

Region C Water Planning Group

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11 Implementation and Comparison to Previous Regional Water Plan

11.1 Introduction

One of the new requirements for the 2016 Regional Water Plans is the inclusion of a chapter providing a comparison of the current regional water plan to the previous plan and a discussion of the differences between the two. This chapter includes a description of the water management strategies (WMSs) that were included in the previous plan (*2011 Region C Water Plan*⁽¹⁾) and have been implemented since the previous plan was published, as well as strategies that are no longer considered. It also includes a discussion on the differences between the two plans, specifically regarding:

- Water demand projections,
- Drought of record and hydrologic modeling and assumptions used in planning for the region,
- Groundwater and surface water availability, existing water supplies, and identified water needs for Water User Groups (WUGs) and Wholesale Water Providers (WWPs),
- Recommended and alternative water management strategies, and
- Cost of the proposed plan.

Each of these topics is discussed in the sections below.

11.2 Implemented and No Longer Included Water Management Strategies

The following sections discuss the WMSs that were recommended in the *2011 Region C Water Plan* (2011 Plan) and have been partially or completely implemented since that plan was published, as well as WMSs that are no longer being considered and are not included in the 2016 Plan. Changes to WMSs since the 2011 Plan are discussed in Section 11.3.6.

11.2.1 Implementation of Previously Recommended Water Management Strategies

Table 11.1 lists the 30 WMSs that have been fully or partially implemented since the 2011 Plan. Because conservation was a recommended strategy for a large number of WUGs and WWPs in the 2011 Plan, it is discussed separately below and is not listed by WUG/WWP in Table 11.1. Additional information on conservation as a WMS is included in Section 11.3.6.

Since the 2011 Plan, Region C WUGs have made significant progress in the implementation of recommended water conservation strategies. A summary of the conservation water management strategies recommended in the 2011 Plan is included in Section 5E.1 of this report. A description of existing conservation in Region C and the level of implementation since the 2011 Plan can be found in Section 5E.6. Based on survey responses, the most widely implemented municipal water conservation strategies are water system audits, leak detection and repair; time-of-day watering restrictions; and education programs (Table 5E.6).

Region C did not consider drought management as a feasible strategy to meet long-term growth in demands or currently identified needs in either the 2011 or 2016 Plan so the implementation of this strategy is not relevant to the discussion in this Chapter. The drought management WMS is discussed in more detail in Section 7.6 of this report.

11.2.2 Water Management Strategies No Longer Considered

Table 11.2 lists water management strategies that were considered as recommended or alternative WMSs in the 2011 Plan, but are not included in the 2016 Plan as a WMSs. There are a number of alternative WMSs that large WWP considered in the 2011 Plan, but are no longer considering. Overdrafting of aquifers and supplemental wells are other WMSs that were considered for several entities in the 2011 Plan, but are no longer WMSs for any entities in the 2016 Plan. The entities that had supplemental wells as a WMS in the 2011 Plan are not listed in Table 11.2 because of the large number of entities with this WMS. The supplemental well WMS is discussed in more detail below.

In prior Region C Plans, supplemental wells (or replacement wells) were included as recommended water management strategies for all WUGs and WWPs that had a groundwater supply. There were 184 WUGs and WWPs with supplemental wells as a WMS in the 2011 Plan. Capital costs associated with these strategies reflected replacement of existing wells during the 50 year planning period. However, in this fourth cycle of regional planning, the regional planning rules explicitly prohibit the inclusion of replacement of existing infrastructure that does not provide additional volume of supply. These rules are specifically laid out in Section 5.1.2.3 of the Regional Planning Guidelines ⁽²⁾ as shown below.

Table 11.1
Water Management Strategies Implemented Since the 2011 Region C Water Plan^(a)

Sponsor	Project Name	Source of Supply
Ables Springs WSC	Connect to NTMWD and Purchase Water	NTMWD
Aledo	Connect to Fort Worth (TRWD)	TRWD
Alvord	Water from West Wise SUD (TRWD)	TRWD
Arlington	Fort Worth Direct (Reuse)	Fort Worth
Aurora	Rhome (from Walnut Creek SUD and TRWD)	TRWD & Walnut Creek SUD
Bardwell	Rockett SUD	Rockett SUD (TRWD and Midlothian)
Cooke County Irrigation	Moss Lake (Gainesville)	Gainesville
Corsicana	Pump Station from Richland-Chambers and New WTP (Lake Halbert) ^(b)	Richland-Chambers Reservoir
Dallas	Direct Reuse supplies ^(c)	Reuse
Denton County Irrigation	New wells in Trinity Aquifer	Trinity Aquifer
Denton County Irrigation	New wells in Woodbine Aquifer	Woodbine Aquifer
Denton County Mining	New wells in Trinity Aquifer	Trinity Aquifer
Ellis County Irrigation	New wells in Woodbine Aquifer	Woodbine Aquifer
Eules	Fort Worth Direct Reuse	Fort Worth
Fort Worth	Village Creek Direct Reuse	Fort Worth
Fort Worth	New 12 MGD West Water Treatment Plant	TRWD
Gainesville	Moss Lake raw water and WTP ^(c)	Part of the Cooke County WSP (now referred to as Gainesville).
GTUA	Lake Texoma Pump Station expansion	Lake Texoma
Kaufman County Steam Electric Power	Additional NTMWD treated water through Forney	NTMWD
Kennedale	New wells in Trinity Aquifer	Trinity Aquifer
Lake Worth	New wells in Trinity Aquifer	Trinity Aquifer
Midlothian	New 9 MGD WTP	TRWD
Navarro Mills WSC	New wells in Woodbine Aquifer	Woodbine Aquifer
NTMWD	Texoma Pump Station Expansion	Lake Texoma
Palmer	Rockett SUD (TRWD)	TRWD
Pilot Point	New wells in Trinity Aquifer	Trinity Aquifer
Sardis-Lone Elm WSC	Rockett SUD (TRWD)	TRWD
Southmayd	New wells in Woodbine Aquifer ^(c)	Woodbine Aquifer
Terrell	Additional water from NTMWD - New pipeline	NTMWD
TRWD	Integrated Pipeline and Reuse ^(c)	Richland-Chambers Reuse

^(a) Not considering conservation strategies.

^(b) Pump station from Richland-Chambers is completed. New WTP is still a WMS.

^(c) Partially implemented. For the TRWD strategy, the Integrated Pipeline portion is yet to be implemented and there is additional reuse yet to be implemented.

5.1.2.3 Infrastructure/Costs That Shall Not be Included in Regional Water Plans

“If an infrastructure component is not required to increase the treated water supply volume delivered to a WUG either as new supply or through demand reduction, the component and its costs shall not be included in the RWP. Types of items and associated cost that *shall not* be incorporated into a RWP included, but are not limited to: ...New wells that are required simply to replace aging wells (i.e., maintenance).”

It is Region C’s understanding that supplemental wells are not permitted to be included in the 2016 Regional Water Plans, consequently they have not been included and are no longer considered a WMS. However, the planning group believes that the replacement of aging infrastructure, like wells, is an important part of maintaining an adequate water supply. Such projects should be considered consistent with this plan and supported by adequate state funding, where needed.

