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## Introduction

### Planning Process

The South Central Texas Regional Water Planning Group (SCTRWPG) has employed a planning process (Figure 1) focused on the development of a Regional Water Plan to meet the needs of every water user group in the region for a period of fifty years. Given the history of sharp and divisive conflict concerning water planning in this region, the planning process has provided extraordinary opportunities for participation by water user groups in providing input to achieve the goal of a plan that will “provide for the orderly development, management, and conservation of water resources...” 31 TAC 357.5(a). To build consensus among the constituencies represented by the members of the SCTRWP, the planning process has emphasized the coordination and careful integration of technical information with information provided through public participation.

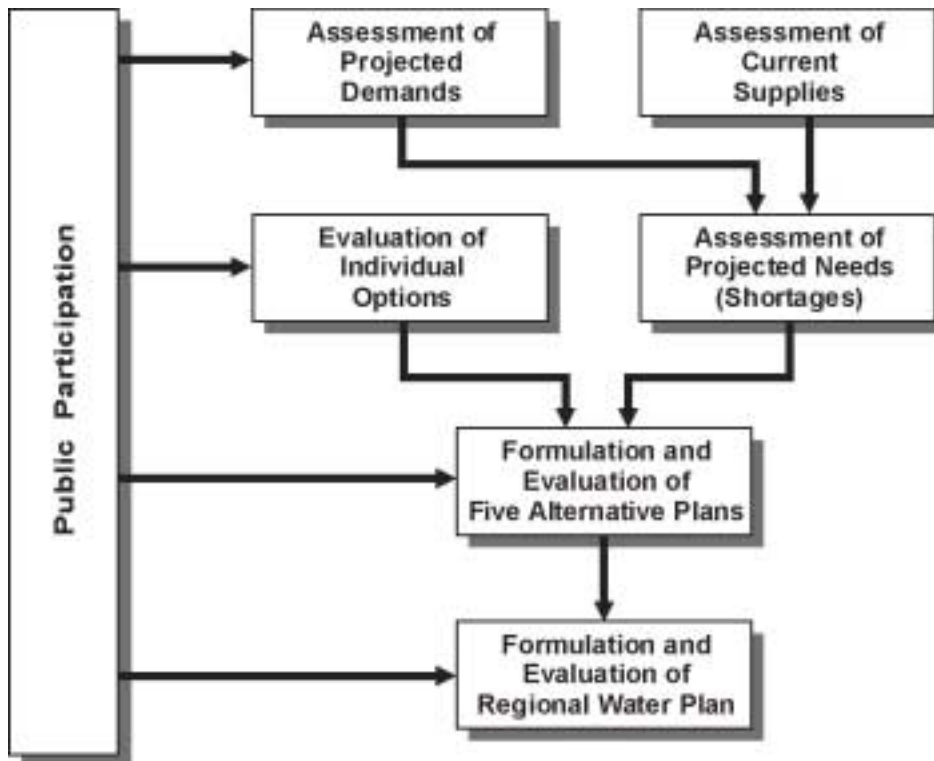


Figure 1. Planning Process

Conflict over the past several decades in this region has focused on how to manage the Edwards Aquifer so as to meet the needs of many water user groups. Central to progress in resolving this conflict, and thus in achieving the formulation of a water plan acceptable to all constituencies represented in the SCTRWPG, is the assurance that all of the different competing strategies for meeting water needs will be given consideration. It has thus been central to the viability of the planning process itself that the evaluation of water supply options and combinations of these options in the context of a regional plan receive extraordinary attention.

To this end, the SCTRWPG has employed a planning process that ensures evaluation of virtually all the water supply options or management strategies that have been proposed or discussed in the past, together with several new ones that have never before been subjected to technical evaluation. To achieve confidence by all constituencies in the planning process, it has been necessary to evaluate the options both on a stand-alone basis (Volume III – Technical Evaluations of Water Supply Options) and in various combinations in the context of alternative plans (Volume II – Technical Evaluations of Alternative Regional Water Plans). Given the fact that some of the proposed strategies for regional management are at odds with one another, it has been important to look at a series of alternative regional water plans. By formulating five alternative regional water plans, the SCTRWPG has carefully considered many diverse management strategies. In keeping with logical and acceptable planning methods, the SCTRWPG has taken the best components of these alternative plans and developed a Regional Water Plan (Volume I – Executive Summary and Regional Water Plan).

