested Amendment:**
  - Substitution of “500-acre site” as the Recommended WMS as it capable of meeting the same water needs

DRAFT (8-7-14)

\* Raw Water at Reservoir

1

## GBRA Lower Basin Storage\*



DRAFT (8-7-14)

2

## **GBRA Lower Basin Storage Requested Amendment of the 2011 Region L Water Plan**

- **August 7, 2014 GBRA Request of the SCTRWPG:**
  - Discussion and appropriate action regarding solicitation of written approval of the requested substitution by the TWDB Executive Administrator
- **November 6, 2014 GBRA Request of the SCTRWPG:**
  - Discussion and appropriate action regarding amendment of the 2011 Region L Water Plan by substitution of the “500-acre site” as the Recommended GBRA Lower Basin Storage WMS during a noticed public meeting (assuming TWDB written approval of the requested substitution is timely received)

**DRAFT (8-7-14)**

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