11.3 Differences Between the Previous and Current Regional Water Plan

The following sections provide a discussion of changes from the 2011 Plan to the 2016 Plan.

11.3.1 Water Demand Projections

As shown in Table 11.3 and Figure 11.1, the water demand projections in the *2016 Region C Water Plan* are lower than the projected demands in the 2011 Plan. The largest change occurred with respect to municipal demand projections. One reason for the decreased demands is increased conservation across the region. The total municipal 2060 gallons per capita per day (gpcd) in the 2011 Plan was 200 as opposed to the total municipal gpcd of 165 in the 2016 Plan. (It should be noted that these gpcd’s reflect demands before any conservation water management strategies have been applied). Much of the conservation that was included as water management strategies in the 2011 Plan has been achieved and is now reflected as a reduction in demand. Another reason for the decreased demands is the fact that the municipal water demand projections presented in this Plan are based on per capita dry-year water use from year 2011 data because TWDB asserted that 2011 represented the most severe drought year in recent history for the majority of the state of Texas, although 2011 was not the most severe recent drought year for much of Region C. For many Region C water user groups, 2006 and 2008 were more representative of dry-year, high-demand conditions than 2011. (In parts of Region C, unlike most of Texas, there were periodic light rains in the summer of 2011 that suppressed the demand for water.) The Region C consultants suggested that the dry-year per capita demands should be based on the highest per capita use in recent years and then reduced over time to reflect savings from low flow water fixtures. TWDB staff did not agree. As a result, it is the opinion of the Region C consultants that the projected dry-year demands

for some Water User Groups in Region C underestimate true dry-year needs. This is one of the main reasons for the large decrease in demands from the 2011 Plan.

There were several changes to the non-municipal demand projections since the 2011 Plan. Nearly all of the non-municipal demand projections (with the exception of the Steam Electric Power demand in 2020) decreased from the 2011 Plan. This is mainly due to the inclusion of more recent historical use data as the basis for the projections. Table 11.4 shows the changes in demand projections from the 2011 Plan by type of use.

Table 11.2
Water Management Strategies No Longer Considered in the 2016 Region C Water Plan
(Not Including Supplemental Wells)

Sponsor	Project Name	Comments
Athens MWA	Forest Grove Reservoir and WTP	Was recommended, no longer a WMS
Azle	3 MDG WTP Expansion (TRWD)	Three WTP expansions were included in the 2011 Plan; Only 1 expansion is included in the 2016 Plan
Bardwell	Ennis (TRWD through TRA)	Was recommended, no longer a WMS
Buena Vista-Bethel SUD	Overdraft from Trinity Aquifer	Was recommended, no longer a WMS
Collin County Mining	Additional water from NTMWD	Was recommended, no longer a WMS
Cooke County Irrigation	Overdraft Trinity Aquifer, Direct Reuse	Was recommended, no longer a WMS
Cooke County Mining	Overdraft Trinity Aquifer (existing wells)	Was recommended, no longer a WMS
Corsicana	Purchase water from TRWD	Was recommended, no longer a WMS. No longer anticipated to need TRWD water prior to 2070.
Corsicana	Raw Water for Second Proposed Power Plant	Was recommended, no longer a WMS.
Crandall	Dallas Water Utilities	Was recommended, no longer a WMS.
Dallas	Wright Patman	Was recommended, now alternative WMS in combination with Marvin Nichols
Dallas	Direct reuse	A portion was implemented; a portion was moved to an alternative WMSs; a portion is no longer being considered
Dallas	Lake Ray Hubbard Operational Efficiency Supply	Was recommended, no longer a WMS. Dallas is still planning to develop this, but since it does not provide additional reliable supply it has not been included in this plan.
Dallas	Additional dry year supply	Was recommended, no longer a WMS
Dallas	George Parkhouse North	Was alternative, no longer a WMS
Dallas	George Parkhouse South	Was alternative, no longer a WMS
Dallas	Oklahoma	Was alternative, no longer a WMS
Dallas	Roberts County GW	Was alternative, no longer a WMS
Dallas	Lake Texoma - Elm Fork	Was alternative, no longer a WMS
Dallas	Lake Texoma - Blend	Was alternative, no longer a WMS
Dallas	Lake O' the Pines	Was alternative, no longer a WMS

Sponsor	Project Name	Comments
Dallas	Lake Livingston	Was alternative, no longer a WMS
Dallas County Irrigation	Additional water from DWU	No longer a recommended WMS
Dawson	New WTP	Was recommended, no longer a WMS
Denton County Irrigation	TRA Direct Reuse	Was recommended, no longer a WMS
Denton County Mining	Additional water from groundwater	Was recommended, no longer a WMS
Denton County Other	Additional water from Fort Worth	Was recommended, no longer a WMS
Denton County other	Additional water from groundwater	Was recommended, no longer a WMS
Denton County Steam Electric Power	Additional Groundwater	Was recommended, no longer a WMS
Everman	Additional water from Fort Worth	Was recommended, no longer a WMS
Fairfield	New well in Carrizo-Wilcox Aquifer	Was recommended, no longer a WMS
Fort Worth	New 25 mgd Southwest Plant	Was recommended, no longer a WMS
Fort Worth	Southwest Plant 25 mgd expansion	Was recommended, no longer a WMS
Gainesville	Overdraft Trinity Aquifer (existing wells)	Was recommended, no longer a WMS
Grayson County Manufacturing	Additional Denison	Was recommended, no longer a WMS
Jack County Irrigation	Jacksboro Indirect Reuse to Mining	Was recommended, no longer a WMS
Jack County Mining	Jacksboro (Lost Creek/Jacksboro system)	Was recommended, no longer a WMS
Kaufman County Irrigation	Additional water from NTMWD	Was recommended, no longer a WMS
Kemp	Additional water from TRWD	Was recommended, now water comes through West Cedar Creek MUD
Kennedale	Additional water from Trinity Aquifer	Was recommended, no longer a WMS
Lakeside	Additional Trinity Aquifer wells	Was recommended, no longer a WMS
Little Elm	Additional Woodbine Aquifer wells	Was recommended, no longer a WMS
Marilee SUD	Additional Water from Grayson County WSP	Was recommended, WMS is now for Marilee to purchase additional water directly from Sherman rather than via the GCWSP
Melissa	Treated water supply from NTMWD	Was recommended, no longer a WMS
Mountain Peak SUD	Overdraft Trinity Aquifer in 2010	Was recommended, no longer a WMS
Navarro County Steam Electric Power	Corsicana	Corsicana will provide water for one power plant in the 2016 Plan. In the 2011 Plan, they were shown to provide water for two power plants.
Prosper	Additional water from UTRWD	Was recommended, no longer a WMS
Reno	Additional water from Springtown	Was recommended, no longer a WMS
Sanger	Additional water from Bolivar WSC	Was recommended, no longer a WMS
Sardis-Lone Elm WSC	Overdraft Trinity Aquifer (existing wells)	Was recommended, no longer a WMS
Tarrant County irrigation	Additional water from Reuse	Was recommended, no longer a WMS
Wortham	Corsicana	Was recommended, no longer a WMS
Wortham	TRWD	Was recommended, no longer a WMS
Wortham	WTP Expansion/Rehabilitation	Was recommended, no longer a WMS
NTMWD	Roberts County GW	Was alternative WMS, no longer a WMS
NTMWD	Renewed Interim GTUA	Was recommended, no longer a WMS
NTMWD	DWU Treated Water	Was alternative WMS, no longer a WMS