This volume of the Initially Prepared Regional Water Plan for the South Central Texas Regional Planning Area includes the technical evaluations of water supply options and strategies selected by the SCTRWPG for consideration. The methods whereby options and strategies were selected for consideration are summarized below. The technical evaluations of each water supply option are presented in the following sections of this volume.

### ***Selection of Options and Strategies***

In its scope of work, the SCTRWPG defined a Regional Water Management Alternative Plan as a combination of Options and Strategies that will meet the water needs of the entire South Central Texas Region. However, in order to formulate meaningful Regional Water Management Alternative Plans for consideration, it is necessary to evaluate, in comparable

terms, the known and available Options and Strategies with respect to feasibility and potentials to contribute to a Regional Water Management Alternative Plan. The SCTRWPG's scope of work provided that up to 60 potentially feasible regional Options and Strategies would be identified for evaluation, using criteria to be established by the SCTRWPG. The scope of work specified that the 60 regional water management Options and Strategies would be evaluated according to the criteria of TWDB Rules, Section 357.7 (a)(7). For purposes of this task, the scope of work provided that the evaluations of 122 options identified in the West Central Trans-Texas "Summary Report of Water Supply Alternatives," San Antonio River Authority, et al., March 1998, would be used to the extent possible, and that up to 40 of the options listed in this reference would be selected for evaluation. In addition, the scope of work provided that up to 20 new Options and Strategies identified through public input would also be included in the list from which Options and Strategies would be selected for evaluation.

At its facilitated workshop of January 29-30, 1999, the SCTRWPG developed a screening process that enabled them to make an initial selection of nine Options and Strategies for evaluation by the Technical Consultant, HDR Engineering, Inc.<sup>1</sup> For this initial selection, the RWPG applied screens to exclude options for which:

- Source is outside the region;
- Per acre-foot cost greater than \$800; and
- Yield less than 20,000 acre-feet.

For selection of additional options, the RWPG identified the following additional factors for consideration:

- Options with an established record of strong public controversy should be excluded;
- Options suggested in Senate Bill 1, but never studied under Trans-Texas, could be considered for inclusion as "new" options;
- Options included in existing local water plans should be included;
- Options mentioned in regional media as under consideration by local water agencies should be reviewed for inclusion; and
- Options and strategies on the Trans-Texas list that are "variations on a theme" could be consolidated.

The RWPG directed the SCT Staff Workgroup to perform preliminary screening of the Options and Strategies and report the results to the RWPG.

<sup>1</sup> "South Central Texas Regional Water Planning Group, Phase 1 – Project Planning and Initial Workshop," Folk-Williams, John, Open Forum Facilitation Team, November 20, 1998 through February 5, 1999, San Antonio, Texas.

On February 3, 1999, the Staff Workgroup reviewed the complete West Central Trans-Texas list of 122 items and reduced the list to 46 (55 including the nine chosen at the January 30, 1999 workshop) from which the RWPG could pick up to 31 additional options (bringing the total from the West Central Trans-Texas group up to 40) for further evaluation. The screening process used to reduce the list successively eliminated options that fell into one or more of the following categories:

- Already committed or otherwise viewed as no longer available;
- Already built;
- In a group with many variations; other options of the group remain for further consideration;
- Insufficient information to be “existing option,” but may become “new option;”
- Listed and developed for information purposes only;
- Cost greater than \$2,000 per acre-foot; and/or
- Two groups of similar options from one of which three are to be chosen and from the other two are to be chosen.

On February 9, 1999, the results of the Staff Workgroup’s screening efforts were presented to the SCTRWPG, together with its recommendation that the SCTRWPG hold a workshop to select options for further consideration at the March 9, 1999 meeting. The SCTRWPG accepted by consensus the results of applying the technical screens and scheduled a workshop, as recommended.

At the March 9, 1999 workshop, the SCTRWPG reviewed the results of a survey of the public, technical factors for selection of options, and the list of options—as grouped by the Staff Workgroup at its February 9, 1999 meeting—including suggested new options. The results of this facilitated review was a list of 58 options and strategies, for which the SCTRWPG directed the Staff Workgroup to work with the Technical Consultant to develop a scope, budget, and schedule for evaluation of each option. The SCTRWPG further specified that the sum of the budgets for evaluation of the 58 options should not exceed 80 percent of the total funds budgeted for this purpose.