Sponsor	Project Name	Comments
NTMWD	Lake Livingston	Was alternative WMS, no longer a WMS
TRA	Additional Freestone County Raw Water (TRWD)	Was recommended, no longer a WMS
TRWD	Wright Patman - Texarkana	Was alternative WMS, no longer a WMS
TRWD	Wright Patman - Raise Pool	Was alternative WMS, no longer a WMS
TRWD	Lake Livingston	Was alternative WMS, no longer a WMS

Table 11.3
Changes in Projected Water Dry Year Demands from 2011 Plan to 2016 Plan for Region C by County

County	Change in Projected Water Dry Year Demand (Acre-Feet per Year)				
	2020	2030	2040	2050	2060
Collin	-62,350	-84,306	-99,327	-107,325	-118,665
Cooke	-1,145	-2,369	-3,327	-3,743	-3,244
Dallas	-173,210	-182,048	-168,205	-181,599	-233,187
Denton	-15,824	-28,440	-36,223	-41,935	-47,547
Ellis	-9,475	-13,691	-15,566	-13,747	-6,461
Fannin	2,221	1,510	938	651	2,043
Freestone	11,881	9,091	5,637	5,966	7,239
Grayson	-11,054	-11,091	-12,799	-13,632	-8,535
Henderson	1,067	-3,663	-4,555	-5,556	-3,637
Jack	592	802	761	772	781
Kaufman	-14,702	-17,434	-20,111	-18,945	-14,398
Navarro	-855	-858	-814	-250	628
Parker	-2,393	-5,208	-6,755	-474	11,097
Rockwall	-15,063	-14,976	-17,795	-16,009	-11,863
Tarrant	-44,669	-56,184	-67,636	-94,482	-143,658
Wise	-20,440	-23,882	-26,377	-26,176	-26,218
Region C Total	-355,419	-432,747	-472,154	-516,484	-595,625

Figure 11.1
Total Change in Projected Water Dry Year Demands from 2011 Plan to 2016 Plan

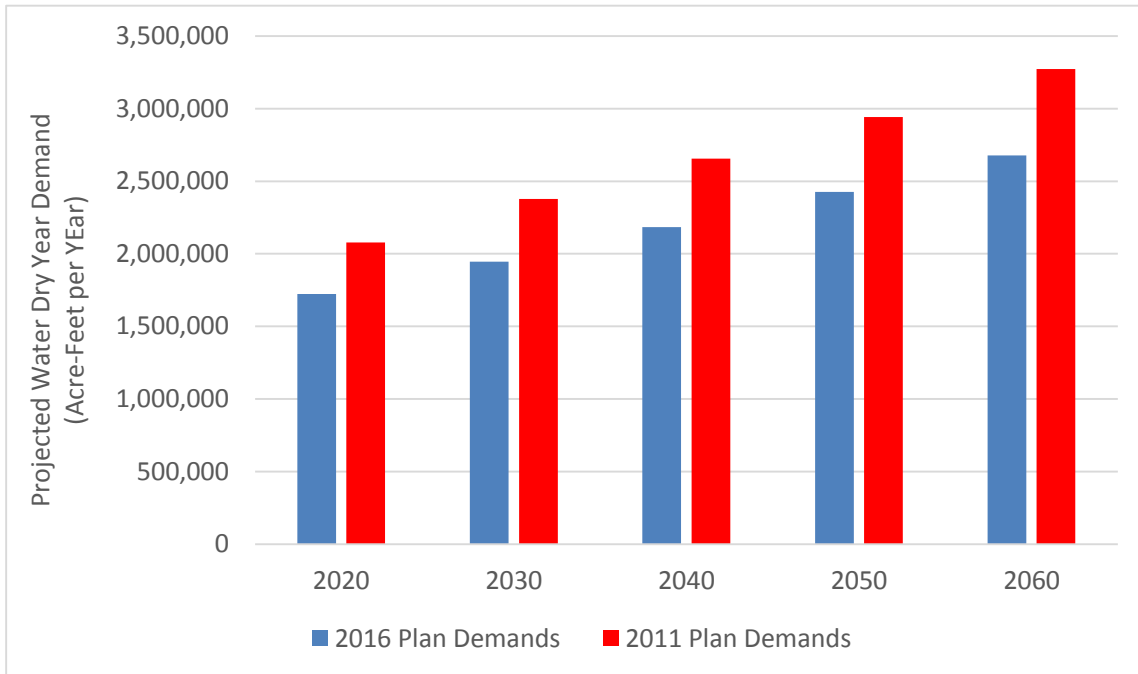


Table 11.4
Change in Projected Water Dry Year Demands from 2011 Plan to 2016 Plan by Type of Use

Use	Change in Projected Water Demand (Acre-Feet per Year)				
	2020	2030	2040	2050	2060
Municipal	-352,141	-412,212	-449,393	-492,363	-571,339
Manufacturing	-1,733	-2,052	-2,332	-2,501	-2,698
Steam Electric Power	6,827	-3,912	-1,361	-2,417	-2,427
Irrigation	-7,799	-7,782	-7,774	-7,781	-7,799
Mining	-103	-6,319	-10,824	-10,952	-10,892
Livestock	-470	-470	-470	-470	-470
Region C Total	-355,419	-432,747	-472,154	-516,484	-595,625

11.3.2 Drought of Record and Hydrologic Modeling Assumptions used in Planning for the Region

The drought of record for most water supplies used in Region C occurred from 1950 through 1957. The recent drought, which began in 2011, has caused low inflows and low water levels for many Region C lakes. Analysis using hydrologic data from recent years has indicated that Jim Chapman (Cooper) Lake in the Sulphur River Basin (outside of Region C) has recently experienced a new drought of record. This more recent hydrologic data was used to calculate a new firm yield of Jim Chapman Lake. For other Region C

supplies, based on the current hydrology in the Texas Commission on Environmental Quality (TCEQ) Water Availability Models (WAMs), the drought of the 1950s remains the drought of record.

Unless there are changed conditions (new water rights, WAM modification, new area/capacity relationships, new drought of record, other), the firm yields from the 2011 Plan were used, extrapolating 2070 yields from 2060 yields. The Region C reservoirs for which new firm yields were calculated include the Elm Fork of the Trinity River System, Forest Grove Reservoir, and Lake Lavon. The Elm Fork System and Lake Lavon yields were updated to reflect new area-capacity relationships based on recent TWDB volumetric surveys. The yield for Forest Grove was updated to reflect that the gates on the dam at the reservoir have not been closed.

The modeling assumptions for run-of-river diversions were changed for the 2016 Plan. The local irrigation availability is based on existing run-of-the-river surface water rights for irrigation not associated with major reservoirs. In previous Region C Water Plans the reliable supply from run-of-the-river diversions was assumed equal to the permitted diversion for water rights located on the main stem of the river and 75 percent of the permitted diversion for water rights located on tributaries. In the 2016 Plan the reliable supply from run-of-the-river diversions was calculated using the WAM as the minimum monthly diversion for the permitted water rights located on the main stem and tributaries of the river. This revision decreased the local irrigation availability in the Red River Basin. Additional information on the hydrologic modeling assumptions can be found in Appendix I.

11.3.3 Groundwater and Surface Water Availability

As shown in Table 11.5, the total available supplies (not considering infrastructure or permit constraints) in the 2016 Plan are lower than the supplies presented in the 2011 Plan. This is largely due to the lower availability from surface water because of the use of safe yields by some of the larger WWPs. However, this is partially offset by greater availability from reuse in later decades due to the development of new reuse projects. Other contributing factors are the decreased yield of Chapman Lake using the new critical period of the reservoir and the decrease to the run-of-river supplies from changes in the calculations of those supplies as discussed in Section 11.3.2. The changes related to reuse are largely due to updates resulting in lower return flow factors used to estimate the reuse amounts which were offset by the implementation of several large reuse projects (TRWD Cedar Creek and Fort Worth Village Creek). The overall groundwater availability in the region is very similar to availability in the 2011 Plan. The changes in availability are chiefly due to changes to the availability from the Nacatoch, Queen City, and Carrizo-

Wilcox and other aquifers. Modeled Available Groundwater (MAG) estimates for these aquifers were not available for the 2011 Plan.

Table 11.5
Change in Total Available Supplies from the 2011 Plan to the 2016 Plan

Source of Supply	2020	2030	2040	2050	2060
Reservoirs	-59,254	-71,560	-83,866	-96,171	-108,475
Imports	5,447	-21,407	-28,291	-35,065	-40,937
Run-of-the-River/Local	-15,241	-15,241	-15,241	-15,241	-15,241
Groundwater	26	38	36	-17	-20
Reuse	37,384	26,978	30,255	58,647	72,799
Total	-31,638	-81,192	-97,107	-87,846	-91,874

11.3.4 Existing Water Supplies of WUGs

Changes to the existing water supplies for WUGs are summarized in Table 11.6 and Table 11.7. Table 11.6 summarizes the current supplies shown in the 2011 Plan that are no longer a supply for the respective WUG. Many of these changes are due to WUGs no longer using groundwater and local supplies. Table 11.7 lists the WUGs with new supplies since the 2016 Plan. Some of these changes are due to new information received from the WUGs since the 2011 Plan. Other changes are from the implementation of new water supplies.

Table 11.6
Existing Supplies in 2011 Plan that Are no Longer a WUG Supply

WUG	Source of Supply in 2011 Plan - No Longer a Supply in 2016 Plan
Ables Springs	SRA
Arlington	Lake Arlington (TRWD). Supply is now dedicated to TRWD by contract and is part of the TRWD System supply to Arlington.
Aubrey	Trinity Aquifer
Balch Springs	Dallas County WCID #6 (DWU)
Collin County Irrigation	Other Aquifer
Collin County Livestock	Other Aquifer
Collin County Mining	Local supplies, NTMWD
Cooke County Irrigation	Other Aquifer
Cooke County Mining	Local Supplies
Cooke County Other	Local Supplies
Dallas County Irrigation	Other Aquifer
Dallas County Manufacturing	Direct Reuse
Dallas County Mining	Woodbine Aquifer, Other Aquifer
Dallas County Steam Electric Power	NTMWD
Denison	Trinity Aquifer

WUG	Source of Supply in 2011 Plan - No Longer a Supply in 2016 Plan
Denton County Mining	Local Supplies
Denton County Other	Fort Worth (TRWD), Other Aquifer
Ellis County Irrigation	Reuse
Ellis County Other	Other Aquifer
Everman	Fort Worth (TRWD)
Freestone County Livestock	Other Aquifer, Queen City Aquifer
Freestone County Other	TRWD
Grayson County Mining	Woodbine Aquifer
Grayson County Other	Other Aquifer
Gun Barrel City	Mabank (TRWD)
Hackberry	Trinity Aquifer
Henderson County Livestock	Other Aquifer
Henderson County Other	Other Aquifer
Jack County Irrigation	Indirect Reuse
Jack County Other	Jacksboro (Lost Creek/Jacksboro system), Trinity Aquifer
Kaufman County Irrigation	Trinity Aquifer, NTMWD
Kaufman County Livestock	Woodbine Aquifer
Keller	Trinity Aquifer
Kemp	TRWD
Little Elm	Woodbine Aquifer
Marilee SUD	Grayson County WSP
Navarro County Livestock	Other Aquifer
Navarro County Other	Woodbine Aquifer
North Richland Hills	Trinity Aquifer
Reno	Springtown (TRWD)
Rockwall County Irrigation	Direct Reuse
Rockwall County Livestock	Other Aquifer
Rockwall County Mining	Local Supplies
Rockwall County Other	Other Aquifer
Sanger	Bolivar WSC
Southmayd	Trinity Aquifer
Van Alstyne	Trinity Aquifer
Venus	Trinity Aquifer (Region G)
Wise County Manufacturing	Other Aquifer
Wortham	Bistone Municipal WSD (Carrizo-Wilcox, Limestone County, Region G)

**Table 11.7
New Existing Supplies Since the 2011 Region C Water Plan**

WUG	New Existing Supply Since 2011 Plan
Ables Springs	NTMWD
Aledo	Fort Worth (TRWD)
Alvord	West Wise SUD (TRWD)
Arlington	Fort Worth (Reuse)
Aurora	Rhome (Walnut Creek SUD and TRWD)
Balch Springs	DWU - No longer through Dallas County WCID #6
Bardwell	Rockett SUD
Bryson	Other Aquifer
Collin County Irrigation	Woodbine Aquifer
Cooke County Irrigation	Woodbine Aquifer, Moss Lake (Gainesville)
Cooke County Livestock	Woodbine Aquifer
Dallas	Indirect Reuse Supplies
Dallas County Irrigation	Trinity Aquifer, Woodbine Aquifer
Dallas County Manufacturing	Grand Prairie
Dallas County Other	TRWD Sources for DFW Airport, Fort Worth Reuse Sources for DFW Airport
Denton County Irrigation	Trinity Aquifer
Denton County Manufacturing	Northlake (TRWD Sources)
Denton County Other	Little Elm (NTMWD)
Denton County Steam Electric Power	Denton (Lake Lewisville)
Ellis County Irrigation	Woodbine Aquifer
Ellis County Other	Rockett SUD (Midlothian), Rockett SUD (TRWD), Waxahachie (Lake Bardwell), Waxahachie (Reuse), Ennis (TRWD)
Ennis	Rockett SUD (Midlothian Sources), Rockett SUD (TRWD Sources)
Euless	Fort Worth Direct Reuse
Fannin County Irrigation	Woodbine Aquifer
Fannin County Livestock	Other Aquifer
Ferris	Rockett SUD (Midlothian)
Freestone County Manufacturing	Carrizo-Wilcox Aquifer (Teague & Fairfield)
Freestone County Other	Corsicana
Glenn Heights	Woodbine Aquifer
Grand Prairie	TRWD (Mansfield, Midlothian)
Grayson County Irrigation	Trinity Aquifer
Grayson County Livestock	Trinity Aquifer
Grayson County Mining	Red River Authority (Lake Texoma)