The Staff Workgroup met on March 23, April 1, and April 6, 1999 and reviewed drafts of the scopes of work for evaluation of each option provided by the Technical Consultant. Upon completion of this series of reviews and modifications of the scopes, a document entitled, “South Central Texas Regional Water Plan Water Supply Options” was prepared for presentation to the SCTRWPG at its April 13, 1999 meeting. The document presented the scope of work for an

evaluation of each option, with the view that upon approval of the specific scope of work, then the Technical Consultant could provide a cost estimate to perform the work. Following the approval of the draft scopes, the SCTRWPG scheduled a workshop for April 27, 1999 to consider the proposed scopes, budgets, and schedules to perform the evaluations of each of the 58 options.

At the beginning of the April 27, 1999 workshop, the facilitator reported that the Staff Workgroup had met to review the scopes of work, budgets, and assumptions of the water supply options selected by the SCTRWPG. The facilitator also stated that the SCTRWPG had given HDR Engineering, Inc. and the Staff Workgroup the goal to reserve 20 percent of the available budget so new or additional options could be studied, and further stated that the Staff Workgroup has recommended a balanced study program, but that it was not able to reserve 20 percent of the budget.

The facilitator suggested four options for the SCTRWPG to consider in order to initiate the analyses of the water supply options. They were:

1. Accept the Staff Workgroup recommendation;
2. Depend on other agencies to conduct some of the analyses;
3. Ask, if needed, the local water agencies to provide funding for any additional studies; and
4. Select options to cut or delay.

The facilitator suggested that the SCTRWPG keep these options in mind as HDR Engineering, Inc. explained each water supply option and for the SCTRWPG to discuss and decide how to proceed after HDR's explanation.

Representatives of HDR Engineering, Inc. explained the scope of work, budget, and general assumptions associated with each water supply option.

The SCTRWPG discussed the four options of how to provide adequate funds to evaluate new or additional water supply options in addition to the 58 water supply options recommended by the Staff Workgroup. By consensus, the SCTRWPG adopted a motion to approve the scopes of work, budgets, and assumptions of the 58 water supply options recommended by the Staff Workgroup; to raise, from the local water agencies, any funds needed to study water supply options that are in addition to the 58 approved water supply options; and to continue discussions to coordinate concurrent studies with the Edwards Aquifer Authority that may result in reduced costs.

During its meeting of March 2, 2000 in Carrizo Springs, the SCTRWPG engaged in extended discussions of potential additional water supply options for technical evaluation. As a result, scopes of work for two additional water supply options were prepared and presented to the SCTRWPG during its meeting of April 6, 2000 in Gonzales. Technical evaluations of the Cotulla Reservoir (SCTN-18) and Nueces Reservoir/Smyth Crossing Site (SCTN-19) were authorized by the SCTRWPG at this meeting. Technical evaluation of an additional group of water supply options, Lower Colorado River Diversions (SCTN-20) was authorized by the SCTRWPG during a June 1, 2000 meeting in Port Lavaca. Although the inclusion of SCTN-20 brought the official total of water supply options for consideration to 61, variations of options for which technical evaluations have been completed actually total 79.

The list of 61 options and strategies approved by the SCTRWPG for evaluation is as follows:

#### Local/Conservation/Reuse/Exchange Water Supply Options

- 01 Demand Reduction (Water Conservation) (L-10)
- 02 Exchange Reclaimed Water for Edwards Irrigation Water (L-11)
- 03 Purchase or Lease of Edwards Irrigation Water for Municipal and Industrial Use (L-15)
- 04 Transfer of SAWS Reclaimed Water to Coletto Creek Reservoir (Exchange for CP&L Rights and GBRA Canyon Contract) (L-20)
- 05 Transfer of Unappropriated and/or Reclaimed Water to Corpus Christi via Choke Canyon Reservoir (for Water Exchange or Mitigation) (L-14)
- 06 Brush Management (SCTN-4)
- 07 Weather Modification (SCTN-5)
- 08 Rainwater Harvesting (SCTN-9)
- 09 Gulf Coast Aquifer — Exchange for Irrigation Surface Water Rights (SCTN-12)
- 10 Desalination (SCTN-17)
- 11 Off-Channel Local Storage (SCTN-10)