WUG	New Existing Supply Since 2011 Plan
Henderson County Manufacturing	Athens Groundwater, Carrizo-Wilcox Aquifer (through Malakoff)
Jack County Manufacturing	Bryson
Kaufman County Manufacturing	Trinity Aquifer
Kaufman County Mining	Trinity Aquifer
Kaufman County Other	Woodbine Aquifer, DWU (through Combine WSC through Seagoville)
Kaufman County Steam Electric Power	NTMWD Treated Water (through Forney)
Kemp	West Cedar Creek MUD (TRWD)
Marilee SUD	Sherman
Mustang SUD	Woodbine Aquifer
Navarro County Mining	Trinity Aquifer
Navarro County Other	Trinity Aquifer
Navarro Mills WSC	Woodbine Aquifer
Oak Point	Trinity Aquifer
Palmer	Rockett SUD (TRWD & Midlothian)
Parker County Irrigation	Weatherford
Parker County Manufacturing	Walnut Creek SUD (TRWD)
Parker County Other	Local Supplies, Walnut Creek (TRWD)
Payne Springs	East Cedar Creek FWSD (TRWD)
Prosper	Trinity Aquifer, Woodbine Aquifer, UTRWD
Sanger	UTRWD
Sardis-Lone Elm WSC	Woodbine Aquifer, Rockett SUD
Southmayd	Woodbine Aquifer
Tarrant County Irrigation	Woodbine Aquifer
Tarrant County Manufacturing	Trinity Aquifer
Tarrant County Other	Fort Worth Reuse, DWU
Wise County Manufacturing	Trinity Aquifer
Wortham	Mexia

11.3.5 Identified Water Needs for WUGs and WWP

The 2060 water needs for WUGs and WWP in the 2011 Plan were 784,758 and 2,333,436 acre-feet per year, respectively. The WUG needs do not include the needs for entities like Dallas, Fort Worth, Corsicana, etc. that are both a WUG and a WWP. The needs for these entities are included with the WWP needs. The total 2060 need from the 2011 Plan was 1,588,236 acre-feet per year. This total need is different from the numbers presented above because the WWP needs can double or triple count the WUG needs

in many cases. For example, if the water is sold through multiple WWPs before it gets to the end user, the water is counted each time it passes through an entity.

The total 2060 need in the 2016 Plan is over 1.09 million acre-feet per year. This need is less than the need shown in the 2011 Plan because of the decreased demands in the 2016 Plan and the implementation of additional sources since the 2011 Plan.

11.3.6 Recommended and Alternative Water Management Strategies

In addition to the implemented and no longer considered WMSs discussed in Section 11.2, there have been numerous changes to the recommended and alternate water management strategies presented in the 2011 Plan. These changes are summarized in Table 11.7. Table 11.7 does not include the 21 new WUGs added since the 2011 Plan. In addition, the table does not include the ten WUGs that are no longer considered WUGs. These WUGs are listed in Table 11.8. Any strategies associated with these new and removed WUGs are considered changes since the 2011 Plan. It is important to note that the changes to the WMSs listed in Table 11.7 are only changes to the base WMS. For example, if a WUG had a strategy in the 2011 Plan to purchase additional water from DWU and if in the 2016 Plan new infrastructure is required to purchase that water, that is not considered a change to the WMS because there was no change to the source of supply. Because conservation strategies were included for a large number of WUGs, changes to conservation strategies are discussed below and are not listed by WUG in Table 11.7.

The currently recommended Water Conservation Package for municipal WUGs (described in Section 5E.7.2) is generally consistent with the Basic Water Conservation Package recommended in the 2011 Plan, with the following changes:

- The 2011 “new efficient clothes washer standards” strategy from the 2011 Plan is now included in the water demand projections.
- The 2011 “water use reduction due to increasing prices” and “water conservation pricing structure” strategies have been combined to form the 2016 “price elasticity/rate structure impacts” strategy.
- Main replacement and automatic metering infrastructure have been added to the 2011 “water system audit, leak detection and repair, and pressure control” strategy to form the 2016 “enhanced water loss control program” strategy.

Some of the municipal water conservation strategies recommended in the Expanded Water Conservation Package in the 2011 Plan have limited applicability. Therefore, instead of renewing the recommendation an Expanded Water Conservation Package, the RCWPG recommends that WUGs be able to substitute any other appropriate, service-area specific water conservation strategies for those specifically listed in the Water Conservation Package. This recommendation is presented in greater detail in Section 5E.7.6. For

non-municipal WUGs, the RCWPG has renewed the 2011 recommendation for manufacturing and irrigation rebate programs.

In addition to the information summarized in Table 11.7, detailed information regarding significant changes to WMSs for the Regional WWP is provided below. The information below is intended to highlight the changes to several of the Regional WWP WMSs since the 2011 Plan, not to provide detailed information on the WMS itself. That information can be found in Sections 5B and 5C of this report.

Tehuacana. The Tehuacana Reservoir is a recommended strategy for the Tarrant Regional Water District (TRWD). Tehuacana Reservoir was an alternative strategy in the 2011 Region C Plan. Tehuacana Reservoir is a proposed reservoir on Tehuacana Creek in Freestone County, immediately south and adjacent to Richland-Chambers Reservoir.

Marvin Nichols Reservoir and Wright Patman Lake in the Sulphur River Basin. In the previous three Region C water plans, Marvin Nichols Reservoir was a recommended strategy. The reallocation of flood storage at Wright Patman Lake has been an alternative strategy in previous plans. In this plan, those projects continue to be strategies, but are now being considered as a combined recommended strategy (referred to as the Sulphur Basin Supplies strategy) and the elevations being considered are different than those previously considered. For the purpose of the 2016 Region C Water Plan, the Sulphur Basin Supplies Strategy assumes the reallocation of Wright Patman to 232.5 msl and new storage at Marvin Nichols site for a conservation pool elevation of 313.5 msl. In addition, the original configuration of Marvin Nichols Reservoir (at conservation pool elevation 328.0 msl) is also being retained as an alternative water management strategy for this 2016 Region C Water Plan. Detailed quantitative information on both the recommended Sulphur Basin Supplies strategy and the alternative Marvin Nichols (elevation 328.0) strategy is contained in Appendix P and Appendix Y.

In TWDB's January 8, 2015 Order ⁽³⁾ resolving the interregional conflict between the 2011 Region C and D Plans related to the Marvin Nichols Reservoir, TWDB encouraged both Region C and D to continue to participate in the ongoing Sulphur River Basin Studies. Region C entities have been and plan to continue participating in these ongoing studies. The Region C entities that are interested in development of Marvin Nichols Reservoir and other Sulphur Basin Supplies (NTMWD, TRWD, Dallas, UTRWD, and Irving) have formed a Joint Committee on Program Development (JCPD). Since 2001, the JCPD has provided more than \$5 million to the Sulphur River Basin Authority (SRBA) to further investigate the development of Marvin Nichols Reservoir and other potential water supply sources in the Sulphur River Basin. Ongoing Sulphur Basin Feasibility studies are being conducted by the U.S. Army Corps of Engineers, SRBA and the JCPD. At

the direction of SRBA and the JCPD, these ongoing studies are seeking to address concerns from Region D entities regarding the protection of natural resources, environmental impacts, and the socio-economic impacts of developing water supply within Region D and the Sulphur Basin. As a result, these ongoing studies have identified additional options for water supply in the Sulphur Basin that may address concerns from Region D and would also develop supply needed for Region C and Region D entities.

As identified in the 2014 Sulphur River Basin studies ⁽⁴⁾, this 2016 Region C Plan recommends a Marvin Nichols Reservoir that would be part of a combined strategy with the reallocation of flood storage to conservation storage in Wright Patman Lake. (This combination is referred to in this plan as the Sulphur Basin Supplies strategy). It should be recognized that the footprint of Marvin Nichols Reservoir being considered as part of this combination strategy is a smaller footprint than has previously been considered. The proposed combined Marvin Nichols and Wright Patman strategy would yield around 600,000 acre-feet per year (calculated using TCEQ WAM models, assuming Lake Ralph Hall is senior, and accounting for environmental flows). The Sulphur Basin Supplies strategy is a recommended water management strategy for NTMWD, UTRWD, and TRWD. It is also an alternative strategy for Dallas and the City of Irving. Approximately 80 percent of the water supplied from the Sulphur Basin Supplies strategy is expected to serve customers of wholesale water providers in Region C and approximately 20 percent would serve water needs in Region D.

Region C recognizes that there are inherent risks and impacts associated with the reallocation of flood storage at Wright Patman Lake. Reallocation of storage at Wright Patman Lake at the scale envisioned for the Sulphur Basin Supplies strategy will require recommendation by the Corps of Engineers/Department of the Army and approval by the United States Congress. Prior to making a recommendation, the Corps will need to conduct a detailed evaluation of impacts associated with raising the conservation pool elevation. Potentially significant impacts could include inundation of natural resources within the flood pool, loss of flood protection downstream, increased impacts to cultural resources on the reservoir perimeter, effects on the Congressionally-established White Oak Creek Mitigation Area in the upper reaches of the Wright Patman flood pool, and reduced flexibility in International Paper's effluent management operations downstream of the dam. Wright Patman reallocation may also be constrained by Dam Safety considerations. As more detailed studies seek to develop an understanding of the tradeoffs between the environmental impacts at Wright Patman in comparison with the predicted impacts of new storage at the Marvin Nichols site, the risk exists that the Wright Patman reallocation alternative may be constrained by either policy or environmental issues, or both. Recognizing these risks and impacts of the reallocation of Wright Patman, Region C is retaining the original configuration of Marvin Nichols Reservoir

(as detailed in the *2011 Region C Water Plan*) as an alternative water management strategy for the 2016 Region C Water Plan. It is an alternative strategy for NTMWD, UTRWD, TRWD, and Irving.

Main Stem Trinity River Pump Station. This was a recommended strategy for Dallas Water Utilities (DWU) and North Texas Municipal Water District (NTMWD) in the 2011 Plan. It is recommended for both of these WWPs in the 2016 Plan, but the configuration of the strategy has changed. In the previous plan, the pump station was to be constructed by Dallas and utilized by both Dallas and NTMWD. Since the publication of that plan, NTMWD has started the design on the pump station and will construct the facility. There are still plans for both entities to make use of the facility.

Lake Columbia. Lake Columbia is a recommended strategy for DWU. This was an alternative strategy in the 2011 Region C Plan. Lake Columbia is a proposed reservoir project of the Angelina and Neches River Authority (ANRA). The reservoir would be connected to Dallas' water supply system via a pipeline from Lake Columbia to the proposed Integrated Pipeline pump station at Lake Palestine ⁽⁴⁾.

Neches Run-of-River. This was an alternative strategy in the 2011 Plan for DWU. Through an errata, it later became a recommended strategy in place of the Fastrill Replacement strategy. In the 2016 Plan, this is a recommended strategy for DWU. The strategy includes a new river intake and pump station for a run-of-river diversion from the Neches River. Water will be delivered to Dallas' pump station at Lake Palestine for delivery to Dallas through the Integrated Pipeline ⁽⁵⁾.

Removal of Silt Barrier at Lake Chapman Intake Pump Station. This is a new recommended strategy for North Texas Municipal Water District (NTMWD), Upper Trinity Regional Water District (UTRWD), and Irving. NTMWD is in the construction phase of a project that would remove a silt barrier in Chapman Lake. This silt barrier currently limits the amount of water reaching the intake structure at the lake. This project will allow for use of the full yield from Chapman Lake.

Dredge Lake Lavon. This is a new recommended strategy for NTMWD. NTMWD is in the design phase of a project that will remove sediment in Lake Lavon. This dredging project would allow NTMWD to divert water down to elevation 467 msl.

11.3.7 Total Cost of Recommended Strategies

Most of the new supplies for Region C will be developed by the major wholesale water providers in the region. The total cost of implementing all of the water management strategies in the 2016 Region C Plan is \$23.5 billion. The total cost from the 2011 Region C Plan was \$21 billion. The main changes related to

the increase in the cost to develop all of the WMSs are due to changes to several of the large WMSs and inflation.

11.4 Conclusion

Since the 2011 Region C Water Plan there have been 30 WMSs implemented, over 200 WMSs no longer being considered by WUGs/WWPs (including 184 WMSs related to supplemental wells), and over 140 WMSs that are still included in the 2016 Plan, but are different from the way in which they were included in the 2011 Plan. The total 2060 demand for the region has decreased since the 2011 Plan from 3,272,461 acre-feet per year to 2,676,836 acre-feet per year. Since the 2011 Plan, the total available supplies have decreased by nearly 91,900 acre-feet per year. This is largely due to the lower availability from surface water due to the use of safe yields by some of the larger WWPs. However this is partially offset by greater availability from reuse due to the development of new reuse projects. The total need decreased by nearly 500,000 acre-feet per year in 2060 since the 2011 Plan.