#### Edwards Aquifer Recharge Water Supply Options

- 12 Edwards Aquifer Recharge from Natural Drainage — Type 1 Projects (L-17)
- 13 Edwards Aquifer Recharge from Natural Drainage — Type 2 Projects (L-18)
- 14 Medina Lake — Existing Rights and Contracts with Irrigation Use Reduction for Recharge Enhancement (S-13B)
- 15 Guadalupe River Diversion near Comfort to Recharge Zone via Medina Lake (G-30)
- 16 Diversion of Canyon Reservoir Flood Storage to Recharge Zone via Cibolo Creek (G-32)
- 17 Edwards Aquifer Recharge Enhancement with Guadalupe River Diversions (SCTN-6)

### River Diversion with Storage Water Supply Options

- 18 Guadalupe River Diversions at Gonzales to Mid-Cities and/or Major Water Providers with Regional Water Treatment Plant with Uniform Delivery to Mid-Cities, CRWA, and SAWS (G-38C)
- 19 Lower Guadalupe River Diversion — Firm Yield (Sources of Supply are Existing Water Rights at the Guadalupe River Saltwater Barrier and Stored Water from Canyon Reservoir) (SCTN-16a)
- 20 Lower Guadalupe River Diversion — Firm Yield (Sources of Supply are Unappropriated Streamflow, Existing Water Rights at the Guadalupe River Saltwater Barrier, and Stored Water from Canyon Reservoir) (SCTN-16b)
- 21 Lower Guadalupe River Diversion — Firm Yield (Sources of Supply are Unappropriated Streamflow, Existing Water Rights at the Guadalupe River Saltwater Barrier and Stored Water from Canyon Reservoir, and Groundwater from the Gulf Coast Aquifer) (SCTN-16c)
- 22 Colorado River in Colorado County — Buy Stored Water and Irrigation Rights; Firm Yield (C-17A)
- 23 Colorado River in Wharton County — Buy Irrigation Rights and Groundwater; Firm Yield (C-17B)
- 24 Purchase/Lease Surface Water Irrigation Rights for Municipal/Industrial Use (SCTN-11)
- 25 Lower Colorado River Diversions (SCTN-20)

### Existing Reservoir Water Supply Options

- 26 Canyon Reservoir Released to Lake Nolte — Firm Yield (G-15C)
- 27 Wimberley and Woodcreek Water Supply from Canyon Reservoir, with G-23A and 2030 Demands (G-24)
- 28 Joint Development of Water Supply with Corpus Christi — Firm Yield (Sources of Supply are Guadalupe River at Saltwater Barrier and Groundwater from Gulf Coast Aquifer) (SCTN-14a)
- 29 Joint Development of Water Supply with Corpus Christi — Firm Yield (Sources of Supply are Guadalupe River at Saltwater Barrier and Groundwater from Gulf Coast Aquifer plus Diversions from the San Antonio River at Falls City) (SCTN-14b)
- 30 Colorado River at Bastrop — Purchase of Stored Water; Firm Yield (C-13C)

### Potential New Reservoir Water Supply Options

- 31 Cibolo Reservoir; Firm Yield (S-15C)
- 32 Cibolo Reservoir with Imported Water from the San Antonio River; Firm Yield (S-15Da)
- 33 Cibolo Reservoir with Imported Water from the San Antonio and Guadalupe Rivers; Firm Yield (S-15Db)

- 34 Cibolo Reservoir with Imported Water from the San Antonio, Guadalupe, and Colorado Rivers; Firm Yield (S-15Dc)
- 35 Cibolo Reservoir with Imported Water from the Guadalupe River at the Saltwater Barrier; Firm Yield (S-15Ea)
- 36 Cibolo Reservoir with Imported Water from the Guadalupe River at the Saltwater Barrier and the Colorado River below Garwood (S-15Eb)
- 37 Goliad Reservoir — Firm Yield (S-16C)
- 38 Applewhite Reservoir — Firm Yield (S-14D)
- 39 Guadalupe River Dam No. 7 — Raw Water at Reservoir; Firm Yield (G-19)
- 40 Gonzales Reservoir — Raw Water at Reservoir; Firm Yield (G-20)
- 41 Lockhart Reservoir — Raw Water at Reservoir; Firm Yield (G-21)
- 42 Dilworth Reservoir — Raw Water at Reservoir; Firm Yield (G-22)
- 43 Cloptin Crossing Reservoir — Raw Water at Reservoir; Firm Yield (G-40)
- 44 Sandies Creek Reservoir — Firm Yield (G-17C1)
- 45 Cuero Reservoir — Firm Yield (G-16C1)
- 46 Palmetto Bend Stage II Reservoir (SCTN-13)
- 47 Shaws Bend Reservoir — Firm Yield (C-18)
- 48 Cummins Creek Reservoir (SCTN-15)
- 49 Allens Creek Reservoir — Firm Yield (B-10C)
- 50 Cotulla Reservoir (SCTN-18)
- 51 Nueces Reservoir / Smyth Crossing Site (SCTN-19)