**Table 11.8
Changes to Water Management Strategies Since the 2011 Region C Water Plan**

Sponsor	Project Name	Water Management Strategy Name	Change from 2011 Plan
Aledo	Additional water from Fort Worth (TRWD)	Additional water from Fort Worth (TRWD)	2011 Plan was for initial infrastructure to Fort Worth; 2016 Plan is for additional infrastructure
Alvord	Additional water from West Wise SUD		New recommended WMS; previous WMS was to connect to West Wise SUD
Anna	Grayson County Water Supply Project	Sherman WTP	New alternative WMS
Arlington	Additional water from TRWD	Raw Water Pump Station Improvements	New recommended WMS
Arlington	Additional water from TRWD	Raw water line extension at Pierce Burch WTP	New recommended WMS
Arlington	Additional water from TRWD	John F. Kubala WTP Expansion & Improvements	Now includes raw water supply line as well as expansion
Athens	New Wells		New recommended WMS
Aurora	Additional water from Rhome		New recommended WMS; previous WMS was to connect to Rhome
Balch Springs	Additional Dallas		New recommended WMS; previously was through DCWCID #6
Bardwell	Additional Rockett SUD		New recommended WMS
Benbrook	Plant Expansion	4.25 MGD WT Plant Expansion	2011 Plan had three 3 MGD expansions; 2016 plan has one 4.25 MGD plant expansion and a contract increase with TRWD
Blue Mound	Monarch Utilities	Purchase existing water system from Monarch Utilities	New recommended WMS
Blue Ridge	Upsize Connection and water from NTMWD		New recommended WMS
Bolivar WSC	Gainesville	Initial Connection and water from Gainesville	Part of the Cooke County WSP (now referred to as Gainesville) that was a recommended WMS in the 2011 Plan
Collin County Manufacturing	New Well in Woodbine Aquifer		New recommended WMS
Collin County Mining	Additional Water from NTMWD		No longer a recommended WMS
Cooke County Irrigation	Additional Gainesville		Part of the Cooke County WSP (now referred to as Gainesville) that was partially implemented since the 2011 Plan
Cooke County Manufacturing	Additional Gainesville		Part of the Cooke County WSP (now referred to as Gainesville) that was partially implemented since the 2011 Plan
Cooke County Mining	Connect to Gainesville		Part of the Cooke County WSP (now referred to as Gainesville)
Cooke County Other	Connect to Gainesville		New recommended WMS, Part of the Cooke County WSP (now referred to as Gainesville)
Cooke County Other	Connect to Gainesville System		Part of the Cooke County WSP (now referred to as Gainesville) that was a recommended WMS in the 2011 Plan
Corinth	New wells in Trinity Aquifer		New recommended WMS
Cresson	New well in Trinity Aquifer (Parker Co)		New recommended WMS
Dallas	Main Stem Pump Station		Now includes a balancing reservoir
Dallas	Direct reuse		Remaining amount to be implemented is now an alternative WMS
Dallas	Lake Columbia		Was an alternative WMS, now a recommended WMS
Dallas	Wright Patman		Was recommended, now alt WMS in combination with Marvin Nichols (referred to as the Sulphur Basin Strategy)
Dallas County Manufacturing	Additional water from Grand Prairie		New recommended WMS
Dallas County Other	Additional Water for DFW Airport	Additional water from DWU and Ft Worth/TRWD	New recommended WMS
Dallas County Other	Additional Water from DWU		New recommended WMS
Dallas County Steam Electric Power	Additional water from NTMWD		No longer a recommended WMS
Denison	WTP Expansion & more Texoma		Changes to the number and size of WTP expansions from the 2011 Plan
Denton	Water treatment plant expansions	Water treatment plant - expansion	Changes to the number and size of WTP expansions from the 2011 Plan

Sponsor	Project Name	Water Management Strategy Name	Change from 2011 Plan
Denton County Irrigation	Water Conservation		New recommended WMS
Denton County Manufacturing	Additional water from Northlake		New recommended WMS
Denton County Other	Additional water from Little Elm		New recommended WMS
East Cedar Creek FWSD	WTP expansion and TRWD		Changes to the number of WTP expansions from the 2011 Plan
Eustace	New well in Carrizo-Wilcox Aquifer		New recommended WMS
Fannin County Steam Electric Power	Additional water from Lake Texoma (GTUA)		New recommended WMS
Files Valley WSC	Ellis County WSP		Water is no longer through Buena-Vista Bethel WSC
Fort Worth	Eagle Mountain WTP Expansion		WMSs was changed from 70 mgd expansion to 30 mgd expansion
Freestone County Irrigation	Water Conservation		New recommended WMS
Fort Worth	Advanced Meter Infrastructure System	Conservation	New recommended WMS
Fort Worth	Water Conservation and Condition Assessment Program	Conservation	New recommended WMS
Freestone County Other	Additional water from Corsicana		New recommended WMS
Freestone County Other	Water from TRWD	New delivery and treatment facilities	New recommended WMS
Frost	Additional water from Corsicana		New recommended WMS
Gainesville	Additional raw water from Lake Moss	WTP Expansion and infrastructure	Changes to the number and size of WTP expansions from the 2011 Plan
Gastonia-Scurry SUD	Connect to Seagoville (DWU)		New recommended WMS
Grapevine	Purchase unused Lake Grapevine yield from DCPCMUD		New alternative WMS
Grapevine	Additional water from DWU		New recommended WMS
Grayson County Irrigation	Water Conservation		New recommended WMS
Grayson County Manufacturing	Direct reuse from Sherman		New alternative WMS
Grayson County Mining	New well in Trinity Aquifer (Red Basin)		New recommended WMS
Grayson County Steam Electric Power	Direct reuse from Sherman		New alternative WMS
Gunter	New well		New recommended WMS
Henderson County Mining	Additional water from TRWD		New recommended WMS
Henderson County Other	Additional water from TRWD		New recommended WMS
Howe	Grayson County Water Supply Project	Sherman WTP	New alternative WMS
Irving	Direct reuse		Project configuration has changed since 2011 Plan
Irving	Oklahoma water		Was recommended, now an alternative WMS
Irving	Marvin Nichols		Have added an alternative WMS of combined Marvin Nichols with Wright Patman reallocation of flood storage (referred to as Sulphur Basin Supplies)
Jack County Irrigation	Water Conservation		New recommended WMS
Jack County Mining	TRWD		New recommended WMS
Jack County Other	Walnut Creek SUD		New recommended WMS
Jack County Other	Connect to Jacksboro (Lost Creek/Jacksboro system)		New recommended WMS
Jack County Steam Electric Power	Additional TRWD		New recommended WMS
Jacksboro	Jacksboro indirect Reuse to mining		New recommended WMS
Justin	New Well		New recommended WMS
Kaufman County Irrigation	Additional water from TRWD		New recommended WMS
Kaufman County Mining	Trinity Aquifer new wells		New recommended WMS
Kaufman County Mining	Connect to and purchase water from NTMWD		New recommended WMS
Kaufman County Other	Additional water from DWU		New recommended WMS
Kaufman County Other	Water from TRWD	New delivery and treatment facilities	New recommended WMS
Kemp	Additional water from WCCMUD		New recommended WMS
Kennedale	Water from Arlington (TRWD)	Initial connection	New recommended WMS
Krum	Additional groundwater	new well	New recommended WMS