#### Carrizo and Other Aquifer Water Supply Options

- 52 Carrizo Aquifer — Firm Yield (Source of water includes Carrizo Aquifer in Wilson, Atascosa, and/or Gonzales Counties South of the San Marcos River) (CZ-10C)
- 53 Carrizo Aquifer — Firm Yield (Source of water includes Carrizo Aquifer in Wilson, Atascosa, Gonzales, Caldwell, and/or Bastrop Counties south of the Colorado River) (CZ-10D)
- 54 Simsboro Aquifer — North of Colorado River in Milam, Lee, and Bastrop Counties (SCTN-3)
- 55 Wintergarden Carrizo Recharge Enhancement (Dimmit, Zavala, Frio, La Salle, and Atascosa Counties) (SCTN-7)
- 56 Local Groundwater Supply — Carrizo Aquifer (SCTN-2a)
- 57 Local Groundwater Supply — Gulf Coast Aquifer (SCTN-2b)
- 58 Local Groundwater Supply — Trinity Aquifer (SCTN-2c)
- 59 Aquifer Storage and Recovery (ASR) — Regional Option (SCTN-1a)
- 60 Aquifer Storage and Recovery (ASR) — Local Option (SCTN-1b)
- 61 Aquifer Optimization (SCTN-8)

### **General Assumptions for Applications of Hydrologic Models**

Following are general assumptions for applications of hydrologic models in the evaluations of water supply options for the South Central Texas Regional Water Planning Group. Pertinent exceptions to—or clarifications of—these general assumptions are enumerated in the technical evaluation of each option identified for study and included herein.

- Full exercise of surface water rights;
- Edwards Aquifer pumpage of 400,000 acft/yr with Critical Period Management rules;
- Subordination of all senior Guadalupe River hydropower permits to Canyon Reservoir;
- Annual effluent discharge/return flows reported for 1988 with SAWS direct reclaimed water use of 35,000 acft/yr;
- Operation of power plant reservoirs (Coletto Creek, Braunig, and Calaveras) subject to authorized consumptive uses at the reservoir, with makeup diversions as needed to maintain full conservation storage subject to instream flow constraints and/or applicable contractual provisions;
- Delivery of GBRA's full contractual obligations from Canyon Reservoir to point of diversion in all years. Uncommitted balance of Canyon Reservoir currently authorized annual diversions, and additional diversions proposed under an amendment presently before TNRCC, to be diverted near Lake Dunlap;
- Desired San Antonio River flows at Falls City gage of 55,000 acft/yr. Minimum desired instream flows under current SAWS/SARA/CPS agreement included;
- Application of Environmental Water Needs Criteria of the Consensus Planning Process (Appendix B) in consideration of water potentially available for diversion and/or impoundment as a part of a new water supply project;
- Operation of Choke Canyon Reservoir/Lake Corpus Christi (CCR/LCC) System subject to Phase 4 (maximum yield) policy and TNRCC Agreed Order regarding freshwater inflows to the Nueces Estuary;
- Historical Edwards Aquifer recharge estimates developed by HDR;
- Applicable rules of groundwater management districts will be included to the extent possible; and
- Period of record for simulations: Guadalupe-San Antonio River Basin (1934-89, Critical Drought = 1950s), Nueces River Basin (1934-96, Critical Drought = 1990s), Colorado River Basin (1941-65, Critical Drought = 1950s).

Hydrologic Models to be applied include, but are not limited to:

- Guadalupe-San Antonio River Basin Model (HDR)
- Nueces River Basin Model (HDR)
- Lower Nueces River Basin & Estuary Model (HDR)
- Guadalupe-San Antonio River Basin Water Availability Model (WRAP) (TNRCC/HDR)
- Nueces River Basin Water Availability Model (WRAP) (TNRCC/HDR)
- Colorado River Daily Allocation Program (RESPONSE) (LCRA)
- Edwards Aquifer (Balcones Fault Zone) Model GWSIM4 (TWDB)
- Carrizo-Wilcox Aquifer Model (TWDB/LBG-G/HDR)
- SIMYLD, RESOP, & SIMDLY (TWDB/TDWR)