Sponsor	Project Name	Water Management Strategy Name	Change from 2011 Plan
Ladonia	Connect to UTRWD (Ralph Hall)	Connect to UTRWD and construct WTP	WTP portion is a new recommended WMS
Lake Cities MUA	Infrastructure to deliver to customers		New recommended WMS
Lake Kiowa SUD	Connect to Gainesville System		Part of the Cooke County WSP (now referred to as Gainesville). Formerly Kiowa Homeowners WSC
Leonard	Fannin County WSP (NTMWD)	Water system improvements	New recommended WMS
Lewisville	Additional DWU	WTP expansions	Changes to WTP expansions since 2011 Plan
Lindsay	Connect to Gainesville System		Part of the Cooke County WSP (now referred to as Gainesville)
Malakoff	Additional water from TRWD		New recommended WMS
Marilee SUD	Additional water from Sherman		2011 Plan showed purchase from the Grayson County Water Supply Project. Marilee purchases directly from Sherman
Melissa	Additional water from NTMWD (thru McKinney)		New recommended WMS
Midlothian	Additional TRWD supply	WTP expansions	Changes to the size of the WTP expansions
Muenster	Connect to Gainesville		New alternative WMS
Navarro County Irrigation	Water Conservation		New recommended WMS
Navarro County Steam Electric Power	Purchase water from TRWD		New recommended WMS
NTMWD	Removal of Chapman Silt Barrier		New recommended WMS
NTMWD	Dredge Lavon		New recommended WMS
NTMWD	Additional Measures to Access Full Lavon Yield		New recommended WMS
NTMWD	Freestone/Anderson County Groundwater (Forestar)		New recommended WMS
NTMWD	Marvin Nichols		Recommended WMS from 2011 Plan has changed from Stand-alone Marvin Nichols to a recommended WMS of Marvin Nichols combined with Wright Patman reallocation of flood storage (referred to as Sulphur Basin Supplies); Stand-alone Marvin Nichols was recommended WMS in 2011 Plan, now an alternative
Palmer	Additional water from Rockett SUD		New recommended WMS; previous WMS was to connect to Rockett SUD
Parker County Manufacturing	Additional water from Walnut Creek SUD/TRWD		New recommended WMS
Parker County Manufacturing	New wells in Trinity Aquifer		New recommended WMS
Parker County Other	Additional water from TRWD		New recommended WMS
Parker County Other	Additional water from Walnut Creek		New recommended WMS
Parker County Other	New WTP and water from BRA (Region G)		The entity this WMS is associated is now considered a WUG and this WMS is now associated with that WUG (Parker County SUD)
Pecan Hill	Additional Rockett SUD		New recommended WMS
Pottsboro	Additional Denison		Up to existing constraint limit
Rockett SUD	WTP expansions		Changes to the number and size of WTP expansions from the 2011 Plan
Rockett SUD	Additional Midlothian		New recommended WMS
Rockwall County Irrigation	Additional water from NTMWD		New recommended WMS
Sanger	Additional water from UTRWD		In 2011 Plan water was shown coming from Bolivar WSC rather than UTRWD
Sansom Park	Additional Fort Worth		New recommended WMS
Sardis-Lone Elm WSC	Connect to Midlothian		New recommended WMS
Sardis-Lone Elm WSC	Additional Rockett SUD		New recommended WMS; previous WMS was to connect to Rockett SUD
South Grayson WSC	Grayson County Water Supply Project		In 2011 Plan was from the Northwest WTP, now from the Sherman WTP
Southmayd	Grayson County Water Supply Project		In 2011 Plan was from the North WTP, now from the Sherman WTP
Southwest Fannin County SUD	New well in Woodbine Aquifer and transmission facilities		New recommended WMS
Tarrant County Mining	Additional water from TRWD		New recommended WMS
Tarrant County Other	Additional water from DWU		New recommended WMS
Tarrant County Other	Purchase water from Eules (for DFW Airport)		New alternative WMS
Tioga	Grayson County Water Supply Project	Northwest WTP	New alternative WMS
Trenton	New well in Woodbine Aquifer		New recommended WMS

Sponsor	Project Name	Water Management Strategy Name	Change from 2011 Plan
TRWD	Western Oklahoma		Now an alternative WMS, was recommended in 2011 Plan
TRWD	Toledo Bend		Now an alternative WMS, was recommended in 2011 Plan
TRWD	Tehuacana		Was an alternative WMS, now a recommended WMS
TRWD	Wright Patman		Was an alternative WMS, now a recommended WMS referred to as Sulphur Basin Supplies
TRWD	Marvin Nichols		Recommended WMS from 2011 Plan has changed from Stand-alone Marvin Nichols to a recommended WMS of Marvin Nichols combined with Wright Patman reallocation of flood storage (referred to as Sulphur Basin Supplies); Stand-alone Marvin Nichols was recommended WMS in 2011 Plan, now an alternative
TRWD	Interim Purchase from DWU		New recommended WMS
UTRWD	Oklahoma water		Moved from recommended to alternative WMS
UTRWD	Contract Negotiation with Commerce for Chapman		New recommended WMS
UTRWD	Contract Negotiation with Commerce for Chapman Reuse		New recommended WMS
UTRWD	Marvin Nichols		Recommended WMS from 2011 Plan has changed from Stand-alone Marvin Nichols to a recommended WMS of Marvin Nichols combined with Wright Patman reallocation of flood storage (referred to as Sulphur Basin Supplies); Stand-alone Marvin Nichols was recommended WMS in 2011 Plan, now an alternative
Valley View	Connect to Gainesville System		Part of the Cooke County WSP (now referred to as Gainesville)
Van Alstyne	Water system improvements		New recommended WMS
Venus	Additional water from Midlothian		New recommended WMS
Walnut Creek SUD	Additional TRWD water	New WTP	Changed from 2 MGD to 4.2 MGD capacity
Walnut Creek SUD	Additional TRWD water	WTP expansions	Changes to the size and number of expansions
Waxahachie	Additional TRA/TRWD water	WTP expansions	Changes to the number, sizes, and location of planned expansions
Weatherford	Indirect Reuse		New recommended WMS
West Cedar Creek MUD	Additional water from TRWD	WTP expansions	Changes to the size of the WTP expansions
Weston	New wells in Woodbine Aquifer		New recommended WMS
Whitesboro	Grayson County Water Supply Project	Sherman WTP	New alternative WMS
Willow Park	Fort Worth (TRWD)		Changed from recommended to alternative WMS
Wise County Irrigation	Additional water from TRWD	New contract	New recommended WMS
Wise County Manufacturing	New wells in Trinity Aquifer		New recommended WMS
Wise County Other	Additional water from TRWD		New recommended WMS
Woodbine WSC	Connect to Gainesville System		Part of the Cooke County WSP (now referred to as Gainesville)
Wortham	Additional supply from Mexia (Region G)		New recommended WMS

**Table 11.9
New and Removed WUGs Since the 2011 Plan**

New WUGs	Removed WUGs
Annetta North	Bartonville WSC
Copeville SUD	Combine WSC
Corbet WSC	Community Water Company
Denton Co FWSD #10	Danville WSC
Denton Co FWSD #7	Hebron
Garrett	Lincoln Park
Kentucky Town WSC	Milligan WSC
Lakewood Village	Paradise
Lavon	R-C-H WSC
Mountain Spring WSC	Sanctuary
Oakwood	
Paloma Creek	
Parker Co SUD	
Providence Village WCID	
Rose Hill SUD	
Seis Lagos	
Talty WSC	
Westlake	
Wylie Northeast SUD	

CHAPTER 11

LIST OF REFERENCES

- (1) Freese and Nichols, Inc., Alan Plummer Associates, Inc., CP&Y, Inc., and Cooksey Communications, Inc.: 2011 Region C Water Plan, prepared for the Region C Water Planning Group, Fort Worth, October 2010.
- (2) Texas Water Development Board, *Exhibit C First Amended General Guidelines for Regional Water Plan Development* (October 2012), Austin, [Online] Available URL: http://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2016/doc/current_docs/contract_docs/2012_exhC_1st_amended_gen_guidelines.pdf, January 28, 2013.
- (3) Texas Water Development Board, *An Order Concerning the Interregional Conflict between the 2011 North Central Texas Regional Planning Area Regional Water Plan and the 2011 North East Texas Regional Planning Area Regional Water Plan in Accordance with Texas Water Code Section 16.053*, January 8, 2015.
- (4) HDR Engineering, Inc. *Draft 2014 Dallas Long Range Water Supply Plan to 2070 and Beyond*, October 2014.